



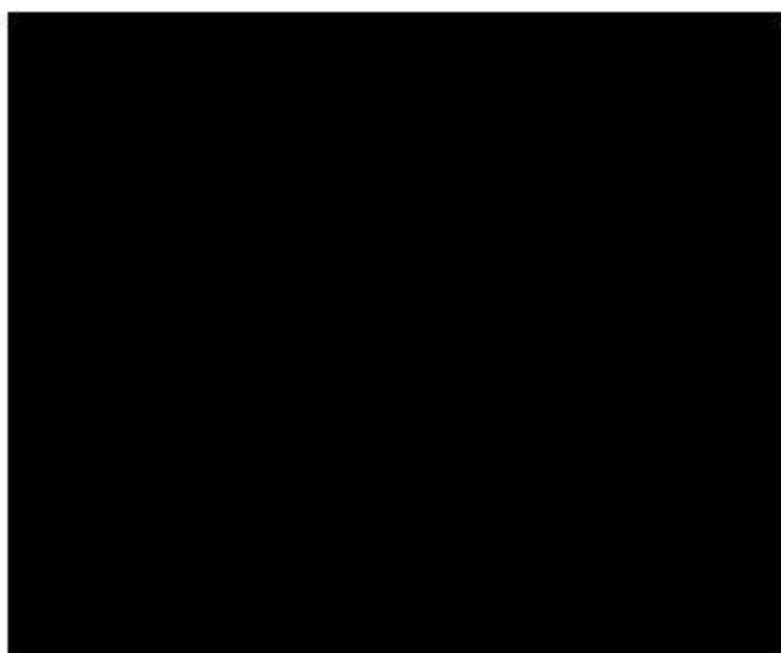
Venta Acoustics

Report VA2551.190123.NIA

Stoke Farm, Hayling Island

Review of Noise Assessment

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VA2551/SP1	Indicative Site Layout
VA2551/TH1 - TH5	Environmental Noise Time Histories
Appendix A	Acoustic Terminology

1. Introduction

A retrospective planning application has been made to regularise the firewood processing activities carried out at Stoke Farm, Northwood Lane, Hayling Island (planning ref: APP/18/01228).

The application is supported by a Noise Impact Assessment Report prepared by Acoustic Associates Sussex Ltd (AAS), their ref: J2581.

Venta Acoustics has been appointed [REDACTED] to undertake an independent survey of background noise levels in the locality and a review of the AAS report to ensure that the potential impact on his amenity has been fully considered.

An unattended noise survey has been undertaken at the property immediately adjacent to Stoke Farm. The measured levels are compared against those used in the AAS report. The calculated impact is reviewed against this data with the sensitivity of the assumptions included in that report tested.

2. Environmental Noise Survey

2.1 Survey Procedure & Equipment

In order to confirm the existing background noise levels at the neighbouring property, a noise survey was carried out between Friday 18th and Tuesday 22nd January 2018 at approximately 1.6m above ground level in the garden in front of the dwelling at [REDACTED] Northwood Lane (indicated in attached figure 2551/SP1). This location was chosen to be representative of the background noise levels in the external amenity space of the property and at the door into the most affected room of the house.

Continuous 5-minute¹ samples of the L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels were undertaken at the measurement location.

The weather during the survey period was generally dry with light winds. On Friday 18th January windy and wet conditions were reported. The background noise data is not considered to have been compromised by these conditions.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

¹ The BS4142 methodology recommends measurements are normally of not less than 15minute intervals. To provide a higher temporal resolution, a 5 minute integration period has been used. This allows periods between activity to be better captured.

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-12202-E0	UCRT19/1017	4/1/19
Larson Davis calibrator	CAL200	13069	UCRT18/1451	26/4/18

Table 2.1 – Equipment used for the tests

The calibration of the sound level meter was verified before and after use with no significant calibration drift observed.

2.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA2551/TH1-5.

The site is primarily affected by activities from Stoke Farm and bird song. The background noise levels, in the absence of farm activity, was deemed to be determined by traffic on the A3023 (Havant Road).

The average noise levels for the proposed operational periods, as measured at the automated monitoring position were:

Monitoring Period	Minimum L_{A90}	Modal L_{A90}	Average L_{A90}
Weekdays 09:00 – 17:00 hours	33 dB	40 dB	42 dB
Saturday 09:00-13:00 hours	39 dB	41 dB	41 dB

Table 2.2 – Typical ambient noise levels at measurement locations

[dB ref. 20µPa]

Venta Acoustics' normal practice is to err towards a robust assessment by using a 'typical' L_{90} calculated as the 10th percentile of all measured L_{A90} values over the relevant period (the level that the background falls below only 10% of the time). This value would be L_{A90} 38dB for the survey.

2.3 Discussion

The AAS survey and assessment determined a background noise level of L_{A90} 46dB based on the modal value over the relevant reference periods. Where there is possible sustained activity associated with the use being assessed, there is a risk that the modal values miss the 'dips' in noise levels between those activities. However, it is noted that periods when firewood processing was undertaken had been excluded from the AAS background analysis.

Although the use of tractors etc is permitted under the current agricultural use, these sounds are related to the firewood processing activities and, rather than masking the noise from the processing, may be perceived as intensification of the firewood processing. Additionally, the application makes the point that the firewood processing and farming activities are unlikely to occur concurrently. Therefore, the local background noise level in the absence of farming activities immediately adjacent to the receptors should be considered in the assessment.

██████ a neighbour of the farm, noted anecdotally that the farm appeared to be more busy than usual during the AAS survey period.

As a comparison, the modal analysis has been repeated using the currently surveyed data. This is indicated in the figures below:

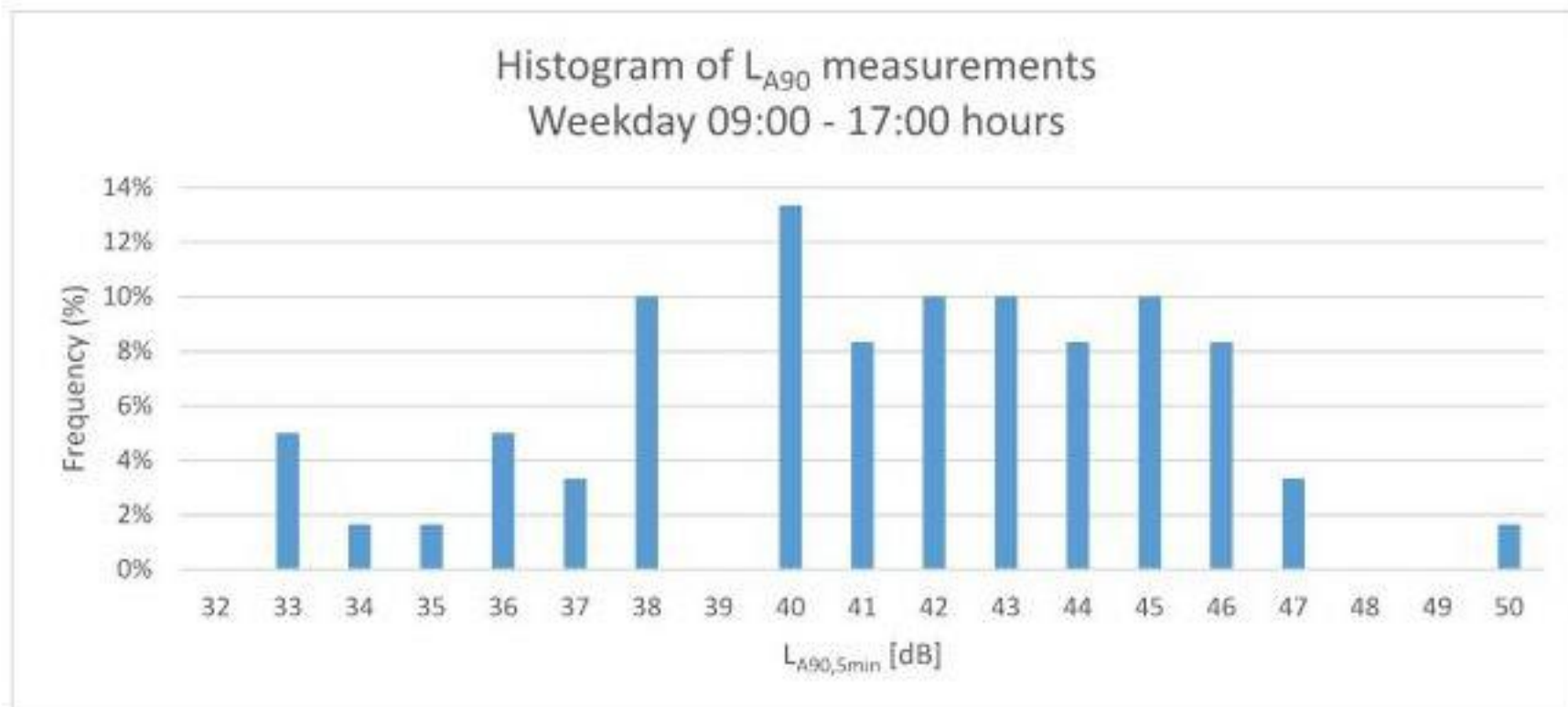


Figure 2.1 – Histogram of noise levels during proposed week day operational period

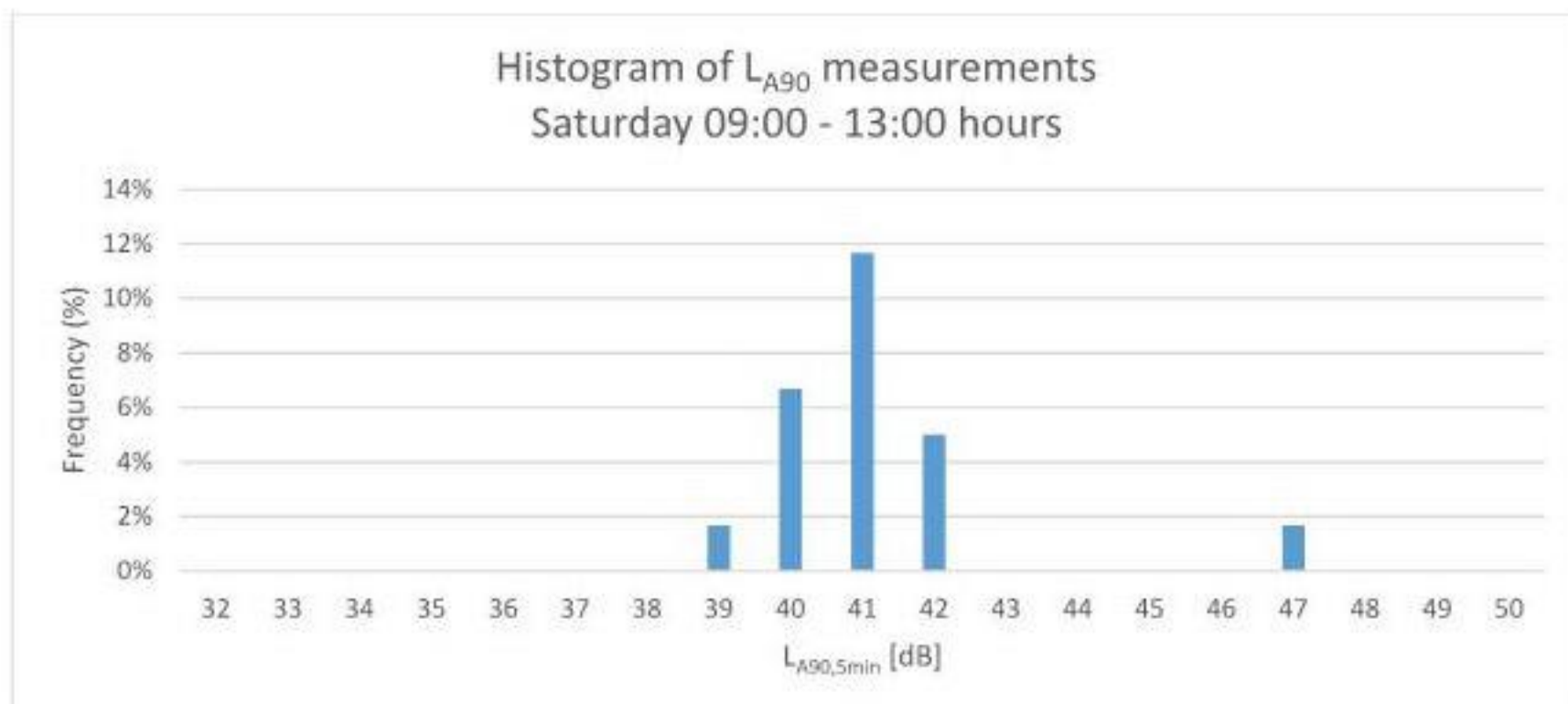


Figure 2.2 – Histogram of noise levels during proposed Saturday operational period

The modal values are around L_{A90} 40dB. This value is considered representative of the typical background noise level in the locality for the purposes of this assessment.

However, it is seen from the time history graphs that there are periods of significant duration when the background noise level was in the low to mid-thirties.

The measured mode sound levels are 6dB lower than those reported in the AAS assessment. As the two monitoring locations are in relatively close proximity and the background is primarily deemed

to be determined by road traffic at some distance to the south, the difference in noise levels is not expected to be due to the different locations. Variation in noise levels over time are expected and normal temporal variations may account for the different levels measured.

3. Context of the locality

It is acknowledged that the locality has an established agricultural nature and associated activities and noises are expected and accepted where undertaken in a reasonable and 'neighbourly' manner.

However, the cutting of firewood on a commercial scale as an ongoing operation, particularly when undertaken in close proximity to residential neighbours, may be considered to generate noise that is out of character with the established agricultural use, particularly the frequent use of chainsaws and deliveries by large HGVs.

Although the firewood processing has been carried out on the site for some time, this has not been a permitted use and, as an ongoing cause of contention, has not been an accepted part of the local soundscape.

4. Source Noise Levels and Assessments

4.1 Firewood Processor

The firewood processor is powered by a power take off from a tractor and was allocated a sound power rating of L_{WA} 99dB. This is understood to be while processing material.

No information regarding the noise level of the equipment during the 'off time' between logs is provided. It is unlikely that the equipment and tractor are completely turned off while the subsequent log is loaded onto the conveyor belt, although it was assumed that the power take off is not operational during these periods.

It was noted that a 3m long log is processed in 28 seconds and an assumption made that a maximum of 20 logs per hour can be processed. On this basis an on-time correction of -8 was determined.

As an indication of the sensitivity of the assessment, if the processing operation is intensified with additional staff to allow faster loading of logs onto the conveyor belt, for example, an increase to one log every 2 minutes would reduce the on-time correction to -6dB. One log per minute would result in an on-time correction of -3dB.

The noise level predicted, using noise modelling software, [REDACTED] from the operation of the firewood process at the south location was L_{Aeq} 50dB. Assuming a 30m distance loss, no screening and soft ground finishes, a simple line calculation provides a high level of agreement with this figure. With semi-hemispherical propagation over hard ground, a level 3 dB higher is calculated.

An acoustic character correction of 3dB for intermittency is assigned to the specific noise level. Possible impulsivity from logs falling on or off the conveyor belt is not discussed.

The BS4142 assessment is repeated below using both the values from the AAS assessment and the discussed possibilities of intensified use and propagation over hard ground. These are compared against the background levels obtained in the repeated noise survey undertaken by Venta Acoustics.

BS4142 Assessment – Firewood Processor	AAS Values	Values with intensification
Specific sound level	50	53
On-time Correction Value	-8	-3
Acoustic Character Correction	3	3
Rating Level	45	53
Background Sound Level	40	40
Excess of rating over background sound level	+5 Indicative of adverse impact, depending on context	+13 Indicative of a significant adverse impact, depending on context

Table 4.1 – Firewood Processor – South location

Based on the typical background noise level, the excess of rating level over background is between 5 dB and 13 dB. If these activities were to take place during a quieter hour, such as the L_{A90} 34dB measured at noon on Monday 21st January, the rating level would be between 10dB and 18dB above background, indicating a significant adverse impact, even in the context of the agricultural setting.

A discussion of constructing a barn with concrete sides is presented. The subsequent assessment indicates a reduction in rating level of approximately 14dB. This would dramatically reduce the impact of this specific source. However, it would be suggested that the 4m high concrete barrier would need to extend along the north side of the barn as well, and it should be noted that even with these measures in place, a marginal impact would still be expected at the quietest times.

A similar assessment is expected to apply to the north processing area if the intermittent buildings have closed sides. However, an increased impact is likely to the dwellings to the west.

The indication of the use of the log piles as an acoustic barrier is not considered a suitable mitigation measure. It is not believed that this could be suitably conditioned or enforced by planning and variation in the height of log piles is to be expected as product is used.

4.2 Chainsaw

The use of a chainsaw was observed and measured by AAS to be L_{Aeq} 92 dB at 3m. It was noted that it took 25 seconds to cut through a log. Based on 17 cuts being made in a one hour period, an on-time correction of -9dB was determined. It is agreed that this is a reasonably robust assumption.

However, the sound of the chainsaw idling between cuts was not considered in the assessment.

An acoustic character correction of 3dB was assigned by AAS for intermittency in the use of the chainsaw with tonality excluded following third-octave analysis. BS4142 also includes a suggested correction for 'other sound characteristics' where 'the specific sound features characteristics that are neither tonal or impulsive, through otherwise are readily distinctive against the residual acoustic

environment, a penalty of 3dB can be applied. It is suggested that noise from a chainsaw would fit this descriptor and an additional 3dB factor may be added to the noise source.

The specific sound pressure level at the assessment location was calculated by AAS to be 57dB(A). This appears low as a simple line calculation to 30m would be $92 - 20 \cdot \log(3/30) = 72\text{dB(A)}$. It is assumed that a screening correction of 15dB has been included which may account for this difference. However, it is entirely feasible that the chainsaw would be used adjacent to the log pile at a location much closer to the neighbouring dwellings or at a location not benefiting from screening.

Using the unscreened value, the following assessment would result:

BS4142 Assessment – Chainsaw	AAS Values	Alternative Values
Specific sound level	57	72
On-time Correction Value	-9	-9
Acoustic Character Correction	3	6
Rating Level	51	69
Background Sound Level	40	40
Excess of rating over background sound level	+11 Indicative of a significant adverse impact, depending on context	+29 Indicative of a significant adverse impact, depending on context

Table 4.2 – Chainsaw Assessment

If this assessment were undertaken during the quietest hour, the impact would be 5dB higher. This demonstrates a high probability of significant adverse impact on neighbouring dwellings from the use of the chainsaw in this location.

A reduction of approximately 13dB has been calculated by AAS when limiting the use of the chainsaw to the north of the property. These calculations cannot be verified but would suggest a low to marginal impact expected at the dwellings to the east, with a greater impact on the dwellings to the west. It is not clear whether limiting the location of use of a handheld tool such as a chainsaw is realistically enforceable.

4.3 Ford Transit Tipper

AAS has measured the noise levels from the Ford Transit Tipper manoeuvring within the farm yard as a SEL. Sound from loading firewood into the vehicle is not discussed.

The assessment considered noise from movements of the vehicle averaged over a 4 hour period. Assuming that the deliveries are equally spaced over the period, the 1 hour average would have the same value, and this would be appropriate for a BS4142 assessment.

The predicted levels are not expected to represent a significant impact.

4.4 Log Deliveries

AAS base the source noise levels for log deliveries on measurements captured during the unattended survey, indicating a level of $L_{Aeq,15min}$ 63dB when immediately adjacent to the monitor. There is evidence that the deliveries are made by rigid body or articulated HGVs with grab arms / cranes. Sound pressure levels in the order of L_{Aeq} 75dB at 10m have previously been measured from such lorries manoeuvring at other sites, and the levels during idling are expected to be around 70dB(A) at 5m, increasing when the grab arm is in use. Using these figures, the specific sound level of 41dB(A) at Molandi used in the assessment would appear to be low for an HGV within 10m of the dwelling.

It is suggested that the values of around L_{Aeq} 80dB measured towards the end of the period (16:00 hours – 16:30 hours) shown in Figure 11 of the AAS report would align more with the levels expected from logs being delivered close to the boundary (in close proximity to the monitor) over a period of 30 minutes, although as noted, this cannot be verified from the report.

Assuming a sound pressure level of approximately 70dB(A) at the dwelling during deliveries, the following assessment would apply:

BS4142 Assessment – Log Deliveries	Alternative Assessment
Specific sound level	70
On-time Correction Value	-3
Acoustic Character Correction	0
Rating Level	67
Background Sound Level	40
Excess of rating over background sound level	+27 Indicative of a significant adverse impact, depending on context

Table 4.3 – Log Delivery Assessment

For the 30 minutes of during which deliveries take place, a significant adverse impact would be expected.

4.5 Operation of Tractor

AAS undertook nearfield measurements to quantify the sound power emissions of a tractor idling and under load. Measurements were also undertaken at the telegraph pole immediately adjacent to the boundary [REDACTED]. Based on the derived sound power, the sound pressure levels [REDACTED] was calculated to be up to 54dB(A) under load when adjacent to the fence line. However, the far field measurements reported a value of 60dB(A) at the monitor location, which would be expected to be similar to the level at the assessment location.

During the repeated noise survey by VA, periods of the tractor moving were captured indicating levels between L_{Aeq} 55dB and L_{Aeq} 60dB (indicated on the attached time history plots). This shows good agreement with the AAS far field measurements. On one occasion (16:45 hours on Monday 21st January) an engine, assumed to be the tractor immediately alongside the boundary, was

measured at L_{Aeq} 76dB [REDACTED]. This correlates closely with the AAS measured sound power level of 94/97dB(A) calculated back to between 3 and 5 meters.

An on-time correction was applied on the basis of the tractor being used to move logs for no more than 10 minutes a day. Under possible intensification this would likely increase. However, it is also likely that the tractor would only spend a portion of the time immediately adjacent to the boundary wall and hence the correction would still be reasonable.

It is agreed that the use of tractors fits within the context of the site and no character correction is applied.

BS4142 Assessment – Tractor Moving Logs	Immediately next to boundary	Manoeuvring at a greater distance
Specific sound level	75	60
On-time Correction Value	-8	-8
Acoustic Character Correction	0	0
Rating Level	67	52
Background Sound Level	40	40
Excess of rating over background sound level	+27 Indicative of a significant adverse impact, depending on context	+12 Indicative of a significant adverse impact, depending on context

Table 4.4 – Tractor Moving Logs Assessment

Within the context of an established agricultural setting, movements of tractors within the farm yard would be expected and hence the impact would be reduced. However, commercial operations that include stacking of product immediately adjacent to the boundary fence would not be considered reasonable use congruent with the previous operation of the farm and a significant adverse impact is expected. In particular, during the quietest times, the rating level would be up to 32dB above the background noise level.

4.6 Cumulative Assessment

The AAS report does not discuss the aggregation of the assessments of the individual activities forming the firewood processing operation. A number of these would likely take place within a given hour and add up in some fashion to a greater cumulative impact.

Unfortunately, the BS4142 standard does not provide any guidance as to a method for combining individual sources which each have their own character correction. However, intuitively, operations would occur sequentially to fill the reference period that on-time correction values may have discounted and an increase in the impact is expected.

5. Mitigation recommendations

It is considered that the construction of an enclosed barn in which to undertake firewood processing would be beneficial. This would require that the barn include walls to the north and east to protect [REDACTED] and possibly on the other sides as well to mitigate the noise impact to other dwellings.

However, the greatest impact has been shown to come from delivery and rearrangement of logs, as well as the use of chainsaws to cut the logs to size.

These activities would need to be relocated to some distance from the surrounding dwellings, with logs stored away from the boundaries and cutting of logs limited to taking place within the enclosed barn. It is not clear if this would be sufficient to fully mitigate the noise impact and further assessments should be undertaken to confirm this.

Deliveries would need to be strictly controlled to permitted hours.

6. Conclusions

Venta Acoustics has been commissioned to undertake a survey of background noise levels in the locality of Stoke Farm, Hayling Island, and undertake a review of the noise impact assessment of the firewood processing activities on the farm.

The results of the environmental noise survey have indicated a lower background noise level than used in the applicant's noise assessment. This is likely to be due to temporal variations and changes in farm activity during the measurement period, and are considered entirely valid for the purposes of the assessment.

The applicant's noise impact assessment has been reviewed and alternative assumptions suggested to allow for potential intensification of use if permitted.

Based on the revised background noise levels and alternative assumptions, a revised assessment indicates that there is a significant risk that residential dwellings bordering Stoke Farm would experience an adverse noise impact from activities associated with the wood processing business.

Although mitigation has been suggested, it is not clear that this would address all identified sources of noise and the risk of an adverse impact is considered to remain.

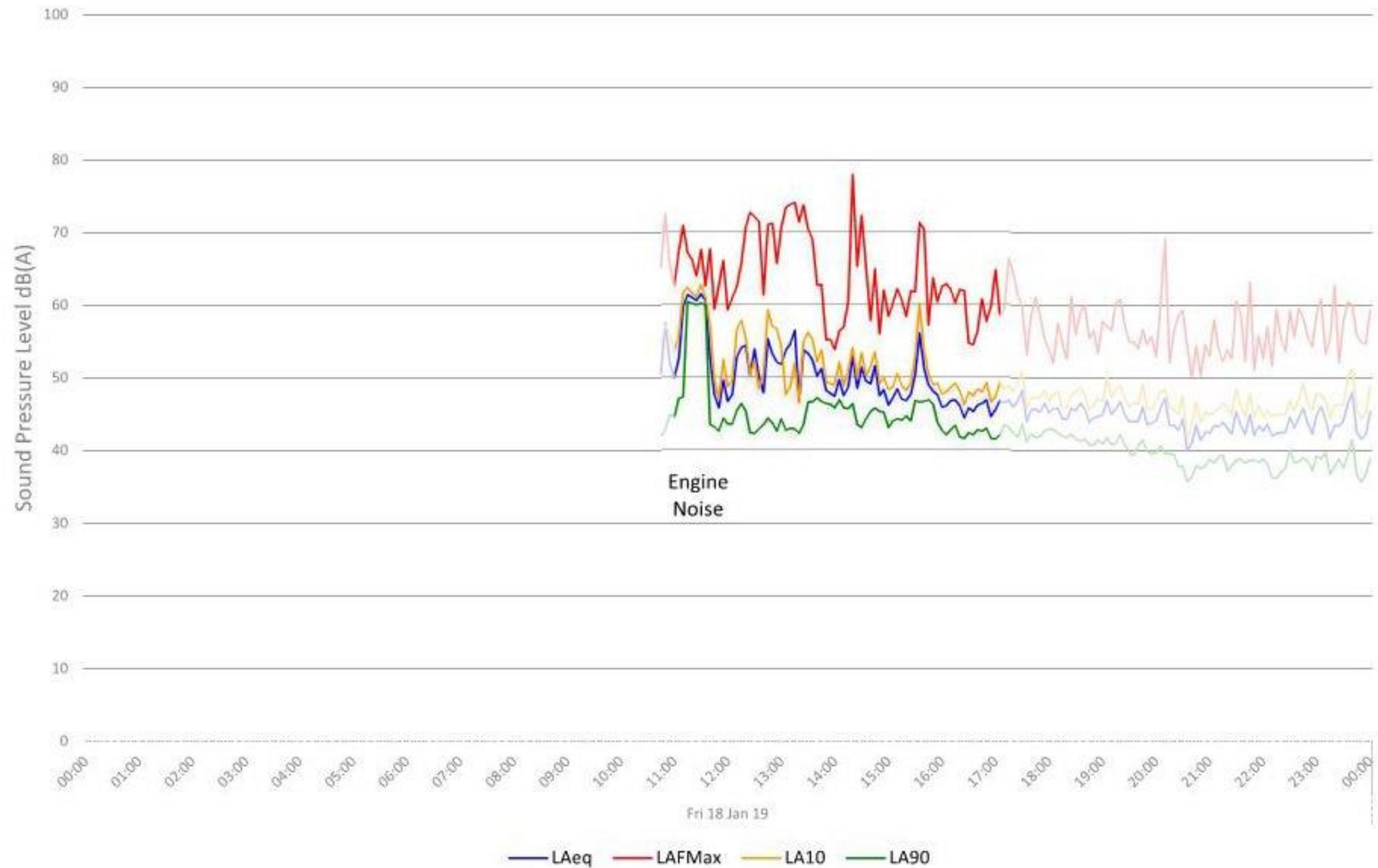
Steven Liddell MIOA



Stoke Farm, Hayling Island
Environmental Noise Time History: 1

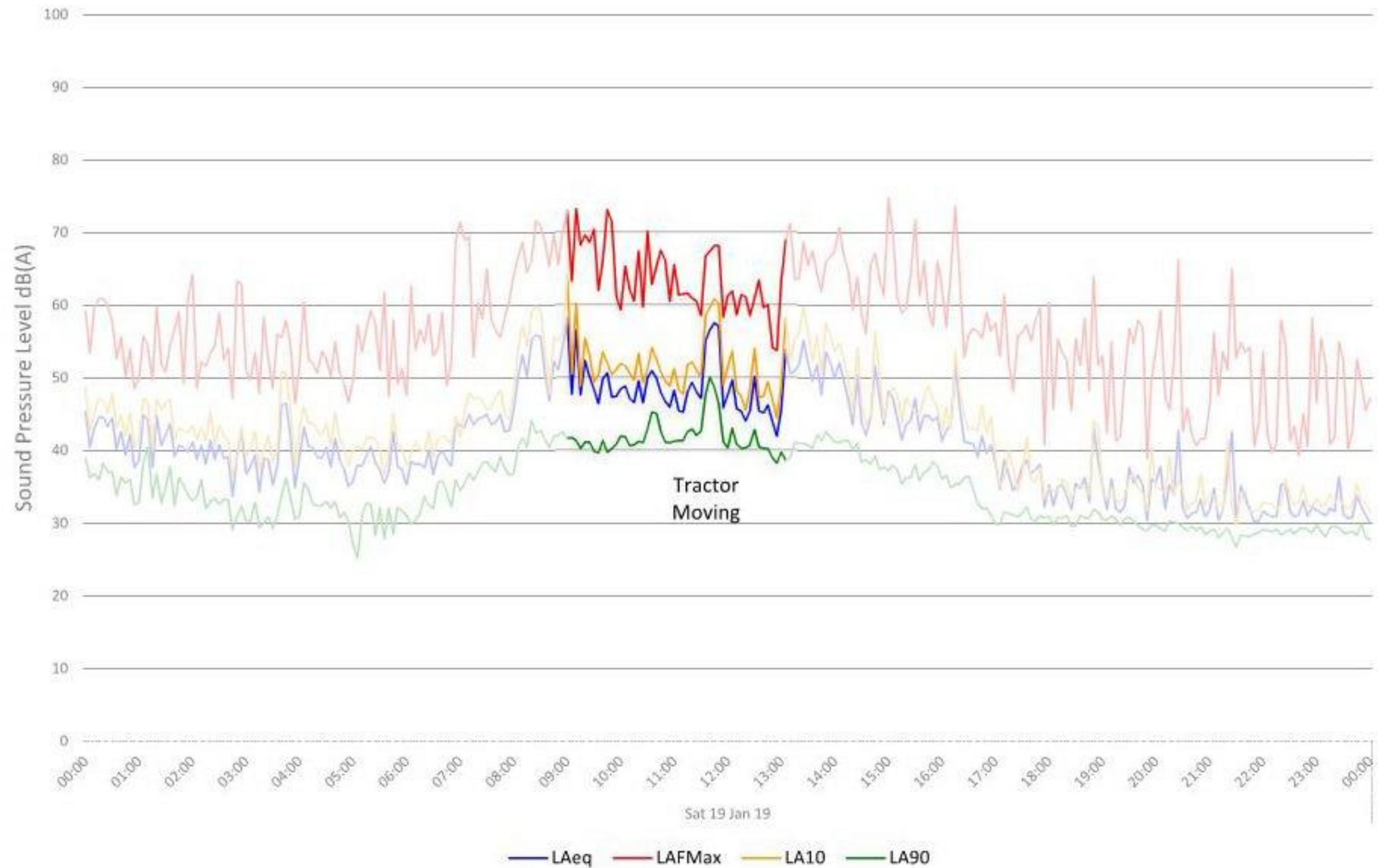


Figure VA2551/TH1



Stoke Farm, Hayling Island
Environmental Noise Time History: 2

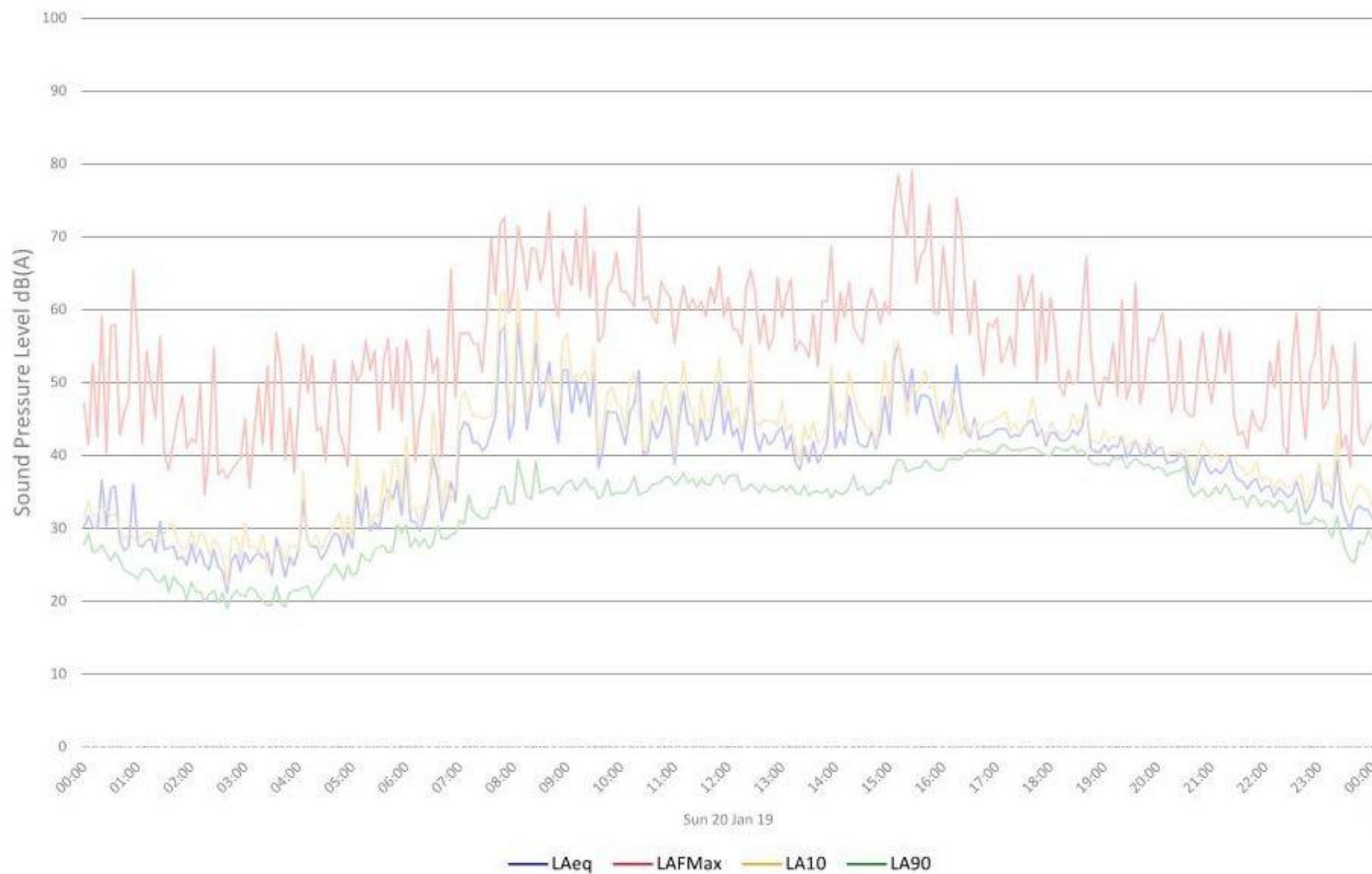
Figure VA2551/TH2



Stoke Farm, Hayling Island
Environmental Noise Time History: 3



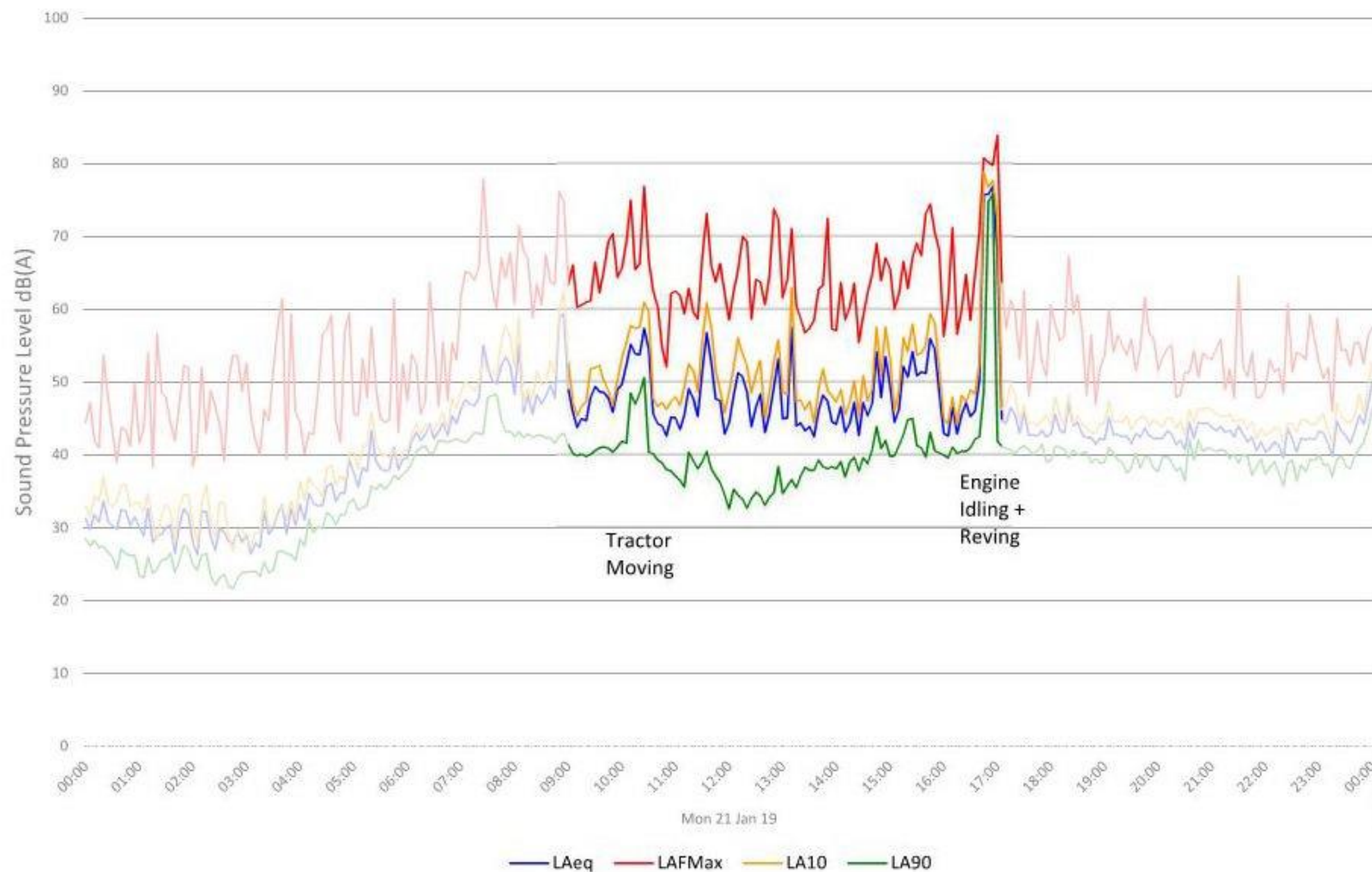
Figure VA2551/TH3



Stoke Farm, Hayling Island

Environmental Noise Time History: 4

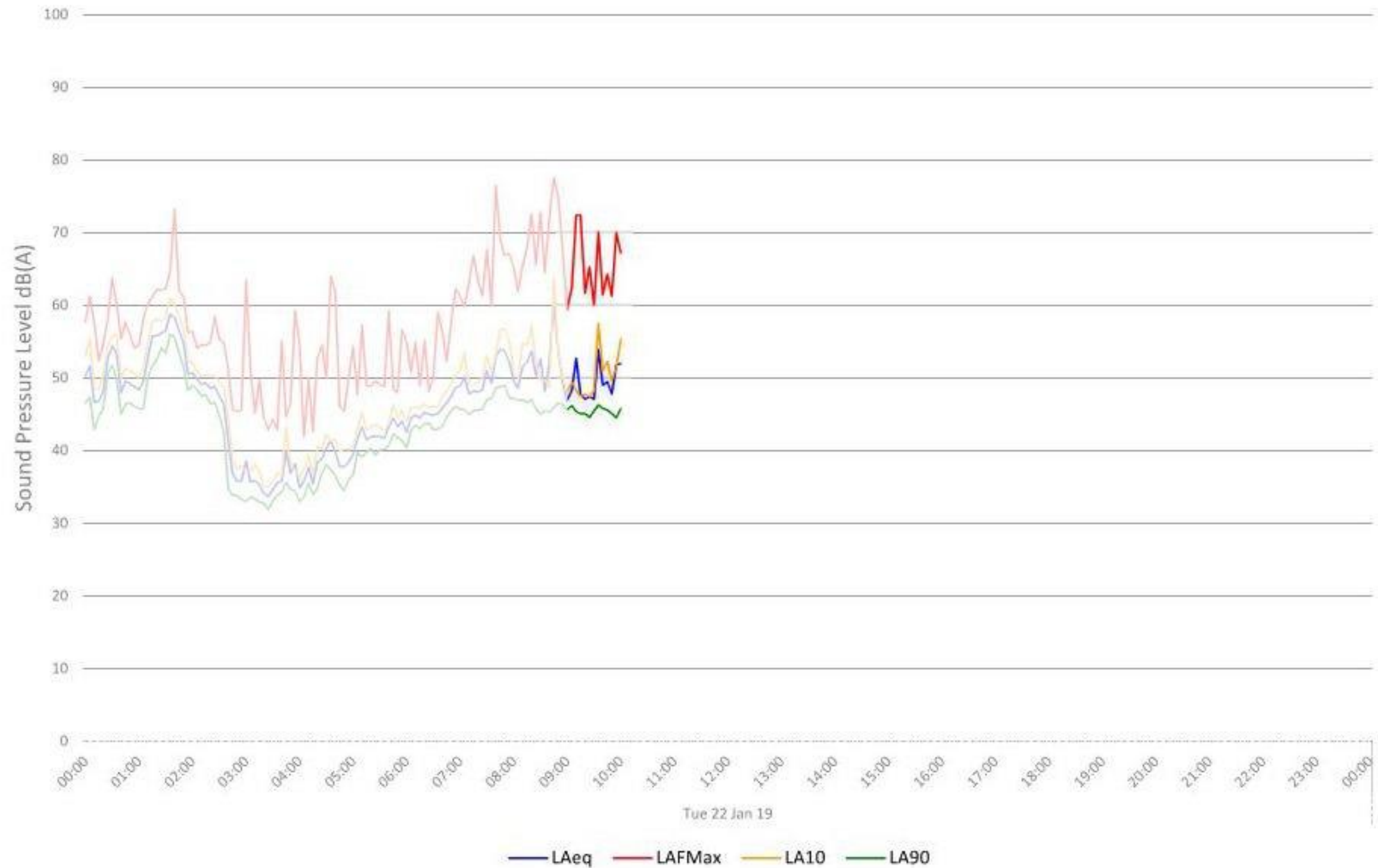
Figure VA2551/TH4



Stoke Farm, Hayling Island
Environmental Noise Time History: 5



Figure VA2551/TH5



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 . 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).
L_{eq} :	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 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
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1.3 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.

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