

Report VA6550.260925.NIA

**Land to the Rear of 30 The Crescent,
Eastleigh**

Noise Impact Assessment

25 September 2026

**RS Studio
Suite 2
Fairways House
Mount Pleasant Road
Southampton
SO14 0QB**

01962 461016
0203 8650332

mail@ventaacoustics.com

registered company no. 10139494

Contents

1.	Introduction	1
2.	Site Description	1
3.	Design Criterion and Assessment Methodology	2
3.1	BS4142:2014+A1:2019	2
3.2	Institute of Environmental Management and Assessment (2014)	3
3.3	BS8233:2014	4
4.	Environmental Noise Survey	4
4.1	Survey Procedure & Equipment	4
4.2	Results	5
5.	BS4142 Noise Impact Assessment	5
5.1	Yard Activity Noise Levels	5
5.2	Acoustic Character Correction	6
5.3	Rating Level and Assessment	6
5.4	Context	7
5.5	Uncertainty	9
6.	Noise Management	10
7.	Conclusion.....	11

Attachments

VA6550/SP1	Site Plan
VA6550/TH1-TH4	Environmental Noise Time Histories
VA6550/BG1	Background Sound Level Distribution
Appendix A	Acoustic Terminology

Report Version	Author	Approved	Changes	Date
NIA	Steven Liddell	Ben Alexander	-	25/09/2026

The interpretations and conclusions summarised in this report represent Venta Acoustics' best technical interpretation of the data available to us at the time of assessment. Any information provided by third parties and referred to in this report has not been checked or verified by Venta Acoustics, unless otherwise expressly stated in the document. Venta Acoustics cannot accept any liability for the correctness or validity of the information provided. Due to a degree of uncertainty inherent in the prediction of all parameters, we cannot, and do not guarantee the accuracy or correctness of any interpretation and we shall not, except in the case of gross or wilful negligence on our part, be liable for any loss, cost, damages or expenses incurred or sustained by anyone resulting from any interpretations, predictions or conclusions made by the company or employees. The findings and conclusions are relevant to the period of the site survey works, and should not be relied upon to represent site conditions at later dates. Where additional information becomes available which may affect the findings of our assessment, the author reserves the right to review the information, reassess the findings and modify the conclusions accordingly.

1. Introduction

Venta Acoustics has been commissioned by RS Studio, on behalf of the Applicant, to undertake a noise impact assessment of the storage yard on land to the rear of 30 The Crescent, Eastleigh, SO50 9BR.

A retrospective planning application (ref. F/26/101924) has been made to Eastleigh Borough Council for the change of use of the land for Use Class B8 (storage) and extension to the area of hardstanding. Given the proximity of the yard to neighbouring dwellings, the Council has requested a noise survey and assessment in support of the application, in accordance with item 25 of its Local Validation List.

An environmental noise survey has been undertaken over four days, including working days on which the yard was in use. The survey has been used to establish the prevailing background sound levels and to measure the sound level of yard activities directly. The impact on the nearest dwellings has been assessed with reference to the methodology set out in BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*, and considered in the context of the site and its surroundings.

All staff at Venta Acoustics are fully qualified and members of the Institute of Acoustics, the recognised UK professional body for acoustics, noise and vibration professionals and are fully competent to undertake BS4142 assessments.

2. Site Description

As illustrated on the attached site plan VA6550/SP1, the site is an existing storage yard to the rear of 30 The Crescent, Eastleigh. The yard is used for the storage of earth moving equipment and associated materials, including drainage pipes, chambers and aggregates. It contains a single-storey office, storage containers, aggregate bays and parking for six vehicles. The combined existing and extended yard measures approximately 27 metres deep by 26 metres wide, comprising a concrete hardstanding with a gravelled area to the north-west.

The site has a history of commercial use. The Council's planning register records permission granted in 2008 (ref. F/08/63563) for the erection of a single-storey building at Youngs Scaffolding, 30 The Crescent.

Vehicle access to the yard is taken from The Crescent, via a private drive between the houses. To the south and south-west, the yard is bounded by palisade and close-boarded fencing, with an access alleyway beyond and then the rear gardens of houses on The Crescent. To the north, the site is bounded by a curved section of railway line, with a commercial park beyond. To the east, the A335 Twyford Road crosses the railway on an overpass.

The acoustic environment of the area is characteristic of a busy urban location, with significant transport noise noted during the day and night. Train movements on the railway immediately to the

north, and road traffic on the A335 overpass to the east, including emergency vehicle sirens, are regular features. Southampton Airport is located approximately 1.5 kilometres to the south, and the site lies on the flight path to the north of the runway, with aircraft passing overhead frequently during the day.

The application seeks retrospective permission for the use of the land for storage (Use Class B8) and for the extension to the area of hardstanding. Activity at the yard comprises the movement of plant and vehicles, the loading, unloading and sorting of materials and equipment, and work on equipment.

The nearest noise sensitive receptors are the houses on The Crescent whose rear gardens are close to the yard. The rear façades of the nearest of these houses are approximately 25 metres from the main working area of the yard.

3. Design Criterion and Assessment Methodology

3.1 BS4142:2014+A1:2019

British Standard BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises, and;
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes.

The Standard is therefore suited to this assessment.

The assessment methodology considers the Specific Sound Level, as measured or calculated at a potential noise sensitive receptor, due to the source under investigation in terms of a L_{Aeq} value over a one-hour period during daytime operation (07:00-23:00 hours) and a fifteen-minute period during night-time operation (23:00-07:00 hours).

A correction factor is added to this level to account for the acoustic character of the sound. This is determined as follows when using the subjective assessment methodology:

Tonality - For sound ranging from not tonal to prominently tonal, the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be allocated as a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

Impulsivity - A correction of up to +9dB can be applied for sound that is highly impulsive considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be allocated as a penalty of 3 dB for impulsivity which is just perceptible at the receiver, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Other sound characteristics - Where the specific sound contains characteristics that are neither tonal nor impulsive, but are otherwise startling, disturbing or incongruous with the residual acoustic environment, a penalty of +3 dB can be applied.

Intermittency - When the specific sound has identifiable on/off conditions, if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.

An initial estimate of the impact of the source is then obtained by subtracting the typical background noise level, in terms of a L_{A90} value over the relevant period of operation, from the corrected Specific Sound Level.

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB could be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context.

The initial estimate of the impact may then be modified by taking consideration of the context in which the sound occurs.

3.2 Institute of Environmental Management and Assessment (2014)

Where a similar type of noise is already present in a locality, a comparison of the ambient noise level with and without the source can provide a quantitative indication of its potential effect. The IEMA *Guidelines for Environmental Noise Impact Assessment* relate the impact of a noise source on a community to the change in the ambient noise level that it causes, as summarised below.

Long Term Impact Classification	Short Term Impact Classification	Sound Level Change dB $L_{Aeq,T}$
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3 dB and < 5 dB
Moderate	Major	≥ 5 dB and < 10 dB
Major		≥ 10 dB

Table 3.1 – Excerpt from IEMA guidelines

In addition to the overall change in ambient noise level, the nature of the noise should also be considered, including how long and how often it occurs, the time of day at which it occurs, and whether it changes the acoustic character of the area.

3.3 BS8233:2014

BS8233:2014 *Guidance on sound insulation and noise reduction for buildings* advises that, for traditional external amenity areas such as gardens and patios, it is desirable that the external noise level does not exceed $L_{Aeq,T}$ 50dB, with an upper guideline value of $L_{Aeq,T}$ 55dB which would be acceptable in noisier environments. It also recognises that these values are not achievable in all circumstances, such as in urban areas adjoining the strategic transport network.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the existing background noise levels and to measure the sound of activities within the yard, a noise survey was carried out between Friday 18th and Monday 21st September 2026 at the location shown on site plan VA6550/SP1. The sound level meter was mounted on the south-western boundary fence of the yard, opposite the neighbouring gardens, with the microphone approximately 2 metres above ground level. This location was chosen to be representative of the background noise level at the most affected noise sensitive receivers.

Continuous 5-minute samples of the L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels were undertaken at the measurement location. One-second samples and audio were also recorded, which allowed individual sources to be identified.

The weather during the survey period was generally dry with light to moderate winds. 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:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
Svante Class 1 SLM	971A	133643	Factory cal. – no cert no.	16/1/25
Larson Davis calibrator	CAL200	13049	1518310-2	8/7/26

Table 4.1 – Equipment used for the survey

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

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA6550/TH1-4.

The background noise level is determined by road traffic, principally on the A335 and the surrounding road network. Aircraft overflights and train pass-bys give rise to frequent, higher-level events during the day.

The typical background and ambient noise levels measured were:

Monitoring Period	Typical ¹ L _{A90,5min}	Ambient L _{Aeq,T} (whole survey)
07:00 – 18:00 hours	48 dB	56 dB
07:00 – 23:00 hours	44 dB	55 dB
23:00 – 07:00 hours	35 dB	48 dB

Table 4.2 – Typical background and average ambient noise levels

¹ The typical L_{A90} value is taken as the 10th percentile of all L_{A90} values measured during the relevant period. The 07:00-18:00 value is the modal value, as set out below.

Yard activity identified during the survey took place during the working day, from around 07:00. The distribution of the background sound levels measured during the working day (07:00-18:00) is shown on the attached chart VA6550/BG1. BS4142 advises that the background sound level should be representative of the period being assessed, and that the aim is to establish a typical value rather than simply the lowest measured. The measured levels were consistent from day to day, with a most commonly occurring (modal) value of L_{A90} 48dB and a median of L_{A90} 49dB. Excluding the periods of yard activity from the analysis made no difference to these values. The assessment has therefore been made against a representative background sound level during the working day of L_{A90} 48dB.

5. BS4142 Noise Impact Assessment

5.1 Yard Activity Noise Levels

As the yard is an existing operation, the sound of the yard has been measured directly rather than predicted from library data. The survey audio was reviewed to identify periods of yard activity, and the measured levels during these periods are summarised below. The measurement position is approximately 10 metres from the main working area of the yard, whereas the rear façades of the nearest houses are approximately 25 metres from this working area. The assessment applies to the whole yard, including the gravelled extension to the north-west. The centre of the gravelled area is approximately 28-30 metres from the rear façades of the nearest houses behind it, marginally further than the 25 metres adopted in the assessment, and the rating levels are therefore considered representative of activity in that area.

Yard Activity	Date and Time	Duration	Measured L_{Aeq}
Plant movement	Fri 18 th , 13:29	3 minutes	72 dB
Plant movement	Fri 18 th , 15:47	5 minutes	75 dB
Staff arrival and preparation	Mon 21 st , 07:00	54 minutes	58 dB
Work on equipment	Mon 21 st , 10:08	19 minutes	61 dB
Work on equipment, with brief use of power tools	Mon 21 st , 11:37	15 minutes	56 dB
Sorting of materials	Mon 21 st , 15:24	59 minutes	59 dB

Table 5.1 – Measured ambient sound levels during yard activity

These source measurements include other sounds present at the time, such as aircraft, trains and road traffic. To determine the specific sound level of the yard, the residual sound level has been subtracted from the measured ambient level. The residual sound level has been taken as the ambient level measured over the same daytime hours (07:00-18:00) at the weekend, when the yard was not in use, of L_{Aeq} 55dB¹.

Two cases have been assessed. The first is general yard activity, based on the hour of material sorting on the Monday afternoon, which was the longest continuous period of activity identified. The second is the hour on the Friday afternoon in which plant was moved, which contained the highest yard levels measured during the survey.

5.2 Acoustic Character Correction

The subjective method of allocating corrections to the sound source has been used following the methodology provided in BS4142:2014 and summarised in section 3.1.

Noise Source	Subjective Description	Allocated Corrections
General yard activity	Handling and placing of pipes, chambers and other materials, with occasional impacts. Intermittent, with identifiable periods of activity.	Tonality: 0dB Impulsivity: +3dB Intermittency: +3dB
Plant movement	Diesel engine, broadband in character, with occasional impacts from the plant and its attachments. Brief and intermittent.	Tonality: 0dB Impulsivity: +3dB Intermittency: +3dB

Table 5.2 – Acoustic character corrections

These penalties are applied to the specific sound level in section 5.3 to obtain the rating level.

5.3 Rating Level and Assessment

The rating levels at the nearest façades are compared against the representative background sound level during the working day as follows. The general yard activity case is based on a full hour of continuous activity.

¹ As traffic noise is likely to be higher on weekdays than weekends, the use of the weekend as residual sound levels is conservative.

Results		Relevant Clause	Commentary
Measured ambient sound level	L _{Aeq} 59 dB	7.3	Sorting of materials, 1 hour
Residual sound level	L _{Aeq} 55 dB	7.3	Weekend, 07:00-18:00
Specific sound level at measurement position	L _{Aeq} 57 dB	7.3	Ambient minus residual
Distance correction	-8 dB		10 metres to 25 metres
Specific sound level at nearest façade	L _{Aeq} 49 dB		
Acoustic feature correction	+6 dB	9.2	+3 dB impulsivity, +3 dB intermittency
Rating level	L _{Ar} 55 dB	9.2	
Background sound level	L _{A90} 48 dB	8	07:00-18:00, modal value
Excess of rating over background sound level	+7 dB	11	
Assessment indicates adverse impact		11	Depending on context

Table 5.3 – BS4142 assessment, general yard activity

The initial estimate for general yard activity is +7dB, which is commensurate with an adverse impact, depending on the context. This is based on a full hour of continuous activity.

Results		Relevant Clause	Commentary
Measured ambient sound level	L _{Aeq} 65 dB	7.3	Friday 15:00-16:00, including plant movement
Residual sound level	L _{Aeq} 55 dB	7.3	Weekend, 07:00-18:00
Specific sound level at measurement position	L _{Aeq} 65 dB	7.3	Ambient minus residual
Distance correction	-8 dB		10 metres to 25 metres
Specific sound level at nearest façade	L _{Aeq} 57 dB		
Acoustic feature correction	+6 dB	9.2	+3 dB impulsivity, +3 dB intermittency
Rating level	L _{Ar} 63 dB	9.2	
Background sound level	L _{A90} 48 dB	8	07:00-18:00, modal value
Excess of rating over background sound level	+15 dB	11	
Assessment indicates significant adverse impact		11	Depending on context

Table 5.4 – BS4142 assessment, hour including plant movement

The hour including plant movement gives a higher initial estimate, commensurate with a significant adverse impact, depending on the context. This is driven by the plant movement itself, which lasted around 5 minutes within the hour.

The potential impacts are discussed further with regard to the context of the site in the next section.

5.4 Context

BS4142 requires the initial estimate of impact to be considered in the context in which the sound occurs. In this case, the following factors are considered relevant.

The yard is an existing, established commercial use. Planning permission was granted in 2008 for a building at Youngs Scaffolding, 30 The Crescent, and the Council's request for information describes the application as intensifying the existing use.

The movement of plant and the handling of materials are therefore an established part of the acoustic environment at the rear of these houses, rather than a new source. The application seeks to regularise the current use and extend the area of hardstanding, rather than introduce a new type of activity.

As a scaffolding yard, the previous use of the site would typically have involved the handling of scaffold tubes and fittings, with a strongly impulsive character from metal-on-metal impacts, periods of raised noise separated by long periods of quiet, and vehicles arriving and departing at the start and end of the day. The current use follows the same pattern of activity, but the materials now stored are predominantly plastic drainage pipes, chambers and aggregates, which do not give rise to the ringing metal impacts characteristic of scaffolding. The current use is therefore considered congruent with the previous use of the site, and is expected to be less intrusive in character.

To give an indication of the scale of this difference, Venta Acoustics' measurements of scaffolding loading and unloading at similar yards give a level of $L_{Aeq,1h}$ 65dB at 15 metres. At the nearest façades, approximately 25 metres from the main working area, this would correspond to a specific sound level of around L_{Aeq} 58-61dB, depending on whether loading occupies half or all of the hour. This is some 9-12dB higher than the specific sound level of general activity at the current yard (L_{Aeq} 49dB). Applying the same character corrections, the rating level of a scaffolding yard would be expected to be in the order of 16-19dB above the background sound level, compared with 7dB for the current use. Although indicative, this suggests that the current use is materially less intrusive than the previous use of the site, in both level and character.

The yard sits between a railway line, the A335 overpass and a commercial park, and on the flight path of Southampton Airport. The residual acoustic environment at the rear of these houses is characterised by frequent, high-level transport events. Individual aircraft overflights measured during the survey reached L_{AFmax} 73-83dB and train pass-bys L_{AFmax} 75-84dB, with road traffic and emergency vehicle sirens on the A335 also clearly audible. Over the same daytime hours at the weekend, when the yard was not in use, the ambient sound level at the boundary was L_{Aeq} 55dB, some 7dB above the background sound level. The sound of plant and materials handling at an established yard is not out of keeping with this setting, and is less distinctive against this residual environment than it would be in a quieter residential area. Vehicle movements within the site, and vehicles arriving and departing, are considered secondary to the existing transport noise in the area.

At the rear façades, the specific sound level of general yard activity, L_{Aeq} 49dB, is around 5dB below the prevailing residual sound level. General yard activity would therefore be expected to increase the ambient sound level at the nearest façades by in the order of 1-2dB. With reference to the IEMA guidelines, this represents a negligible long-term change and a minor short-term change.

This is supported by the survey data, which shows that on the Monday, a working day with staff arriving and preparing from 07:00, work on equipment during the morning and material sorting in the afternoon, the daytime ambient sound level at the boundary was $L_{Aeq,16h}$ 55dB. This is the same as on the Sunday ($L_{Aeq,16h}$ 55dB), and within 2dB of the Saturday ($L_{Aeq,16h}$ 53dB). On that working day,

the activity of the yard did not materially alter the overall daytime sound level at the boundary of the gardens.

The gardens opposite the yard are exposed to transport noise irrespective of the yard's activity. The daytime ambient level at the yard boundary, close to the ends of the gardens, was $L_{Aeq,16h}$ 53 - 55dB across the weekend and the working Monday, within the range given in BS8233 for external amenity areas. Parts of the gardens closer to the houses are further from the yard. The measurement position was on the boundary fence itself, and so did not benefit from the screening that the close-boarded fence provides to the gardens and ground floor rooms beyond. No allowance has been made for this in the assessment.

Yard activity is not continuous. It occurred in sporadic, discrete periods, generally of between 15 minutes and an hour, separated by longer periods with no identifiable activity. The plant movements, which give the highest levels, lasted between 3 and 5 minutes and were identified on two occasions over the four-day survey. The initial estimates therefore represent the busier periods of the yard's operation rather than its typical condition. Residents have long periods of respite between events. BS4142 assesses the rating level over a one-hour reference period, and so does not differentiate between activity that continues throughout the day and isolated periods of activity such as these. It is offered that the initial estimate should be moderated accordingly.

In level, the plant movements are also comparable to the existing transport events. Allowing for the additional distance to the nearest façades, a plant movement would give an event level there of around L_{Aeq} 67dB, which is within the range measured at the boundary for individual aircraft overflights (L_{Aeq} 65-73dB over each flyover).

All of the yard activity identified took place during the working day, beginning at around 07:00. No activity was identified in the evening or overnight, when background sound levels are lower and more residents in the vicinity are likely to be at home and are more sensitive to noise.

The suggested management measures in Section 6 address the features that most influence the initial estimate, namely impacts from the handling of materials and the movement of plant.

Given this context, it is offered that the initial estimates overstate the likely effect of the yard on the neighbouring dwellings. The yard is an established use in a setting characterised by busy rail, road and air traffic, its activity is intermittent and confined to the working day, and it does not materially change the daytime ambient sound level at the neighbouring gardens. The current storage use is also expected to be less intrusive than the previous scaffolding yard use. Within this context, and subject to the suggested management measures, the yard is not expected to adversely alter the amenity of the neighbouring residents.

5.5 Uncertainty

This section considers the variables in the assessment that may cause variations within the final results and describes how these have been addressed.

- Use of a Class 1 sound level meter is considered to reduce instrument error to insignificant levels as compared with environmental variations. The calibration of the instrumentation was confirmed before and after the noise survey.
- The background measurements were undertaken under suitable weather conditions over a four-day period, including a weekend and working days on which the yard was in use. The monitoring location was on the boundary with the neighbouring gardens, and is representative of the background noise levels experienced by the nearest dwellings.
- The sound of the yard has been measured on site while the yard was in use, rather than predicted from library data. The assessment is based on the busiest periods identified and is based on a full hour of continuous activity, so the specific sound levels are not expected to be underestimated.

Overall, the uncertainty is considered to have been minimised to a suitable range so as not to risk significant variations in the assessment of typical operations.

6. Noise Management

The following measures are suggested to manage noise from the yard. They reflect the activities identified during the survey, and are practical measures that can form part of the day-to-day operation of the site.

- Yard activity, including the movement of plant and the loading and unloading of materials, takes place only during the working day.
- Plant movements within the yard are kept to those necessary, and plant is parked and worked in the parts of the yard furthest from the gardens, where practicable.
- Plant working and materials handling within the gravelled extension are kept towards the railway side, away from the boundary with the gardens, where practicable.
- Engines are switched off when plant and vehicles are not in use, and unnecessary revving and idling is avoided.
- Materials, particularly pipes, chambers and metal items, are lowered and placed rather than dropped or thrown, and plant attachments are not dropped onto hard surfaces.
- Outdoor use of power tools is kept to short periods.
- Broadband reversing alarms are used on site plant, where practicable.
- Music is not played loudly in the yard, and shouting and the sounding of horns are avoided except in an emergency.
- Where vehicles or plant need to leave early, loads are prepared the day before to minimise noise in the early morning.

- A contact telephone number is made available to neighbours, and any complaints are recorded and investigated.

These measures are intended to reduce the frequency and prominence of the most noticeable yard sounds, particularly impacts from the handling of materials and the movement of plant close to the gardens.

7. Conclusion

A noise survey has been undertaken by Venta Acoustics at the boundary between the storage yard to the rear of 30 The Crescent, Eastleigh, and the neighbouring gardens, over four days including working days on which the yard was in use.

The sound of the yard has been measured directly and assessed against the measured background sound level using the methodology in BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*. The initial estimate of impact, which is based on the busiest periods of activity, indicates an adverse impact for general yard activity, and a significant adverse impact for the hour in which plant is moved, depending on the context.

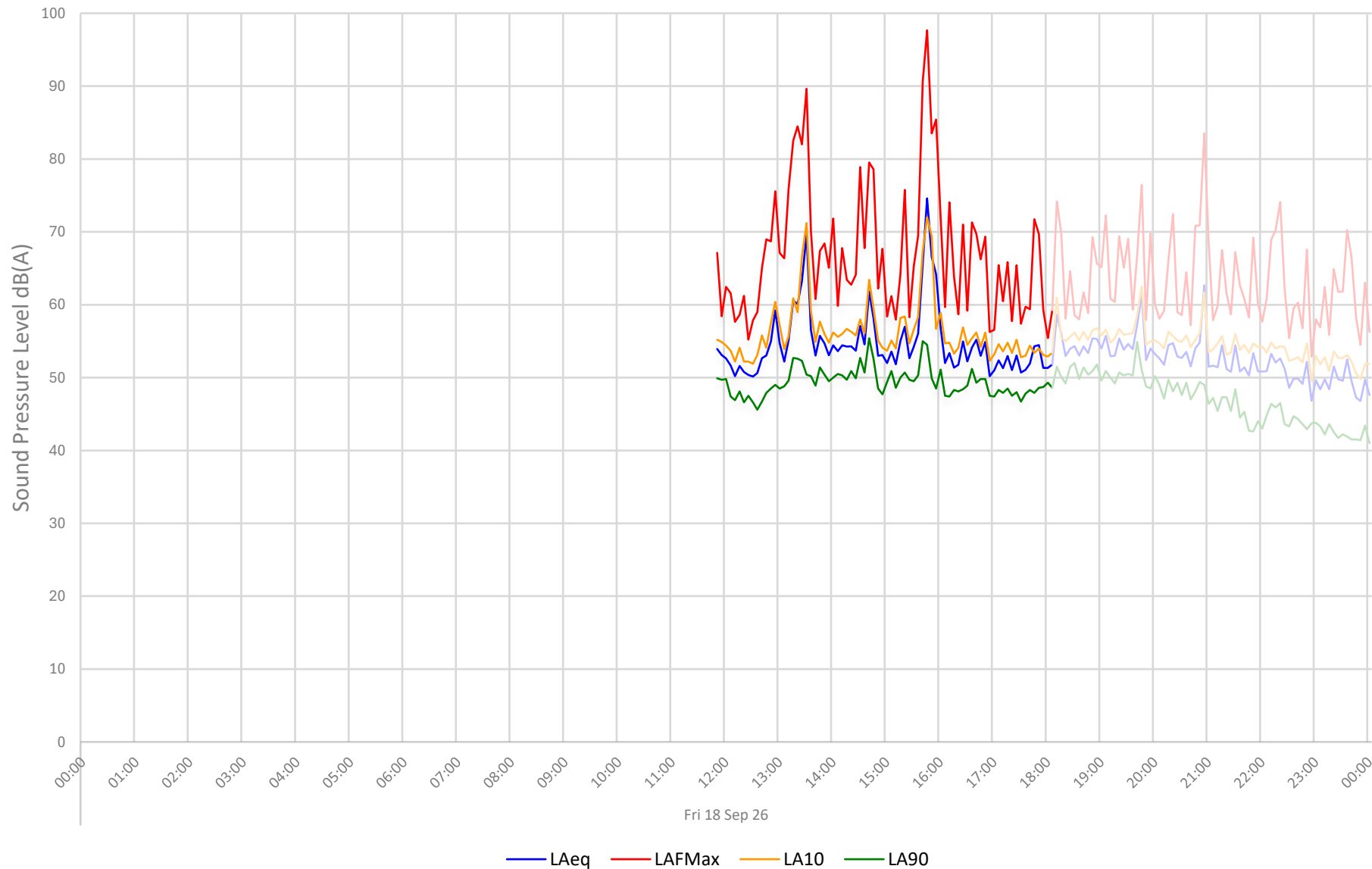
The yard is an established commercial use, in a location where the acoustic environment is shaped by the adjacent railway, the A335 overpass and aircraft on the Southampton Airport flight path. Yard activity is sporadic and takes place during the working day only, and the measured daytime ambient sound level at the neighbouring gardens was similar on a working day to that at the weekend.

Within this context, the impact of the yard is expected to be lower than the initial estimate suggests. Subject to the suggested management measures, the continued use of the yard, including the extended area of hardstanding, is not expected to adversely alter the amenity of the neighbouring residents, and is expected to represent an improvement relative to the previous scaffolding yard use. The proposal is therefore considered acceptable in acoustic terms.

Steven Liddell MIOA

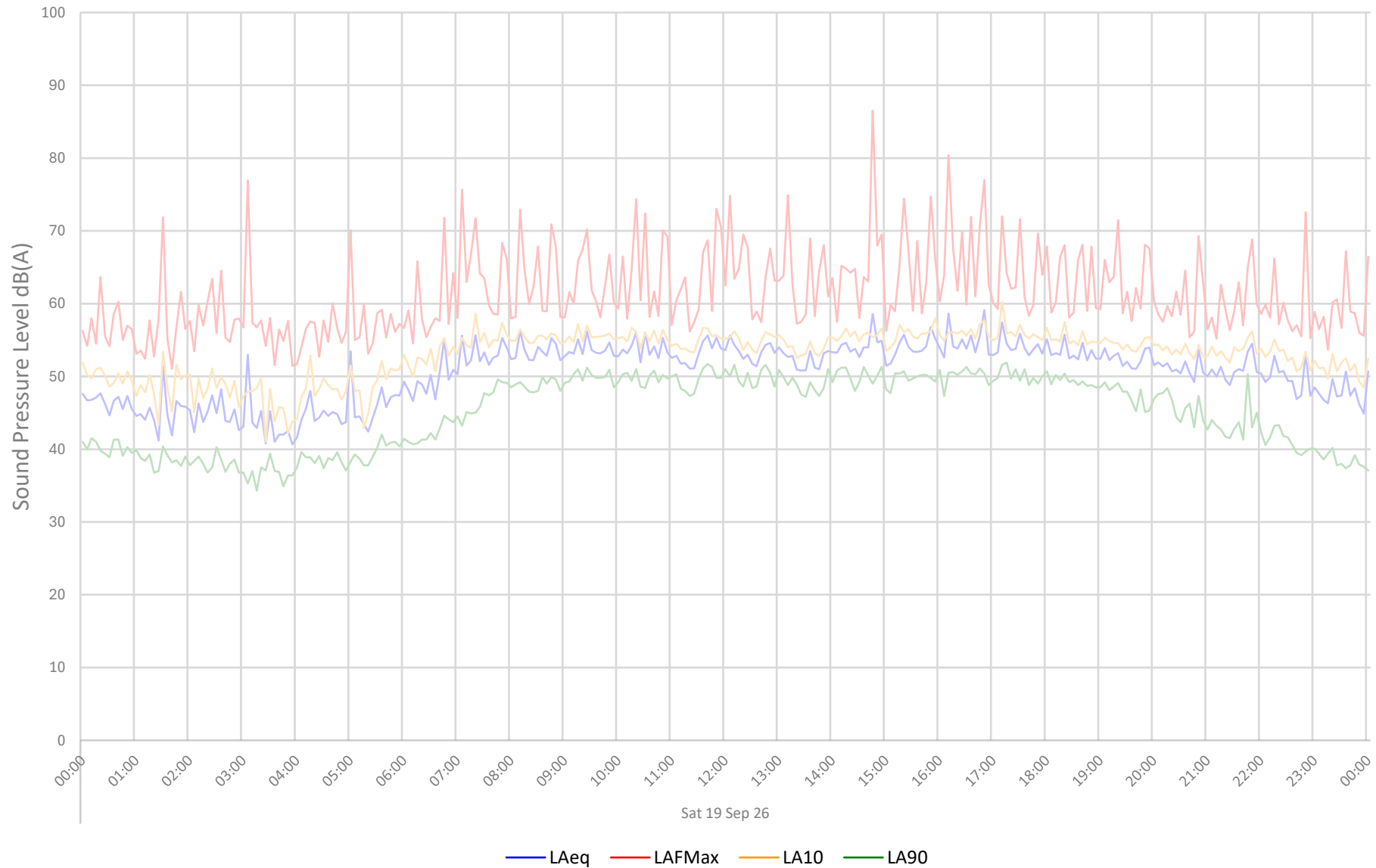


Figure VA6550/TH1



Land to Rear of 30 The Crescent, Eastleigh
Environmental Noise Time History: 2

Figure VA6550/TH2



Land to Rear of 30 The Crescent, Eastleigh
Environmental Noise Time History: 3

Figure VA6550/TH3

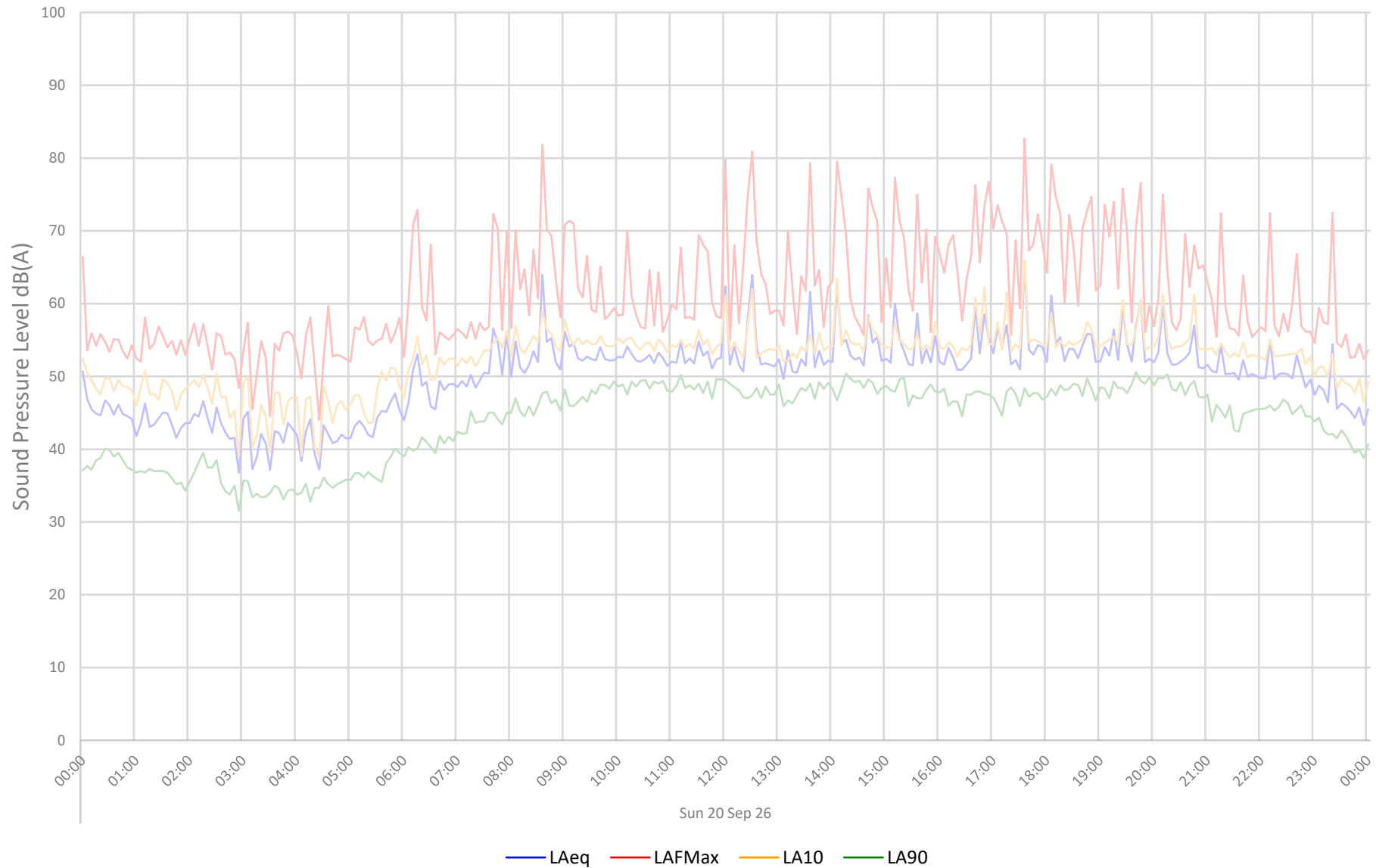
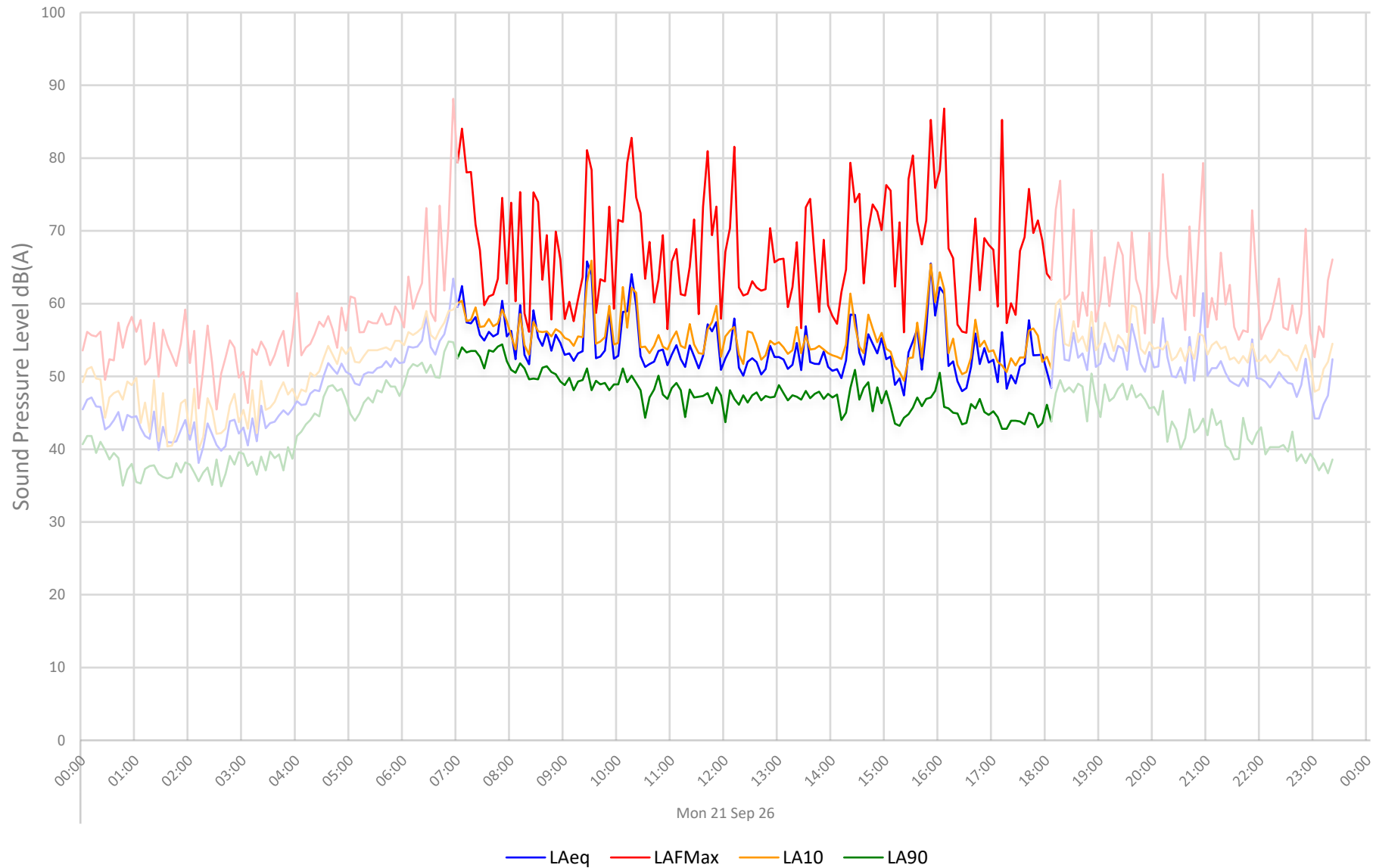
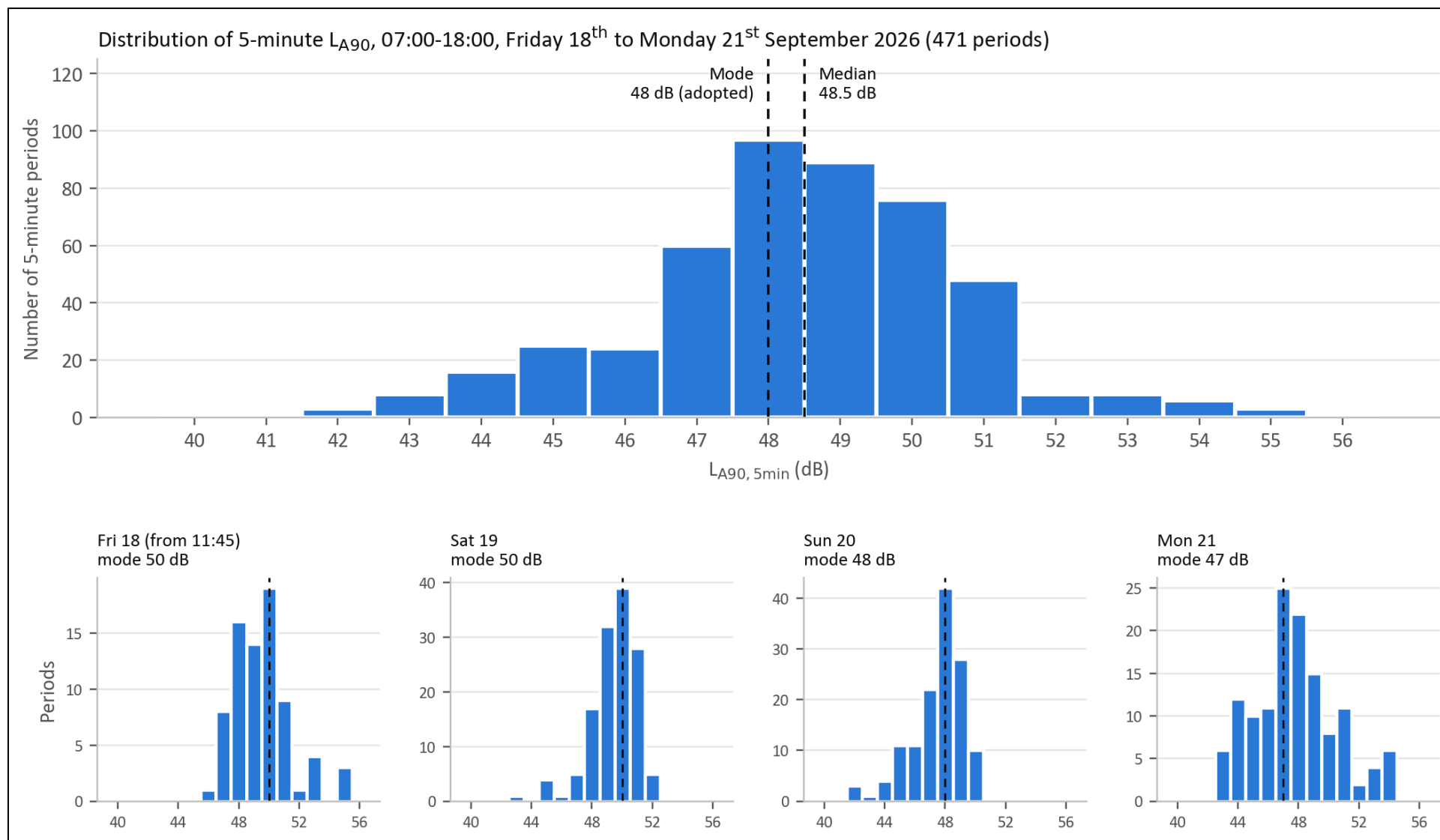


Figure VA6550/TH4





APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

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 LA.

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.

L₁₀ & L₉₀ : Statistical Ln 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, L₁₀ is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L₉₀ is the typical minimum level and is often used to describe background noise.

It is common practice to use the L₁₀ 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.

R Sound Reduction Index. Effectively the Level Difference of a building element when measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-2:2010 and corrected for its size and the reverberant characteristics of the receive room.

D The sound insulation performance of a construction is described in terms of the difference in sound level on either side of the construction in the presence of a sound source on one side and the reverberant characteristics of the adjoining 'receive' space. D is the arithmetic Level

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

	Difference in decibels between the source and receive sound levels when filtered into frequency bands.
D_{nT}	Weighted Standardised Level Difference. As defined in BS EN ISO 717-1, representing the Weighted Level Difference, when standardised for reference receiving room reverberant characteristics.
$D_{n,e}$	Normalised sound insulation of small building elements of fixed dimensions, such as vents, measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-2:2010.
$D_{n,f}$	Flanking sound insulation of lightweight elements, such as curtain wall mullions, measured in an accredited laboratory test suite in accordance with the procedures laid down in ISO 10848-2:2006
R_w D_w $D_{nT,w}$ $D_{n,e,w}$ $D_{n,f,w}$	Value of parameter, determined as above, but weighted in accordance with the procedures laid down in BS EN ISO 717-1 to provide a single-figure value.
C , C_{tr}	Spectral adaptation terms to be added to a single number quantity such as $D_{nT,w}$, to take account of the sound insulation within frequency ranges of particular interest.
$L'_{nT,w}$	Weighted Standardised Impact Sound Pressure Level as defined in BS EN ISO 717-2, representing the level of sound pressure when measured within a space where the floor above is under excitation from a calibrated tapping machine, standardised for the receiving room reverberant characteristics.
ΔL_w	Change in impact sound pressure level when a floor is fitted with a 'soft' or resilient covering, as measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-3:2010.

B. 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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C. 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

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

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

D. 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.