



TERRESTRIA LIMITED

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16 December 2019
BY EMAIL ONLY

Dear Mrs Johnson

**Dudman Investments Limited
Unit H6 Rudford Industrial Estate, Ford
Planning Application Ref CM/56/19/PL**

Further to recent email correspondence, specifically your request for a noise assessment to be provided in support of the above application, please find attached to this letter an assessment undertaken by Clarke Saunders.

You will note that this report concludes that, subject to the hours of operation being amended from those originally proposed in the application, the sound emissions from the proposed concrete batching plant would not have an adverse impact.

On the basis of the noise assessment, therefore, we propose that the operational hours in the application be amended to be as follows:

Mondays to Fridays 0700 to 1900
Saturdays 0700 to 1300

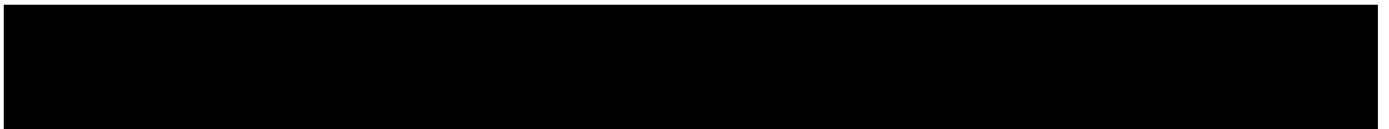
No working on Sundays or Public Holidays

Should you require any further information then please do not hesitate to contact me.

Yours sincerely



M G Metcalfe
LLB (Hons) DipArb FRICS



*Terrestria Limited is incorporated under the Companies Act 2006 as a private company registered in England and Wales,
Company Number 8741702 and having its Registered Office at 6 Engine Mews, Hampton-in-Arden, Solihull B92 0AZ.*



PREPARED: Friday, 13 December 2019

Rudford Industrial Estate, Ford; Concrete Processing Noise Impact

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LIST OF ATTACHMENTS

ASI1466/SP1	Indicative Site Plan,
ASI1466/TH1-TH4	Environmental Noise Time Histories
APPENDIX A	Acoustic Terminology
APPENDIX B	Acoustic Calculations

Project Ref:	ASI1466	Title:	Terrestria Ltd, Rudford Industrial Estate, Ford
Report Ref:	ASI1466.191121.NIA	Title:	Rudford Industrial Estate, Ford; Concrete Processing Noise Impact
Client Name:	The Dudman Group of Companies		
Project Manager:	Daniel Saunders		
Report Author:	Daniel Saunders		
Clarke Saunders Acoustics Winchester SO22 5BE		This report has been prepared in response to the instructions of our client. It is not intended for and should not be relied upon by any other party or for any other purpose.	

1.0 EXECUTIVE SUMMARY

- 1.1 The Dudman Group of Companies has submitted a planning application for permission to install and operate a concrete batching / processing plant at a unit on the Rudford Industrial Estate, Ford.
- 1.2 An assessment has been made of the proposed equipment, and calculations undertaken to ascertain the potential impact at nearest noise sensitive receptors.
- 1.3 Following procedures in BS4142:2014, the proposed plant has been measured in lieu of manufacturers' data and been used to predict the sound impact of the new plant at an assessment location representative of the most affected nearby residential properties.
- 1.4 The assessment indicates that sound emissions from the proposed plant would not have an adverse impact during weekday/Saturday operation.
- 1.5 Dwellings close to the application site already experience a sound climate which includes contributions from external plant and other external industrial activity. Sound from the proposed plant is expected to be consistent with, (and largely indistinguishable from), this existing sound climate.

2.0 INTRODUCTION

- 2.1 Planning approval is being sought for the installation of concrete batching plant at Rudford Industrial Estate, Ford Road, Ford.
- 2.2 Clarke Saunders has been commissioned to undertake an assessment of the potential noise impact of this proposed plant and its operation..
- 2.3 The equipment has been measured whilst fully operational off-site, and a comparison made of the impact of the proposed equipment on the existing noise climate at the proposed location.
- 2.4 The plant has been assessed against BS4142:2014 *Methods for rating and assessing industrial and commercial sound*. This is designed explicitly to assess the impact of industrial sound on residential properties.

3.0 SITE DESCRIPTION

- 3.1 The background sound climate of the area is determined by industrial noise from units already in situ on the estate, and road traffic noise from Ford Road, which bounds the east of the site.
- 3.2 The proposed location for the installation of the upgraded equipment is over 150m away from the boundary of the nearest residential receptor to the south-east of the site.

4.0 ENVIRONMENTAL SOUND SURVEY

- 4.1 An automated survey of environmental sound levels was undertaken at the boundary of the unit on Rudford Industrial Estate at the location shown on site plan ASI1466/SP1. Measurements of consecutive 5 minute L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels were

taken between 12:30 hours on Thursday 21st November and 11:00 hours on Monday 25th November 2019.

4.2 Additional manual and short-term measurements have also been conducted on Thursday 21st November at an existing site in Shoreham-by-Sea to quantify the specific source levels associated with this type of operation. A series of measurements were recorded at various points around the existing concrete plant covering every aspect of its operation. The machinery, a mobile concrete batching plant comprises a hopper for aggregate, conveyor and crushing / grinding section, and a pumping area;

- Elkon Mobile Master 60

4.3 The manual measurements of the plant were taken between 3-5m distant, with the short-term measurements at approximately 6 metres; when the HGV mixer was manoeuvring and filling, the engine cab was approximately 1m from this location. The equipment comprises a hopper for aggregate, conveyor and crushing / grinding section, and pumping to the HGV mixer for distribution.

4.4 The following equipment was used during the course of these two survey exercises:

- Norsonic data logging sound level meter type 118;
- Rion data logging sound level meter type NA28;
- Rion sound level calibrator type NC74;
- Norsonic sound level calibrator type 1251.

4.5 The calibration of the sound level meters was verified before and after use. No significant calibration drift was detected.

4.6 The weather during the survey was dry with light winds, which made the conditions suitable for the measurement of environmental noise.

4.7 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* and BS4142:2014 *Methods for rating and assessing industrial and commercial sound*.

4.8 Please refer to Appendix A for details of the acoustic terminology used throughout this report.

5.0 RESULTS AND DISCUSSION

5.1 Figures ASI1466/TH1-TH4 show the L_{Aeq} , L_{A10} , L_{A50} and L_{A90} sound pressure levels as time histories at the measurement position.

5.2 Measured typical background and average noise levels are shown below;

MONITORING PERIOD	10TH PERCENTILE $L_{A90,5\text{min}}$	AVERAGE $L_{Aeq,T}$
07:00 – 19:00 Weekday	50 dB	63 dB
07:00 – 13:00 Saturday	47 dB	57 dB

Minimum measured background and average noise levels

[dB ref. 20µPa]

- 5.3 The 10th percentile $L_{A90,5\text{min}}$ are considered 'typical lowest' levels and have been selected to represent the Background Sound Level for the daytime period in the following assessment.
- 5.4 The five-minute measurement time interval offers a finer degree of resolution than required by the daytime BS4142:2014 reference time intervals and is therefore expected to provide a robust assessment.
- 5.5 Noise levels generated by the operating processing plant are shown in the table below. This measurement includes all operational aspects of the process, as described;

PLANT OPERATION	DISTANCE	AVERAGE $L_{Aeq,T}$
HGV Manoeuvre / Mixing / Pumping	5m	81 dB

6.0 METHOD OF ASSESSMENT

BS4142:2014 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

- 6.1 BS4142:2014 Methods for rating and assessing industrial and commercial sound is designed explicitly to assess the noise impact from industrial noise on residential properties.
- 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.
- 6.2 The Standard is therefore suited to this assessment.
- 6.3 This Standard compares the sound levels in terms of a L_{Aeq} for a one-hour period during the daytime (07:00 – 23:00 hours) and a fifteen-minute period during the night-time (23:00 – 07:00 hours) due to the sound source, the "Specific Sound Level", with the existing background sound level in terms of an L_{A90} when the sound source is not operating.
- 6.4 The Specific Sound Level can be determined by various means, depending upon the relative level, of otherwise-occurring sound, i.e. the "Residual Sound Level".
- 6.5 As part of the assessment, consideration is given to the character of the sound. The Standard provides the following advice.

6.6 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 sound receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

6.7 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 3dB for impulsivity which is just perceptible at the receiver, 6dB where it is clearly perceptible and 9dB where it is highly perceptible.

6.8 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 +3dB can be applied.

6.9 Intermittency

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

6.10 Impact Assessment

The resultant background sound level is subtracted from the Rating Level to obtain an initial estimate of the impact.

- Typically, the greater this difference, the greater the magnitude of the impact;
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB could be an indication of an adverse impact, depending on the context;
- 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 lower the rating level is relative to the background sound level, the less likely it is that the specific sound source will have an adverse impact.

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

7.0 SOUND IMPACT ASSESSMENT

7.1 Following an inspection of the site, the nearest sound sensitive receiver is situated on Ford Road to the east. The assessment location representing this receptor is indicated on the attached indicative site plan, ASI1466/SP1 and is at least 150 metres away from the proposed plant location. The next closest residential property is at 200m away to Horsemere Green Lane.

- 7.2 The sound impact of the proposed plant items at the assessment location has been assessed following procedures in BS4142:2014 *Methods for rating and assessing industrial and commercial sound* as guidance, using the measured sound data above.
- 7.3 The planning application proposes that the plant will be operational at times between 07:00 and 19:00 hours, Monday to Friday, and on Saturdays between 07:00 and 13:00 hours, with HGV movements and processing / filling operations. The Applicant has confirmed that on a typical day the process of batching / pumping will approximate to up to 30 minutes in each hour.
- 7.4 The Specific Sound Level of the proposed plant and associated processes has been predicted at the assessment location through calculation showing appropriate propagation losses. No intermediate screening has been included, to allow for a robust assessment.
- 7.5 The selected plant is unlikely to be audibly tonal at the assessment location, however it is anticipated the plant may exhibit intermittent characteristics during operation.

ASSESSMENT (Weekday)	DAYTIME $L_{Aeq,1hour}$
Specific Sound Level (predicted)	48dB
Total Acoustic Feature Correction	0dB
Rating Level	48
Background Sound Level	50dB
Assessment Level	-2
Conclusion: Indication of low impact depending on context.	

ASSESSMENT (Saturday)	DAYTIME $L_{Aeq,1hour}$
Specific Sound Level (predicted)	48dB
Total Acoustic Feature Correction	0dB
Rating Level	48
Background Sound Level	47dB
Assessment Level	+1
Conclusion: Indication of low impact depending on context.	

- 7.6 Assuming the advised typical operational capacity is consistent throughout the day, the Rating Level does not exceed the background level during the daytime weekday period. The assessment level is therefore indicating a low impact, reinforced by the context of the ambient sound climate.
- 7.7 The Rating Level during Saturday daytime tends towards indicating a low impact in the context of the ambient sound climate.
- 7.8 Full calculations can be found in Appendix B.

8.0 DISCUSSION AND CONTEXTUAL ANALYSIS

- 8.1 There is no sound emission data available for the proposed equipment, site measurements were therefore taken at an existing operation.
- 8.2 The current revision of BS4142 recognises the importance of the context in which a sound occurs. In this instance, the background sound level legitimately includes sound of an industrial / commercial nature from other operations associated with neighbouring industrial units.
- 8.3 The proposed site is one of many commercial / light industrial units based on the industrial park, several of which are already in closer proximity to the surrounding receptors. Following a brief visual inspection, these include auto-repair units and waste processing operations.
- 8.4 Significant commercial and industrial activity, therefore, already forms part of the existing sound character at nearby residential dwellings. Sound from the proposed plant is expected to be consistent with (and largely indistinguishable from) these existing sources.
- 8.5 No attenuation from screening, ground absorption or air absorption has been assumed within the calculations, leading to a conservative assessment of the sound impact on the residential receptor.

9.0 UNCERTAINTY

- 9.1 As per the requirements of BS4142:2014, the uncertainty in the assessment is considered and reported. This is not an indication of error but an acknowledgment of possible variability of the factors contributing to the assessment.
- 9.2 Use of a calibrated type 1 sound level meter is considered to reduce measurement instrument error to insignificant levels as compared with environmental variations.
- 9.3 The (necessary) use of calculations to predict the Specific Sound Level at the assessment location, (based on manufacturer's data), eliminates any possible error associated with correcting for the residual sound climate.
- 9.4 It is acknowledged that prediction of attenuation effects naturally introduces a degree of uncertainty into calculations.
- 9.5 Any uncertainty associated with the assessment is expected to be sufficiently mitigated by the adoption of a robust Background Sound Level, which is based on five-minute measurement time interval and represents the 10th percentile of the daytime L_{A90} datasets.

10.0 CONCLUSION

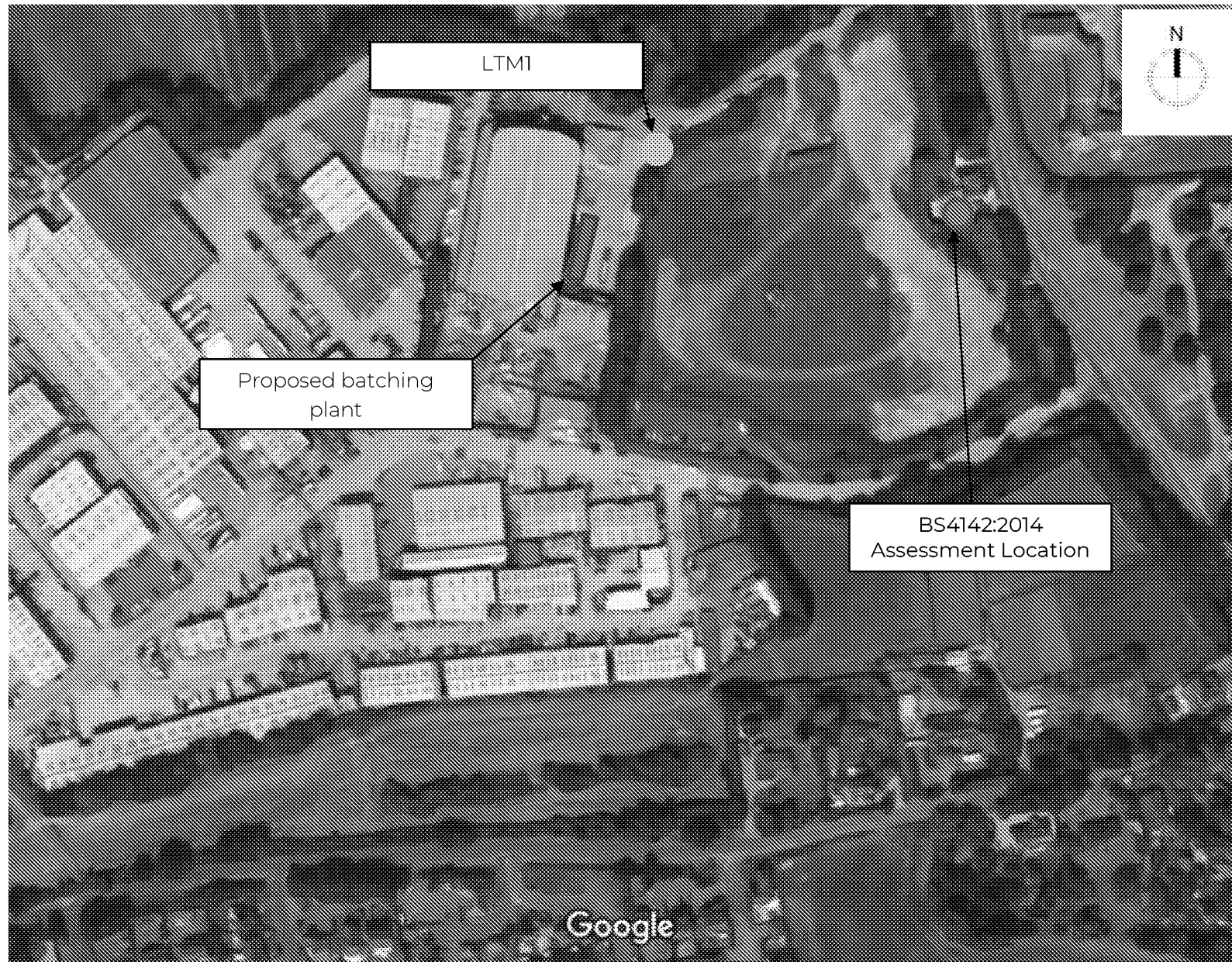
- 10.1 An environmental sound survey has been undertaken at the proposed location for concrete batching plant on Rudford Industrial Estate by Clarke Saunders Associates between 22nd November and 25th November 2019.
- 10.2 Measurements have been made to establish the current background sound climate. Following procedures in BS4142:2014, data for the new plant units have been used to predict the sound impact of the new plant at an assessment location representative of the most

affected nearby residential property. The assessments indicate that sound emissions from the proposed plant would be of low impact, and in the context of the ambient noise climate, unlikely to be of any significance.

- 10.3 Residential receptors close to the application site already experience a sound climate which includes contributions from external plant and other external commercial activity. Sound from the proposed plant during weekday operation is expected to be consistent with, (and largely indistinguishable from), this existing sound climate.

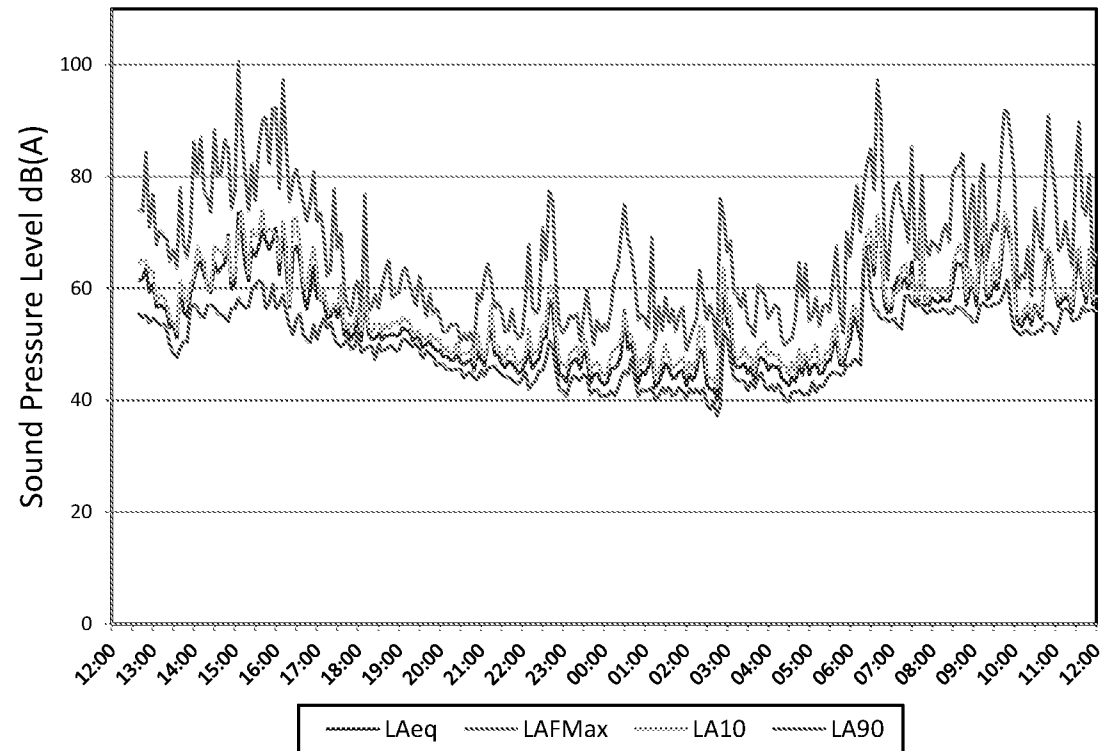


Daniel Saunders MIOA
CLARKE SAUNDERS ACOUSTICS



Terrestria Ltd, Rudford Industrial Estate, Ford

Environmental Noise Time History: LTM1

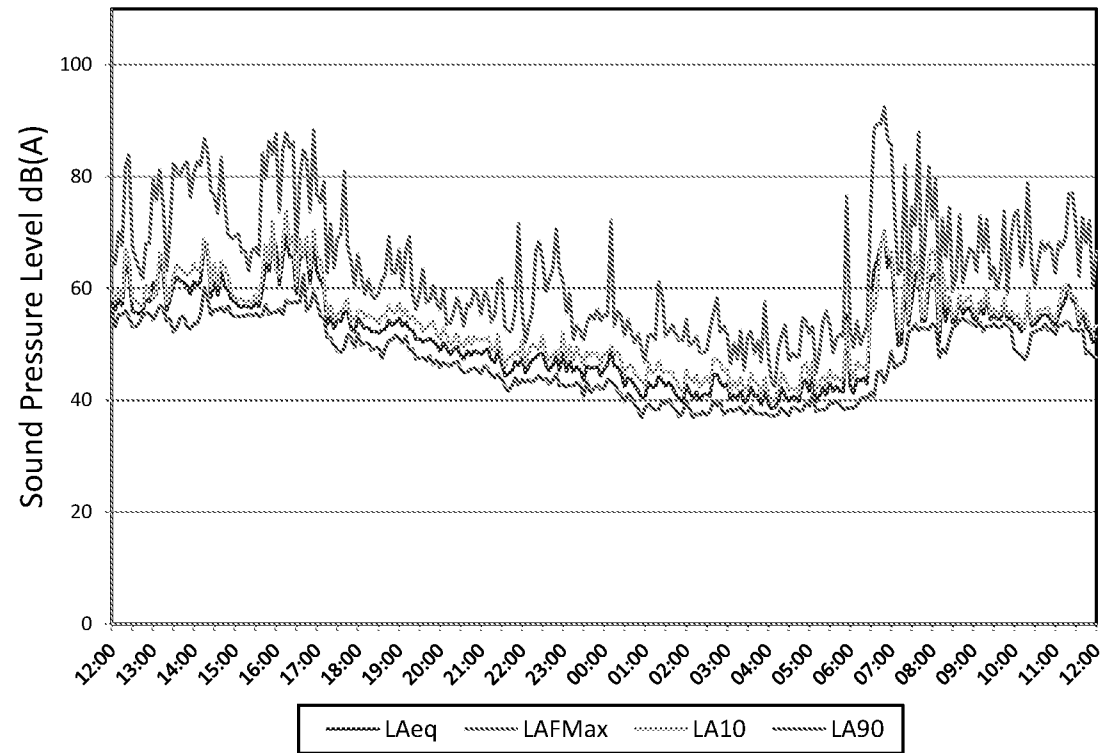


Thursday 21 November to Friday 22 November 2019

Figure AS11466/TH1

Terrestria Ltd, Rudford Industrial Estate, Ford

Environmental Noise Time History: LTM1

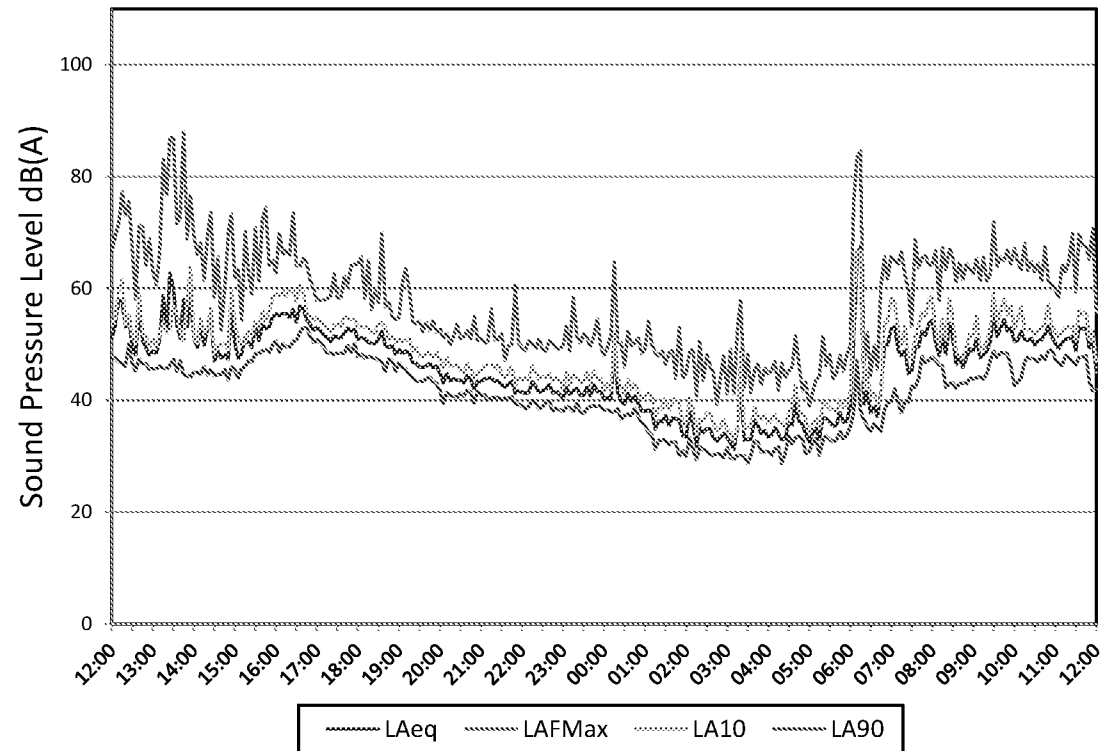


Friday 22 November to Saturday 23 November 2019

Figure AS11466/TH2

Terrestria Ltd, Rudford Industrial Estate, Ford

Environmental Noise Time History: LTM1

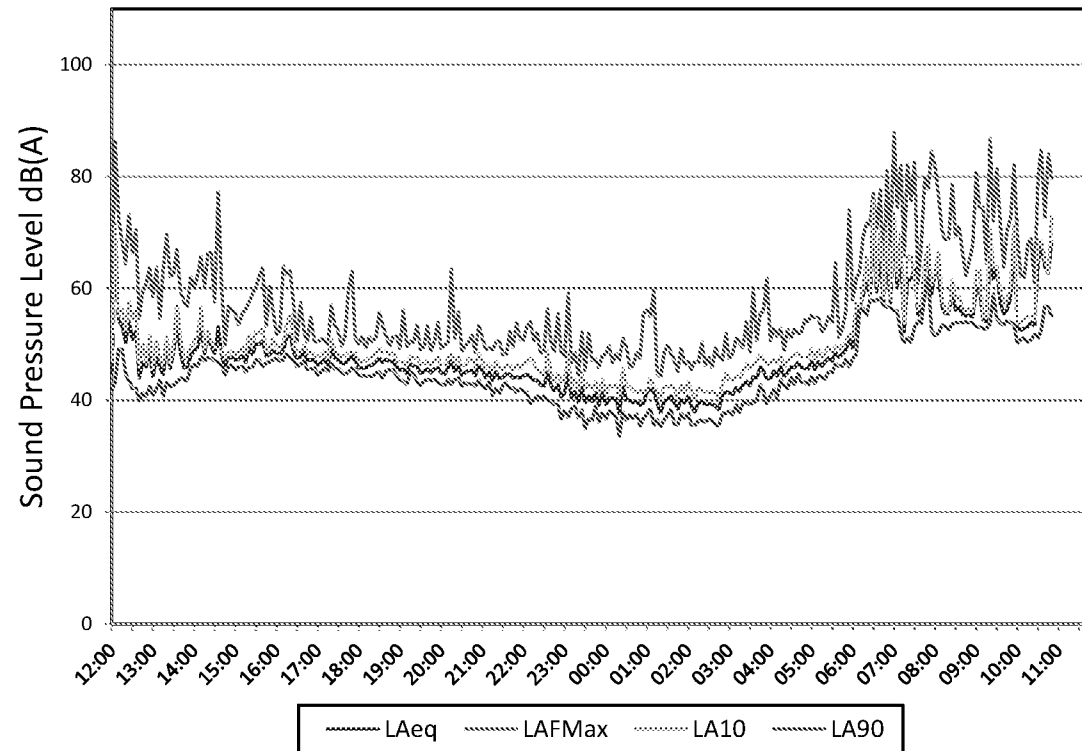


Saturday 23 November to Sunday 24 November 2019

Figure AS11466/TH3

Terrestria Ltd, Rudford Industrial Estate, Ford

Environmental Noise Time History: LTM1



Sunday 24 November to Monday 25 November 2019

Figure AS11466/TH4

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 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.

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

1.4 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.

APPENDIX B

AS11466: Rudford Industrial Estate, Ford External Plant Noise Emissions Calculations

Ford Road, Day; Weekday Operation 07:00 - 19:00

			dB(A)
Elkon Mobile Master 60 & HGV	Lp @	5 m	81
Processing time on per hour (mins)		30 minutes	-3
Distance loss		160 m	-30
Specific Noise Level	L _{Aeq,1hour}		48

Specific Noise Level 48

Specific Noise Level	48
Acoustic Feature Correction	+0
Rating Level	48
Background Noise Level	50
Assessment Level	-2

BS4142: 2014 Assessment:

Indication of the specific sound having low impact, context dependent

APPENDIX B

AS11466: Rudford Industrial Estate, Ford External Plant Noise Emissions Calculations

Ford Road, Day; Saturday Operation 07:00 - 13:00

			dB(A)
Elkon Mobile Master 60 & HGV	Lp @	5 m	81
Processing time on per hour (mins)		30 minutes	-3
Distance loss		160 m	-30
Specific Noise Level	L _{Aeq,1hour}		48

Specific Noise Level 48

Specific Noise Level	48
Acoustic Feature Correction	+0
Rating Level	48
Background Noise Level	47
Assessment Level	1

BS4142: 2014 Assessment:

Indication of the specific sound having low impact, context dependent