

Report VA5167.240325.NIA

62 London Road, Reading

Noise Impact Assessment

05 April 2024

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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 of 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

Planning consent is sought for the conversion of the existing ground floor veterinary surgery (use class E), to an independent primary school (use class F1), at 62 London Road, Reading.

Venta Acoustics has been commissioned by Trinity Christian School to undertake an assessment of the potential noise impact of external child play on nearby noise-sensitive receptors, in order to address the planning concerns of Reading Borough Council:

Noise Assessment – *Required for all applications which would introduce noise generating uses (such as schools) in the vicinity of existing noise sensitive uses (eg. surrounding residential dwellings). The proposals seek permission for up to 60 pupils so should be assessed on this basis.*

An environmental noise survey has been undertaken to determine the prevailing noise climate at the rear of the site, in a location representative of neighbouring residential windows.

Noise library data for children at play has been used to predict typical play levels at the most-affected residential windows overlooking the playground and compared against the guidance levels detailed BS 8233: 2014 *Guidance on sound insulation and noise reduction for buildings*.

The predicted levels are further discussed in the context of the established existing noise climate at the rear of the site, the nature of children at play and other aspects of typical school operation.

The overall impact is considered in the context of the overarching requirements of the National Planning Policy Framework and Noise Policy Statement for England.

2. Design Criterion and Assessment Methodology

2.1 The National Planning Policy Framework (2023)

The revised *National Planning Policy Framework* (NPPF), published in December 2023, sets out the Government's planning policies for England, superseding all previous planning policy statements and guidance.

In respect of noise, the NPPF states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing developments from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

Hence, Paragraph 191 states that *planning policies and decisions should also ensure new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

- a) *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life*
- b) *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason*

In regards to the term adverse impact, reference is made to the Noise Policy for England:

2.2 Noise Policy Statement for England (2010)

The Noise Policy Statement for England (NPSE) sets out the long term vision of Government noise policy: to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

This vision is supported by the following aims:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.*

The terms “significant adverse” and “adverse” are related to the following concepts:

- No Observed Effect Level (NOEL) - the level below which no effect on health and quality of life can be detected.
- Lowest Observed Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The guidance acknowledges that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations, but will be different for different noise sources, receptors and times.

In order to enable assessment of impacts in line with these requirements, reference should be made to other currently available guidance.

2.3 BS8233:2014

BS8233 *Guidance on sound insulation and noise reduction for buildings* provides guidance as to suitable internal noise levels for different areas within residential buildings.

The relevant section of the standard is shown below in Table 2.1.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16 \text{ hour}}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16 \text{ hour}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 \text{ hour}}$	30 dB $L_{Aeq, 8 \text{ hour}}$

Table 2.1 - Excerpt from BS8233: 2014

[dB ref. 20μPa]

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

For external areas the standard states the following:

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.

However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

3. Site Description & Proposals

As illustrated on attached site plan VA5167/SP1, 62 London Road, Reading is a large, part 3-storey, part 2-storey detached building located in a predominantly residential area which also offers professional commercial services and office space.

There is a large parking area at the front of the building, which borders the busy London Road (A4), immediately north of the curtilage. These are further residential houses and professional services located on the opposite side of the road.

There is a private medical and dental centre to the immediate east of the site and residential gardens and carparking to the rear (south) of the site.

The ground floor of 62 London Road was formerly tenanted by a veterinary surgery but is now vacant. The ground floor is proposed for redevelopment as a private school offering space initially for 20 pupils who are to be relocated from the existing Trinity Christian School at 11 Glebe Road, Reading but offering space for up to 60 pupils eventually. The upper floors of 62 London Road provide residential accommodation, which will be retained going forward.

The rear of the site features a large hard standing, which will become the playground area of the redeveloped school. There is a large neighbouring building immediately to the west of the site which offers residential accommodation.

To the rear of this building is another two-storey residential building providing apartment accommodation which overlooks the hard standing and grassed area at the rear of 62 London Road. These receptors will be those most potentially affected by play noise during break and lunch times. It should be noted that there is only an access path externally along this façade of the building and the grass external amenity space serving these dwellings is on the opposite side of the building. This external amenity space will therefore be substantially screened from school play noise by the built form of the site.

The proposed school will operate between 09:00 – 15:00 hours. It is understood that there will likely be a 15-minute break period in the morning and afternoon, with a 1-hour lunch break at midday or early afternoon. During these times, the children will be in the playground, weather dependant.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the existing background noise levels at the site, a noise survey was carried out between Monday 4th and Wednesday 6th March 2024 at the external location shown in site plan VA5167/SP1. 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.

The weather during the survey period was dry with light 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
NTi Class 1 Integrating SLM	XL2	A2A-15892-E0	150497-1	28/3/23
Larson Davis calibrator	CAL200	13069	1506037-2	28/7/23

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 VA5167/TH1-3.

The noise climate at the rear of the site is determined by traffic on the surrounding road network and building services plant serving the neighbouring private healthcare facility.

The typical background and average noise levels measured were:

Monitoring Period, T	Typical ¹ L _{A90,5min}	Average L _{Aeq,T}
Daytime, 07:00 – 23:00 hours	42 dB	52 dB
Night-time, 23:00 – 07:00 hours	37 dB	50 dB
School day, 09:00 – 15:00 hours	44 dB	50 dB

Table 4.2 – Typical background and average noise levels

[dB ref. 20 µPa]

¹ The typical L_{A90} value is taken as the 10th percentile of all L_{A90} values measured during the relevant period.

5. Predicted Play Noise Impact

Levels of child play noise have been predicted at the windows of the most-affected dwellings overlooking the playground at the rear of the site based on source noise levels detailed in ANSI 3.5:1997 – *Methods for calculation of the speech intelligibility index*.

These source levels are as follows:

Vocal effort	Octave Band Centre Frequency (Hz) Sound Pressure L _p @1m (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Normal voice	45	51	57	60	54	49	44	39	60
Raised voice	50	56	62	66	62	57	51	43	67
Loud voice	52	58	64	70	71	66	60	49	74
Shouted voice	53	59	65	75	80	76	69	58	82

Table 5.1 – ANSI 3.5:1997 source levels (average male/female) for varying vocal effort

It has been assumed that a child will exhibit a variety of vocal effort present over a typical 15-minute break or lunch hour, depending on the nature of play. However, it is offered that the louder types of vocal effort will be smaller in percentage terms than the quieter types.

When the above source levels are corrected for the following time-weighting percentages, the source levels are as follows. The resultant overall combined level over an entire 15-minute break, or 1-hour lunch time is also provided:

Vocal effort	Time percentage	Octave Band Centre Frequency (Hz) Sound Pressure L _p @1m (dB)								dB(A)
		63	125	250	500	1k	2k	4k	8k	
Normal voice	53	42	48	54	57	51	46	41	36	57
Raised voice	33	45	51	57	61	57	52	46	38	62
Loud voice	13	43	49	55	61	62	57	51	40	65
Shouted voice	1	33	39	45	55	60	56	49	38	62
Combined	100	48	54	60	65	65	60	54	44	68

Table 5.2 – Time-corrected source vocal levels over a given 15-minute break time, or 1-hour lunch hour

Up to 60 children at a time are expected to be present in the playground area at the rear of the site during break and lunchtimes.

The cumulative noise level at the most affected noise sensitive windows overlooking the playground, at least 17 meters away from the centre of the playground, has been calculated on the basis of the above information with reference to the guidelines set out in ISO 9613-2:1996 *Attenuation of sound during propagation outdoors - Part 2: General method of calculation*.

For the purpose of the assessment, play has been assumed to originate from the centre of the playground. In reality, some play will be closer to the receivers but similarly some will also be further away, and the scenario calculated is likely to be representative of overall levels experienced at the receiver windows.

Levels are provided for a given 15-minute breaktime / 1-hour lunch, as well as averaged levels over a 6-hour school day (09:00 – 15:00 hours) and over a full 16-hour daytime period, as defined in BS8233.

The predicted external levels at the receiver windows are shown in Table 5.3.

Assessment Period	Predicted Cumulative Play Noise Level (external)
15-minute or 1-hour break / lunchtime	$L_{Aeq,15min/1hour}$ 61 dB
6-hour school day, 09:00 – 15:00 hours	$L_{Aeq,6hour}$ 55 dB
16-hour daytime, 07:00 – 23:00 hours	$L_{Aeq,16hour}$ 51 dB

Table 5.3 – Predicted cumulative play noise levels at most affected noise sensitive receivers

A summary of the calculations is shown in Appendix B.

6. Comparison with BS8233

BS8233 guidance is primarily intended for the consideration of anonymous noise, particularly transportation noise. However, consideration of play noise against these guidelines nonetheless provides a useful point of comparison.

Levels over break times and the lunch hour are predicted to be above the upper guideline limit detailed in BS8233 for external areas outside the receptor the windows overlooking the play area. However, there are no external amenity spaces here and so the noise impact would be experienced internally within dwellings, rather than externally.

BS8233 advises that external noise ingress via a partially open window will be attenuated by approximately 15 dB, so internal noise levels over break and lunch times would be approximately $L_{Aeq,15min/1hour}$ **46 dB**. This is approximately 5 dB above the BS8233 relaxed guidelines for daytime resting in living rooms and bedrooms.

When considered over the course of the 6-hour school day, internal levels would drop to approximately $L_{Aeq,6hour}$ **40 dB**, which is commensurate with the relaxed BS8233 guidelines for daytime resting in living rooms and bedrooms.

Averaged over the course of the entire 16-hour daytime period, levels would drop to around $L_{Aeq,6hour}$ **36 dB**, which is commensurate with the BS8233 baseline guidelines for daytime resting in living rooms and bedrooms.

External play noise levels in the amenity space on the opposite side of the receptor building would be at least 14 dB lower than the levels indicated in Table 5.3. Whether considered over break/lunchtimes, the 6-hour school day, or over the entire 16-hour daytime period, levels would be substantially (≥ 3 dB) below the lower guideline level recommended in BS8233 for external amenity spaces and therefore unlikely to result in any notable noise impact.

7. Contextual Analysis

Existing residual noise levels at the rear of 62 London Road and at the neighbouring receivers over the course of the school day are $L_{Aeq,6hour}$ 50 dB. Internal noise levels within the receivers in the absence of play noise would therefore be expected to be around $L_{Aeq,6hour}$ 35 dB with windows partially open.

These existing levels are commensurate with the predicted levels of play noise when averaged over the entire day. Whilst play noise is therefore likely to be clearly audible within residences overlooking the playground during playtimes if residents have their windows open, the existing noise climate at the receivers is clearly not tranquil and play levels are not expected to result in a substantially adverse impact in this context.

Playtimes will occur at regular, predictable intervals throughout the school week. This not only provides extended periods of respite to occupants of the dwellings overlooking the playground when play is not occurring during the day, but also provides occupants with the option to close their windows during playtimes. When windows are closed, this would likely attenuate levels by at least 25 dB, resulting in a low impact internally.

The predictability of times when play occurs may also help to mitigate the perception of noise impact or allow occupants to plan their day around these times.

It should be noted that the most sensitive times of the day for most people will be earlier in the morning when they may still be waking up and in the evening when they are likely to be resting and enjoying quiet amenity. There will be no play noise during these times.

On this basis of predicted noise levels and context in which play noise occurs, it is offered that noise impact on occupants inside the dwellings overlooking the playground is likely to be substantially below the SOAEL and tending towards the LOAEL.

Noise impact in the external amenity area on the opposite side of the receptor building will be below the corresponding BS8233 guidelines and well below the prevailing residual noise climate. Impact here is therefore considered to be commensurate with the LOAEL.

8. Conclusion

Noise library data for children at play has been used to predict typical play levels at the most-affected residential windows overlooking the playground.

When considered in the context of the BS8233 guidelines, existing prevailing noise climate and scheduling of playtimes and other aspects of typical school operation, noise impact is expected to be low and approaching the LOAEL within dwellings overlooking the playground.

Levels in the amenity space on the opposite side of the receptor building would be additionally attenuated by the additional distance and built form of the site and would therefore be below the lower BS8233 external amenity guideline and below the prevailing residual noise climate. Noise impact here would be commensurate with the LOAEL.

On this basis, it is offered that noise impact due to play will be low and would not pose an issue to the proposed change of use.

Ben Alexander MIOA

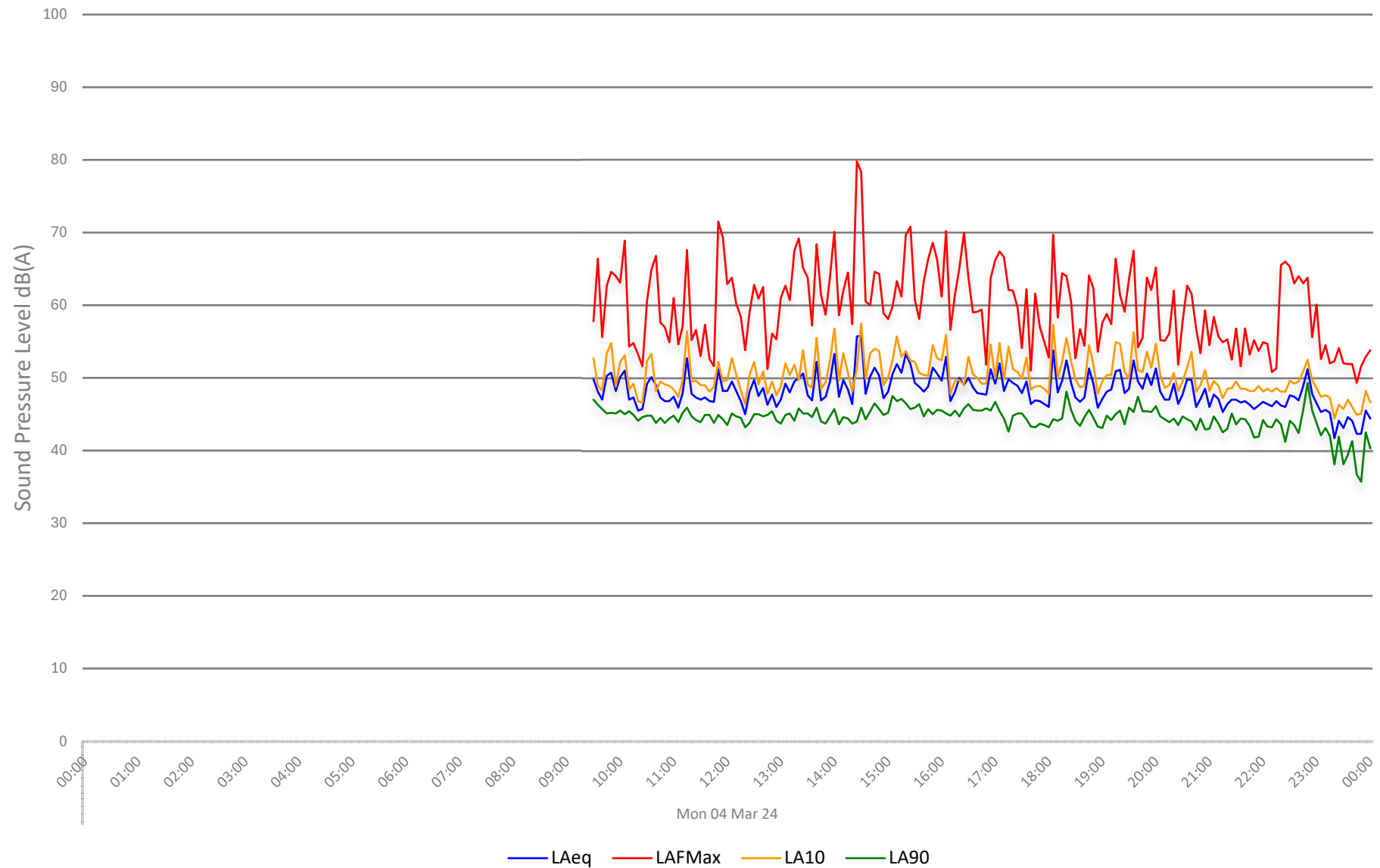


62 London Road, Reading

Environmental Noise Time History: 1



Figure VA5167/TH1

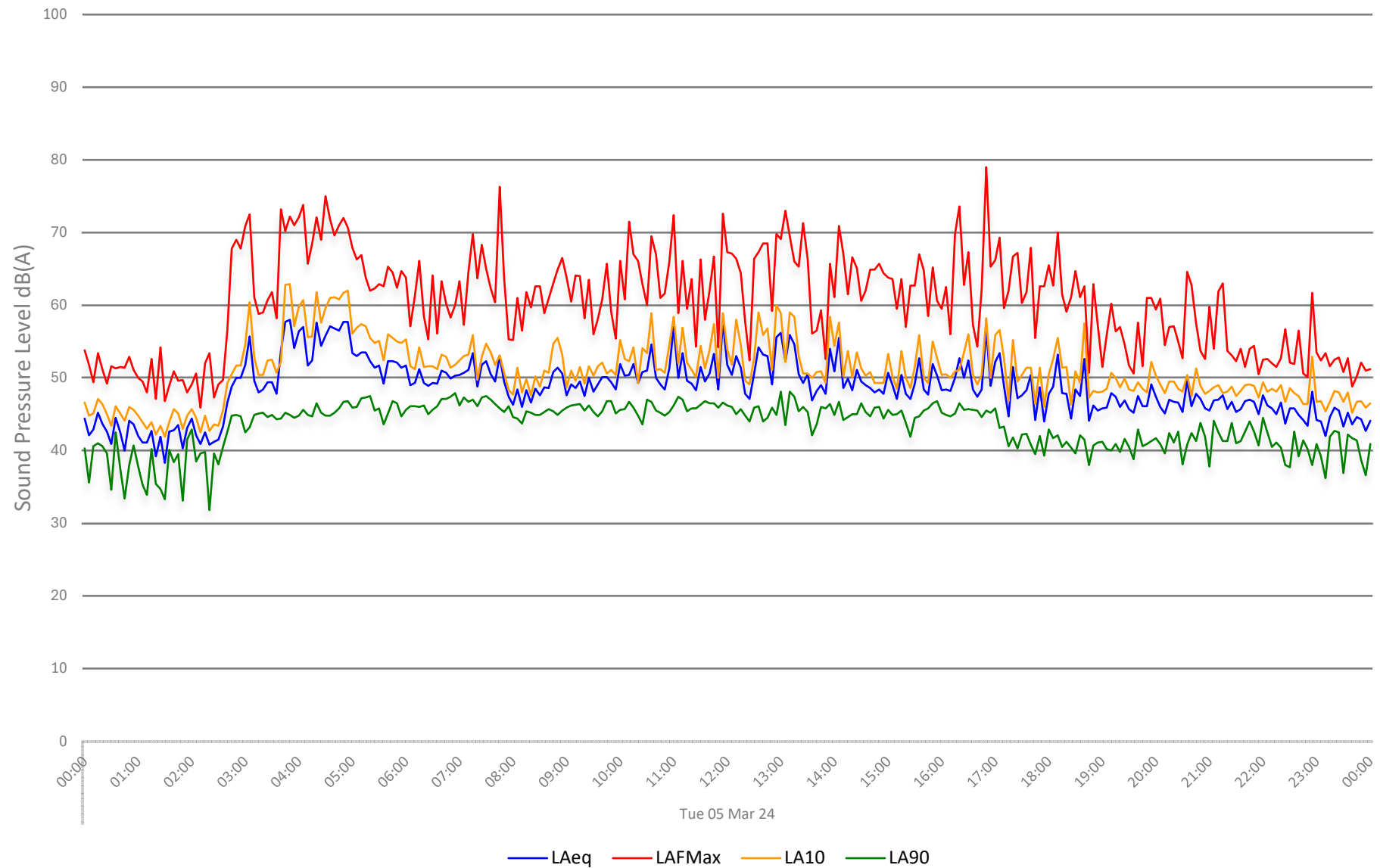


62 London Road, Reading

Environmental Noise Time History: 2



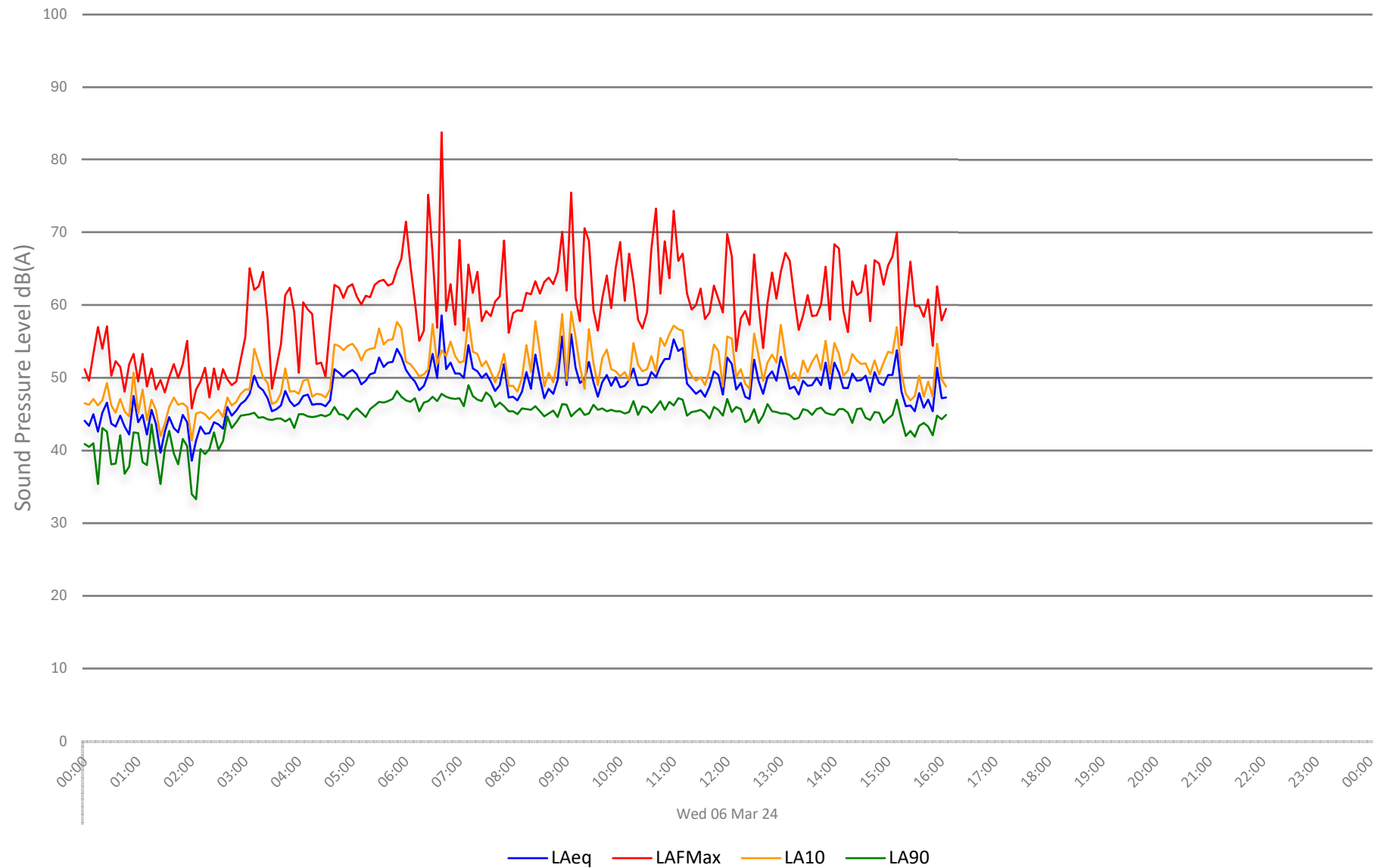
Figure VA5167/TH2



62 London Road, Reading

Environmental Noise Time History: 3

Figure VA5167/TH3



APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

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.

1.1 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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1.2 Human Perception of Broadband Noise

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

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

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

1.3 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

VA5167 - 62 London Road, Reading

Noise Impact Assessment

Assessment: play noise levels at receiver windows over a given 15-minute breaktime, or 1-hour lunch

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Child playing	Lp @ 1m	48	54	60	65	65	60	54	44	68
Number of children	60	18	18	18	18	18	18	18	18	
Distance Loss	To 17m	-25	-25	-25	-25	-25	-25	-25	-25	
Level at receiver	L_{Aeq,15min/1hour}	42	48	54	58	58	54	47	37	61

Assessment: Average play noise levels at receiver windows over the entire school day

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Child playing	Lp @ 1m	48	54	60	65	65	60	54	44	68
Number of children	60	18	18	18	18	18	18	18	18	
Distance Loss	To 17m	-25	-25	-25	-25	-25	-25	-25	-25	
Time correction (6-hour school day)	1.5 hours	-6	-6	-6	-6	-6	-6	-6	-6	
Level at receiver	L_{Aeq,6hour}	36	42	48	52	52	48	41	31	55

Assessment: Average play noise levels at receiver windows, daytime 07:00 - 23:00 hours

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Child playing	Lp @ 1m	48	54	60	65	65	60	54	44	68
Number of children	60	18	18	18	18	18	18	18	18	
Distance Loss	To 17m	-25	-25	-25	-25	-25	-25	-25	-25	
Time correction (16-hour day)	1.5 hours	-10	-10	-10	-10	-10	-10	-10	-10	
Level at receiver	L_{Aeq,16hour}	31	37	43	48	48	43	37	27	51