Report VA5390.240705.NIA

Mendalgief Road, Newport

Noise Impact Assessment

05 July 2024

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1. Introduction

It is proposed to develop a care home as part of a larger residential development on land to the west of Mendalgief Road, Newport.

Venta Acoustics has been commissioned by LNT Construction to undertake an assessment of the current environmental noise impact on the site and provide recommendations for acoustic mitigation, where required, in support of an application for planning permission.

An environmental noise survey has been undertaken to determine the noise levels incident on the site. These levels are then used to undertake an assessment of the likely impact in accordance with the reference to relevant standards and guidance.

Outline mitigation measures are considered and an appraisal of the requirements of external building fabric elements is provided.

2. Guidance and Legislation

Newport City Council has not published planning guidance related directly to consideration of noise impact on new residential uses. The Welsh planning requirements will be addressed.

2.1 Planning Policy Wales (Edition 11, 2021)

Planning Policy Wales (PPW) outlines the Welsh Government's planning policies, including discussions of control of air and noise pollution on and from new developments. The most relevant statements for noise are provided in Section 6.7 and summarised below:

6.7.1 *Clean air and an appropriate soundscape, contribute to a positive experience of place as well as being necessary for public health, amenity and well-being. They are indicators of local environmental quality and integral qualities of place which should be protected through preventative or proactive action through the planning system. Conversely, air, noise and light pollution can have negative effects on people, biodiversity and the resilience of ecosystems and should be reduced as far as possible.*

6.7.6 *In proposing new development, planning authorities and developers must, therefore:*

- *address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors*
- *not create areas of poor air quality or inappropriate soundscape; and*
- *seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.*

6.7.14 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.

PPW does not provide any quantifiable criteria but is supplemented by Technical Advice Notes, with TAN 11 relating to noise.

2.2 Technical Advice Note (Wales) 11, Noise

TAN11 provides criteria for the assessment of noise relating to new developments.

To assist in the assessment of traffic noise sources near proposed residential developments, Appendix A for TAN11 outlines Noise Exposure Categories (NECs) as follows:

NEC	Definition
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Table 2.1 – Noise Exposure Categories

The recommended range of noise levels is provided as follows:

Noise Levels(1) corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB					
Noise Source		Noise Exposure Category			
		A	B	C	D
Road Traffic	07:00-23:00	>55	55-63	63-72	>72
	23:00-07:00 (2)	<45	45-57	57-66	>66
Rail Traffic	07:00-23:00	<55	55-66	66-74	>74
	23:00-07:00 (2)	<45	45-59	59-66	>66
Air Traffic(3)	07:00-23:00	<57	57-66	66-72	>72
	23:00-07:00 (2)	<48	48-57	57-66	>66
Mixed Sources(4)	07:00-23:00	<55	55-63	63-72	>72
	23:00-07:00 (2)	<45	45-57	57-66	>66

Notes:

(1) **Noise levels:** the noise level(s) ($L_{Aeq,T}$) used when deciding the NEC of a site should be representatives of typical conditions.

(2) **Night-time noise levels (23:00-07:00)**: sites where individual noise events regularly exceed 82dBL_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8H}$ (except where the $L_{Aeq,8H}$ already puts the site in NEC D).

(3) **Aircraft noise**: daytime values accord with the contour values adopted by the Department of Transport which relate to levels measured 1.2m above open ground. For the same amount of noise energy, contour values can be up to 2 dB(A) higher than those of other sources because of ground reflection effects.

(4) **Mixed sources:** this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant. To check if any individual noise source is

dominant (for the purposes of this assessment) the noise level from the individual sources should be determined and then combined by decibel addition (remembering first to subtract 2 dB(A) from any aircraft noise contour values). If the level of any one source then lies within 2 dB(A) of the calculated combined value, that source should be taken as the dominant one and the site assessed against the appropriate NEC for that source, rather than using the "mixed source" NECs. If the dominant source is industrial noise see paragraph B17 of Annex B. If the contribution of the individual noise sources to the overall noise level cannot be determined by measurement and/or calculation, then the overall measured level should be used and the site assessed against the NECs for "mixed sources".

Table 2.2 – Recommended Noise Exposure Categories For New Dwellings Near Existing Noise Sources

2.3 WHO Guidelines for Community Noise (1999)

The guidance in this document details suitable noise levels for various activities within residential and commercial buildings.

The relevant sections of this document are shown in Table 2.3.

Criterion	Environment	Design range $L_{Aeq,T}$ dB
Maintain speech intelligibility and avoid moderate annoyance, daytime and evening	Living Room	35 dB
Prevent sleep disturbance, night time	Bedrooms	30 dB

Table 2.3 – Excerpt from WHO **[dB ref. 20µPa]**

This guidance also states:

> *For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times a night (Vallet & Vernet 1991).*

For outdoor living areas, it is stated that:

> *To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB LAeq. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.*

For sleep disturbance, i.e. in bedrooms at night, the NOEL can, therefore, be taken as anything below 30dB(A), whilst the onset of the LOAEL occurs at 30dB(A) and above. The SOAEL cannot be inferred from this information.

During daytime periods, for avoidance of annoyance, the NOEL relates to anything up to 50dB(A) (typically applied to external areas, such as gardens), whilst the onset of the LOAEL occurs at 50dB(A) and above.

2.4 BS8233:2014

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

The relevant section of the standard is shown below in Table 2.4.

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

Table 2.4 – Excerpt from BS8233:2014 - Indoor ambient noise levels for dwellings [dB ref. 20µPa]

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

As illustrated on attached site plan VA5390/SP1, the site is located within a larger residential development currently under phased construction. Bounded by Mendalgief Road to the west and disused railway line to the north with new single-family homes and flats to the south and north, the area is primarily residential in context. On the opposite side of Mendagief Road are established terraced housing with pharmacy and a hospital carpark to the north. No specific noise was noted from these uses.

The primary source of noise expected to affect the new development is traffic on Mendalgief Road, a moderately busy local road, and Cardiff Road, a busier arterial road further to the north.

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 Tuesday 25th and Thursday 27th June 2024 at the location shown in site plan VA5390/SP1. This location was chosen to be representative of the noise level at the most affected site boundary.

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 generally dry with light winds, although higher winds were noted on the night of June 26th. These conditions are not considered to have unduly compromised the noise data.

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
Svantek Class 1 SLM	971	143563	1508506-2	22/4/24
Larson Davis calibrator	CAL200	13049	1504971-3	28/3/23

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 a time-history plot on the attached chart VA5390/TH1-2.

The site is primarily affected by traffic on Mendalgief Road.

The average noise levels for the Daytime and Night-time periods, as measured at the automated monitoring position were:

Monitoring Period	$L_{Aeq,T}$
07:00 – 23:00 hours	61 dB
23:00 – 07:00 hours	54 dB

Table 4.2 – Average ambient noise levels at measurement locations [dB ref. 20µPa]

The typical night time L_{Amax} events, generated by vehicle passbys on Mendalgief Road, were recorded to be in the order of 73dB $L_{Amax,fast}$.

5. Noise Assessment

The noise measurements were undertaken on the site boundary, approximately 4m from the road curbside. The nearest façade of the building will vary between approximately 13m and 30m from the curbside. Allowing for the additional distance, with a correction factor for a line source, the noise levels on the most affected façade would be 5dB lower as follows:

Monitoring Period	$L_{Aeq,T}$
07:00 – 23:00 hours	56 dB
23:00 – 07:00 hours	49 dB

Table 5.1 – Noise levels on most affected facade **[dB ref. 20µPa]**

The rear of the site will be well screened from the road traffic noise by the building form. Noise levels here would be expected to be some 10dB lower again than those shown in Table 5.1.

Referring to the TAN11 guidance values for residential development, the site therefore falls within the **Noise Exposure Category B** at its most affected extent. For NEC B sites, the TAN 11 document recommends that noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.

To demonstrate that occupants of the development will be afforded an appropriate level of protection, the following section reviews the specification of the external building fabric.

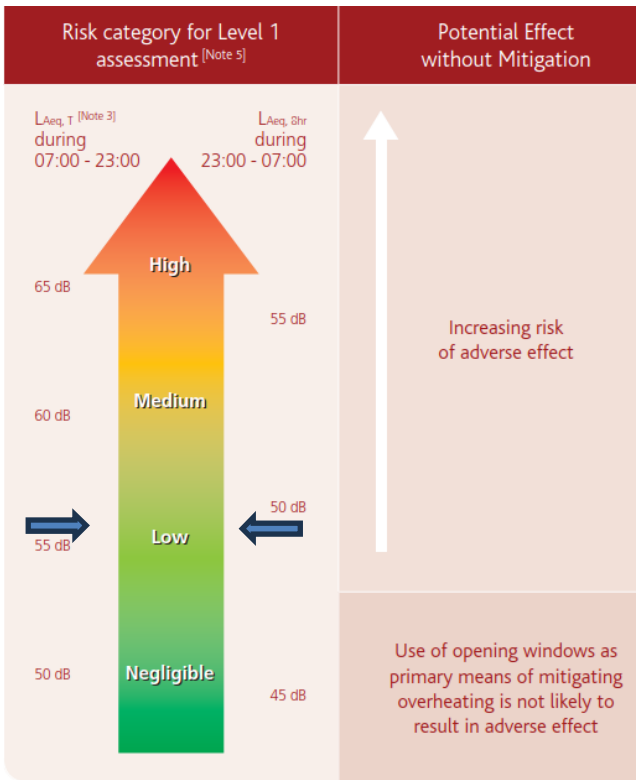
5.2 Good Acoustic Design

The proposal is to construct a new three-storey care home building in a fan shape, with rooms along the wings and communal living spaces in the central portion of the building.

The orientation of the building makes use of the available space, while providing acoustic screening to the rear rooms and moving the majority of the rooms on the front façade further back from the road. The external amenity space at rear of the building will also be well screened.

5.3 Internal Noise Assessment

External noise levels are moderate to low and would be well controlled in internal rooms when occupants decide to keep their windows closed. Therefore, the acoustic implications when occupants choose to open their windows, for example to provide purge ventilation or on warm days, will be considered.



BS8233 allows for a reduction of approximately 10-15dB through a partially open window. On this basis, the guidance in the *Acoustics Ventilation and Overheating Residential Design Guide* [AVOG] would indicate a low risk category relating to noise with the use of openable windows as a means to control the overheating condition.

If overheating in rooms on the east façades of the building would not be prevalent most of the time, overheating could be addressed via partially open windows without

significant noise impact or resultant behavioural change in occupants.

If overheating in rooms on these façades is anticipated to be prevalent most of the time, the use of openable windows may nonetheless be acceptable where measures to reduce overheating occurrence are implemented. These may be passive of active, subject to confirmation by an appropriate assessor.

On the rear façade, the sound levels would fall into the negligible risk category and use of open windows to control overheating would be entirely suitable at all times of the day and night.

A review of the LNT Construction drawings for the proposed scheme has been undertaken with the intent of achieving the internal noise levels from average and maximum noise levels stated in BS8233 and the WHO Guidelines.

5.3.1 Sound Reduction Performances of Building Elements

It has been assumed that all the non-glazed elements, i.e. walls and roof systems, will be capable of providing the following minimum sound insulation performance, when tested in accordance with BS EN ISO 10140-2:2021 *Acoustics - Laboratory measurement of sound insulation of building elements – Part 2: Measurement of airborne sound insulation*.

Building Element	Single figure weighted sound reduction index, dB
Roof	R_w 45
Masonry	R_w 51

Table 5.2 – Assumed sound reductions performances of non-glazed elements

5.3.2 Sound Reduction Performance of Windowsets and Vents

The monitoring data along with the architectural drawings have been used to calculate the required sound insulation performance for the windowsets (glazing and frame combination) and open ventilators for the building. These are summarised in Table 5.3 below.

Glazing Reference	Required Glazing SRI, dB	Ventilator Performance, dB
All Facades	R_w 27	$D_{n,e,w}$ 31

Table 5.3 – Required minimum sound reduction indices for glazing and ventilators

The above performance would be expected to be provided by standard thermal double glazing and trickle ventilators.

It is important that the glazing performance shown is achieved by the entire windowset including frames, ventilators, seals, etc. Glass performance alone would not be likely to show compliance with the specification as the other elements typically provide the weakest noise transmission path.

If trickle vents are used to provide a secure means of whole-dwelling ventilation, the performance shown in Table 5.3 will be required. The figures stated are for a single vent per room. If multiple vents are required, then the performance requirement will increase by a value equal to +10log(*N*), with N being the total number of vents serving the room.

All windows should remain openable at occupant preference, or to allow for cooling and the rapid dilution of pollutants and odours during the purge scenario.

5.3.3 Resultant Internal Noise Levels

With the above recommendations implemented, the noise levels within the proposed rooms would be expected to be in line with recommendations given in the WHO 1999, BS8233:2014 and AVO guidance. Internal noise levels can therefore be considered to be between the NOEL the LOAEL levels.

5.4 Areas of External Amenity

External noise levels comply with the World Health Organisation guideline value for external amenity of $L_{Aeq,16hour}$ 55dB on the western side of the building and the majority of the area to the north of the site.

The outdoor noise levels can therefore be considered to fall between the LOAEL and SOAEL levels, generally being below the level that is expected to cause significant annoyance.

6. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the prevailing noise climate in the locality of Mendalgief Road, Newport in support of a planning application for the proposed development of a new care home as part of the larger residential scheme.

The measured levels have been assessed against the Welsh Planning Policy and TAN11 guidelines, as well as national standards and guidance documents including World Health Organisation *Guidelines for Community Noise* (1999), BS8233:2014 *Guidance on sound Insulation and noise* and AVO guidance.

Noise levels are moderate and would be well controlled with standard building elements. The implication of opening windows to control overheating has been explored and it is seen that a low risk of acoustic impact is anticipated with the use of a natural ventilation strategy, provided that the building does not experience an excessive heat load.

The proposed scheme is not expected to experience a significant adverse noise impact and the site is considered acceptable for the proposed residential use.

Steven Liddell MIOA

Indicative Site Plan

Mendalgief Road, Newport

Environmental Noise Time History: 1

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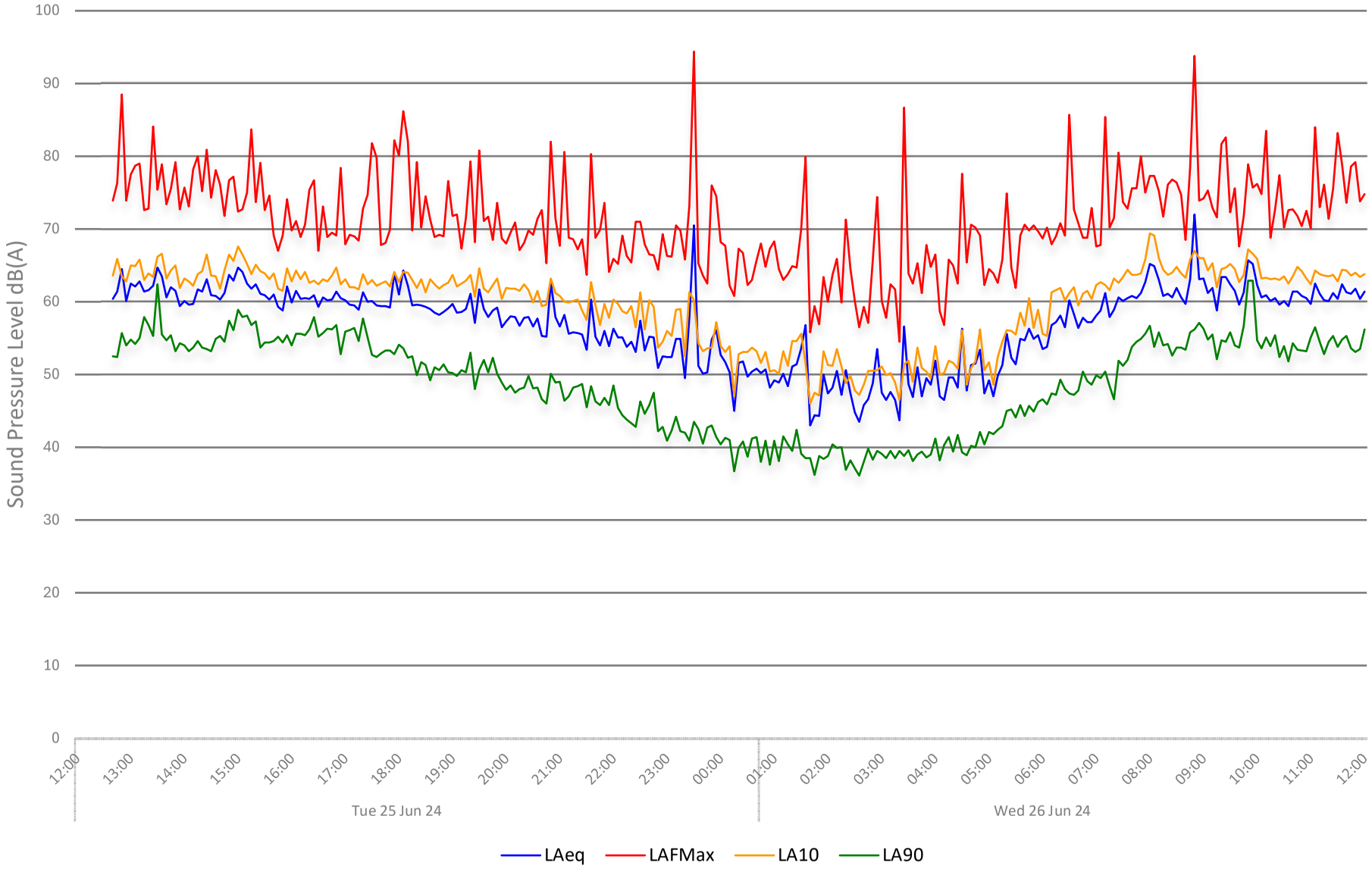
Figure VA5390/TH1



Mendalgief Road, Newport

Environmental Noise Time History: 2

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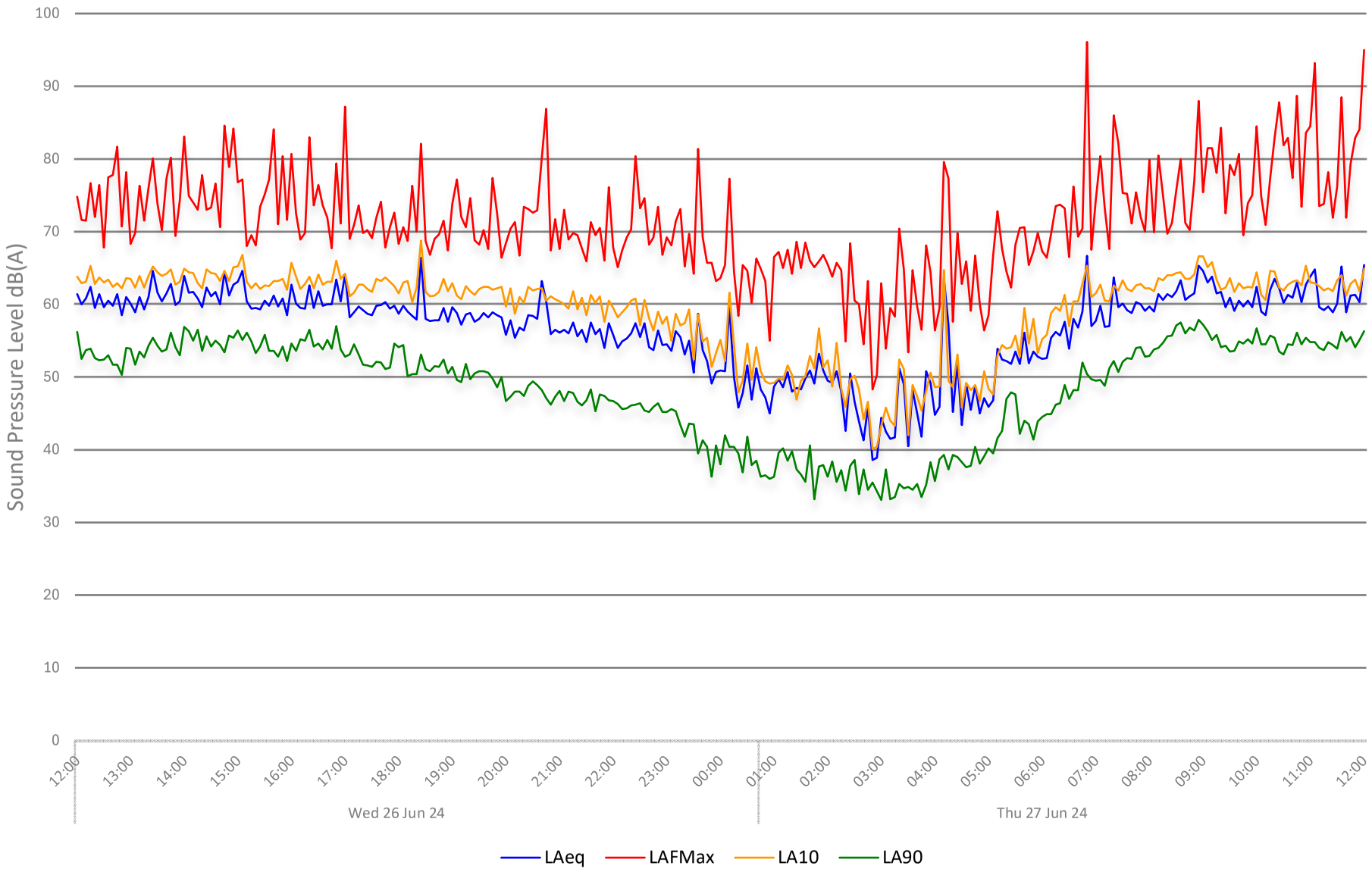
Figure VA5390/TH2



APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

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.
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

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

1.3 Human Perception of Broadband Noise

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

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

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.