

Report VA4070.220301.NIA2

**17 Swaythling Road, West End,
Southampton**

Noise Impact Assessment

01 March 2022

Maidanbuild Homes Limited

01962 461016
0203 8650332
mail@ventaacoustics.com

registered company no. 10139494

Contents

1. Introduction.....	1
2. Guidance and Legislation	1
2.1 The National Planning Policy Framework (2021)	1
2.2 Noise Policy Statement for England (2010).....	2
2.3 WHO Guidelines for Community Noise (1999).....	2
2.4 BS8233:2014	3
2.5 Eastleigh Borough Council Comments	3
2.6 ProPG: Planning & Noise (2017).....	4
3. Site Description.....	5
4. ProPG Stage 1 - Site Risk Assessment	5
4.1 Environmental Noise Survey.....	6
4.1.1 Survey Procedure & Equipment	6
4.1.2 Results	6
4.2 Site Risk Category.....	6
5. ProPG Stage 2 - Acoustic Design Statement.....	7
5.1 Element 1 - Good Acoustic Design Process	7
5.2 Element 2 – Internal Noise Level Assessment.....	7
5.2.1 Sound Reduction Performances of Building Elements.....	7
5.2.2 Sound Reduction Performance of Windowsets and Vents	8
5.2.3 Windowset Performances.....	8
5.3 Areas of External Amenity	9
5.4 Element 4 – Other Relevant Issues.....	9
6. Conclusion	9

Attachments

VA4070/SP1	Indicative Site Plan
VA4070/TH1-TH3	Environmental Noise Time Histories
Appendix A	Acoustic Terminology
Appendix B	Façade Calculations

1. Introduction

A new house is to be constructed at 17 Swaythling Road, West End, Southampton.

Venta Acoustics has been commissioned by Maidanbuild Homes Limited to undertake an assessment of the current environmental noise impact on the site and provide recommendations of 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 National Planning Policy Framework with reference to relevant standards, guidance and the planning requirements of Eastleigh Borough Council.

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

2. Guidance and Legislation

2.1 The National Planning Policy Framework (2021)

The revised *National Planning Policy Framework* (NPPF), published in July 2021, 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 185 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 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 2.1.

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 2.1 – 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 2.2.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB LAeq, 16 hour	-
Dining	Dining Room	40 dB LAeq, 16 hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16 hour	30 dB LAeq, 8 hour

Table 2.2 – 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 LAeq,T, with an upper guideline value of 55 dB LAeq,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.

2.5 Eastleigh Borough Council Comments

Eastleigh Council has provided the following comments and guidance on the application.

The site is likely to be adversely impacted by noise and air pollution from Swaythling Road. Set back from the road, at the dwelling concentrations of nitrogen dioxide and particulates reduce, and air quality is better on the rear side of the proposed dwelling.

We recommend the applicant carries out noise and air quality impact assessments to support the planning application and include means for good acoustical design and ventilation / thermal comfort.

We draw planning colleagues to views of planning committee members on noise and ventilation matters which were reiterated in January 2022 as follows:

- ***For any development, best practice (Professional Practice Guidance on Planning and Noise - ProPG) is that a noise risk assessment should be made at an early stage. If the noise risk assessment concludes that noise is a significant risk to be considered, an acoustic design statement should be drawn up and employed in the design of the buildings.***
- ***On thermal comfort, "The Acoustics, Ventilation and Overheating Guide: Application of the AVO Guide" is intended to demonstrate good acoustic design as described in the ProPG: Planning & Noise, May 2017 when considering internal noise level guidelines." The AVO Guide makes clear that trickle venting may not be sufficient to ensure thermal comfort for residents. The AVO Guides state that an energy consultant should be commissioned to provide an assessment of the risk of overheating in a property to check that ventilation measures will be sufficient to ensure thermal comfort combined with sufficient mitigation of noise levels.***
- ***Overheating is increasingly of concern as climate change is resulting in higher overall temperatures as well as increasing frequency of extreme weather incidents. It is congruent with EBC's objectives on health and wellbeing that thermal comfort and noise are considered.***

2.6 ProPG: Planning & Noise (2017)

ProPG (Professional Practice Guidance: Planning and Noise) 2017 has been jointly developed by the Institute of Acoustics (IOA), the Association of Noise Consultants (ANC) and the Chartered Institute of Environmental Health (CIEH) to guide Local Planning Authorities (LPA's) and Practitioners in assessing the suitability for residential development on sites predominantly exposed to airborne transport noise.

The guidance advocates a proportionate and risk based 2-stage assessment approach.

Stage 1 is an initial noise risk assessment of the site, based on measurements or predictions, in the absence of mitigation or consideration of the proposed layout. A risk category is assigned to the site as follows:

Risk Category	Indicative Daytime Noise Levels $L_{Aeq,16hr}$	Indicative Night Time Noise Levels $L_{Aeq,8hr}$	Pre-Planning Application Advice
Negligible Risk	< 50 dB	< 40 dB	Indication that the development site is likely to be acceptable from a noise perspective and application need not normally be delayed on noise grounds.
Low Risk	50 - 60 dB	40 - 50 dB	Indication that the development site is likely to be acceptable provided a good acoustic design process is followed and is confirmed in a detailed Acoustic Design Statement confirming how noise will be mitigated
Medium Risk	60 - 70 dB	50 - 60 dB	
High Risk	> 70dB	> 60dB	Indication that the development site may be refused on noise grounds unless a good acoustic design process and detailed Acoustic Design statement can demonstrate the significant noise risk can be mitigated.

Notes

- Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is “not dominant”.
- $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.
- An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F} > 60$ dB means the site should not be regarded as negligible risk.

The table suggests hard boundaries between risk categories based on values. The intent is a more considered and progressive increase in risk level as noise levels increase.

Table 2.3 – ProPG Stage 1 Site Noise Risk Assessment

Stage 2 is a detailed assessment of the proposals with consideration of four key elements:

- Element 1 – demonstrating a “Good Acoustic Design Process”
- Element 2 – observing internal “Noise Level Guidelines”
- Element 3 – undertaking an “External Amenity Area Noise Assessment”
- Element 4 – consideration of “Other Relevant Issues”

3. Site Description

As illustrated on attached site plan VA4070/SP1, the site is currently occupied by a small garage/storage building, and is bounded by a shop with an apartment above to the south, houses to the north and west, and Swaythling Road to the east.

The dominant noise source expected to affect the site is road traffic noise.

4. ProPG Stage 1 - Site Risk Assessment

The Stage 1 Assessment assigned a risk category to the site as it exists and before any mitigation measures are considered.

4.1 Environmental Noise Survey

4.1.1 Survey Procedure & Equipment

In order to establish the existing background noise levels at the site, a noise survey was carried out between Tuesday 15th and Friday 18th February 2022 at the location shown in site plan VA4070/SP1. This location was chosen to be representative of the ambient noise level at the new 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.

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-15993-E0	UCRT21/1390	22/3/21
Larson Davis calibrator	CAL200	13049	UCRT21/1385	22/3/21

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.

4.1.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA4070/TH1-3.

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	56 dB
23:00 – 07:00 hours	52 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, were recorded to be in the order of 68dB $L_{Amax,fast}$.

4.2 Site Risk Category

Following Table 2.3, the site is assigned the following risk categories, before mitigation:

Assessment Period	Risk Category
Daytime Traffic Noise Levels	Low Risk
Night Time Traffic Noise Levels	Medium Risk
Implications Indication that the development site is likely to be acceptable provided a good acoustic design process is followed and is confirmed in a detailed Acoustic Design Statement confirming how noise will be mitigated	

Table 4.3 – Site Noise Risk Categorisation

5. ProPG Stage 2 - Acoustic Design Statement

5.1 Element 1 - Good Acoustic Design Process

The site does not provide an opportunity to position the building to minimise noise.

However, the layout of the site has been optimised as far as practicable, with the living room window at the front façade of the ground floor being partially screened by the new garage building, and the non-noise sensitive hallway being more exposed to the noise from the road.

At first floor level, there are four bedrooms, with two at the front and two at the rear of the building, which does not allow for relocating rooms to a façade that is not exposed to traffic noise. The use of the most sheltered façade for windows at the rear (west) is not available due to concerns about overlooking the existing dwellings.

This layout is considered to follow Good Acoustic Design principles.

5.2 Element 2 – Internal Noise Level Assessment

A review of the Tycoh Design 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.

To the rear of the building, with the new built form in place, noise levels are expected to be at least 10dB lower than those measured during the noise survey. Assuming a 15dB loss for a partially open window, this would result in internal noise levels for both average and maximum events being achieved to the rear of the building with open windows. Elsewhere, an attenuated means of ventilated will be required.

5.2.1 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 10140-2:2010 *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
Masonry	R _w 51

Table 5.1 – Assumed sound reductions performances of non-glazed elements

5.2.2 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 5.2 below.

Glazing Reference	Required Glazing SRI, dB	Ventilator Performance, dB
Living Room, Front Bedrooms	R_w 27	$D_{n,e,w}$ 29
Rear Bedrooms	Non-acoustic glazing	Openable windows

Table 5.2 – Required minimum sound reduction indices for glazing and ventilators

In order that windows may remain closed to maintain the internal noise levels, it is expected that attenuated means of background ventilation will be required. If trickle vents are used the performance shown in Table 5.2 will be required. The figures stated are for a single vent per room. If multiple vents are required, then the performance requirement shown in Table 5.2 will increase by a value equal to $+10\log(N)$, with N being the total number of vents serving the room. It should be noted that there is no reason why windows could not be opened as a matter of personal preference or for purge ventilation.

5.2.3 Windowset Performances

It is important that the performance shown in Table 5.2 are 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.

It should be noted that the performances required from the glazing and ventilators would be expected to be achieved using any suitable thermal double glazing unit and 'standard' ventilator, which often provide around $D_{n,e,w}$ 30dB.

The ventilator performances provided would need to be achieved with the vents open. Should this performance not be achievable, a mechanical ventilation solution may be required.

Passive ventilators alone may not provide sufficient air flow for summer overheating in the front bedrooms, which should be evaluated by a suitably qualified thermal engineer.

With the above recommendations implemented, the noise levels within the proposed dwellings would be expected to meet the recommendations of BS8233 and WHO when occupants choose to have windows closed.

Internal noise levels can therefore be considered to be between the NOEL the LOAEL levels.

5.3 Areas of External Amenity

The garden is to be located to the rear of the building and hence will be screened from the road noise. With the screening provided by the house and the garage, external noise levels are expected to be reduced to below $L_{Aeq,16\text{hour}}$ 50dB, meeting with the lower recommended noise level in the World Health Organisation guideline value for external amenity. To the front and sides of the garden it is recommended that a 1.8m close board fence/gate is installed to the side of the property to mitigate noise down the side of the building.

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

5.4 Element 4 – Other Relevant Issues

No significant commercial noise sources were noted around the site at the time of the survey.

The site is in an established residential area and is not unique in its proximity to the road traffic noise.

The construction of the new house would provide a level of screening of the road, benefiting the existing houses to the west.

The scheme is considered to comply with the intents of local and national planning policies.

6. Conclusion

A noise survey has been undertaken by Venta Acoustics to establish the prevailing noise climate in the locality of 17 Swaythling Road, West End, Southampton in support of a planning application for the proposed development of a new residential dwelling.

The measured levels have been assessed against the ProPG 2017 document to provide a Stage 1 noise risk assessment of the site for residential development.

The Stage 1 assessment indicates a low to medium noise risk for the site, indicating that acoustic design would be required.

A Stage 2 Acoustic Design Statement is included in which the proposed site layout and building orientation have been reviewed. These are considered to comply with the goal of mitigating noise as far as possible through good acoustic design.

Recommendations have been provided regarding the minimum level of performance to be provided by the windows and ventilators. A discussion of the requirement for mechanical ventilation for the two front bedrooms has been included which would need to be evaluated by a thermal engineer.

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

Jamie Duncan MIOA

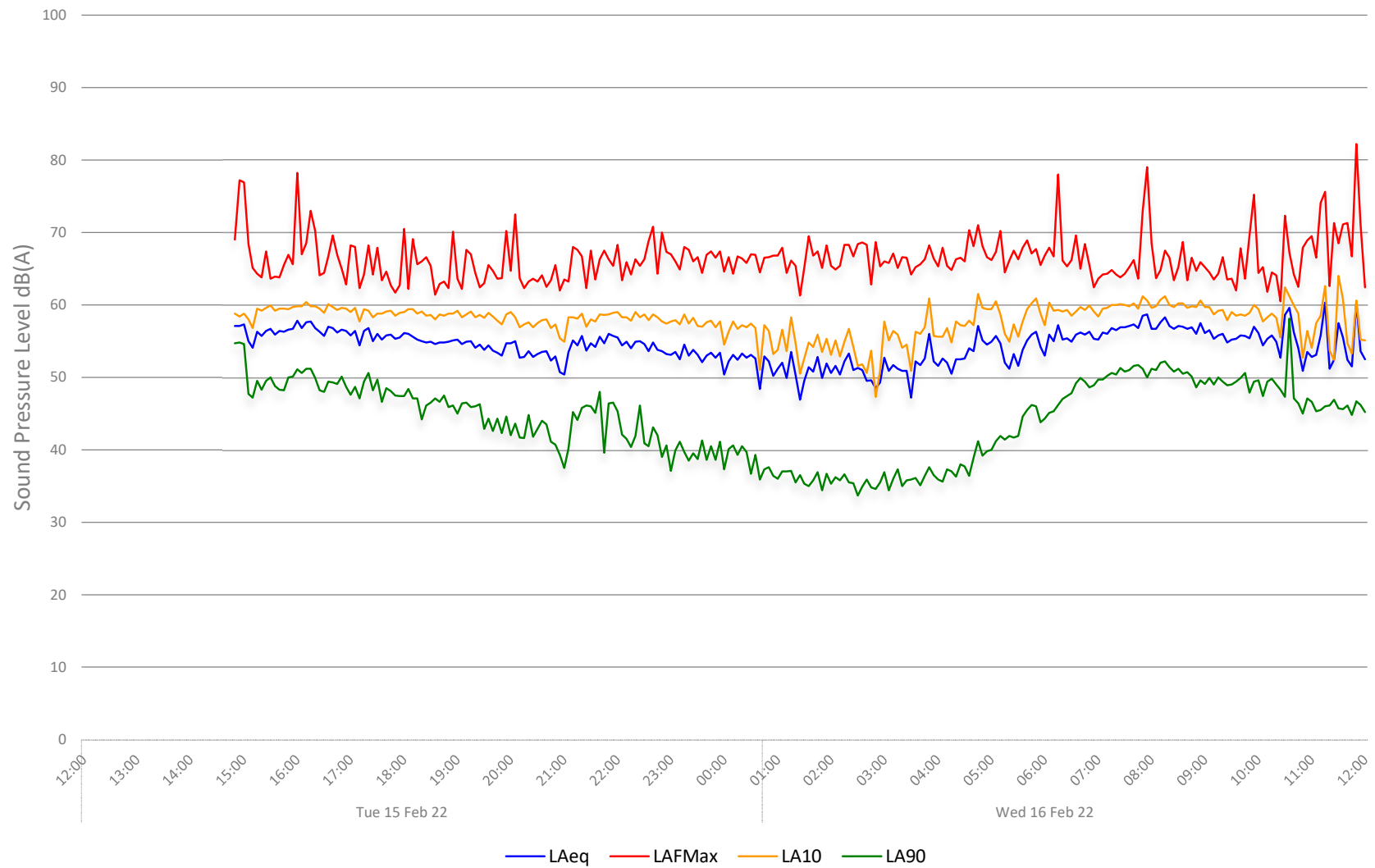


17 Swaythling Road, West End, Southampton

Environmental Noise Time History: 1



Figure VA4070/TH1

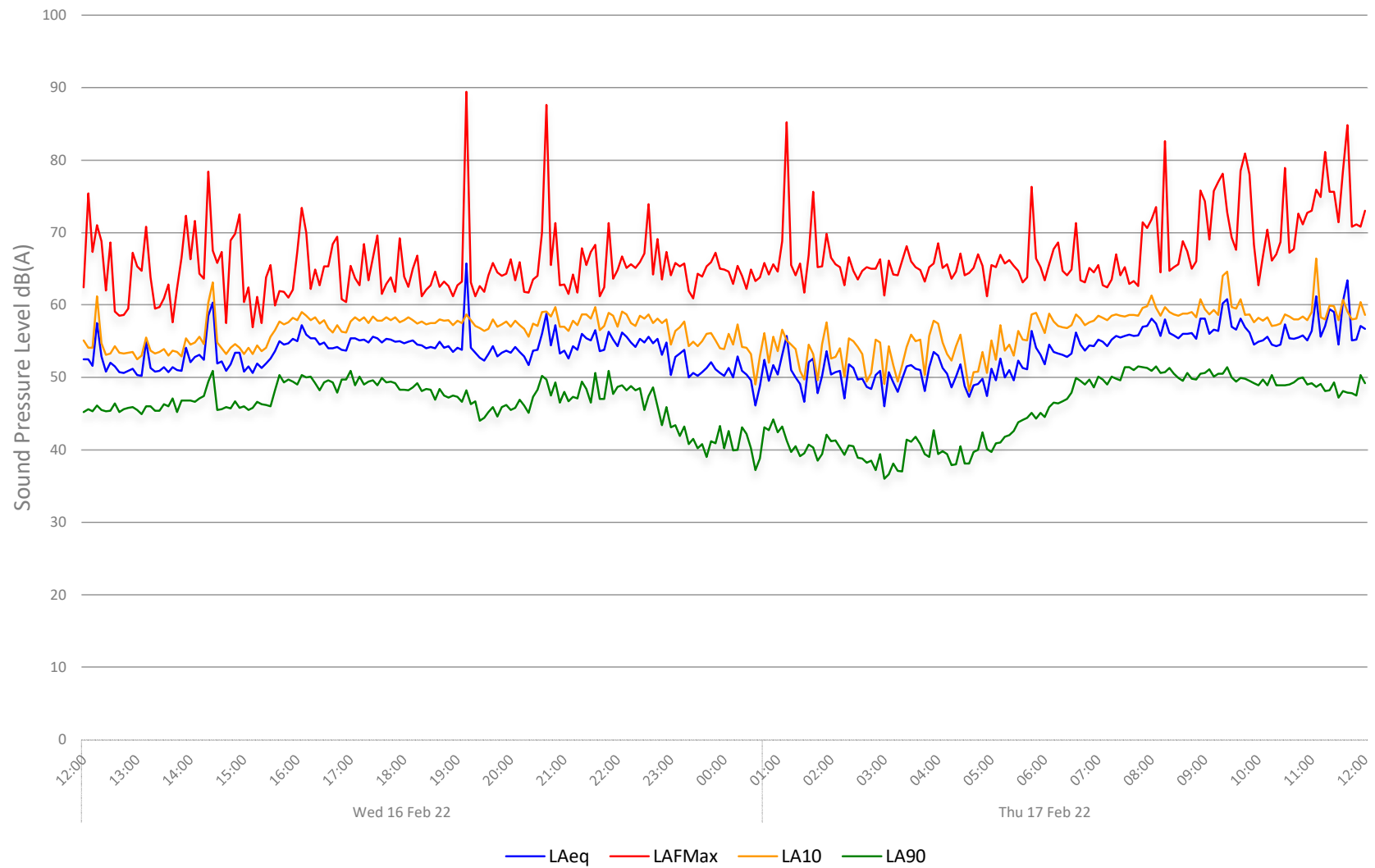


17 Swaythling Road, West End, Southampton

Environmental Noise Time History: 2

 **VENTA** ACOUSTICS

Figure VA4070/TH2

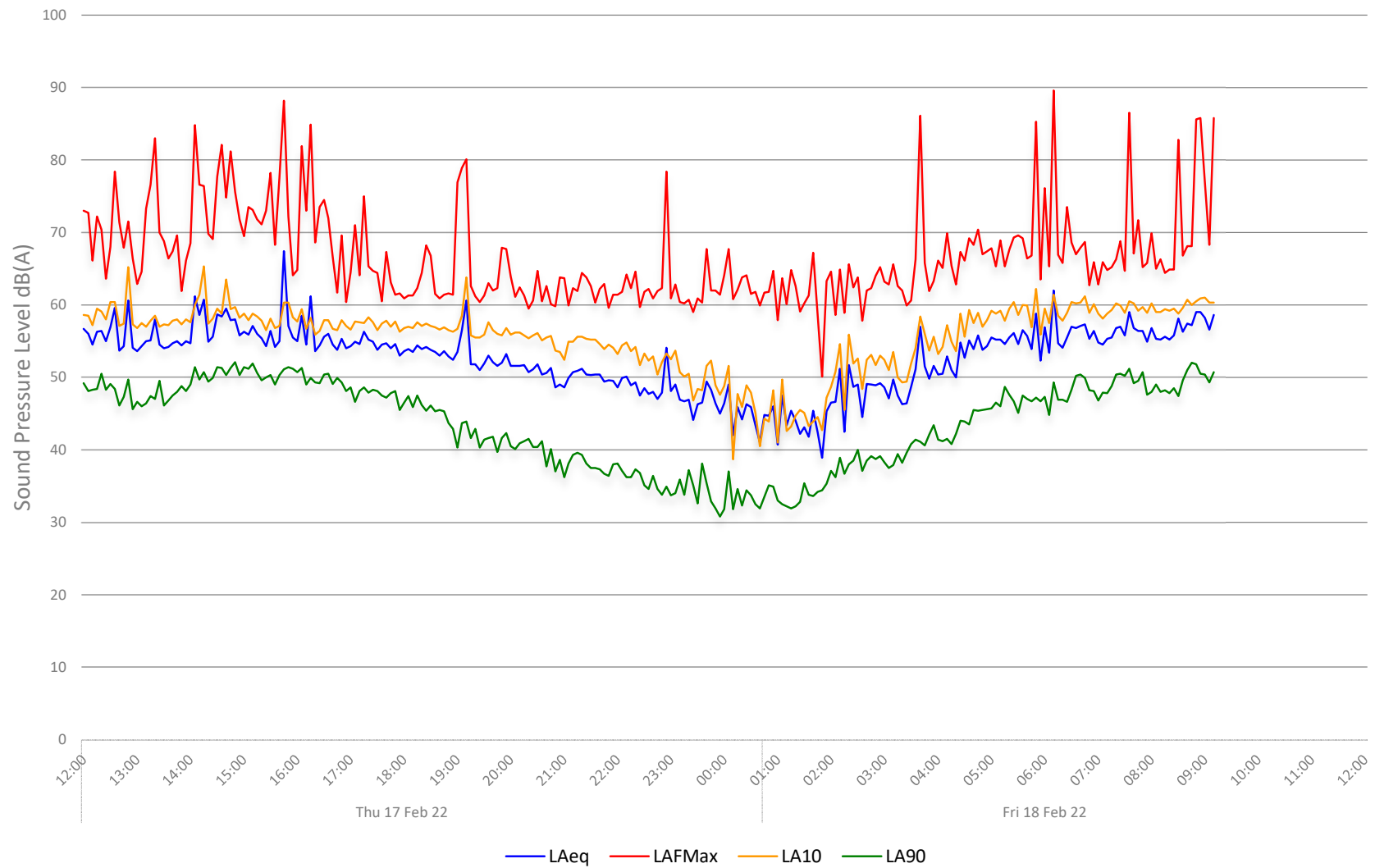


17 Swaythling Road, West End, Southampton

Environmental Noise Time History: 3

 **VENTA** ACOUSTICS

Figure VA4070/TH3



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 . 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.
R	<i>Sound Reduction Index</i> . Effectively the <i>Level Difference</i> 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.

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

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

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

Appendix B

Façade Calculations

BS8233 Calculation of Noise Break-in

V2.4

Project Number: 4070

Project Name: 17 Swaythling Road, West End, Southampton

Description: Living Room

Term	Term Description	Value
S_f	Façade area (incl. window) (m ²)	14.7
S_{wi}	Area of the windows (m ²)	2.4
S_{rr}	Area of the ceiling (m ²)	0.0
S_{ew}	Area of the external wall (m ²)	12.3
S	Area of facade and roof	14.7
x	Room Dimension x	6.4
y	Room Dimension y	11.0
z	Room Dimension z	2.3
RT	Receiving Room RT	Typical furnished Living Room: VA
K	Façade correction	0.0

	Term	Term Description	Description	Octave Band Centre Frequency						dB(A)
				125	250	500	1000	2000	4000	
A	L _{eq,ff}	Free-field L _{eq} outside room	Enter the Octave Band L _{eq} Data	55	53	52	53	48	42	56
	D _{n,e}	Insulation of the trickle vent	29dB Titon Maxiglaze 8000 Ventilator	33	28	30	27	28	33	
B		$\frac{A_0}{S} 10^{\frac{-D_{n,e}}{10}}$		0.00037	0.00118	0.00066	0.00132	0.00103	0.00038	
	R _{wi}	SRI of the window	Rw27 BS8233 Example - 6-12-6 insulated glass unit	26	29	33	28	24	100	
C		$\frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}}$		0.00041	0.00020	0.00008	0.00026	0.00064	0.00000	
	R _{ew}	SRI of the external wall	Rw51 Typical Cavity Wall	41	43	48	50	55	55	
D		$\frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}}$		0.00007	0.00004	0.00001	0.00001	0.00000	0.00000	
	R _{rr}	SRI of roof/ceiling								
E		$\frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}}$		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
F		10log(B + C + D + E)		-31	-28	-31	-28	-28	-34	
	A	Equivalent Absorption Area		68	55	51	54	54	54	
G		10log(S/A)		-7	-6	-5	-6	-6	-6	
H	3	Correction Factor		3	3	3	3	3	3	
	L _{eq}	Internal Noise Level (F + G + H)		21	22	18	22	18	5	25 dB(A)

BS8233 Calculation of Noise Break-in

V2.4

Project Number: 4070

Project Name: 17 Swaythling Road, West End, Southampton

Description: Bedroom Front

Term	Term Description	Value
S_f	Façade area (incl. window) (m ²)	8.5
S_{wi}	Area of the windows (m ²)	1.4
S_{rr}	Area of the ceiling (m ²)	0.0
S_{ew}	Area of the external wall (m ²)	7.1
S	Area of facade and roof	8.5
x	Room Dimension x	3.7
y	Room Dimension y	4.6
z	Room Dimension z	2.3
RT	Receiving Room RT	Typical furnished bedroom: VA
K	Façade correction	0.0

	Term	Term Description	Description	Octave Band Centre Frequency						dB(A)
				125	250	500	1000	2000	4000	
A	L _{eq,ff}	Free-field L _{eq} outside room	Enter the Octave Band L _{eq} Data	53	49	48	49	44	41	52
	D _{n,e}	Insulation of the trickle vent	29dB Titon Maxiglaze 8000 Ventilator	33	28	30	27	28	33	
B		$\frac{A_0}{S} 10^{\frac{-D_{n,e}}{10}}$		0.00065	0.00204	0.00115	0.00229	0.00178	0.00066	
	R _{wi}	SRI of the window	Rw27 BS8233 Example - 6-12-6 insulated glass unit	26	29	33	28	24	100	
C		$\frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}}$		0.00042	0.00021	0.00008	0.00027	0.00067	0.00000	
	R _{ew}	SRI of the external wall	Rw51 Typical Cavity Wall	41	43	48	50	55	55	
D		$\frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}}$		0.00007	0.00004	0.00001	0.00001	0.00000	0.00000	
	R _{rr}	SRI of roof/ceiling								
E		$\frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}}$		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
F		10log(B + C + D + E)		-29	-26	-29	-26	-26	-32	
	A	Equivalent Absorption Area		19	17	16	17	18	18	
G		10log(S/A)		-3	-3	-3	-3	-3	-3	
H	3	Correction Factor		3	3	3	3	3	3	
	L _{eq}	Internal Noise Level (F + G + H)		23	23	20	23	18	9	25 dB(A)

BS8233 Calculation of Noise Break-in - Maximum Events

V2.4

Project Number: 4070

Project Name: 17 Swaythling Road, West End, Southampton

Description: Bedroom Front

Term	Term Description	Value
S_f	Façade area (incl. window) (m ²)	8.5
S_{wi}	Area of the windows (m ²)	1.4
S_{rr}	Area of the ceiling (m ²)	0.0
S_{ew}	Area of the external wall (m ²)	7.1
S	Area of façade and roof	8.5
x	Room Dimension x	3.7
y	Room Dimension y	4.6
z	Room Dimension z	2.3
RT	Receiving Room RT	Typical furnished bedroom: VA
K	Façade correction	0.0

Term	Term Description	Description	Octave Band Centre Frequency						dB(A)
			125	250	500	1000	2000	4000	
A	$L_{max,ff}$	Free-field L_{max} outside room	Enter the Octave Band L_{max} Data						68
	$D_{n,e}$	Insulation of the trickle vent	29dB Titon Maxiglaze 8000 Ventilator						
B	$\frac{A_{0,10}}{S} 10^{-\frac{D_{n,e}}{10}}$		0.00065	0.00204	0.00115	0.00229	0.00178	0.00066	
	R_{wi}	SRI of the window	Rw27 BS8233 Example - 6-12-6 insulated glass unit						
			26	29	33	28	24	100	
C	$\frac{S_{wi}}{S} 10^{-\frac{R_{wi}}{10}}$		0.00042	0.00021	0.00008	0.00027	0.00067	0.00000	
	R_{ew}	SRI of the external wall	Rw51 Typical Cavity Wall						
			41	43	48	50	55	55	
D	$\frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}}$		0.00007	0.00004	0.00001	0.00001	0.00000	0.00000	
	R_{rr}	SRI of roof/ceiling							
E	$\frac{S_{rr}}{S} 10^{-\frac{R_{rr}}{10}}$		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
F		$10\log(B + C + D + E)$	-29	-26	-29	-26	-26	-32	
	A	Equivalent Absorption Area	19	17	16	17	18	18	
G		$10\log(S/A)$	-3	-3	-3	-3	-3	-3	
H	3	Correction Factor	3	3	3	3	3	3	
	L_{max}	Internal Maximum Noise Level (F + G + H)	41	40	36	37	33	25	41 dB(A)