

Report VA5675.250102.NIA1.1

17-21 Wellington Way, Waterlooville

Noise Impact Assessment

02 January 2025

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Contents

1.	Introduction	1
2.	Site Description	1
3.	Design Criterion and Assessment Methodology	1
3.1	Local Authority Requirements	1
3.2	BS4142:2014+A1:2019	2
3.3	BS8233:2014	3
4.	Environmental Noise Survey	3
4.1	Survey Procedure & Equipment	3
5.	Results	4
6.	BS4142 Noise Impact Assessment	4
6.1	Proposed plant.....	4
6.2	Acoustic Character Correction	5
6.3	Recommended Mitigation Measures	5
6.4	Rating Noise Level and Assessment	6
6.5	Context	6
6.6	Uncertainty	7
7.	Conclusion.....	7

Attachments

VA5675/SP1	Indicative Site Plan
VA5675/TH1-TH4	Environmental Noise Time Histories
Appendix A	Acoustic Terminology
Appendix B	Acoustic Calculations

Report Version	Author	Approved	Changes	Date
NIA	Ben Alexander	Steven Liddell	-	13/12/2024
NIA1.1	Ben Alexander	Steven Liddell	Minor update to Table 6.5 and Table 6.6.	02/01/2025

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

It is proposed to install five new condensing units at the rear of 17-21 Wellington Way, Waterloooville.

Venta Acoustics has been commissioned by Healthy Pet Store to undertake an assessment of the potential noise impact of these proposals on in support of an application for planning permission.

An environmental noise survey was undertaken to determine the background noise levels at the site. A requested by Havant Borough Council, these levels, along with manufacturer's published noise data for the proposed condensing units, is used to undertake an assessment of the likely impact with reference to the methodology in BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.

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

2. Site Description

As illustrated on attached site plan VA5675/SP1, 17-21 Wellington Way is a two-storey corner commercial unit located in the Wellington Way Shopping Centre in central Waterloooville.

Healthy Pet Store intends to occupy the unit and has submitted a planning application which includes for the installation of 5 no. condensing units at low level at the rear of the building.

As part of the wider refurbishment and redevelopment of the shopping centre, the first floor above the location where the condensing units are to be installed will be converted into apartments, with windows overlooking the install location. These receivers will be the most affected by noise emissions from the units.

3. Design Criterion and Assessment Methodology

3.1 Local Authority Requirements

Havant Borough Council has confirmed the following assessment requirements:

Thank you for consulting with the Environmental Protection Team on the above planning application. Please note this response relates to noise only. Please accept this email as confirmation that we recommend refusal of the application as there is failure to assess the potential noise impacts of the 5 air condenser units on the amenity of the nearby noise sensitive receptors. Any future application must be accompanied by a British Standard 4142:2014+A1:2019 noise report 'Methods for rating and assessing industrial and commercial sound'.

Additionally I note under APP/23/00106 there is permission to build flats directly above the commercial premises subject of this application. Potentially there will be bedroom windows etc directly above the units which would be affected by the noise including tonal noise and any structure-borne noise. It may be possible to mitigate the noise from the condensers through enclosure, but I cannot comment on how successful this would be. Relocation of the condenser units could be considered.

3.2 BS4142:2014+A1:2019

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

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

The Standard is therefore suited to this assessment.

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

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

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

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

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

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

An initial estimate of the impact of the source is then obtained by subtracting the typical background noise level, in terms of a LA90 value over the relevant period of operation, from the corrected Specific Sound Level.

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

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

3.3 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 3.1.

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 3.1 - Excerpt from BS8233: 2014

[dB ref. 20µPa]

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 10th and Friday 13th December 2024 at the external first floor location shown in site plan VA5675/SP1. The microphone was installed on builders' scaffold outside where the committed development receiver windows will be. Measurements at this location are therefore representative of the noise climate that will be experienced outside these receiver windows.

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. 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
Svantek Class 1 Integrating SLM	958A	59177	Sound: UCRT23/1144	31/1/23
Larson Davis calibrator	CAL200	13069	1509201-4	19/7/24

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.

5. Results

The measured sound levels are shown as time-history plots on the attached charts VA5675/TH1-4.

The background noise level is determined by traffic on the surrounding road network.

The typical background noise levels measured were:

Monitoring Period	Typical ¹ $L_{A90,5min}$
07:00 – 23:00 hours	44 dB
23:00 – 07:00 hours	31 dB
Daytime operation hours, 09:00 – 20:00	49 dB

Table 5.1 – Typical background noise levels [dB ref. 20 μ Pa]

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

6. BS4142 Noise Impact Assessment

6.1 Proposed plant

The following plant is proposed for installation at low level of ground floor at the location indicated on site plan VA5675/SP1.

Plant Item	Quantity	Proposed Model	Notes
Condensers	5	Panasonic U-100PZ2E5	4 no. units will be for comfort cooling only and will only operate between 09:00 – 20:00 hours 1 unit will serve cold storage and will therefore operate 24/7.

Table 6.1 – Indicative plant selections assumed for this assessment.

The manufacturer has only published a single figure dB(A) source level for the units. Spectral data for a condensing unit of similar form factor and power has been used and shifted to match the manufacturer's overall noise level. On this basis, the following noise emissions levels are attributed to the proposed plant items:

Plant Item	Octave Band Centre Frequency (Hz) Sound Pressure L_p @1m (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Panasonic U-100PZ2E5	61	54	53	51	47	41	34	28	52

Table 6.2 – Plant noise data used for the assessment.

6.2 Acoustic Character Correction

The subjective method of allocating corrections to the sound source has been used following the methodology provided in BS4142:2014 and summarised in section 3.2.

Noise Source	Subjective Description	Allocated Corrections
Condensers	Condensing units will not be perceptible as tonal at the receiver once mitigated and do not generate sufficiently impulsive noise at source such as to attract any penalty. Operation may be just audible enough to be perceived as intermittent in operation.	Tonality: 0dB Impulsivity: 0dB Intermittency: +3dB

Table 6.3 – Acoustic character corrections

These penalties are applied to the specific noise level in section 6.4 to obtain the Rating Level.

6.3 Recommended Mitigation Measures

In order to not exceed the limiting criteria, all condensing units will need to be situated within fully enclosed, adequately ventilated plant housings meeting the minimum insertion losses detailed in Table 6.4.

Attenuation Component	Octave Band Centre Frequency (Hz) Enclosure Insertion Loss (dB)							
	63	125	250	500	1k	2k	4k	8k
Fully enclosed plant housing (comfort cooling condensers only)	5	4	5	6	9	13	14	13
Fully enclosed plant housing (cold storage condenser)	11	11	11	15	14	11	9	12

Table 6.4 – Minimum insertion loss required from plant housings

The cold storage condenser will need to be kept furthest from the new residential windows, as illustrated in the attached site plan.

Please note that the above recommendations relate to acoustic issues only. It is recommended that professional advice confirming the suitability of these measures be sought from others with regards to issues such as airflow, structural stability and visual impact.

6.4 Rating Noise Level and Assessment

The rating noise levels at the assessment locations are compared against the relevant background noise levels to assess the notional significance of the noise impact as follows.

Table 6.5 shows the daytime assessment for all condensing units at the new residential windows above.

Results		Relevant Clause	Commentary
Specific Sound Level	L _{Aeq} 41 dB		See Appendix B
Acoustic feature correction	+3 dB	9.2	+3dB for intermittency
Rating level	L _{Ar} 44 dB	9.2	
Background sound level	L _{A90} 49 dB	8	09:00 – 20:00 operational hours
Excess of rating over background sound level	-5 dB	11	
Assessment indicates low impact		11	Depending on context

Table 6.5 – BS4142 Assessment, daytime

Table 6.6 shows the night-time assessment for the cold storage condensing unit at the new residential windows above.

Results		Relevant Clause	Commentary
Specific Sound Level	L _{Aeq} 26 dB		See Appendix B
Acoustic feature correction	+3 dB	9.2	+3dB for intermittency
Rating level	L _{Ar} 29 dB	9.2	
Night-time background sound level	L _{A90} 31 dB	8	
Excess of rating over background sound level	-2 dB	11	
Assessment indicates low impact		11	Depending on context

Table 6.6 – BS4142 Assessment, night-time

6.5 Context

The noted receptors are located in a busy town centre with a noise climate characterised by road traffic and commercial and retail businesses.

Within this context, the estimated impact of the sound sources is expected to remain valid or be slightly reduced.

6.6 Uncertainty

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

- Use of a Class 1 sound level meter is considered to reduce instrument error to insignificant levels as compared with environmental variations. The calibration of the instrumentation was confirmed before and after the noise surveys.
- The background measurements were undertaken under suitable weather conditions over a period designed to include reasonable temporal variations in background noise levels. The monitoring location was directly outside the new receiver windows and measurements are therefore not unduly influenced by extraneous noise sources.
- Where library data has been used, propagation calculations have been used to correct noise levels to the relevant distance at the receiver.

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

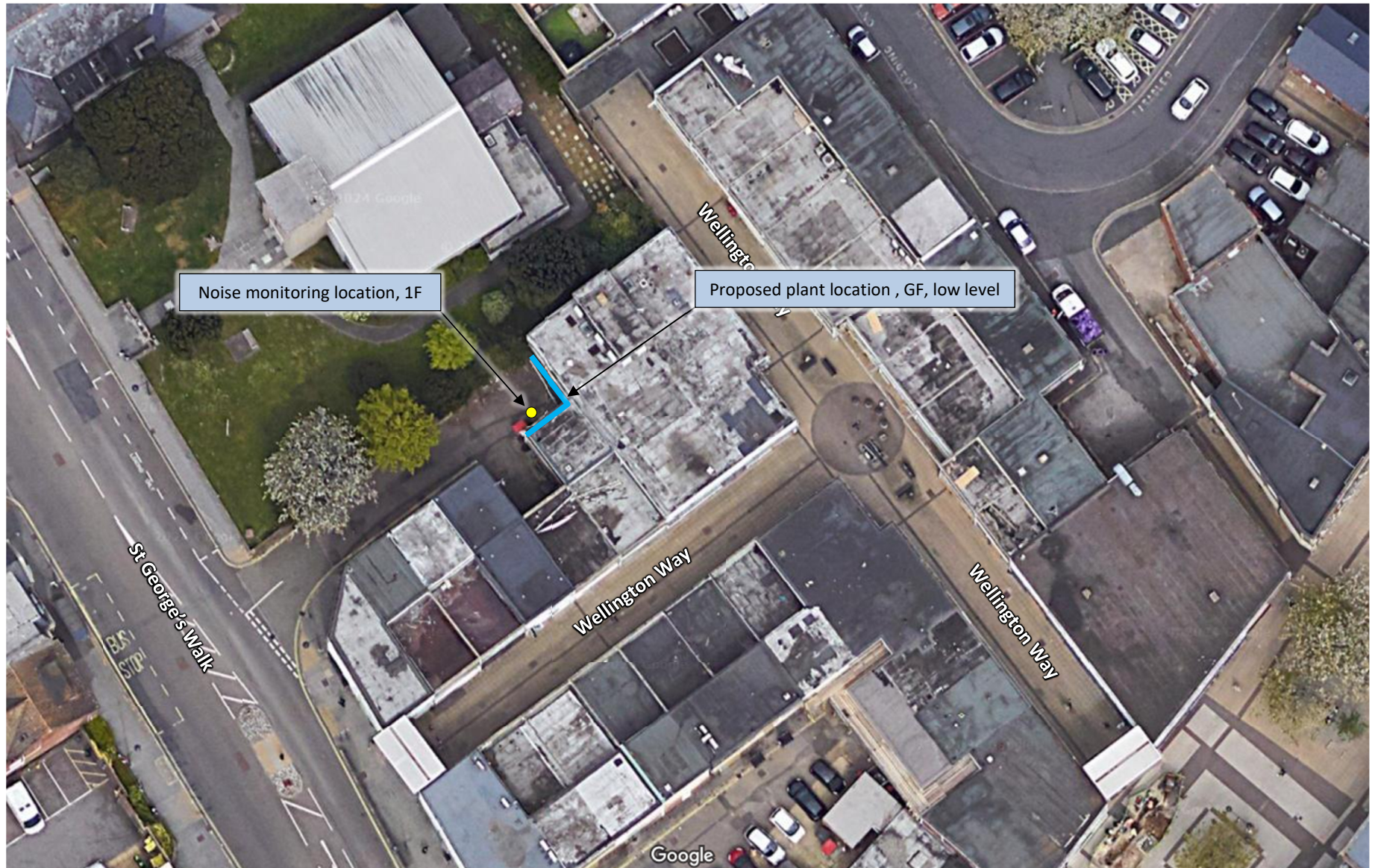
7. Conclusion

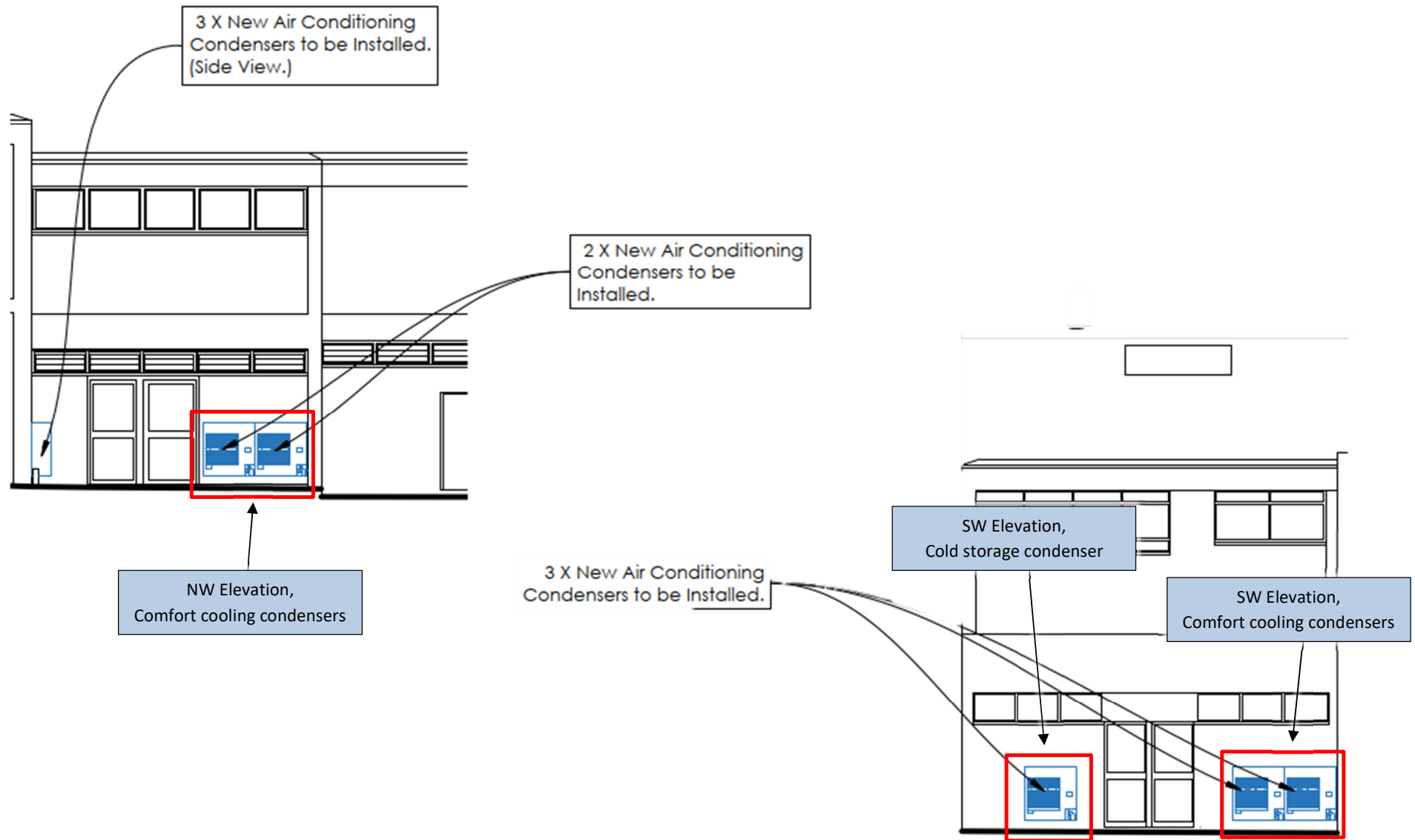
A baseline noise survey has been undertaken by Venta Acoustics to establish the background noise climate in the locality of 17-21 Wellington Way, Waterloooville.

The measured noise levels have been assessed against BS4142:2014+A1:2014 *Methods for rating and assessing industrial and commercial sound* to assess potential noise impacts of proposed mechanical plant at apartment windows which will overlook the installation.

Where the plant items are installed within enclosures meeting the minimum insertion loss performances detailed in this report, a low impact is expected at the receivers.

Ben Alexander MIOA

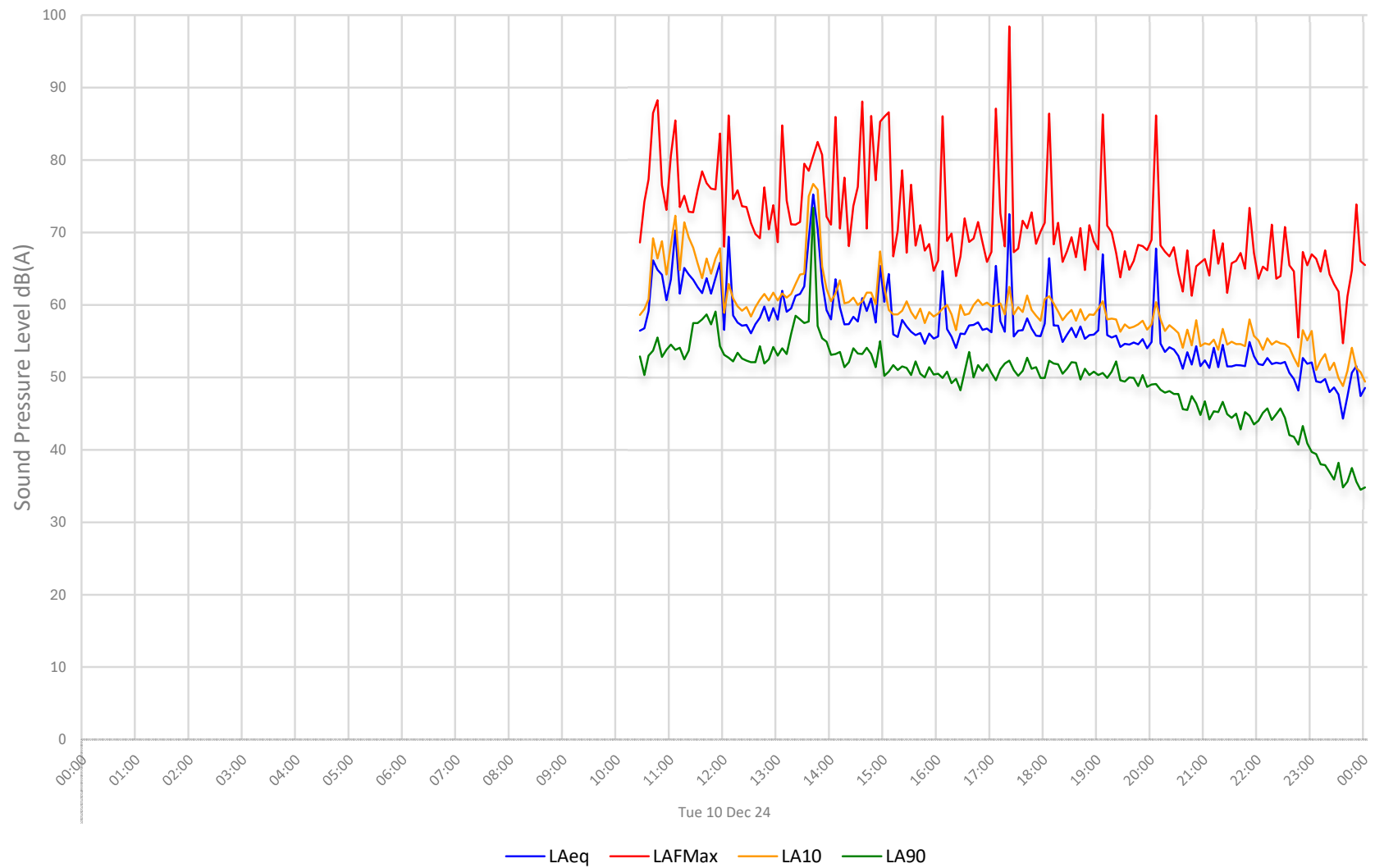




17-21 Wellington Way, Waterloooville
Environmental Noise Time History: 1



Figure VA5675/TH1

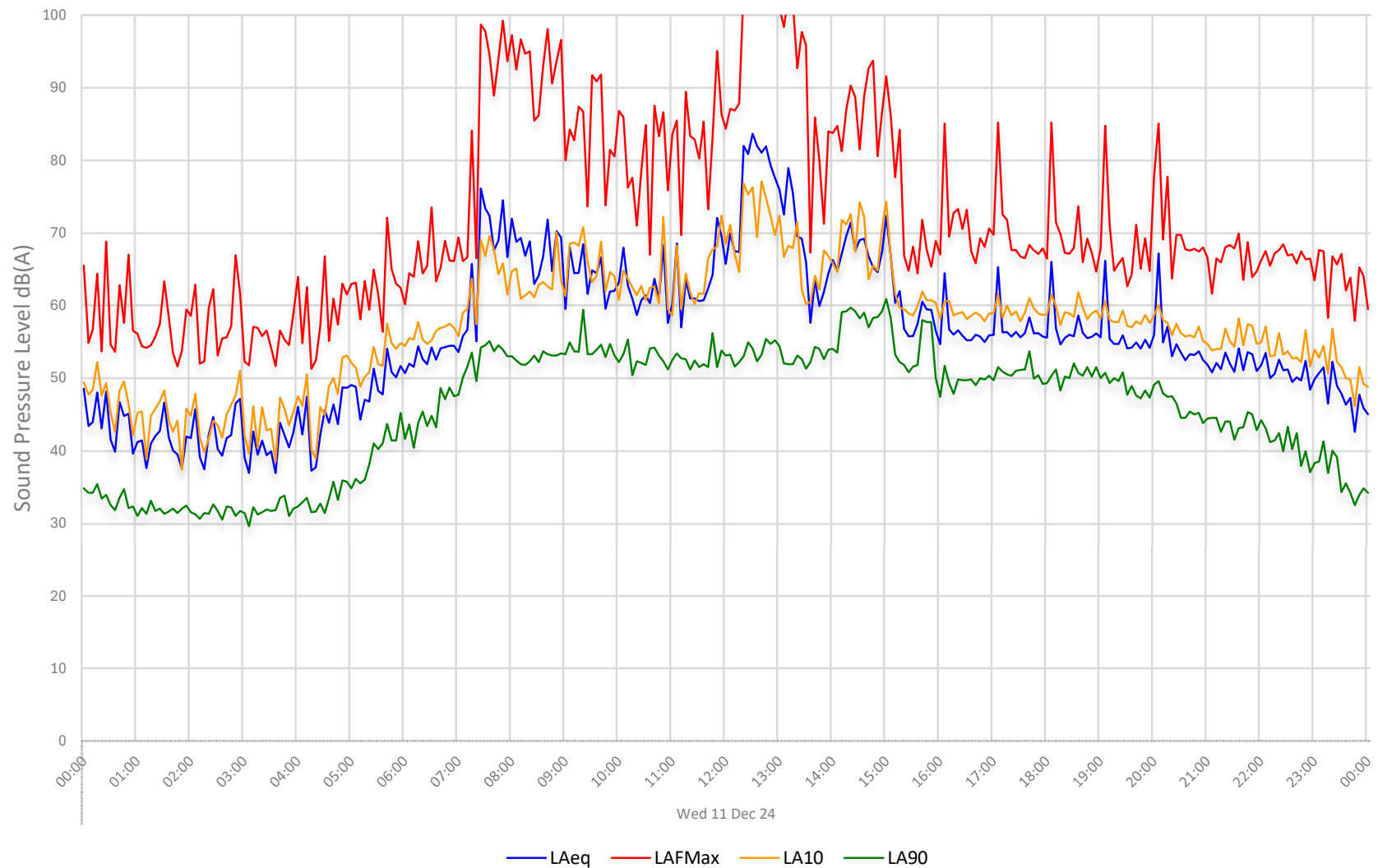


17-21 Wellington Way, Waterloooville

Environmental Noise Time History: 2



Figure VA5675/TH2

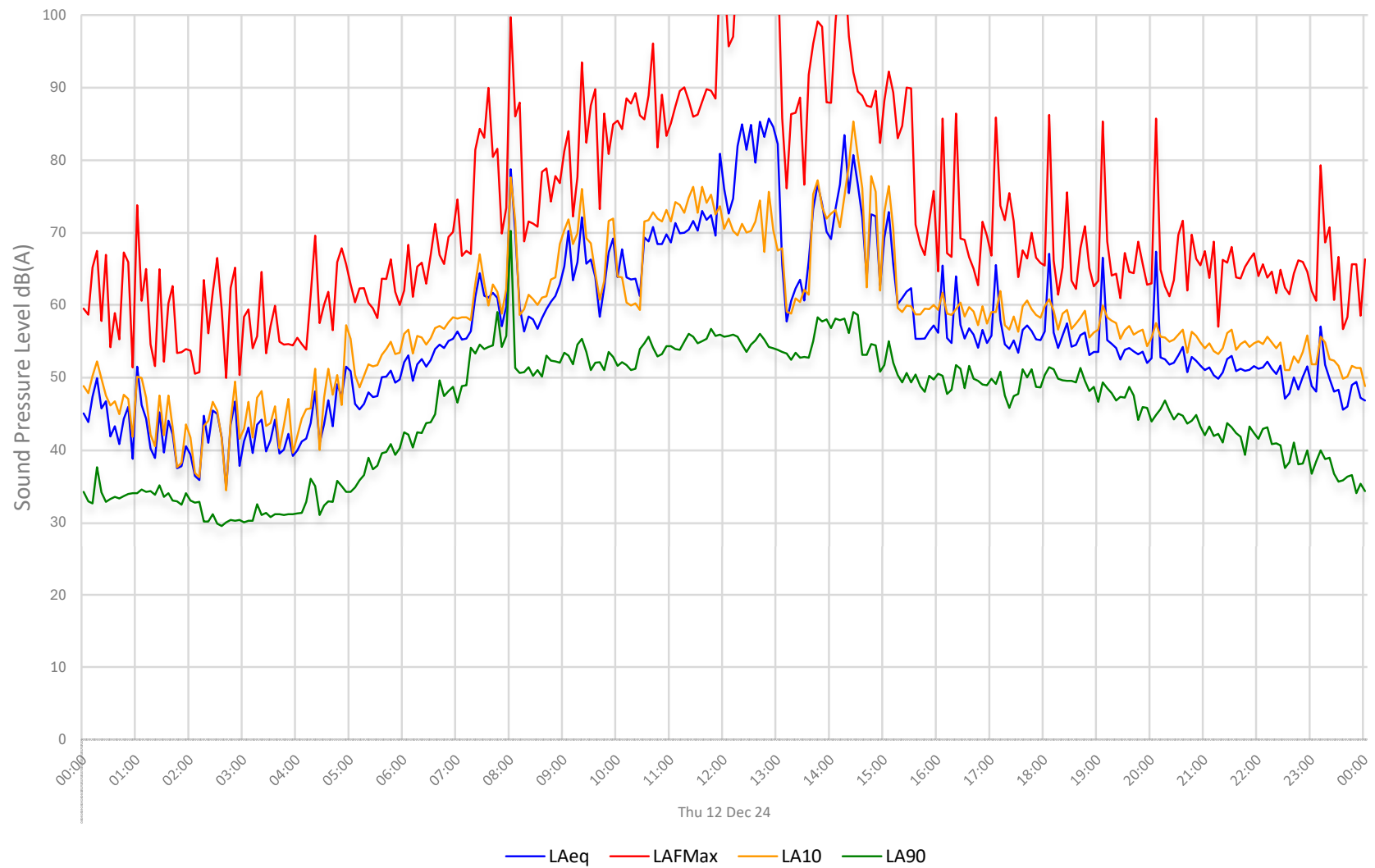


17-21 Wellington Way, Waterloooville

Environmental Noise Time History: 3

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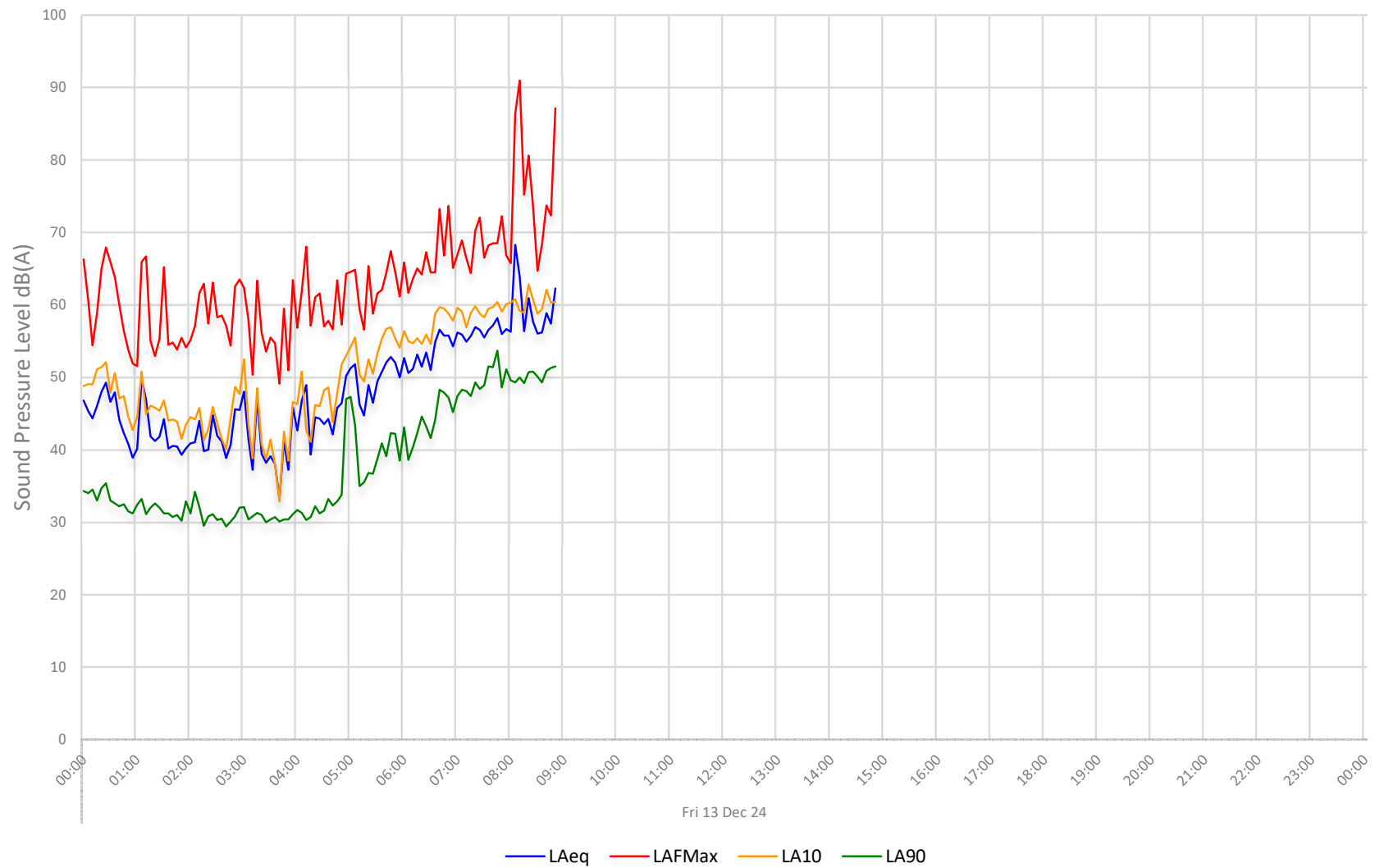
Figure VA5675/TH3



17-21 Wellington Way, Waterloooville
Environmental Noise Time History: 4



Figure VA5675/TH4



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

APPENDIX B

VA5675 - 17-21 Wellington Way, Waterlooville

Noise Impact Assessment

Daytime Assessment: To first floor apartment windows overlooking the plant

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Source Noise Level	Lp @ 1m	61	54	53	51	47	41	34	28	52
Number of Plant	2	3	3	3	3	3	3	3	3	
Location correction		3	3	3	3	3	3	3	3	
Enclosure/louvre loss	SL-100	-5	-4	-5	-6	-9	-13	-14	-13	
Distance Loss	To 4m	-12	-12	-12	-12	-12	-12	-12	-12	
Level at receiver		50	44	42	39	32	22	14	9	39

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Source Noise Level	Lp @ 1m	61	54	53	51	47	41	34	28	52
Number of Plant	2	3	3	3	3	3	3	3	3	
Location correction		3	3	3	3	3	3	3	3	
Enclosure/louvre loss	SL-100	-5	-4	-5	-6	-9	-13	-14	-13	
Distance Loss	To 6m	-15	-15	-15	-15	-15	-15	-15	-15	
Level at receiver		47	41	39	36	29	19	11	6	37

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Source Noise Level	Lp @ 1m	61	54	53	51	47	41	34	28	52
Location correction		3	3	3	3	3	3	3	3	
Enclosure/louvre loss	Sound Cove	-11	-11	-11	-15	-14	-11	-9	-12	
Distance Loss	To 7m	-17	-17	-17	-17	-17	-17	-17	-17	
Level at receiver		36	29	28	22	20	16	11	2	26

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Cumulative level at receiver		52	46	44	41	34	25	17	11	41

Night-time Assessment: To first floor apartment windows overlooking the plant

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Source Noise Level	Lp @ 1m	61	54	53	51	47	41	34	28	52
Location correction		3	3	3	3	3	3	3	3	
Enclosure/louvre loss	Sound Cove	-11	-11	-11	-15	-14	-11	-9	-12	
Distance Loss	To 7m	-17	-17	-17	-17	-17	-17	-17	-17	
Level at receiver		36	29	28	22	20	16	11	2	26