

Report VA5545.250924.NIA2.2

Land at Kings Copse Avenue, Hedge End

Noise Impact Assessment

24 September 2025

**Eastleigh Borough Council
Eastleigh House
Upper Market Street
Eastleigh
SO50 9YN**

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 (2024)	1
2.2	Noise Policy Statement for England (2010).....	2
2.3	BS8233:2014	3
2.4	ProPG: Planning & Noise (2017).....	4
2.5	Eastleigh BC ASHP Noise Requirements	5
3.	Site Description	5
4.	Environmental Noise Survey	5
4.1	Survey Procedure & Equipment	5
4.2	Results	6
5.	ProPG Stage 1 Risk Assessment	6
6.	ProPG Stage 2 – Acoustic Design Statement	7
6.1	Noise Assessment.....	7
7.	Internal Noise Assessment	8
7.1	Sound Reduction Performances of Building Elements	8
7.2	Sound Reduction Performance of Windowsets and Vents	8
7.3	Windowset Performances	9
8.	Areas of External Amenity.....	10
9.	Football Noise	10
10.	Predicted ASHP Noise Impact	11
10.1	Proposed plant.....	11
10.2	Predicted noise levels.....	11
11.	Conclusion.....	12

Attachments

VA5545/SP1	Indicative Site Plan
VA5545/TH1-TH6	Environmental Noise Time Histories
VA5545/NM1-NM14	Noise Maps
Appendix A	Acoustic Terminology
Appendix B	Acoustic Calculations

Report Version	Author	Approved	Changes	Date
NIA	Jamie Duncan	Steven Liddell	-	8/10/24
NIA2	Jamie Duncan	Ben Alexander	Updated layout and added ASHP noise assessment	3/9/25
NIA2.1	Jamie Duncan	Ben Alexander	Minor amendments	22/9/25
NIA2.2	Jamie Duncan	Ben Alexander	Updated with potential glazing configurations	24/9/25

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 develop the land to the east of Kings Copse Avenue, Hedge End for residential use with a mix of houses and apartment buildings across the development.

Venta Acoustics has been commissioned by Eastleigh Borough Council 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. In addition to the above, an assessment of noise from air source heat pumps has been undertaken for the new dwellings, and how they may affect their neighbours.

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. These levels are used to undertake an assessment of the likely impact from the ASHPs with reference to 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 (2024)

The revised *National Planning Policy Framework* (NPPF), published in December 2024 (amended in February 2025), 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 198 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.

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 L_{Aeq} 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 L_{Aeq} . 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.

2.3 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 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 2.2 – 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 $L_{Aeq,T}$, 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.

2.4 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”

2.5 Eastleigh BC ASHP Noise Requirements

Following liaison with Adre Pires, Pollution Control Manager at Eastleigh Borough Council, it was agreed that an assessment of the worst case situations for a number of plots would be undertaken, where noise from the ASHPs would be loudest at the neighbouring properties.

Comparison would be made with the MCS 020 noise limits, which limits noise from ASHPs to a level of 42dB(A) at the nearest window using an assumed background noise level of 40dB(A).

In addition to the above, the predicted noise levels will be compared with the typical night-time background noise levels measured during the noise survey.

3. Site Description

As illustrated on attached site plan VA5545/SP1, the site is currently agricultural land and is bounded by housing to the north and north-west, on the other side of Kings Copse Avenue, football pitches to the west on the other side of Tanhouse Lane, and agricultural land to the south and south-east, with a dwelling to the south, as well as the former Firefly Nursery, which is understood to be closed.

In the greater area, there is a new housing development to the south west on Tanhouse Lane/Heath House Lane overlooking the football pitches, as well as various residential and commercial premises.

The dominant noise source expected to affect the site is from road traffic noise in Kings Copse Avenue.

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 23rd and Thursday 26th September 2024 at the locations shown in site plan VA5545/SP1. These locations were chosen to be representative of the noise level at the proposed 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 each of the measurement locations.

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
NTi Class 1 Integrating SLM	XL2	A2A-11461-E0	1509201-1	19/7/24
Svantek Class 1 SLM	971	143568	1508506-1	22/4/24
Larson Davis calibrator	CAL200	13049	1509201-3	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.

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA5545/TH1-3 for position 1 and VA5545/TH4-6 for position 2.

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

Monitoring Period, T	L _{Aeq, T}		Typical ¹ L _{A90,5min}	
	Position 1	Position 2	Position 1	Position 2
07:00 – 23:00	69 dB	52 dB	43 dB	42 dB
23:00 – 07:00	60 dB	47 dB	29 dB	32 dB

Table 4.2 – Average ambient and typical background noise levels

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

The typical night time L_{Amax} events were recorded to be in the order of 80 dB L_{Amax,fast} at the monitor by Kings Copse Avenue, falling to 62dB L_{Amax,fast} at the rear of the site.

5. ProPG Stage 1 Risk Assessment

The noise levels shown in Table 4.2 lie across the 'Medium Risk' to 'Low Risk' category range. This is an indication that the development site is likely to be acceptable, provided a good acoustic design process is followed and is set out in a detailed Acoustic Design Statement confirming how noise will be mitigated. Noise modelling of the sound propagation across the site in the attached noise maps, VA5545/NM1-NM2, visually confirms this.

Therefore, a Stage 2 assessment and acoustic design statement will be required to evaluate the detailed exposure of the site and the relevant mitigation measures.

6. ProPG Stage 2 – Acoustic Design Statement

The layout of the scheme has been carefully considered during the design process, with the taller apartment buildings located towards the centre of the site. Houses have been oriented, where possible, to have windows to noise sensitive rooms at 90 degrees to or screened from the road. However, due to the internal layout of the houses, it has not been possible for all rooms to be faced away from the road, and dual aspect rooms are not achievable in many situations.

The design will target internal noise levels that achieve the guidance in BS8233:2014, WHO 2009 and ProPG.

6.1 Noise Assessment

BS8233 suggests that a loss of around 15dB can be expected from a partially open window. The document also includes a note that states ‘...the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved’. It is considered that where occupants have a choice, the desirable aspect of an open window offsets the slight increase in internal noise levels and the 5dB relaxation is generally acceptable. This is supported by Note 7 of figure 2, and section 2.30 of the ProPG document.

The following table summarises the implications of external levels on the requirement for windows to be able to remain open. Where windows are required to be closed to achieve acceptable internal noise levels, an alternative means of ventilation will be required. This does not preclude the windows from being openable under occupant preference.

Period	External Noise Level			
	<L _{Aeq} 45dB	L _{Aeq} 45dB – 50dB	L _{Aeq} 50dB – 55dB	≥L _{Aeq} 55
Internal Levels Daytime (07:00-23:00 hours)	L _{Aeq,16hr} <35dB ‘Desirable’ Internal noise level with open windows		L _{Aeq,16hr} <40dB ‘Reasonable’ Internal noise level with open windows	≥L _{Aeq,16hr} 40dB Windows should be closed to control internal levels
Internal Levels Night Time (23:00-07:00 hours)	L _{Aeq,8hr} <30dB ‘Desirable’ Internal noise level with open windows	L _{Aeq,8hr} <35dB ‘Reasonable’ Internal noise level with open windows	L _{Aeq,8hr} ≥35dB Windows should be closed to control internal levels	

Table 6.1 – Summary of implication of external noise levels on the requirements for windows to able to remain open (applicable to bedrooms).

The above relates to continuous traffic noise only. L_{Amax} levels from individual events must also be considered. BS8233 provides the allowance for a relaxation of 5dB for average noise levels, but there is no provision for a similar reduction for maximum event noise levels.

7. Internal Noise Assessment

The noise levels across site have been predicted using 3D noise mapping to ensure the most accurate prediction of noise across the site, and how it will interact with the new buildings.

This process uses several different calculation protocols to derive accurate noise analysis predictions. Noise propagation and barrier attenuation are calculated in accordance with ISO 9613-1:1993 *Acoustics - Attenuation of sound during propagation outdoors - Part 1: Calculation of the absorption of sound by the atmosphere* and ISO 9613-2:2024 *Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure levels outdoors*.

The output maps, ref VA5545/NM3-NM4, are shown with regards to the noise level ranges shown in Table 6.1 with regards to the internal noise levels based upon the three ranges shown in green, orange and red.

During the night-time period, the controlling factor for glazing performance and open or closed windows is defined by the maximum events, which are shown in the noise map ref. VA5545/NM5.

A review of 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.

7.1 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
Masonry	R _w 51

Table 7.1 – Assumed sound reductions performances of non-glazed elements

7.2 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 7.2 below.

During the daytime, the average noise levels control the glazing specifications, with the night-time requirements defined by maximum events across the site.

Although ProPG discusses the 5dB internal noise level relaxation to allow for natural ventilation, this refers to average rather than maximum events. Following discussion with Eastleigh Council Environmental Health, it has been agreed that the 5dB relaxation for average internal noise levels

would be acceptable to allow for natural ventilation, but night-time maximum events should be controlled to less than $L_{A\text{Fmax}}$ 45dB, so will require that windows can remain closed at night.

Glazing Location	Colour on Noise Map	Required Glazing SRI, dB	Ventilator Performance, dB
Living Rooms – Alternative means of ventilation (NM3)	Red	R_w 36	$D_{n,e,w}$ 37
Bedrooms – Alternative means of ventilation (NM4)/closed windows (NM5)	Red	R_w 35	$D_{n,e,w}$ 37
Living Rooms – 5dB relaxation (NM3)	Yellow	R_w 27	$D_{n,e,w}$ 39
Bedrooms – 5dB relaxation (NM4)	Yellow	R_w 30	$D_{n,e,w}$ 30
Living Rooms & Bedrooms – Open Windows (NM3-5)	Green	R_w 27	Open windows

Table 7.2 – 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 7.2 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 7.2 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.

To aid with identification of which plots require the various glazing/mitigation types, noise maps have been presented showing each storey in the buildings with either the alternative ventilation, or open windows (which also includes the 5dB relaxation zone). These are shown for living rooms in VA5545/NM8-10, and bedrooms in VA5545/NM11-14.

Glazing Location	Colour on Noise Map	Required Glazing SRI, dB	Ventilator Performance, dB
Living Rooms (NM7-10)	Red	R_w 36	$D_{n,e,w}$ 37
Bedrooms (NM11-14)	Red	R_w 35	$D_{n,e,w}$ 37
Living Rooms & Bedrooms – Open Windows (NM7-14)	Green	R_w 27	Open windows

Table 7.3 – Required minimum sound reduction indices for glazing and ventilators

7.3 Windowset Performances

To illustrate potential glazing configurations that could provide the performances shown in Table 7.2, Table 7.4 below shows framesets that have previously met these requirements. These are for guidance purposes only and do not constitute the required glazing configuration. Alternative configurations are also capable of providing these performances, and should be verified with suppliers.

However, to ensure compliance, the performance of the proposed framesets should be confirmed prior to selection to ensure that suitable internal noise levels are maintained.

Frameset SRI, dB	Potential Glazing Configuration
R _w 36	10mm glass -12mm void – 12.4mm laminated glass
R _w 35	4mm glass – 12mm void – 10mm glass
R _w 27	6mm glass – 12mm void – 6mm glass

Table 7.4 – Potential glazing configurations

It is important that the performance shown in Table 7.2/Table 7.3 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.

Passive ventilators alone may not provide sufficient air flow for summer overheating, 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 be in line with recommendations given in the WHO 1999 and BS8233:2014 guidance. Internal noise levels can therefore be considered to be between the NOEL the LOAEL levels.

8. Areas of External Amenity

With solid 2m high timber boundary fences to the extents of the gardens. external noise levels comply with the World Health Organisation guideline value for external amenity of L_{Aeq,16hour} 55dB across the majority of the site, as is illustrated in noise map VA5545/NM6, with most of the site being below L_{Aeq,16hour} 50dB.

To reduce noise levels in the gardens most exposed to the road, it is recommended that the fences to plots 1, 94, 95 and 102 have 2.5m fences, as shown by the blue lines in VA5545/NM6.

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.

9. Football Noise

Although it will not be a constant noise source, an assessment of shouting from the sports pitches has also been considered,

A calculation of noise levels expected from shouts at the nearest pitch to the new houses is shown below:

Maximum Levels – Shouts	
Shout @1m	82 dB
Distance loss, 55m	-35 dB
Level outside window	47 dB
Loss for partially open window (BS8233)	-15 dB
Internal Noise Level	32 dB

Table 9.1 – Assessments of maximum noise levels

With windows open, maximum noise levels from shouts on the pitch are expected to be below BS8233/WHO recommended average noise level of L_{Aeq} 35dB during daytimes. As this is based upon a maximum event, rather than an average, and the fact that the pitches would only be used during the daytime, noise from the use of the football pitches is expected to have a low impact on the new properties.

10. Predicted ASHP Noise Impact

10.1 Proposed plant

The new dwellings are proposed to be heated with ASHPs, with the following models proposed for the different types of dwelling.

Plant Item	Proposed Model	Notes	Sound Power, L_w
ASHP	Vaillant Arotherm Plus 5kW	Flats, 2 bed and mid-terrace houses	48 dB(A)
ASHP	Vaillant Arotherm Plus 7kW	3 & 4 bed houses	49 dB(A)

Table 10.1 – Indicative plant selections assumed for this assessment.

10.2 Predicted noise levels

To ensure a robust assessment, it has been assumed that the louder of the units will be utilised in all of the calculations.

Allowance has been made for losses provided by the garden fences, where appropriate, as well as distance losses, and corrections for reflections based upon their installation location. As previously highlighted, assessment of some of the potentially worst case adjacencies have been undertaken.

Calculations have been undertaken in accordance with the MCS 020 standard, with the calculation sheets attached in Appendix B, with a summary of the results shown in Table 10.2.

Plot Numbers	Predicted Sound Pressure Level at Receiver, L_p	Sound Pressure Level Corrected for 40dB(A) MCS background
7-8	30 dB(A)	41 dB(A)
11-12	30 dB(A)	41 dB(A)
18-19	27 dB(A)	41 dB(A)
20-21	27 dB(A)	41 dB(A)
50-51	30 dB(A)	41 dB(A)
93-94	30 dB(A)	41 dB(A)

Table 10.2 – Predicted noise level at receivers

The results above show that noise levels for all adjacencies would meet with the MCS 020 requirement of being less than or equal to 42dB(A), with the actual noise levels being considerably lower than this.

When compared to the background noise levels measured during the survey, which were L_{A90} 29 & 32dB, the units are approximately the same as the background noise levels during the night-time, with a very marginal excess of 1dB for some of the louder units above the lower background noise level of L_{A90} 29dB. It should be noted that even with windows open, the internal noise level would be considerably lower than these external noise levels (BS8233 assumes a loss of approximately 15dB for a partially open window), and likely would be at a level which would be unlikely to cause impact on future residents.

11. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the prevailing noise climate in the locality of Land at Kings Copse Avenue, Hedge End in support of a planning application for the proposed development of new residential dwellings.

The measured levels have been assessed against the National Planning Policy Framework, the guidance in the ProPG (Professional Practice Guidance: Planning and Noise) and currently available standards and guidance documents including World Health Organisation *Guidelines for Community Noise* (1999) and BS8233:2014 *Guidance on sound Insulation and noise*.

The site falls in the low and medium risk categories under ProPG, and hence an acoustic design strategy has been developed.

Appropriate external and internal noise criteria have been considered to minimise adverse impacts on health and quality of life as a result of the new development.

Appropriate mitigation measures have been outlined which should be developed during detailed design, including proprietary thermal double-glazing and trickle vents, and fences to gardens.

The noise emission levels from the proposed ASHPs have been assessed to be within an acceptable range, as discussed with Eastleigh Borough Council.

With suitable measures implemented, 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



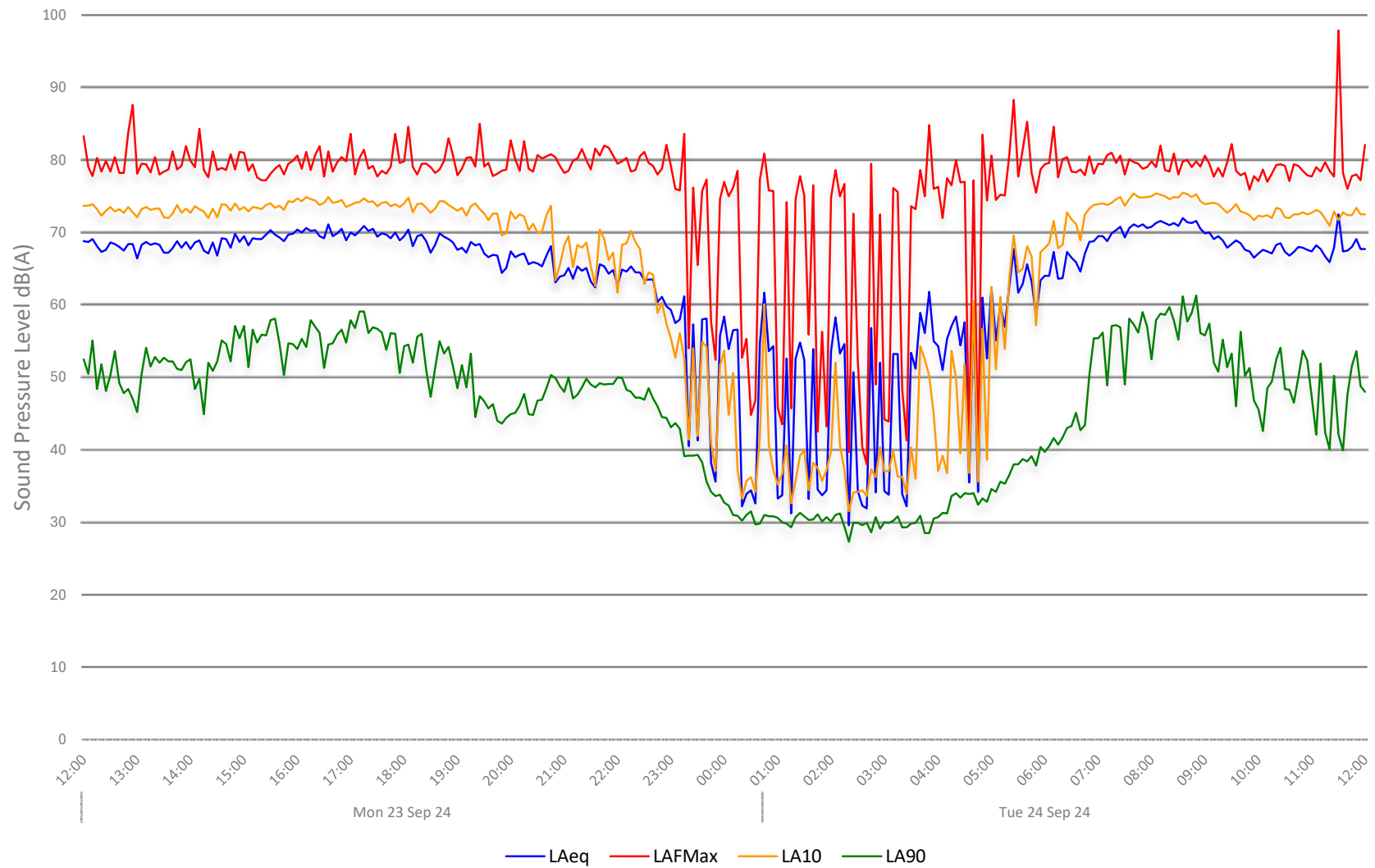
Land at Kings Copse Avenue, Hedge End

Environmental Noise Time History: 1

Road

 **VENTA** ACOUSTICS

Figure VA5545/TH1



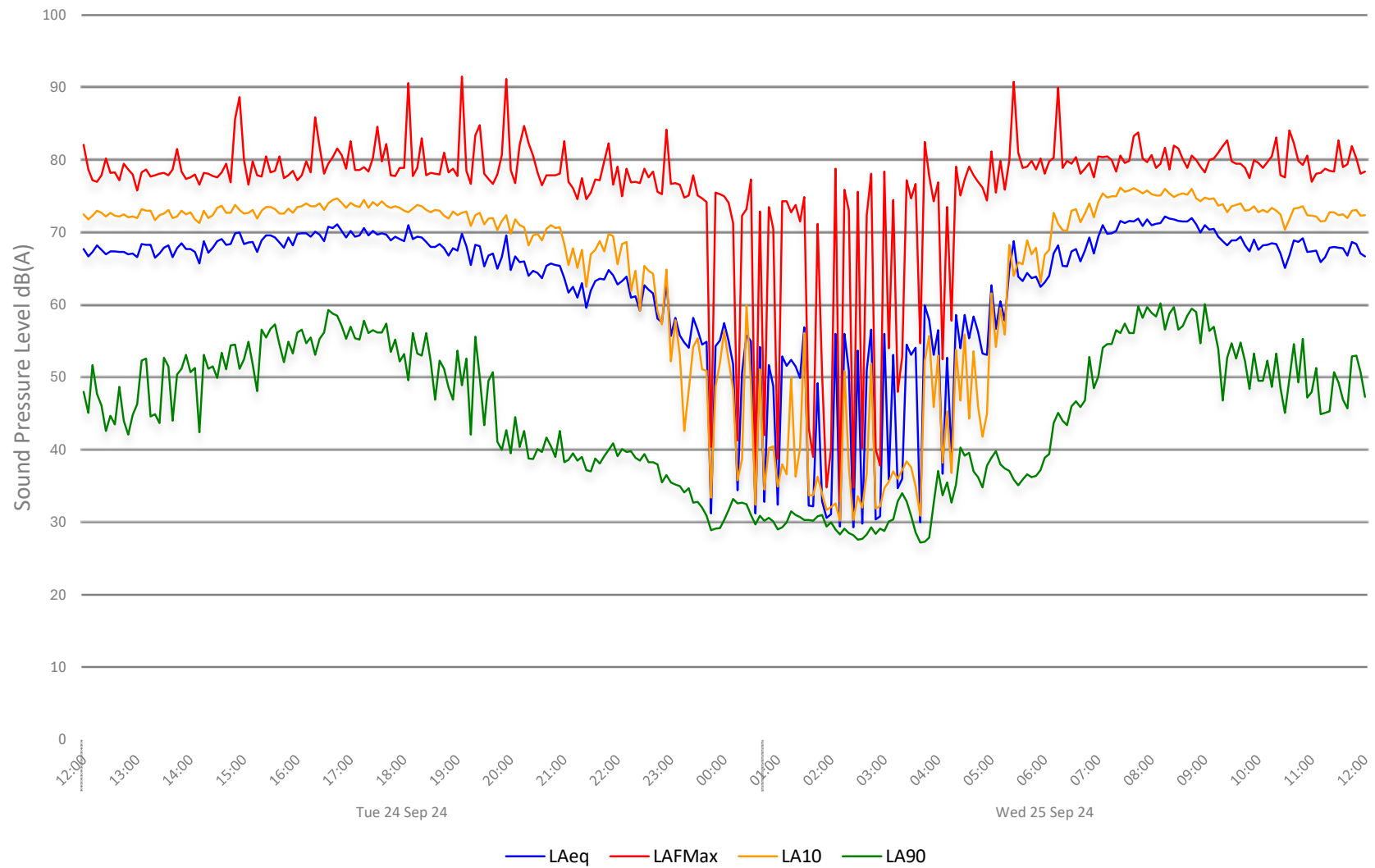
Land at Kings Copse Avenue, Hedge End

Environmental Noise Time History: 2

Road

 **VENTA** ACOUSTICS

Figure VA5545/TH2



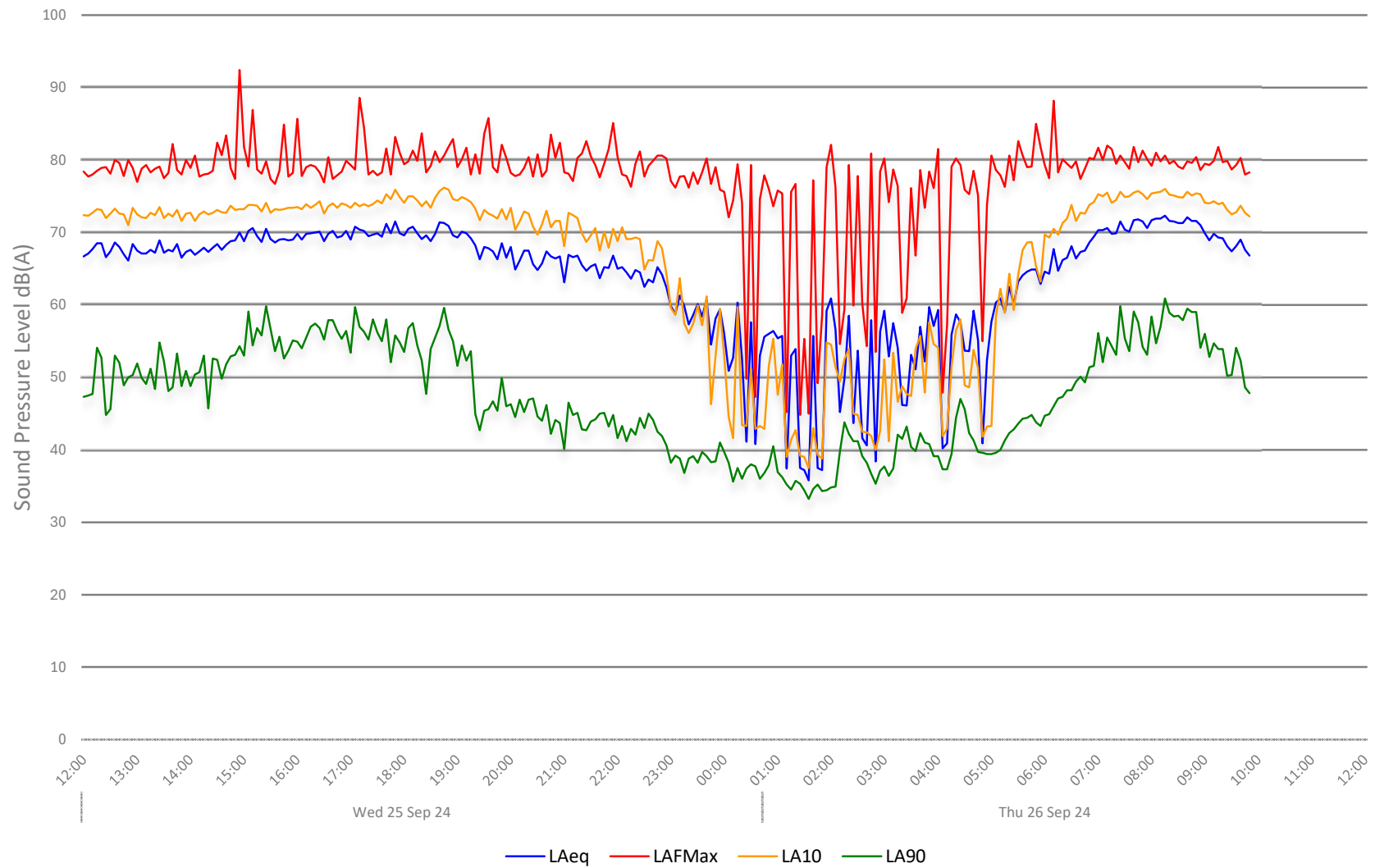
Land at Kings Copse Avenue, Hedge End

Environmental Noise Time History: 3

Road

 **VENTA** ACOUSTICS

Figure VA5545/TH3



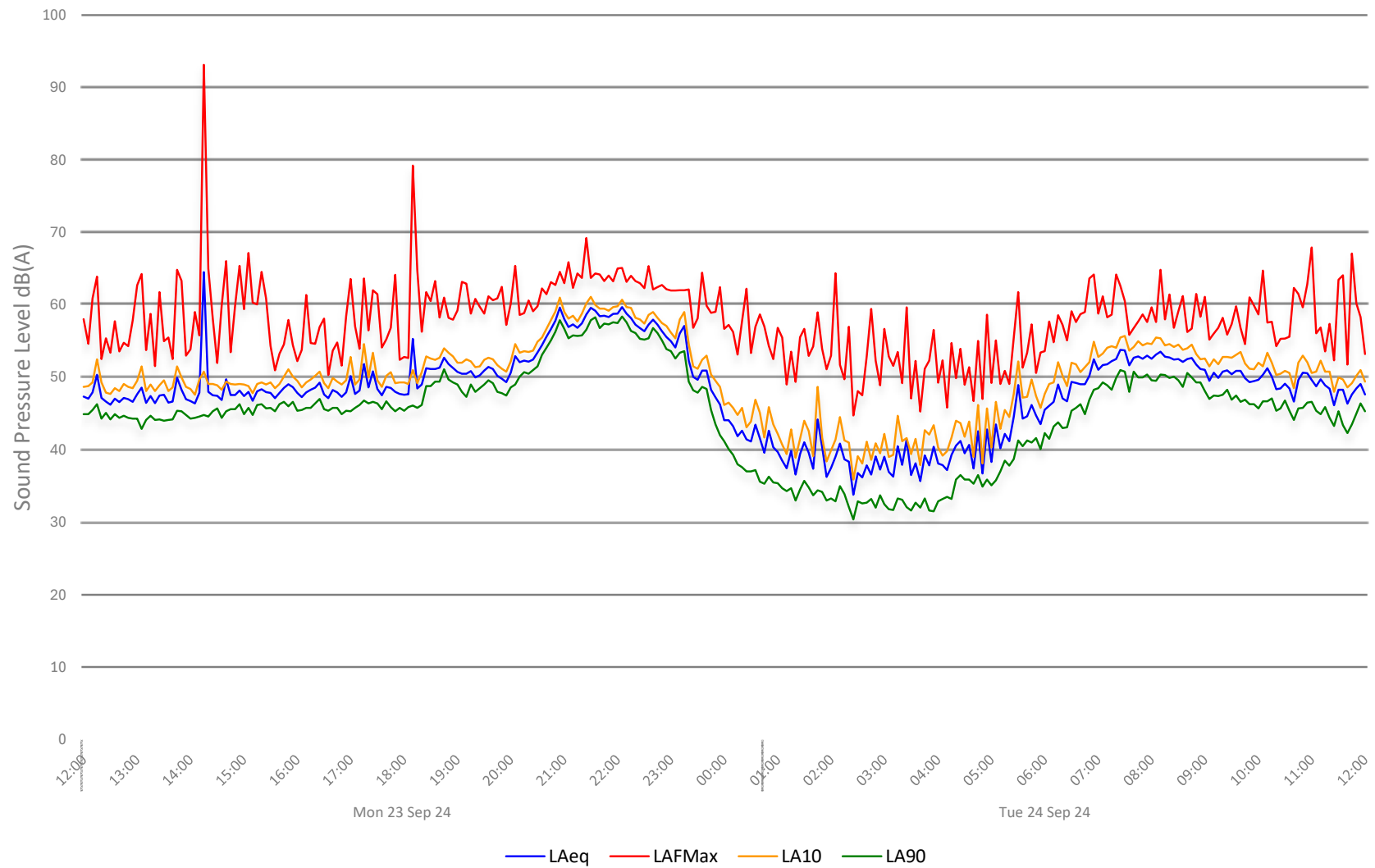
Land at Kings Copse Avenue, Hedge End

Environmental Noise Time History: 4

Rear

 **VENTA** ACOUSTICS

Figure VA5545/TH4



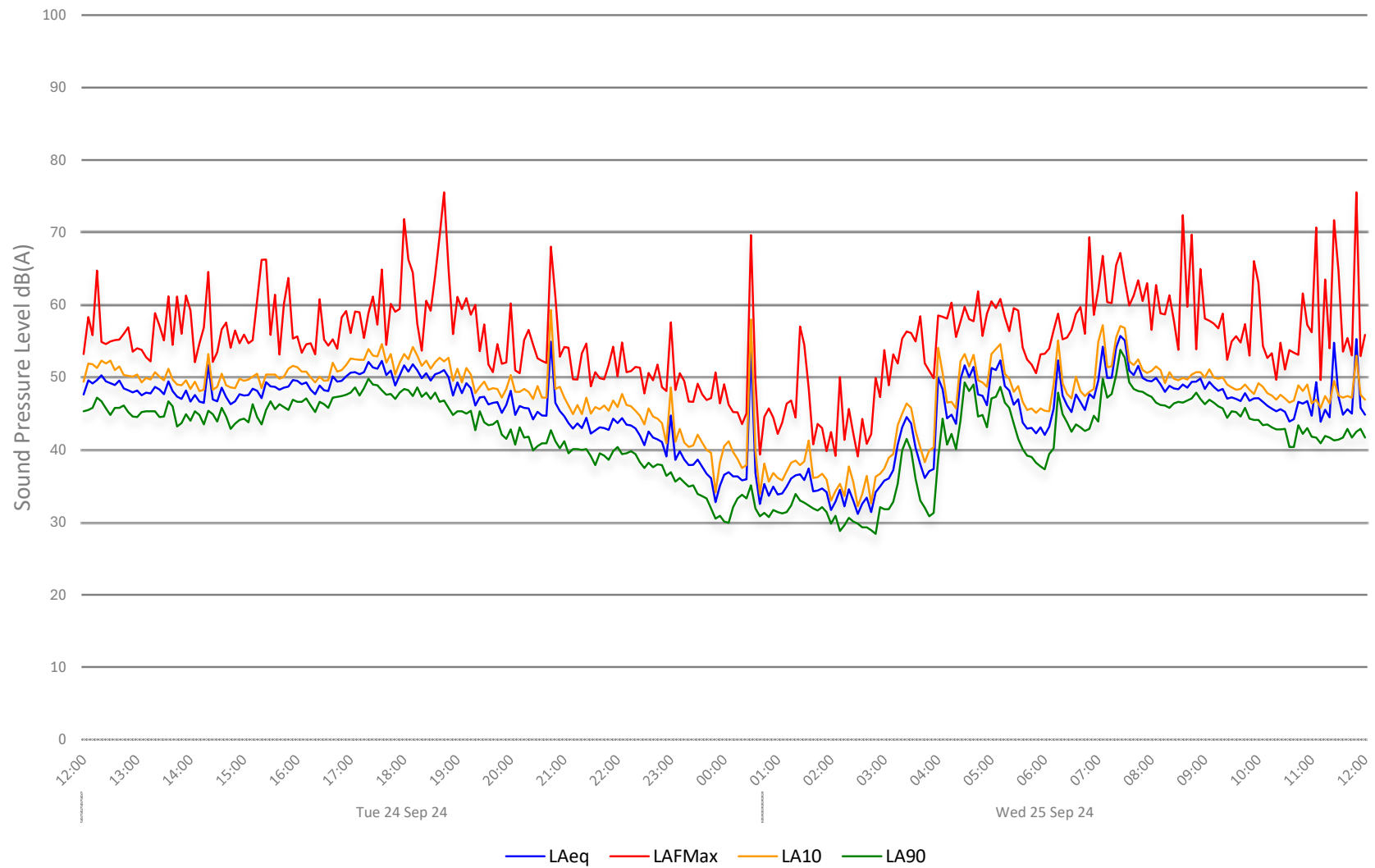
Land at Kings Copse Avenue, Hedge End

Environmental Noise Time History: 5

Rear

 **VENTA** ACOUSTICS

Figure VA5545/TH5



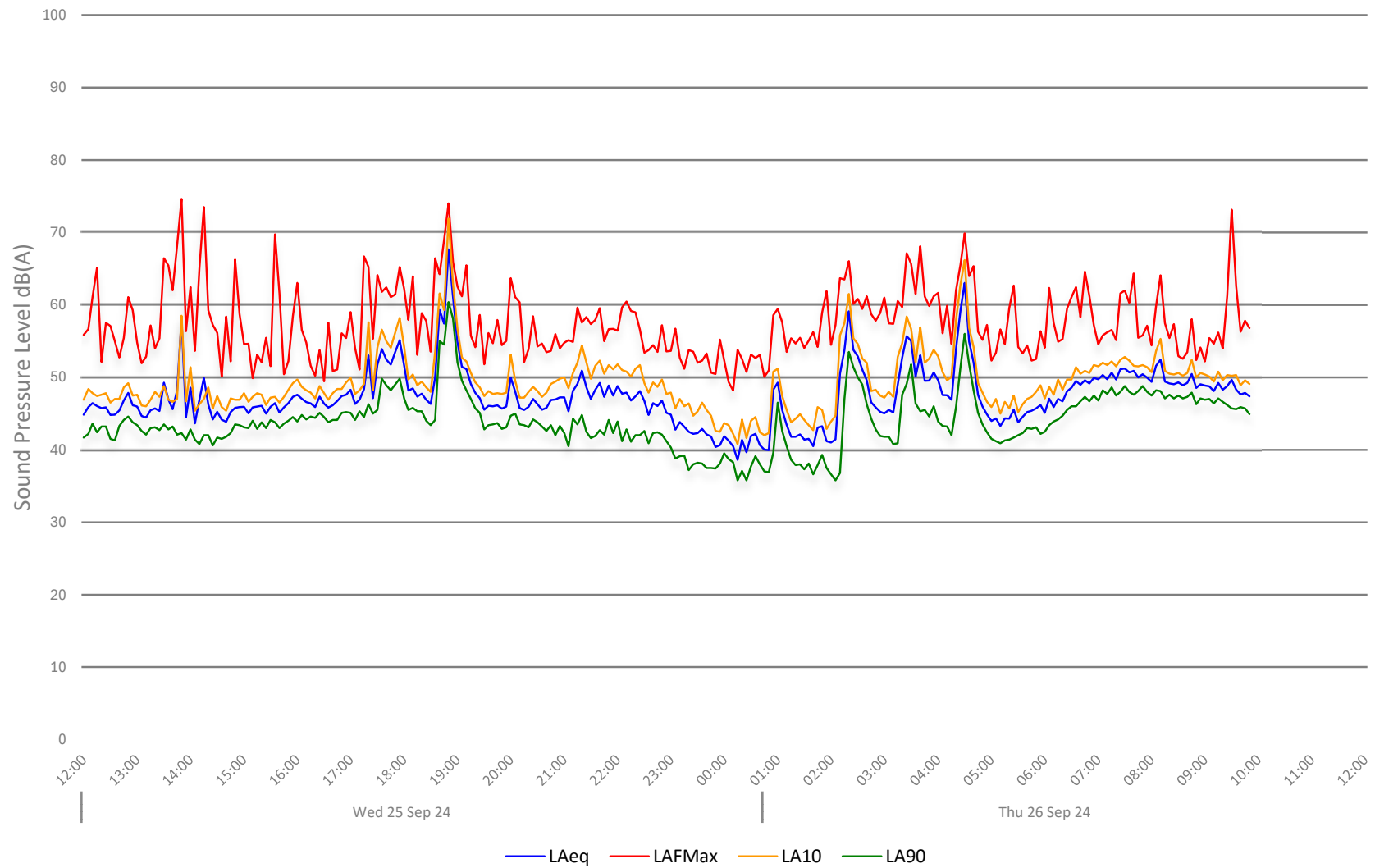
Land at Kings Copse Avenue, Hedge End

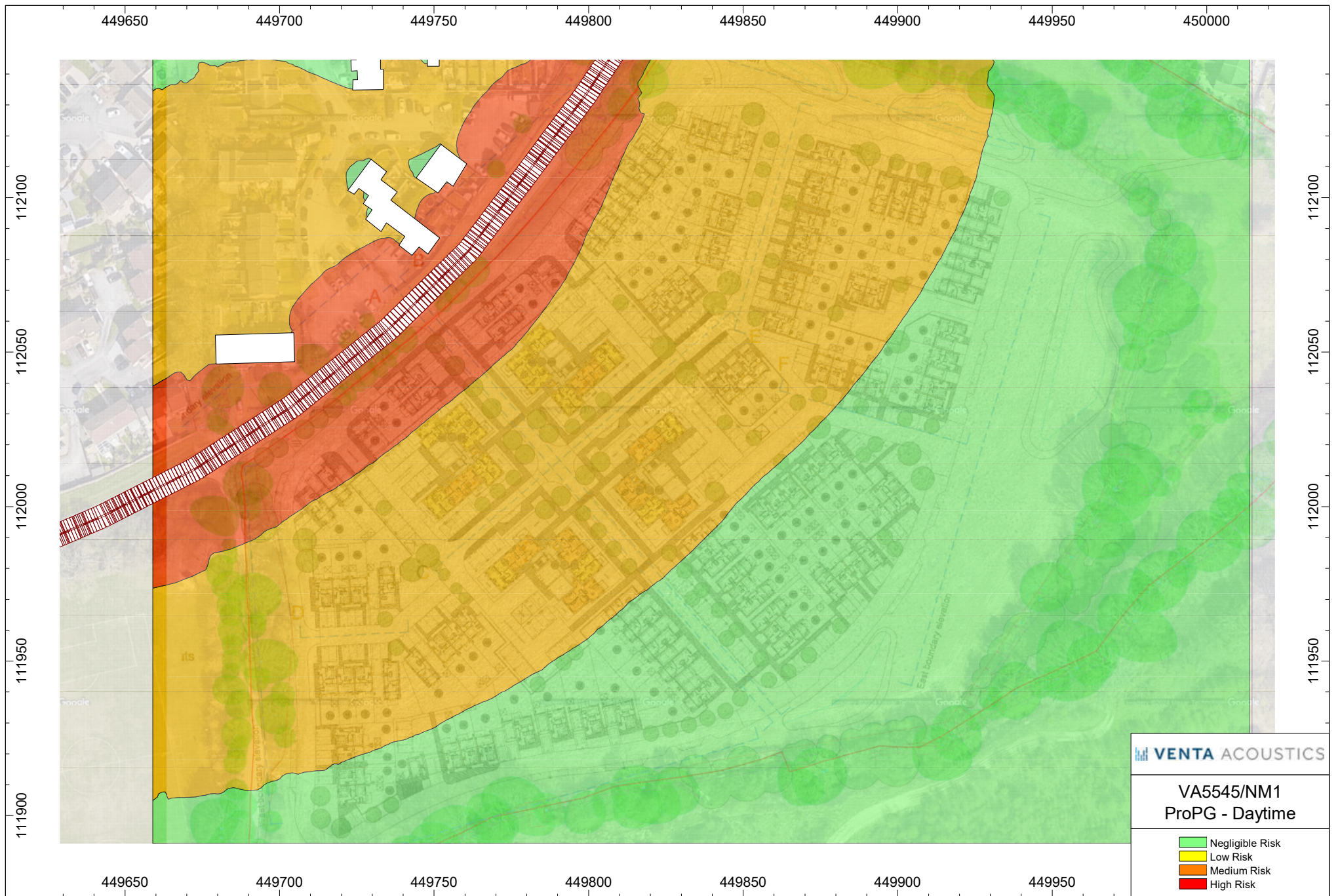
Environmental Noise Time History: 6

Rear

 **VENTA** ACOUSTICS

Figure VA5545/TH6

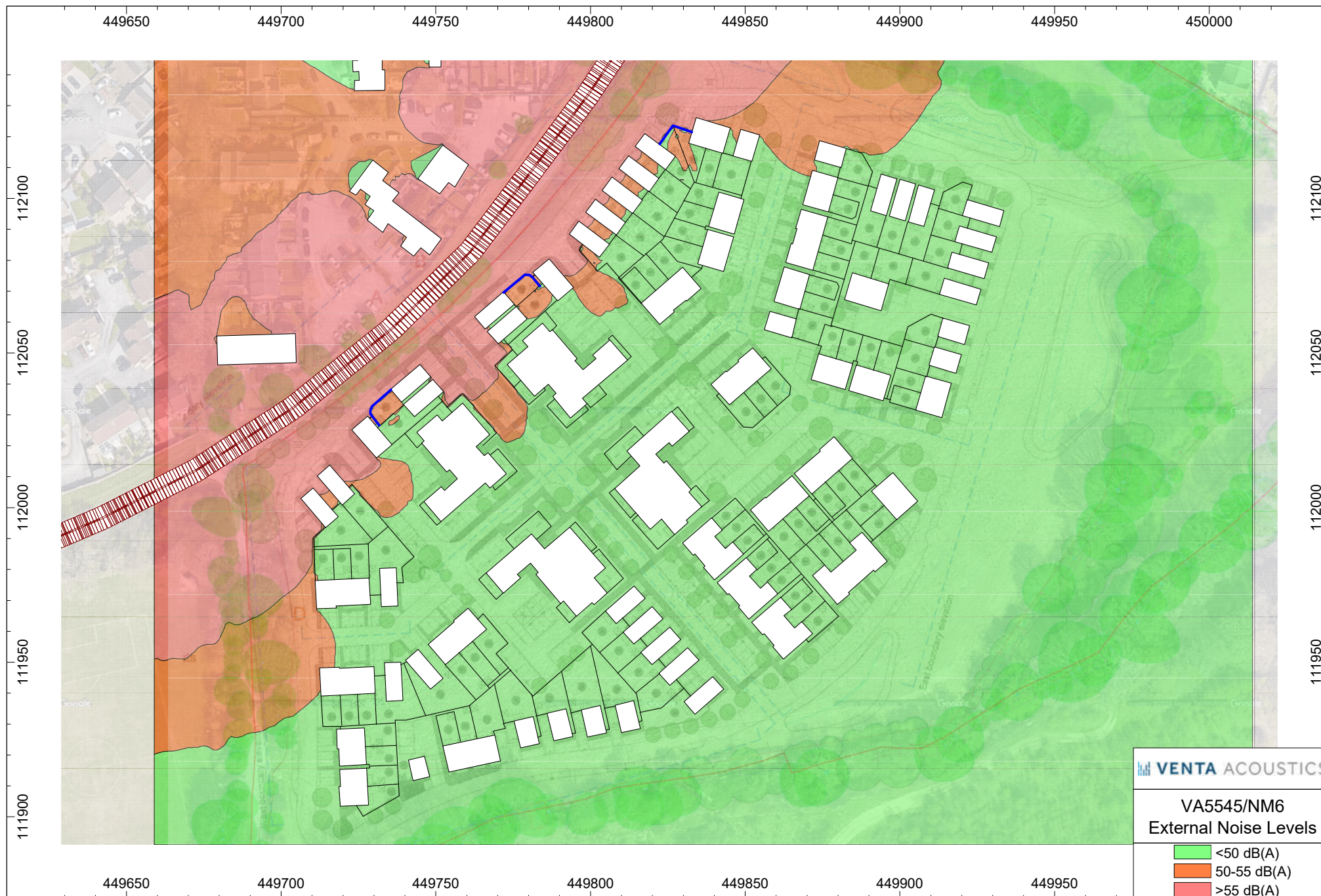










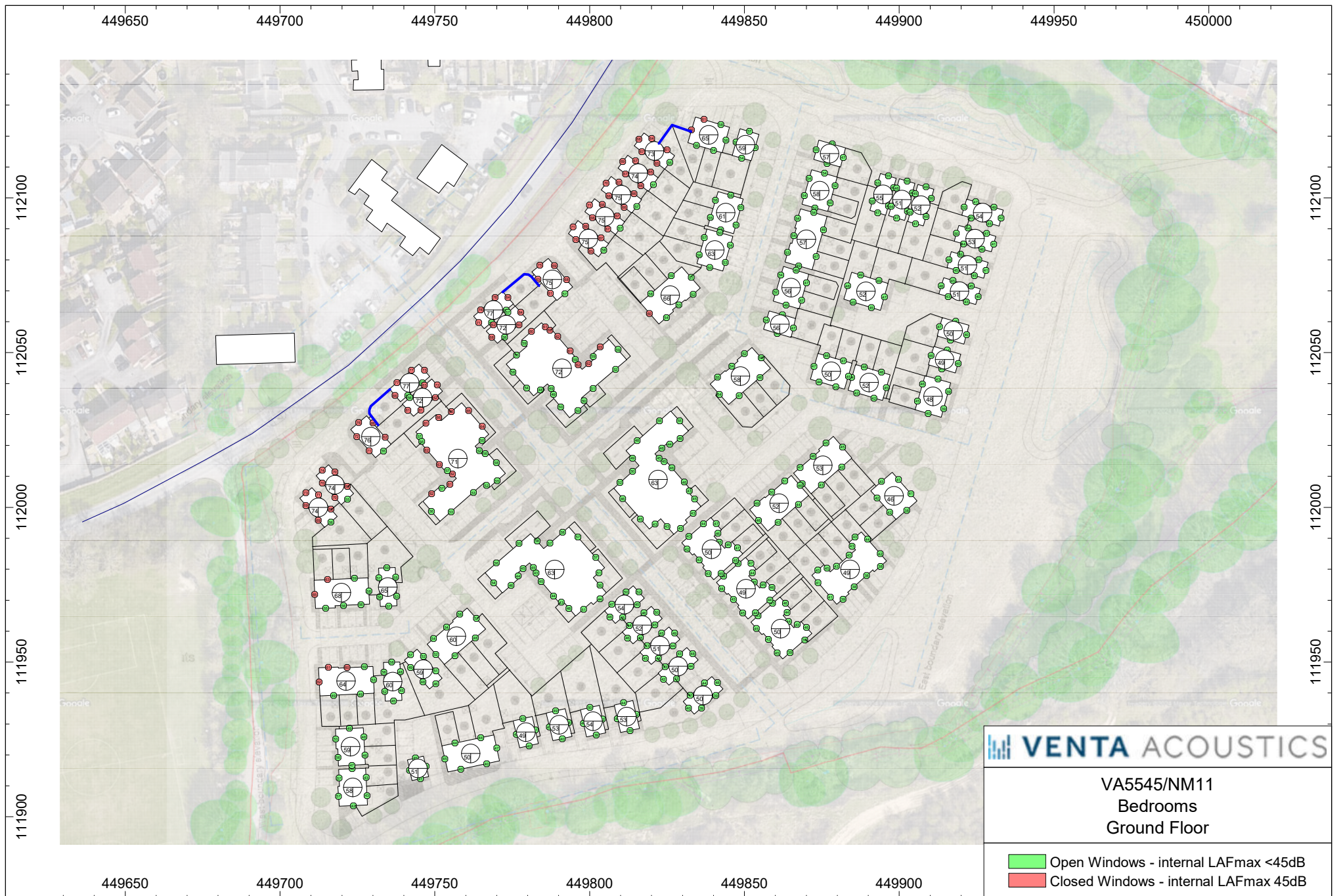








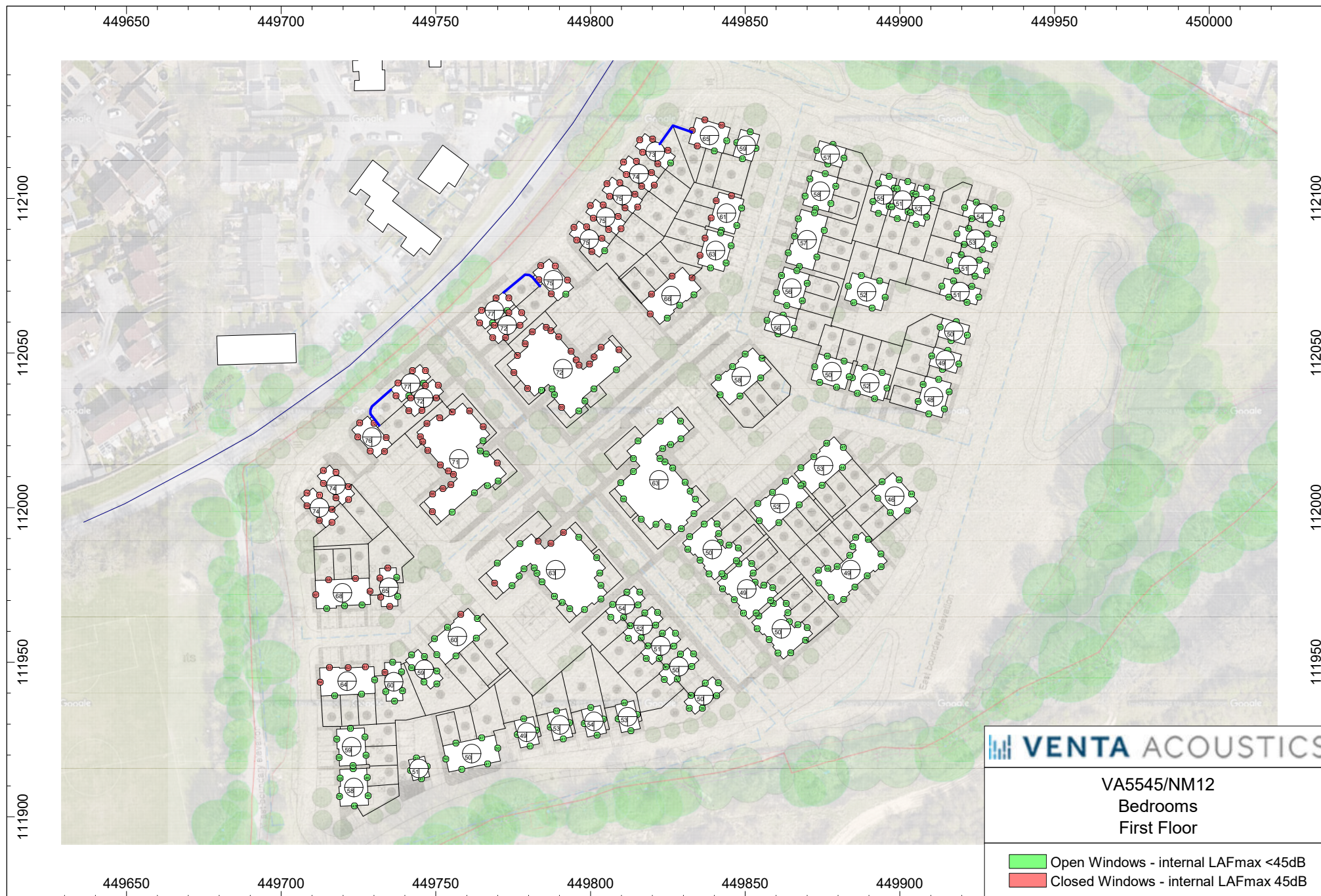


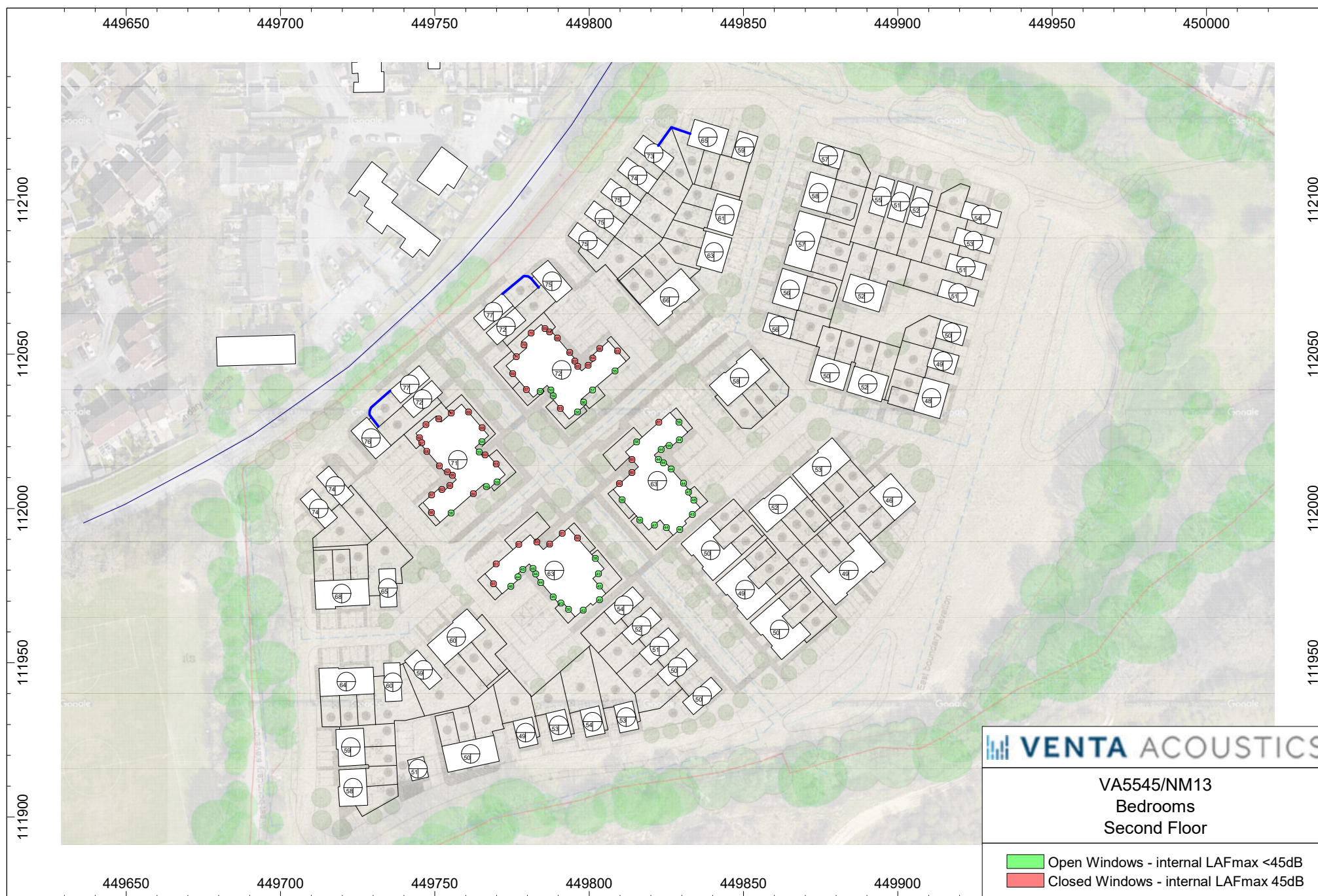


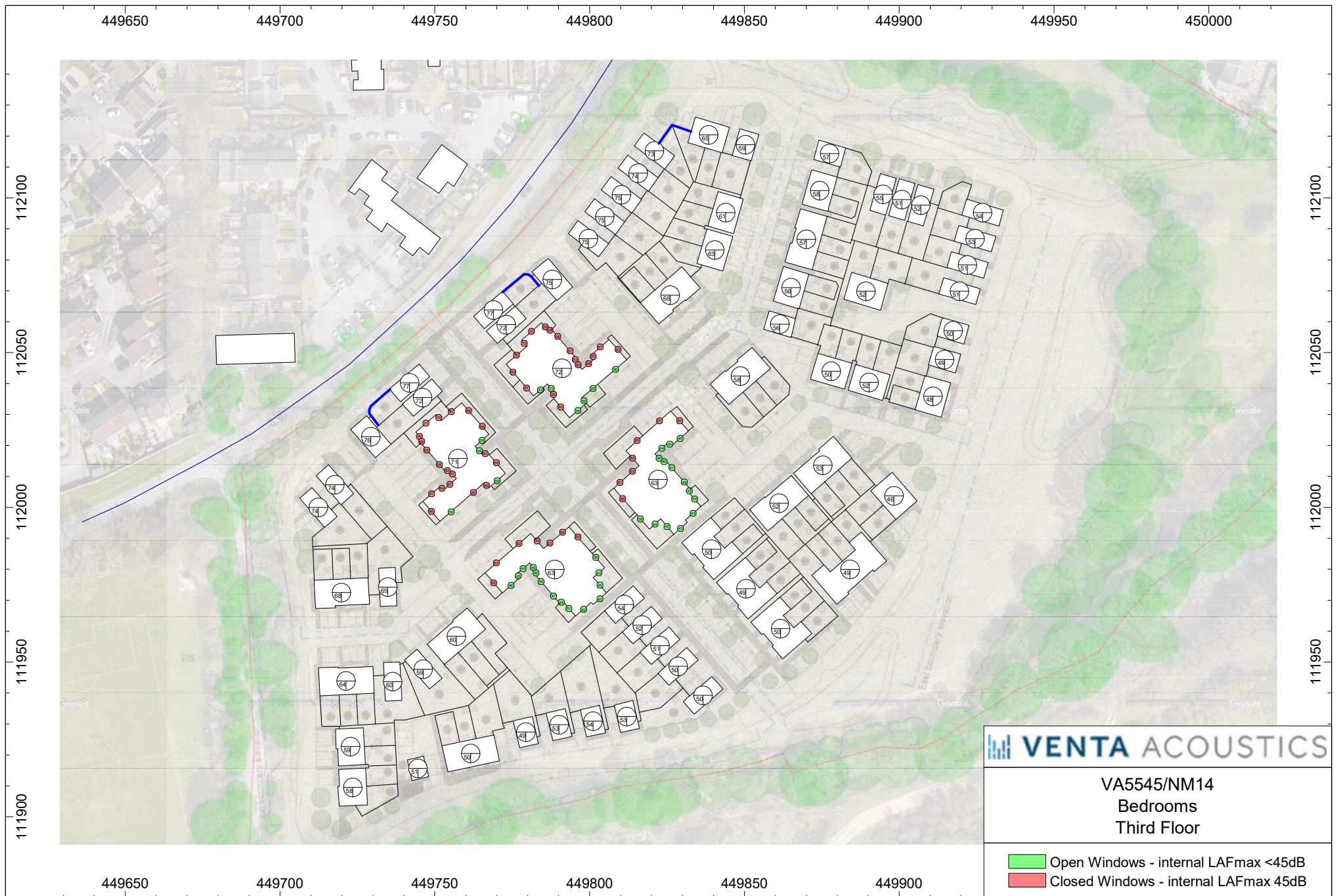
VENTA ACOUSTICS

VA5545/NM11
Bedrooms
Ground Floor

Open Windows - internal LAFmax <45dB
Closed Windows - internal LAFmax 45dB







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.
L_{max} :	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz		63		125		250		500		1000		2000		4000		8000
---------------------------------	--	----	--	-----	--	-----	--	-----	--	------	--	------	--	------	--	------

APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

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.

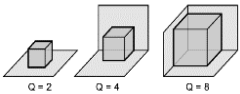
Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a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

Appendix B

Plant Noise Calculations

Plots 7-8

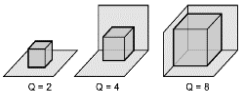
MCS 020 Planning Standard - Air Source Heat Pump calculation procedure

Instruction	Result
1. From manufacturer's data, obtain the A-weighted sound power level of the heat pump. See 'Note 1: Sound power level'. The highest sound power level specified should be used (the power in "low noise mode" should not be used).	49
2. Use 'Note 2: Sound pressure level' and 'Note 3: Determination of directivity' below to establish the directivity 'Q' of the heat pump noise.	8
3. Measure the distance from the heat pump to the assessment position in metres (rounded down, maximum 30 metres) - Assessment position means a position one metre external to the centre point of any door or window to a habitable room of a neighbouring property as measured perpendicular to the plane of the door or window. - Habitable room means a room other than a bathroom, shower room, water closet or kitchen. - Neighbouring property. Means any building used for any of the purposes of Class C of the Town and Country Planning (Use Classes) Order 1987 (as amended) (includes dwellinghouses, hotels, residential institutions and houses in multiple occupation). In instances where the air source heat pump would be installed on block of flats, neighbouring property includes flats within the same block of flats (excluding the flat of the "owner(s)" of the air source heat pump. 	4
4. Use table in 'Note 4: dB distance reduction' below to obtain a dB reduction.	-14
5. Establish whether there is a solid barrier between the heat pump and the assessment position using 'Note 5: Barriers between the heat pump and the assessment position' and note any dB reduction. - For a solid barrier (e.g. a brick wall or a fence) that completely obscures an installer's vision of an assessment position from the top edge of the air source heat pump attenuation of -10 dB may be assumed. - Where a solid barrier completely obscures an installer's vision of an assessment position from the top or side edges of the air source heat pump, but moving a maximum distance of 25 cm in any direction to the air source heat pump allows an assessment position to be seen, attenuation of -5 dB may be assumed. - If it is possible for an installer to see any part of an assessment position from the top or side edges of the air source heat pump no attenuation may be assumed.	-5
6. Calculate the sound pressure level (see 'Note 2: Sound pressure level') from the heat pump at the assessment position using the following calculation: (STEP 1) + (STEP 4) + (STEP 5)	30
7. Background noise level. For the purposes of the MCS Planning Standard for air source heat pumps the background noise level is assumed to be 40 dB(A) Lp. For information see 'Note 6: MCS Planning Standard for air source heat pumps background noise level'.	40
8. Determine the difference between STEP 7 background noise level and the heat pump noise level using the following calculation: (STEP 7) – (STEP 6)	10
9. Using the table in 'Note 7: Decibel correction' obtain an adjustment figure and then add this to whichever is the higher dB figure from STEP 6 and STEP 7. Round this number up to the nearest whole number.	41
10. Is the FINAL RESULT in STEP 9 equal to or lower than the permitted development noise limit of 42 dB(A)? If YES - the air source heat pump will comply with the permitted development noise limit for this assessment position and may be permitted development (subject to compliance with other permitted development limitations/conditions and parts of this standard). NOTE - Other assessment positions may also need to be tested. If NO – the air source heat pump will not be permitted development. This installation may still go ahead if planning permission is granted by the local planning authority.	YES

adjust
figure 0.4

Plots 11-12

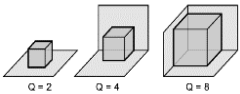
MCS 020 Planning Standard - Air Source Heat Pump calculation procedure

Instruction	Result
1. From manufacturer's data, obtain the A-weighted sound power level of the heat pump. See 'Note 1: Sound power level'. The highest sound power level specified should be used (the power in "low noise mode" should not be used).	49
2. Use 'Note 2: Sound pressure level' and 'Note 3: Determination of directivity' below to establish the directivity 'Q' of the heat pump noise.	8
3. Measure the distance from the heat pump to the assessment position in metres (rounded down, maximum 30 metres) - Assessment position means a position one metre external to the centre point of any door or window to a habitable room of a neighbouring property as measured perpendicular to the plane of the door or window. - Habitable room means a room other than a bathroom, shower room, water closet or kitchen. - Neighbouring property. Means any building used for any of the purposes of Class C of the Town and Country Planning (Use Classes) Order 1987 (as amended) (includes dwellinghouses, hotels, residential institutions and houses in multiple occupation). In instances where the air source heat pump would be installed on block of flats, neighbouring property includes flats within the same block of flats (excluding the flat of the "owner(s)" of the air source heat pump. 	4
4. Use table in 'Note 4: dB distance reduction' below to obtain a dB reduction.	-14
5. Establish whether there is a solid barrier between the heat pump and the assessment position using 'Note 5: Barriers between the heat pump and the assessment position' and note any dB reduction. - For a solid barrier (e.g. a brick wall or a fence) that completely obscures an installer's vision of an assessment position from the top edge of the air source heat pump attenuation of -10 dB may be assumed. - Where a solid barrier completely obscures an installer's vision of an assessment position from the top or side edges of the air source heat pump, but moving a maximum distance of 25 cm in any direction to the air source heat pump allows an assessment position to be seen, attenuation of -5 dB may be assumed. - If it is possible for an installer to see any part of an assessment position from the top or side edges of the air source heat pump no attenuation may be assumed.	-5
6. Calculate the sound pressure level (see 'Note 2: Sound pressure level') from the heat pump at the assessment position using the following calculation: (STEP 1) + (STEP 4) + (STEP 5)	30
7. Background noise level. For the purposes of the MCS Planning Standard for air source heat pumps the background noise level is assumed to be 40 dB(A) Lp. For information see 'Note 6: MCS Planning Standard for air source heat pumps background noise level'.	40
8. Determine the difference between STEP 7 background noise level and the heat pump noise level using the following calculation: (STEP 7) – (STEP 6)	10
9. Using the table in 'Note 7: Decibel correction' obtain an adjustment figure and then add this to whichever is the higher dB figure from STEP 6 and STEP 7. Round this number up to the nearest whole number.	41
10. Is the FINAL RESULT in STEP 9 equal to or lower than the permitted development noise limit of 42 dB(A)? If YES - the air source heat pump will comply with the permitted development noise limit for this assessment position and may be permitted development (subject to compliance with other permitted development limitations/conditions and parts of this standard). NOTE - Other assessment positions may also need to be tested. If NO – the air source heat pump will not be permitted development. This installation may still go ahead if planning permission is granted by the local planning authority.	YES

adjust
figure 0.4

Plots 18-19

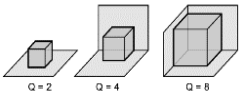
MCS 020 Planning Standard - Air Source Heat Pump calculation procedure

Instruction	Result
1. From manufacturer's data, obtain the A-weighted sound power level of the heat pump. See 'Note 1: Sound power level'. The highest sound power level specified should be used (the power in "low noise mode" should not be used).	49
2. Use 'Note 2: Sound pressure level' and 'Note 3: Determination of directivity' below to establish the directivity 'Q' of the heat pump noise.	4
	
3. Measure the distance from the heat pump to the assessment position in metres (rounded down, maximum 30 metres) - Assessment position means a position one metre external to the centre point of any door or window to a habitable room of a neighbouring property as measured perpendicular to the plane of the door or window. - Habitable room means a room other than a bathroom, shower room, water closet or kitchen. - Neighbouring property. Means any building used for any of the purposes of Class C of the Town and Country Planning (Use Classes) Order 1987 (as amended) (includes dwellinghouses, hotels, residential institutions and houses in multiple occupation). In instances where the air source heat pump would be installed on block of flats, neighbouring property includes flats within the same block of flats (excluding the flat of the "owner(s)" of the air source heat pump.	4
4. Use table in 'Note 4: dB distance reduction' below to obtain a dB reduction.	-17
5. Establish whether there is a solid barrier between the heat pump and the assessment position using 'Note 5: Barriers between the heat pump and the assessment position' and note any dB reduction. - For a solid barrier (e.g. a brick wall or a fence) that completely obscures an installer's vision of an assessment position from the top edge of the air source heat pump attenuation of -10 dB may be assumed. - Where a solid barrier completely obscures an installer's vision of an assessment position from the top or side edges of the air source heat pump, but moving a maximum distance of 25 cm in any direction to the air source heat pump allows an assessment position to be seen, attenuation of -5 dB may be assumed. - If it is possible for an installer to see any part of an assessment position from the top or side edges of the air source heat pump no attenuation may be assumed.	-5
6. Calculate the sound pressure level (see 'Note 2: Sound pressure level') from the heat pump at the assessment position using the following calculation: (STEP 1) + (STEP 4) + (STEP 5)	27
7. Background noise level. For the purposes of the MCS Planning Standard for air source heat pumps the background noise level is assumed to be 40 dB(A) Lp. For information see 'Note 6: MCS Planning Standard for air source heat pumps background noise level'.	40
8. Determine the difference between STEP 7 background noise level and the heat pump noise level using the following calculation: (STEP 7) – (STEP 6)	13
9. Using the table in 'Note 7: Decibel correction' obtain an adjustment figure and then add this to whichever is the higher dB figure from STEP 6 and STEP 7. Round this number up to the nearest whole number.	41
10. Is the FINAL RESULT in STEP 9 equal to or lower than the permitted development noise limit of 42 dB(A)? If YES - the air source heat pump will comply with the permitted development noise limit for this assessment position and may be permitted development (subject to compliance with other permitted development limitations/conditions and parts of this standard). NOTE - Other assessment positions may also need to be tested. If NO – the air source heat pump will not be permitted development. This installation may still go ahead if planning permission is granted by the local planning authority.	YES

adjust
figure 0.2

Plots 20-21

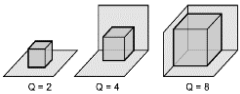
MCS 020 Planning Standard - Air Source Heat Pump calculation procedure

Instruction	Result
1. From manufacturer's data, obtain the A-weighted sound power level of the heat pump. See 'Note 1: Sound power level'. The highest sound power level specified should be used (the power in "low noise mode" should not be used).	49
2. Use 'Note 2: Sound pressure level' and 'Note 3: Determination of directivity' below to establish the directivity 'Q' of the heat pump noise.	4
	
3. Measure the distance from the heat pump to the assessment position in metres (rounded down, maximum 30 metres) - Assessment position means a position one metre external to the centre point of any door or window to a habitable room of a neighbouring property as measured perpendicular to the plane of the door or window. - Habitable room means a room other than a bathroom, shower room, water closet or kitchen. - Neighbouring property. Means any building used for any of the purposes of Class C of the Town and Country Planning (Use Classes) Order 1987 (as amended) (includes dwellinghouses, hotels, residential institutions and houses in multiple occupation). In instances where the air source heat pump would be installed on block of flats, neighbouring property includes flats within the same block of flats (excluding the flat of the "owner(s)" of the air source heat pump.	4
4. Use table in 'Note 4: dB distance reduction' below to obtain a dB reduction.	-17
5. Establish whether there is a solid barrier between the heat pump and the assessment position using 'Note 5: Barriers between the heat pump and the assessment position' and note any dB reduction. - For a solid barrier (e.g. a brick wall or a fence) that completely obscures an installer's vision of an assessment position from the top edge of the air source heat pump attenuation of -10 dB may be assumed. - Where a solid barrier completely obscures an installer's vision of an assessment position from the top or side edges of the air source heat pump, but moving a maximum distance of 25 cm in any direction to the air source heat pump allows an assessment position to be seen, attenuation of -5 dB may be assumed. - If it is possible for an installer to see any part of an assessment position from the top or side edges of the air source heat pump no attenuation may be assumed.	-5
6. Calculate the sound pressure level (see 'Note 2: Sound pressure level') from the heat pump at the assessment position using the following calculation: (STEP 1) + (STEP 4) + (STEP 5)	27
7. Background noise level. For the purposes of the MCS Planning Standard for air source heat pumps the background noise level is assumed to be 40 dB(A) Lp. For information see 'Note 6: MCS Planning Standard for air source heat pumps background noise level'.	40
8. Determine the difference between STEP 7 background noise level and the heat pump noise level using the following calculation: (STEP 7) – (STEP 6)	13
9. Using the table in 'Note 7: Decibel correction' obtain an adjustment figure and then add this to whichever is the higher dB figure from STEP 6 and STEP 7. Round this number up to the nearest whole number.	41
10. Is the FINAL RESULT in STEP 9 equal to or lower than the permitted development noise limit of 42 dB(A)? If YES - the air source heat pump will comply with the permitted development noise limit for this assessment position and may be permitted development (subject to compliance with other permitted development limitations/conditions and parts of this standard). NOTE - Other assessment positions may also need to be tested. If NO – the air source heat pump will not be permitted development. This installation may still go ahead if planning permission is granted by the local planning authority.	YES

adjust
figure 0.2

Plots 50-51

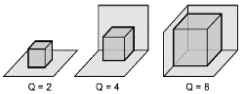
MCS 020 Planning Standard - Air Source Heat Pump calculation procedure

Instruction	Result
1. From manufacturer's data, obtain the A-weighted sound power level of the heat pump. See 'Note 1: Sound power level'. The highest sound power level specified should be used (the power in "low noise mode" should not be used).	49
2. Use 'Note 2: Sound pressure level' and 'Note 3: Determination of directivity' below to establish the directivity 'Q' of the heat pump noise.	8
3. Measure the distance from the heat pump to the assessment position in metres (rounded down, maximum 30 metres) - Assessment position means a position one metre external to the centre point of any door or window to a habitable room of a neighbouring property as measured perpendicular to the plane of the door or window. - Habitable room means a room other than a bathroom, shower room, water closet or kitchen. - Neighbouring property. Means any building used for any of the purposes of Class C of the Town and Country Planning (Use Classes) Order 1987 (as amended) (includes dwellinghouses, hotels, residential institutions and houses in multiple occupation). In instances where the air source heat pump would be installed on block of flats, neighbouring property includes flats within the same block of flats (excluding the flat of the "owner(s)" of the air source heat pump. 	4
4. Use table in 'Note 4: dB distance reduction' below to obtain a dB reduction.	-14
5. Establish whether there is a solid barrier between the heat pump and the assessment position using 'Note 5: Barriers between the heat pump and the assessment position' and note any dB reduction. - For a solid barrier (e.g. a brick wall or a fence) that completely obscures an installer's vision of an assessment position from the top edge of the air source heat pump attenuation of -10 dB may be assumed. - Where a solid barrier completely obscures an installer's vision of an assessment position from the top or side edges of the air source heat pump, but moving a maximum distance of 25 cm in any direction to the air source heat pump allows an assessment position to be seen, attenuation of -5 dB may be assumed. - If it is possible for an installer to see any part of an assessment position from the top or side edges of the air source heat pump no attenuation may be assumed.	-5
6. Calculate the sound pressure level (see 'Note 2: Sound pressure level') from the heat pump at the assessment position using the following calculation: (STEP 1) + (STEP 4) + (STEP 5)	30
7. Background noise level. For the purposes of the MCS Planning Standard for air source heat pumps the background noise level is assumed to be 40 dB(A) Lp. For information see 'Note 6: MCS Planning Standard for air source heat pumps background noise level'.	40
8. Determine the difference between STEP 7 background noise level and the heat pump noise level using the following calculation: (STEP 7) – (STEP 6)	10
9. Using the table in 'Note 7: Decibel correction' obtain an adjustment figure and then add this to whichever is the higher dB figure from STEP 6 and STEP 7. Round this number up to the nearest whole number.	41
10. Is the FINAL RESULT in STEP 9 equal to or lower than the permitted development noise limit of 42 dB(A)? If YES - the air source heat pump will comply with the permitted development noise limit for this assessment position and may be permitted development (subject to compliance with other permitted development limitations/conditions and parts of this standard). NOTE - Other assessment positions may also need to be tested. If NO – the air source heat pump will not be permitted development. This installation may still go ahead if planning permission is granted by the local planning authority.	YES

adjust figure
0.4

Plots 93-94

MCS 020 Planning Standard - Air Source Heat Pump calculation procedure

Instruction	Result
1. From manufacturer's data, obtain the A-weighted sound power level of the heat pump. See 'Note 1: Sound power level'. The highest sound power level specified should be used (the power in "low noise mode" should not be used).	49
2. Use 'Note 2: Sound pressure level' and 'Note 3: Determination of directivity' below to establish the directivity 'Q' of the heat pump noise.	8
3. Measure the distance from the heat pump to the assessment position in metres (rounded down, maximum 30 metres) - Assessment position means a position one metre external to the centre point of any door or window to a habitable room of a neighbouring property as measured perpendicular to the plane of the door or window. - Habitable room means a room other than a bathroom, shower room, water closet or kitchen. - Neighbouring property. Means any building used for any of the purposes of Class C of the Town and Country Planning (Use Classes) Order 1987 (as amended) (includes dwellinghouses, hotels, residential institutions and houses in multiple occupation). In instances where the air source heat pump would be installed on block of flats, neighbouring property includes flats within the same block of flats (excluding the flat of the "owner(s)" of the air source heat pump. 	4
4. Use table in 'Note 4: dB distance reduction' below to obtain a dB reduction.	-14
5. Establish whether there is a solid barrier between the heat pump and the assessment position using 'Note 5: Barriers between the heat pump and the assessment position' and note any dB reduction. - For a solid barrier (e.g. a brick wall or a fence) that completely obscures an installer's vision of an assessment position from the top edge of the air source heat pump attenuation of -10 dB may be assumed. - Where a solid barrier completely obscures an installer's vision of an assessment position from the top or side edges of the air source heat pump, but moving a maximum distance of 25 cm in any direction to the air source heat pump allows an assessment position to be seen, attenuation of -5 dB may be assumed. - If it is possible for an installer to see any part of an assessment position from the top or side edges of the air source heat pump no attenuation may be assumed.	-5
6. Calculate the sound pressure level (see 'Note 2: Sound pressure level') from the heat pump at the assessment position using the following calculation: (STEP 1) + (STEP 4) + (STEP 5)	30
7. Background noise level. For the purposes of the MCS Planning Standard for air source heat pumps the background noise level is assumed to be 40 dB(A) Lp. For information see 'Note 6: MCS Planning Standard for air source heat pumps background noise level'.	40
8. Determine the difference between STEP 7 background noise level and the heat pump noise level using the following calculation: (STEP 7) – (STEP 6)	10
9. Using the table in 'Note 7: Decibel correction' obtain an adjustment figure and then add this to whichever is the higher dB figure from STEP 6 and STEP 7. Round this number up to the nearest whole number.	41
10. Is the FINAL RESULT in STEP 9 equal to or lower than the permitted development noise limit of 42 dB(A)? If YES - the air source heat pump will comply with the permitted development noise limit for this assessment position and may be permitted development (subject to compliance with other permitted development limitations/conditions and parts of this standard). NOTE - Other assessment positions may also need to be tested. If NO – the air source heat pump will not be permitted development. This installation may still go ahead if planning permission is granted by the local planning authority.	YES

adjust
figure 0.4