

Proposed Residential Development
Guysfield Care Home, Willian Road, Willian,
Letchworth Garden City SG6 2AB



Acoustic Design Statement

TECHNICAL REPORT

41005-R2

Proposed Residential Development

Acoustic Design Statement

Prepared for: Oliver and Robb Architects LLP, Pitreavie Drive, Pitreavie Business Park,
Dunfermline KY11 8UH

Site location: Guysfield Care Home, Willian Rd, Willian, Letchworth Garden City SG6 2AB

Table of Contents

1	INTRODUCTION	5
2	NOISE CRITERIA	6
	NATIONAL PLANNING POLICY	6
	NOISE POLICY STATEMENT FOR ENGLAND (NPSE).....	7
	NATIONAL PLANNING PRACTICE GUIDANCE (PPG)	8
	BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND	9
	PROPG: PLANNING AND NOISE – NEW RESIDENTIAL DEVELOPMENT (2017)	10
3	ENVIRONMENTAL SURVEY SUMMARY	11
	BACKGROUND AND RESIDUAL SOUND LEVELS	12
4	NOISE MODELLING PREDICTIONS.....	13
	NOISE MODELLING	13
5	PROPG – FULL ASSESSMENT	15
	GOOD ACOUSTIC DESIGN PROCESS.....	15
	INTERNAL NOISE LEVEL GUIDELINES	16
	BUILDING SERVICES NOISE.....	19
	EXTERNAL AMENITY AREAS	20
6	NOISE IMPACT ASSESSMENT.....	21
	NOISE SOURCE STUDY	21
	BS 4142 ASSESSMENT OF UNDEFINED BUILDING EXTENSION PLANT.....	21
7	CONCLUSIONS	23
Appendix A:	Glossary of Acoustic Terms.....	I
Appendix B:	Annotated Location Plan	II
Appendix C:	Scheme Design	IV
Appendix D:	Environmental Survey Summary	VII
Appendix E:	Noise Model Outputs	XV
Appendix G:	Acousticians Qualifications and Status.....	XVII



Cornwall Suite, Dencora Business Centre, Whitehouse Road, Ipswich IP1 5LT
 Tel: 01473 464 727 | info@sscm.co.uk | www.soundsolutionconsultants.co.uk
 VAT No. 844 9267 90 | Registration No. 5651834
 Registered Address: 2 Lemons Hill, Tattingstone, Ipswich, Suffolk IP9 2NH

PROJECT NUMBER:	41005	DOCUMENT REFERENCE:	41005-R2
ORIGINATED		CHECKED	
E. Anderson BSc. (Hons) AMIOA Acoustic Consultant		D. Attwell BEng. (Hons) MIOA Senior Acoustic Consultant	
RELEASE	DATE	CHANGE DESCRIPTION	
1	08/07/2024	Original release.	
2	02/10/2024	Amendments to external usages	

Sound Solution Consultants Limited (SSC) do not accept any liability in the event of technical reports being used outside of their intended purpose detailed within our terms of engagement or if the report is being relied upon by a third party without direct consent or contract with SSC.

1 INTRODUCTION

- 1.1 The development under consideration is located at Guysfield Care Home, Willian Road, Willian, Letchworth Garden City SG6 2AB (hereinafter, “The Site”).
- 1.2 The proposed development would comprise of the demolition of the existing care home to accommodate 70no. bedrooms with ancillary accommodation and associated works, including a new Car Parking Courtyard and Walled Garden. Along with the demolition and development of the care home the existing “Guys House” to be renovated for staff uses.
- 1.3 Sound Solution Consultants have been commissioned to provide a noise impact assessment of the proposed development.
- 1.4 The document also summarises a noise risk assessment in accordance with ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development (May 2017) and addressing possible local authority concerns with regards to noise generation at The Site.
- 1.5 A site-based study of noise has been used to evaluate the acoustic environment at The Site, in context of the proposal for an extension to a residential care development. A noise survey has been undertaken to identify existing noise sources and a 3D noise model developed (using proprietary noise modelling software IMMI™ 2023) to determine the impact of the noise sources at the façade(s) of proposed habitable spaces.
- 1.6 A noise impact assessment has been carried out to determine the potential for noise disturbance from the proposal on the nearest noise sensitive receptor. The assessment has been conducted following the methodology within British Standard BS 4142:2014 +A1:2019 and national planning policies.
- 1.7 A Glossary of Acoustic Terms can be found in Appendix A that may assist with the terminology used within this report.



2 NOISE CRITERIA

NATIONAL PLANNING POLICY

2.1 The Department for Communities and Local Government introduced the National Planning Policy Framework (NPPF) in March 2012, latest revision of the NPPF dated December 2023.

2.2 The Framework replaced most planning policy, circulars and guidance including Planning Policy Guidance 24: Planning and Noise (1994). The NPPF defines the Government's planning policies for England and sets out the framework, within which local authorities must prepare their local and neighbourhood plans, reflecting the needs and priorities of their communities. The Government's stated purpose in producing the NPPF was to streamline policy, so the planning process is less restrictive, to give a more easily understood framework for delivering sustainable development.

2.3 Under the heading of "Conserving and Enhancing the Natural Environment", specific noise pollution aims are detailed in Section 15 of the NPPF. It is stated that planning policies and decisions should contribute to and enhance the natural and local environment by:

"preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of ... noise pollution..."

2.4 Considering "Ground Conditions and Pollution" it is also stated in paragraph 191 of the NPPF that planning policies and decisions should also ensure that any new development is appropriate for its location considering the likely effects of pollution on health, living conditions, the natural environmental, sensitivity of the site and wider area and impacts that could arise from the development. The aims in doing so should:

- *"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;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

2.5 Planning policies and decisions should also ensure that any new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). The applicant (or 'agent of change') is required to provide suitable mitigation to avoid significant adverse effects, to avoid established businesses/facilities having unreasonable restrictions placed upon them as a result of the new permitted development.

It is stressed that the above references to noise should not be considered in isolation and that the theme, referred to as the "golden thread" of sustainability that runs through the NPPF is integral to noise. The NPPF acknowledges that there is a host of existing sources of national and international guidance which can be used, in conjunction with the Framework, to inform the production of Local Plans and decision making.



NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

2.6 The Noise Policy Statement for England (NPSE) was published in March 2010. It sets out the long-term vision of government noise policy, which is fundamentally to: “Promote good health and good quality of life through the effective management and control of noise within the context of Government policy on sustainable development”. The vision is supported by three key aims:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and reduce to a minimum, other adverse impacts on health; and
- Where possible, contribute to the improvement of health and quality of life.

2.7 The NPSE should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise but does not apply to noise in the workplace. The NPSE adopts the following concepts, to help consider whether noise is likely to have “significant adverse” or “adverse” effects on health and quality of life:

SOAEL – Significant Observed Adverse Effect Level.

This is the level above which significant adverse effects on health and quality of life occur.

LOAEL – Lowest Observed Adverse Effect Level.

This is the level above which adverse effects on health and quality of life can be detected.

NOEL – No Observed Effect Level.

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

2.8 The NPSE emphasises 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. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available (Defra, 2010).”



NATIONAL PLANNING PRACTICE GUIDANCE (PPG)

2.9 Revised Planning Practice Guidance was released in March 2014 to support the NPPF and last updated in July 2019. The Guidance stipulates that Local Planning Authorities' plan making and decision making should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

2.10 The table below is in the Guidance to assist recognising “when noise could be a concern”.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Unnoticeable	No Effect	NOEL	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	
		LOAEL	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g., turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for sleep disturbance. Affects acoustic character of the area and creates a perceived change in quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		SOAEL	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 1 – Planning Practice Guidance to Support National Planning Policy Framework.

BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

- 2.11 The British Standard BS 4142:2014 +A1:2019 “Methods for Rating and Assessing Industrial and Commercial Sound” describes methods for rating and assessing sound of an industrial or commercial nature. The scope of the standard includes relevant topics for commercial development, such as sound from fixed installations (mechanical and electrical plant and equipment). The standard is applicable to the determination of rating levels for sources of sound as well as ambient, background and residual levels. The Standard was amended in June 2019.
- 2.12 Certain acoustic features can increase the significance of impact that might be expected from a comparison of the specific sound level to the background sound level where these features are likely to affect perception and response. Where such features are present at the assessment location, a character correction (or penalty) to the specific sound level is made to obtain the rating level. This can be approached from subjective, objective and reference methods.
- + Tonality: A correction of 0 dB to + 6 dB for sound ranging from not tonal to prominently tonal.
 - + Impulsivity: A correction of up to + 9 dB can be applied for sound that is impulsive.
 - + Intermittency: A penalty of + 3 dB can be applied if on/off conditions are readily distinctive within the reference time interval over the period of the greatest amount of on-time.
 - + Other characteristics: A penalty of + 3 dB can be applied in the absence of all other defined characteristics, where the specific sound contains a distinctive feature in the residual acoustic environment.
- 2.13 Character corrections are normally added arithmetically where more than one feature is present, however, if any single feature is dominant to the exclusion of others, then it may be appropriate to reduce the correction or apply a zero correction for the minor characteristics. The rating sound level is equal to the specific sound level if there are no acoustic features present or expected to be present.
- 2.14 The significance of sound depends upon both the margin by which the rating level exceeds the background sound level and the context in which the sound occurs. An initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level. The context of the development is important in assessing the impact.
- 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 is likely to 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 the specific sound source will have an adverse impact or significant adverse



impact. Where the rating level does exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

- 2.15 The scope of the Standard recognises that human response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact can depend on various factors such as the exceedance to the background level, its absolute level, time of day and change in environment, as well as local attitudes to the source of sound and character of the neighbourhood.

PROPG: PLANNING AND NOISE – NEW RESIDENTIAL DEVELOPMENT (2017)

- 2.16 Professional Practice Guidance on Planning and Noise has been developed by a working group consisting of representatives from the Association of Noise Consultants (ANC), Institute of Acoustics (IOA), Chartered Institute of Environmental Health (CIEH) and practitioners from a planning and local authority background. The guidance was made effective in May 2017 to provide a recommended approach to the management of noise within the planning system in England. The document draws upon the legislation, guidance and standards available at the time of publication and reflects the Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and Planning Practice Guidance (such as PPG-Noise), as well as other authoritative sources of guidance.
- 2.17 The ProPG recommended approach involves two sequential stages covering an initial noise risk assessment and then full assessment considering four key elements. These cover a good acoustic design process, observing internal noise level guidelines, undertaking an external amenity area noise assessment and consideration of other relevant noise issues.
- 2.18 The scope of ProPG considers new residential development that will be predominantly exposed to airborne noise from transportation sources. In cases where the site is exposed to noise of an industrial and/or commercial nature, this shall be considered at Stage 1 of the ProPG approach.
- 2.19 ProPG provides a summary of internal noise level guidelines as part of Stage 2 assessment requirements. These guidelines are derived from British Standard BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings* and The World Health Organisation *Guidelines for Community Noise* (1999).

Activity	Location	Daytime 07:00 – 23:00	Night-time 23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq, 16 h}$	-
Dining	Dining room / area	40 dB $L_{Aeq, 16 h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 h}$	30 dB $L_{Aeq, 8 h}$ 45 dB $L_{Amax(F)}$

Table 2 – ProPG Internal Noise Level Guidelines.

- 2.20 The use of dB $L_{Amax(F)}$ as a health indicator during the night should be treated in correlation with the overall dB $L_{Aeq, T}$ value, considering the number of transient events that occur on a regular basis.

3 ENVIRONMENTAL SURVEY SUMMARY

3.1 A noise survey has been undertaken from Friday 14th to Sunday 16th June 2024 to quantify sound levels at the development site. Appendix B provides details of the site location and measurement position(s).

3.2 The environmental survey results have been used to inform the following elements of this report:

- Calibrate a working noise model of The Site under existing conditions and predict external sound levels incident on development façades;
 - Used to inform the full ProPG assessment and provide commensurate noise mitigation measures for the development.
- Ascertain representative background and residual sound levels at the nearest noise sensitive dwelling (to inform the noise impact assessment in accordance with BS 4142).

3.3 The measured noise levels have been summarised in Table 3 with full noise survey details provided in Appendix D (including recorded weather conditions).

Position	Location	Period	Sound Pressure Levels dB re. 20 µPa
1	Front of development site	Day (07:00 – 23:00)	60 dB L _{Aeq} , 16 h
		Night (23:00 – 07:00)	52 dB L _{Aeq} , 8 h
			71 dB L _{Amax(F)} *
2	Rear of development site	Day (07:00 – 23:00)	51 dB L _{Aeq} , 16 h
		Night (23:00 – 07:00)	50 dB L _{Aeq} , 8 h
			72 dB L _{Amax(F)} *

* Value exceeded 10 times during entire night-time period, following latest industry guidance.

Table 3 – Summary environmental sound pressure levels

3.4 The dominant sound sources incident on The Site were noted from transportation sources to the south (particularly road traffic along Wilian Road and distant traffic noise from the A1(M)).

3.5 The initial site noise risk assessment has been categorised (in the worst-case) as a ‘medium risk’ on the future occupants of the new noise sensitive development. Where a medium noise risk has been noted, the pre-planning application advice stated in ProPG is as follows: *“As noise levels increase, the site is likely less suitable from a noise perspective and any subsequent application may be refused unless good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.”*



BACKGROUND AND RESIDUAL SOUND LEVELS

3.6 Baseline sound measurements were taken over a weekday and weekend period to be representative of the underlying noise climate.

3.7 The 'typical' background and residual sound levels have been reported in this section in accordance with BS 4142, as established from histograms of the recorded dB $L_{A90, 15min}$ and $L_{Aeq, 15min}$ data at Position L1 and Position 2, shown in Appendix D. Position 2 measurement location has been used to describe the underlying climate at the boundary of The Site.

3.8 In line with Section 8.1.4 of BS 4142, the monitoring duration should reflect the range of sound levels for the period assessed. In practice, there is no single level for background or residual sound as these are fluctuating parameters, although a representative value of the period should be used. Note that this is not either the lowest or mean average values of dB $L_{A90, 15min}$ / $L_{Aeq, 15min}$.

Background Sound Level				
Measurement Data			Free Field Sound Pressure Level, dB $L_{A90, T}$ re. 20 μ Pa	
Position	Period	Time HH:MM	Range	Representative
1	Day	07:00 – 23:00	42 - 56	43
	Night	23:00 – 07:00	37 - 48	39
2	Day	07:00 – 23:00	37 - 56	40
	Night	23:00 – 07:00	35 - 57	38

Table 4 – Background sound level summary, dB $L_{A90, T}$.

Residual Sound Level				
Measurement Data			Free Field Sound Pressure Level, dB $L_{Aeq, T}$ re. 20 μ Pa	
Position	Period	Time HH:MM	Range	Representative*
1	Day	07:00 – 23:00	66 – 76	69
	Night	23:00 – 07:00	52 – 74	59
2	Day	07:00 – 23:00	58 – 67	66
	Night	23:00 – 07:00	55 – 64	56

* Representative values of residual have been noted at times of representative background sound.

Table 5 – Residual sound level summary, dB $L_{Aeq, T}$.

3.9 Both background and residual sound levels were notably made up by road traffic noise from Wilian Road and the A1(M).

4 NOISE MODELLING PREDICTIONS

NOISE MODELLING

4.1 Sound pressure level predictions have been undertaken using IMMI™ (v2023) noise mapping software. Indicative noise contour map(s) for typical day and night-time periods have been shown in Appendix E, based on site-based measurement data.

4.2 The success of any noise model is dependent on the software user to generate both valid and representative results, accounting for accurate input of calibrated source data, and proposed topography and form.

- Site geometry and topography has been taken from online mapping resources including Ordnance Survey mapping and LIDAR topographical data.¹
- Simplified building structures have been modelled on and about The Site.
- Surface attenuation factors have been assumed as a worst-case, hard ground. The attenuation factor has been taken as $G = 0.0$ for G_s , G_m and G_r (the ground types in the source region, middle region and receiver region as defined by ISO 9613-2).
- Receiver locations have been taken to be 1.5 m, 4.5 m, 7.5 m and 10 m above ground level (AGL).
- Results have been generated as single figure components for ease of understanding.

4.3 Sound pressure levels have been calculated within the noise model for key points about The Site and are presented in Table 6 below.

Location	Period	Predicted Sound Pressure Levels, dB re. 20 μ Pa (IMMI 2023)							
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dBA	
South Façade GF	Day	58	52	54	61	56	50	63	$L_{Aeq,16hour}$
	Night	50	45	46	52	48	47	55	$L_{Aeq,8hour}$
	Max	63	58	64	69	66	63	72	L_{AFmax*}
South Façade 1F	Day	60	57	57	61	57	50	64	$L_{Aeq,16hour}$
	Night	52	50	49	52	49	47	56	$L_{Aeq,8hour}$
	Max	65	63	67	69	67	63	73	L_{AFmax*}
South Façade 2F	Day	59	56	56	60	56	50	63	$L_{Aeq,16hour}$
	Night	51	49	48	51	48	47	55	$L_{Aeq,8hour}$
	Max	64	62	66	68	66	63	72	L_{AFmax*}
South Façade 3F	Day	60	57	57	61	56	50	63	$L_{Aeq,16hour}$
	Night	52	50	49	52	48	47	55	$L_{Aeq,8hour}$
	Max	65	63	67	69	66	63	73	L_{AFmax*}
West Façade Gf	Day	55	48	49	55	50	43	57	$L_{Aeq,16hour}$
	Night	47	41	41	46	42	40	49	$L_{Aeq,8hour}$
	Max	60	54	59	63	60	56	66	L_{AFmax*}

¹ www.openstreetmap.org / www.blueskymapshop.com

Location	Period	Predicted Sound Pressure Levels, dB re. 20 µPa (IMMI 2023)							
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dBA	
West Façade 1F	Day	53	50	50	54	49	42	56	L _{Aeq,16hour}
	Night	45	43	42	45	41	39	48	L _{Aeq,8hour}
	Max	58	56	60	62	59	55	65	L _{AFmax} *
West Façade 2F	Day	53	50	50	54	49	41	56	L _{Aeq,16hour}
	Night	45	43	42	45	41	38	48	L _{Aeq,8hour}
	Max	58	56	60	62	59	54	65	L _{AFmax} *
West Façade 3F	Day	53	49	48	52	46	36	54	L _{Aeq,16hour}
	Night	45	42	40	43	38	33	46	L _{Aeq,8hour}
	Max	58	55	58	60	56	49	63	L _{AFmax} *
North Façade GF	Day	49	43	43	47	40	27	49	L _{Aeq,16hour}
	Night	41	36	35	38	32	24	41	L _{Aeq,8hour}
	Max	54	49	53	55	50	40	58	L _{AFmax} *
North Façade 1F	Day	51	47	47	49	42	31	51	L _{Aeq,16hour}
	Night	43	40	39	40	34	28	43	L _{Aeq,8hour}
	Max	56	53	57	57	52	44	60	L _{AFmax} *
North Façade 2F	Day	49	43	40	42	34	25	45	L _{Aeq,16hour}
	Night	41	36	32	33	26	22	37	L _{Aeq,8hour}
	Max	54	49	50	50	44	38	53	L _{AFmax} *
East Façade GF	Day	57	52	53	60	55	49	62	L _{Aeq,16hour}
	Night	49	45	45	51	47	46	54	L _{Aeq,8hour}
	Max	62	58	63	68	65	62	71	L _{AFmax} *
East Façade 1F	Day	58	56	56	60	55	48	63	L _{Aeq,16hour}
	Night	50	49	48	51	47	45	55	L _{Aeq,8hour}
	Max	63	62	66	68	65	61	72	L _{AFmax} *
East Façade 2F	Day	59	56	56	60	55	48	62	L _{Aeq,16hour}
	Night	51	49	48	51	47	45	54	L _{Aeq,8hour}
	Max	64	62	66	68	65	61	72	L _{AFmax} *
East Façade 3F	Day	59	55	56	60	55	47	62	L _{Aeq,16hour}
	Night	51	48	48	51	47	44	54	L _{Aeq,8hour}
	Max	64	61	66	68	65	60	71	L _{AFmax} *
Guys House South Facade	Day	59	56	56	60	55	48	63	L _{Aeq,16hour}
	Night	51	49	48	51	47	45	54	L _{Aeq,8hour}
	Max	64	62	66	68	65	61	72	L _{AFmax} *
Guys House North Facade	Day	49	44	42	43	36	27	46	L _{Aeq,16hour}
	Night	41	37	34	34	28	24	38	L _{Aeq,8hour}
	Max	54	50	52	51	46	40	55	L _{AFmax} *

* Value exceeded 10 times during entire night-time period, following latest industry guidance.

Table 6 – Summary of noise model predictions.

5 PROPG – FULL ASSESSMENT

5.1 The Professional Practice Guidance on Planning and Noise (ProPG) approach involves two sequential stages covering an initial noise risk assessment (covered in Section 3) followed by a full assessment considering four key elements. These cover a good acoustic design process, observing internal noise level guidelines, undertaking an external amenity area noise assessment and consideration of other relevant noise issues.

GOOD ACOUSTIC DESIGN PROCESS

5.2 ProPG has stated that it is imperative for acoustic design to be considered at an early stage of the development control process, as to avoid unreasonable acoustic conditions and prevent those which are unacceptable.

- 5.2.1 The proposed development land space has been notably fixed in its locale, where it has not been readily possible to move the proposed receptors away from the incident noise source, or visa-versa. Given the dominant source as transport noise from the south, providing the range of measured sound levels across the developing land space, there has been considered little relative benefit in moving any plots in the proposal by any significant degree.
- 5.2.2 It has been considered that the orientation of the development building should allow for rear-facing amenity spaces as far as practical, using the intervening residential building as a physical barrier between the incident transportation noise source and any external areas. Where daytime sound levels were found be dominated by southern road traffic noise, it is recommended that external amenity is generally located along the northern façade. Although as demonstrated in scheme drawings in Appendix C, external amenity areas are located surrounding the development on all facades. These potential outdoor use areas may require further mitigation such as screening to reduce noise levels within the external amenity areas.
- 5.2.3 It has otherwise been considered that the total number of plots, including their layout orientation within the available land space will be influenced by other considerations than just incident transportation noise.
- 5.2.4 The plan layouts of each dwelling type have not been reviewed in this assessment; however, it should be borne in mind that good acoustic design generally requires facing less-sensitive rooms (i.e., kitchens and bathrooms) towards the dominant incident noise sources, where a layout reflected in industry guidance² has been considered good acoustic design for dwellings to The Site extents. This is generally not applicable to residential care developments (such as that proposed) where single bedroom apartments minimise ideal layout solutions.
- 5.2.5 It has been assumed that the proposed buildings would be formed by traditional brick construction along with an insulated roof. The sound insulation of these components has been deemed less consequential to resulting internal ambient noise levels, where the acoustic performance of glazing and ventilation elements will typically remain as dictating.

² Figure 28 / Page 23. Sound Control for Homes. The Building Research Establishment. CIRIA, 1993.

INTERNAL NOISE LEVEL GUIDELINES

5.3 ProPG has provided a summary of internal noise level guidelines as part of Stage 2 assessment, which have been replicated in Table 2, Section 2 of this assessment.

5.4 The method adopted to achieve suitable internal noise level guidelines has been based upon information contained within the recent ANC publication, The AVO Guide³. This has provided an approach as to how the competing aspects of thermal and acoustic comfort can be managed and has been written to reflect the requirements of ProPG and overarching planning requirements.

5.5 Given the initial site risk assessment in the worst-case, as 'medium', it has been considered commensurate to judge suitable façade components in terms of windows and ventilation.

5.6 The range of whole dwelling ventilation strategies for development has been taken from The Building Regulations 2010 Approved Document F (2013, as amended) Means of Ventilation. An outline appraisal for suitability has been provided using Table B2 of the AVO Guide.

Ventilation Strategy (according to ADF)	Typical windows and vent	Higher acoustic performance windows and vent
System 1: Intermittent extract fans System 2: Passive stack ventilation	✗	✓
System 3: Continuous mechanical extract (MEV)	✗	✓
System 4: Continuous mechanical supply and extract with heat recovery (MVHR)	✗	✓

Table 7 – Outline appraisal of different ventilation strategies in accordance with ADF.

The following specifications have been based on calculations to the detailed method in section G2.1 of BS 8233 (equivalent to the method in BS EN 12354-3).

Location	Façade Component	Specification	Metric with Adaptation Term	Example Configuration or Proprietary Product
South, East and West Facing Facades of development	Window System 1	≥ 33	dB $R_w + C_{tr}$	Double glazing 4-12-8.8 (glass-gap-glass) laminate
North Facing Façade of Development	Window System 2	≥ 29	dB $R_w + C_{tr}$	Double glazing 4-14-6 (glass-gap-glass) standard glass types

* If more than one ventilator is proposed per room, the specification will increase, see Table 10.

Table 8 – Minimum specifications for windows and ventilators.

5.6.1 An adaptation term has been provided for all specifications following the method ISO 717-1:2013. This includes a comparison between the normalised, A-weighted sound spectrum for day and night against the adaptation curves for C and C_{tr} . In this instance the relevant

³ Acoustics Ventilation and Overheating Residential Design Guide Version 1.1, January 2020.

spectrum adaptation term C_{tr} has been confirmed by visual comparison. As the dominant sound source has been noted to be urban road traffic, this has also been directly relevant from Table A1 of ISO 717-1.

5.7 As shown in Table 8, higher specification window systems would be required for the habitable windows along the south, east and west façades of the development; these would require the minimum acoustic specifications outlined in “Window System 1” above. The remaining windows could comprise standard double-glazing systems (as described in “Window System 2”) which should be sufficient to achieve suitable internal sound levels.

5.8 It shall be noted that, in context to achieving $dB R_w + C_{tr}$ metrics, triple glazing would typically not offer any added benefit to double glazing, as the weight of glass in such a system would need to increase simply to achieve the same design target. On this basis, the specifications have been based upon double glazed spectrums, laboratory rated nominally 38 (-2; -5) $dB R_w (C; C_{tr})$; 32 (-1; -5) $dB R_w (C; C_{tr})$.

5.9 To reduce inaccuracy by design, all window data referenced in this assessment have been based on ISO140 laboratory test records provided by leading manufacturers. It would be acceptable to use alternative specifications, however the minimum performance standards as specified must be met or exceeded by any alternative design approach.

5.10 The advice in this section has considered the internal ambient noise level with closed windows. The AVO guide requires that consideration has also been given to the overheating condition. With an advocated and simplistic insertion loss of 13 dB from external to internal areas with an open window, the following summary has been provided for the worst-affected façade with both closed and open windows.

Level 1 Risk Assessment following the AVO Guide			Internal ambient noise level dB re. 20 μ Pa		
Location	Windows	Ventilation State	Day dB $L_{Aeq, T}$	Night dB $L_{Aeq, T}$	Max dB $L_{Amax(F)}$
South, East and West Façades	Window closed/vents open	Building ventilation	33	25	42
	Windows partially open	Overheating ventilation	51	43	60
North Façade	Window closed/vents open	Building ventilation	20	12	29
	Windows partially open	Overheating ventilation	38	30	47

Table 9 – Estimated IANL from different ventilation conditions.

5.11 In case of closed windows, building ventilation conditions have been shown to provide suitable internal ambient noise levels following ProPG and AVO, given that predicted values in the above Table do not exceed those in Table 2.

- 5.12 The potential for adverse effects with open windows depends upon both the internal ambient noise level and the frequency and duration of the overheating condition. There has been no known appraisal⁴ to determine the latter. The AVO guide has provided that such assessment should be recommended, based on the external sound levels.
- 5.13 It has been noted from the AVO guide, that a material change in behaviour may occur with internal ambient noise levels of $> 50 \text{ dB } L_{Aeq, T}$ (07:00 – 23:00) during the day, $> 42 \text{ dB } L_{Aeq, T}$ or $> 65 \text{ dB } L_{Amax(F)}$ (23:00 – 07:00) during the night.
- 5.14 Based on the simple calculations provided in Table 9, The AVO Guide's internal noise criteria may be exceeded for the south, east and west façades of the development; therefore, providing the initial estimation that opening windows is unlikely to be suitable for these worst-case façades.
- 5.14.1 It has therefore been determined that a reliance on natural ventilation, or opening windows, would be inappropriate along the majority of development building, due to the potential adverse effect on future occupants of the development.
- 5.14.2 BS 8233:2014 clarifies that *"if relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level"*. Adequate ventilation is described as building ventilation in accordance with this standard (e.g., trickle ventilation, which must be considered "open" for adequate assessment).
- 5.14.3 It has therefore been acknowledged that certain habitable spaces would need to incorporate either a mechanical extract ventilation strategy (MEV) or mechanical ventilation with heat recovery (MVHR). These ventilation systems would preclude the need for opening windows in an overheating condition, minimising the risk of adverse impact from incident transport/industrial noise.
- 5.14.4 A System 3 ventilation strategy would require through-wall mechanical supply ventilators for the façades of sensitive spaces, rated $\geq 35 \text{ dB } D_{ne, w} + C_{tr}$ ⁵. Air would be extracted in wet rooms via either a centralised or decentralised continuous extract system terminating at an external flue.
- 5.14.5 Alternatively, the development could install a whole house continuous mechanical supply and extract with heat recovery system (MVHR).
- 5.14.6 If this second strategy is adopted, a full noise assessment should be carried out by a suitably qualified person to specify suitable in-duct attenuators and ensure MVHR plant does not adversely impact neighbouring premises (with reference to the details in Section 5 of this document).
- 5.14.7 It is recommended that the atmosphere-side air paths terminate along the eastern elevation of the development, to minimise risk of noise ingress within ventilation ducting.

⁴ CIBSE Technical Memorandum 59. Design methodology for the assessment of overheating risk in homes.

⁵ Or higher depending on the number required to achieve the suitable equivalent area – see Table 10.

5.15 It is noted from the results in Table 9 that The AVO Guide’s internal noise criteria have not been exceeded along the north façade of the development, therefore providing the initial estimation that opening windows could be acceptable for habitable rooms along this sheltered side of the development..

5.15.1 It has been reviewed that a passive system could be appropriate for this best-case façade, where through-window trickle ventilators (rated $\geq 35 \text{ dB } D_{ne, w} + C_{tr}$ ⁵) should be implemented for any windows to habitable spaces.

5.16 Where the total number of ventilators need to achieve a suitable Equivalent Area for the entire dwelling, each habitable room may need to contain more than one mechanical wall vent. In this instance, the performance of the ventilator will need to increase (by a factor $10 \times \log_{10} [n]$, where n is the number of vents per room), as demonstrated below:

Façade component	Quantity in Room Façade	Specification	Metric with Adaptation Term
Ventilators (per habitable room)	1	≥ 35	$\text{dB } D_{ne, w} + C_{tr}$
	2	≥ 38	
	3	≥ 40	
	4	≥ 41	
	5	≥ 42	
	6	≥ 43	

Table 10 – Minimum specifications for ventilators, where one or more are used per habitable room.

BUILDING SERVICES NOISE

5.17 This document uses indoor ambient noise level criteria in terms of $\text{dB } L_{Aeq, T}$ which includes external noise transmitted via the façade as well as internal noise such as that from mechanical ventilation systems.

5.18 The AVO Guide recommends that the contribution to internal noise levels from external source (such as transport sources) and from mechanical services should be considered “*separately and independently*”, where occupants tend to have different tolerance to each source type.

5.19 Recommendations for desirable internal ambient noise levels (IANLs) for ADF ventilation conditions are set out in Figure 3-4 of The AVO Guide, where the “Approved Document F (ADF) Ventilation Condition” recommends ‘desirable internal ambient noise levels from mechanical services’ of $\leq L_{Aeq} 26 \text{ or } 30 \text{ dB in bedrooms and } \leq L_{Aeq} 30 \text{ dB in living rooms}$.

5.20 Manufacturer test data should be reviewed prior to installation, to ensure that all units would accord with ADF ventilation conditions.

5.21 In the case of an MVHR strategy, a boost function should be included within the design of the mechanical ventilation systems to allow rapid air changes to overcome the requirement for summer cooling (i.e., normally by means of opening windows) whilst maintaining low internal ambient noise levels.



EXTERNAL AMENITY AREAS

- 5.22 External amenity areas (such as shared gardens) have been included in the initial design of the development.
- 5.23 Based upon survey measurements and the predicted daytime sound levels (modelled using IMMI prediction software) the proposed northern amenity area is expected to fall within ProPG guidance of 50-55 dB $L_{Aeq, 16h}$ to provide suitably protected, quiet and tranquil outdoor spaces within the development.



6 NOISE IMPACT ASSESSMENT

NOISE SOURCE STUDY

6.1 It has been determined that the key sources of sound relating to the development proposals would be:

- Fixed plant operations and building services.

6.2 The proposed redeveloped care home is likely to be served by external mechanical services equipment such as A/C condensers and ventilation supply and extract units (yet to be specified).

6.2.1 In the absence of specific location or data for the proposed extraction outlet/equipment siting, an indicative assessment has been provided later in Section 6 to minimise the potential for noise impact at the nearest sensitive receptor.

BS 4142 ASSESSMENT OF UNDEFINED BUILDING EXTENSION PLANT

6.3 Concern has been noted to the potential noise impact from undefined external mechanical services equipment associated with the proposed building.

6.4 Exact equipment is yet to be confirmed but is likely to comprise of extraction ductwork for the kitchens and a number of external AC condenser units. In the absence of relevant source data and finalised location of proposed extraction ductwork, this assessment has provided recommended noise emission limits for the unit and external condensers based on representative baseline sound levels at the NNSRs and the cumulative sound levels from other operations.

6.5 The methodology within BS 4142:2014+A1:2019 has provided the relevant numerical assessment which involves a comparison between the cumulative rating sound level of commercial activities against the background sound level existing prior to development, relative to the proposed hours of operation.

6.6 It is assumed that external mechanical services could operate for 100% of any typical reference period.

6.7 In accordance with BS 4142, where a cumulative rating level is predicted to be no higher than the existing background sound level, this is an indication that the commercial sound source(s) would have a low impact at the receptor.

6.8 To ensure a low noise impact from building services at The Site, and to illustrate an absolute worst-case, the recommended rating level noise emission limits at 1 m from the nearest noise sensitive window has been stipulated in the below table:



Time Period	Representative Background Sound Level, dB $L_{A90,15min}$	Recommended Cumulative Rating Level Limit, dB $L_{Ar, Tr}^*$	Difference between Rating Level and Background Sound Level, dB
Daytime (07:00 – 23:00)	40	40	0
Night (23:00 – 07:00)	38	38	0

* Accounting for character correction, as required.

Table 11 – Recommended plant noise emissions limits expressed as BS 4142 “Rating Level” at 1 m from nearest noise sensitive receptor.

6.8.1 Based on worst-case (night-time) operation, a rating level limit of 38 dB $L_{Ar, Tr}$ is proposed from undefined external plant at the nearest noise sensitive receptors.

6.9 To inform design choices on building services plant, including any extract equipment selection, simple calculations have been carried out to ascertain suitable noise limits at the outlet/ventilation point of any plant sources, based on the above limits at the closest receptors.

6.10 To inform a reasonable worst-case assessment, it is assumed external mechanical services equipment could be positioned at high level on the building and A/C may be positioned along the eastern façade of the building, with negligible screening between the source and the closest sensitive receptor along Greenway.

Procedure	Sound Pressure Level dB re. 20 μ Pa
Cumulative maximum Rating Level Limit at receptor ($L_{Ar, Tr}$)	38
Precautionary character correction	-2
Reflections ($Q = 2$)	-3
Façade correction	-3
Distance correction (approx. 30 m to receptor)	29
Indicative maximum Specific Sound Level for extraction system at 1 m distance	59

Note that the effects of vent directivity have not been considered within the below calculations for simplicity.

Table 12 – Calculation of noise limits for undefined external plant (based on baseline measurements at NNSR).

6.11 Based on the indicative calculations above, suitable design limits for proposed plant (at 1 m from outlets) have been provided as 59 dB(A). This value has been worked back from a maximum Rating Level at the closest receptor to ensure that the noise limit at the NNSR would remain lower than the measured background sound level and ensure a low impact.

6.12 The above specification should be readily achievable by means of carefully selected plant and/or attenuators. Extraction system noise should be reviewed by a suitably qualified acoustician once exact details have been established, against the maximum specific sound level provided in Table 12 above.

7 CONCLUSIONS

- 7.1 An assessment of environmental sound levels has been carried out for a proposed development at Guysfield Care Home, Willian Rd, Willian, Letchworth Garden City SG6 2AB. Environmental sound levels have been taken from a site survey at the boundary of the development site.
- 7.2 Stage 1 assessment in accordance with ProPG Planning and Noise: New Residential Development has provided that the site is influenced by dominant road transport noise, where the initial site noise risk assessment has been categorised as 'medium' on the future occupants of the new noise sensitive development.
- 7.3 The Site has been appraised in terms of design and mitigation, for all habitable windows at the development, based upon site survey measurements and the results of 3D predictive noise modelling (IMMITM v2023).
- 7.4 Stage 2 assessments in accordance with ProPG have reviewed a good acoustic design process, internal ambient noise levels, external amenity areas and other matters. Commensurate design specifications have been established considering latest industry guidance.
- 7.5 On the basis that design specifications within this report have been adopted, it follows that any significant adverse noise impacts will be avoided in the finished development as to accord with overarching planning requirements for new residential development.
- 7.6 A noise impact assessment has also been carried out to address the potential noise generation from the proposed development, in line with BS 4142 methodology. In the absence of detailed proposals for external mechanical services equipment, a cumulative plant noise limit for undefined external plant has been set in Section 6. An indicative assessment has shown that the proposed rating noise limit can be met through careful plant selection and attenuation.



Appendix A: Glossary of Acoustic Terms

'A' weighting dB(A): Correction applied to the frequency range of a noise in order to approximate the response of the human ear. Noise measurements are often A-weighted using an electronic filter in the sound level meter.

Attenuation: Sound reduction, measured in decibels (dB).

Ambient Sound: The totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far. Note: The ambient sound comprises the residual sound and the specific sound when present.

Background sound level: A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

Calibration: A check of the function of a sound level meter by comparing the meter reading with a known sound pressure level.

Decibel (dB): The unit of sound level and noise exposure measurement. The range of audible sound pressures is approximately 0 dB to 140 dB.

Frequency (Hz): The pitch of the sound, measured in Hertz.

L_{Aeq,T}: The A-weighted equivalent continuous sound pressure level during a period. It is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period, T.

Octave-bands: A division of the frequency range into recognised bands.

Rating level, L_{Ar,Tr}: The specific sound level plus any adjustment for the character of the sound.

Residual sound: Ambient sound remaining in the absence of the specific sound or that it is suppressed as not to contribute to the ambient sound level.

Residual sound level, L_r or L_{eq,T}: The equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given reference time interval, T.

Sound pressure level (SPL): The basic measure of sound, expressed in decibels, usually measured with an appropriate frequency weighting (e.g. the A-weighted SPL in dB(A)).

Sound power level (L_w): The sound energy radiated per unit time by a sound source measured in watts (W). Sound power can be weighted (e.g. A-weighted) and is not influenced by environmental or physical factors such as weather or distance.

Specific sound: Sound source being assessed.

Specific sound level, L_s or L_{eq,T}: The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval, T.



Appendix B: Annotated Location Plan

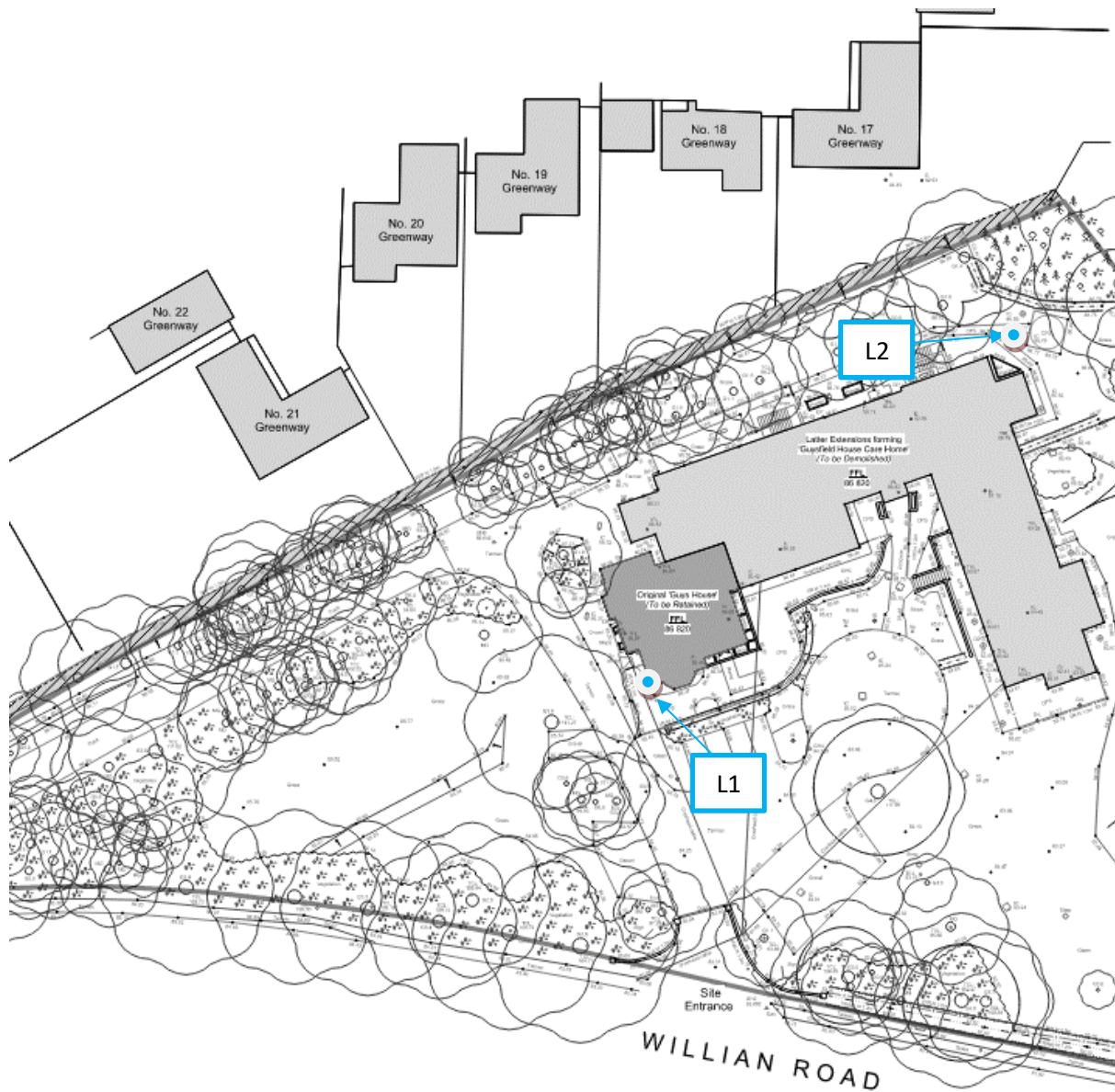


Figure B1 – Location Plan, with measurement positions annotated (L1 – L2 Long term monitoring positions).



Appendix C: Scheme Design



Figure C1 – Proposed development site plan.





Appendix D: Environmental Survey Summary

The equipment used conforms to BS EN 61672-1:2003 (Class 1) for sound level meters and BS EN 60942 (Class 1) for sound calibrators; with at least traceable calibration history valid; no greater than two years for sound level meters and one year for sound calibrators, relevant to the times of the site assessment.

Position No.	Manufacturer	Model No.	Description	Serial No.
L1	Larson Davis	LxT (SE)	3 rd octave band sound level meter	4170
	Larson Davis	PRMLxT1L	Microphone preamplifier (low range)	29299
	Larson Davis	337B02	½" electret microphone	122141
L2	Larson Davis	LxT (ST)	3 rd octave band sound level meter	3934
	Larson Davis	PRMLxT1L	Microphone preamplifier (low range)	29332
	Larson Davis	337B02	½" electret microphone	146990
All	Larson Davis	CAL200	Sound level calibrator	8121

Table D1 – Sound monitoring equipment.

Interval data was recorded at the measurement location at 1-minute and 15-minute periods, time synchronised to BST.

Validation checks at the end of the survey demonstrated acceptable drift across all parts of the study, across the sound level measurement equipment used, of ≤ 0.20 dB.

Position	Calibration Time	Calibration Level	Offset
L1	Start 14/06/2024 12:29	114.10	0.10
	End 16/06/2024 18:02	113.88	-0.12
L2	Start 07/05/2024 10:15	114.00	n/a
	End 08/05/2024 06:45	114.00	n/a

Table D2 – Field calibration data.

Weather conditions at the times of site attendance were deemed acceptable for surveying.

Weather conditions	Start	Finish	Additional comments
Wind velocity	< 5 m/s average	< 3 m/s Average	None
Wind direction	SW	SW	
Cloud cover/rain	50 %, no rain	50 %, no rain	
Temperature	14 °C	10 °C	

Table D3 – Recorded weather conditions.



A brief description of the measurement positions has been provided below:

Position L1) Microphone set at approximately 7.5m AGL in a free-field location out of the window of the south façade of 'Guys House'. Incident sound was observed predominantly from road traffic noise.

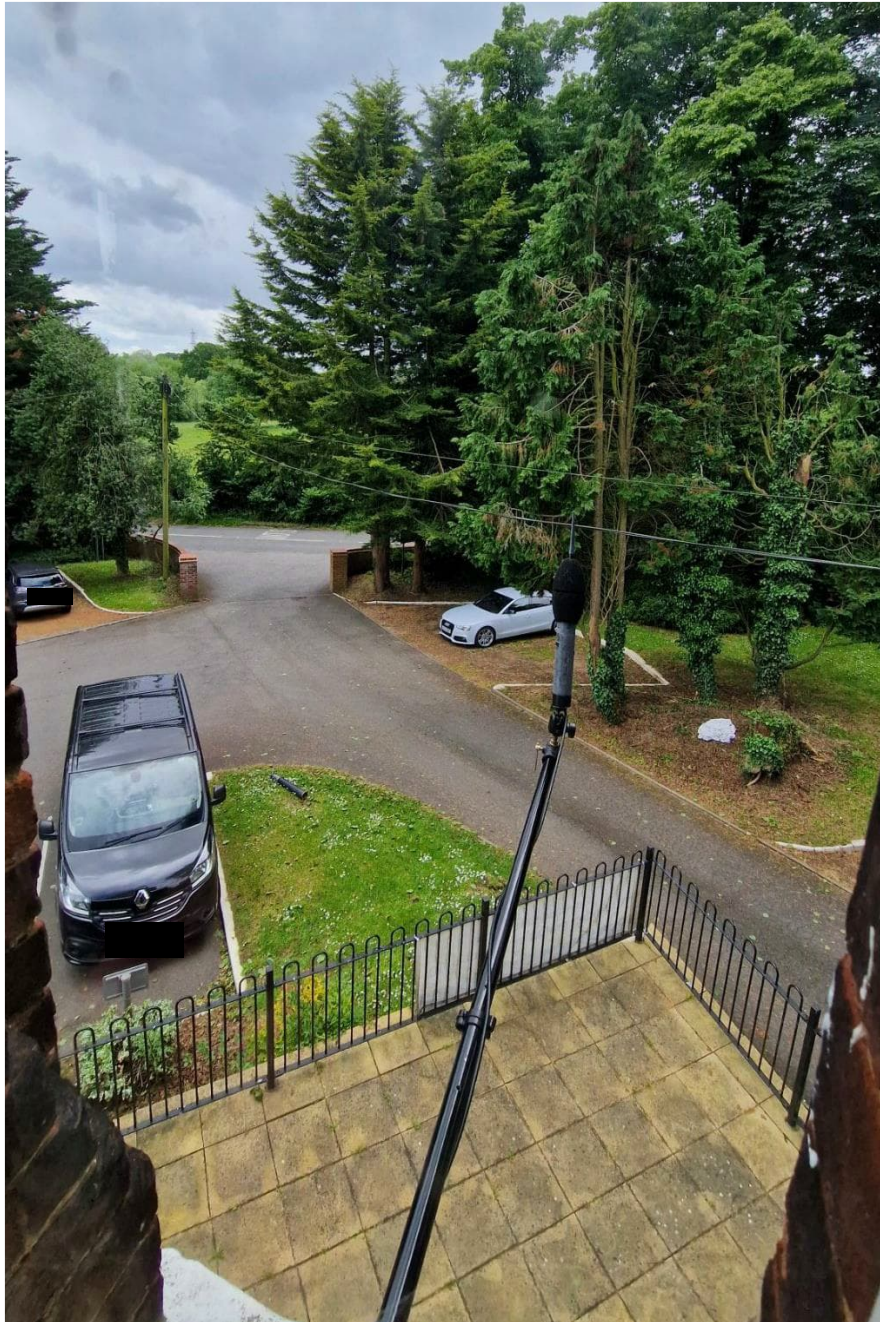
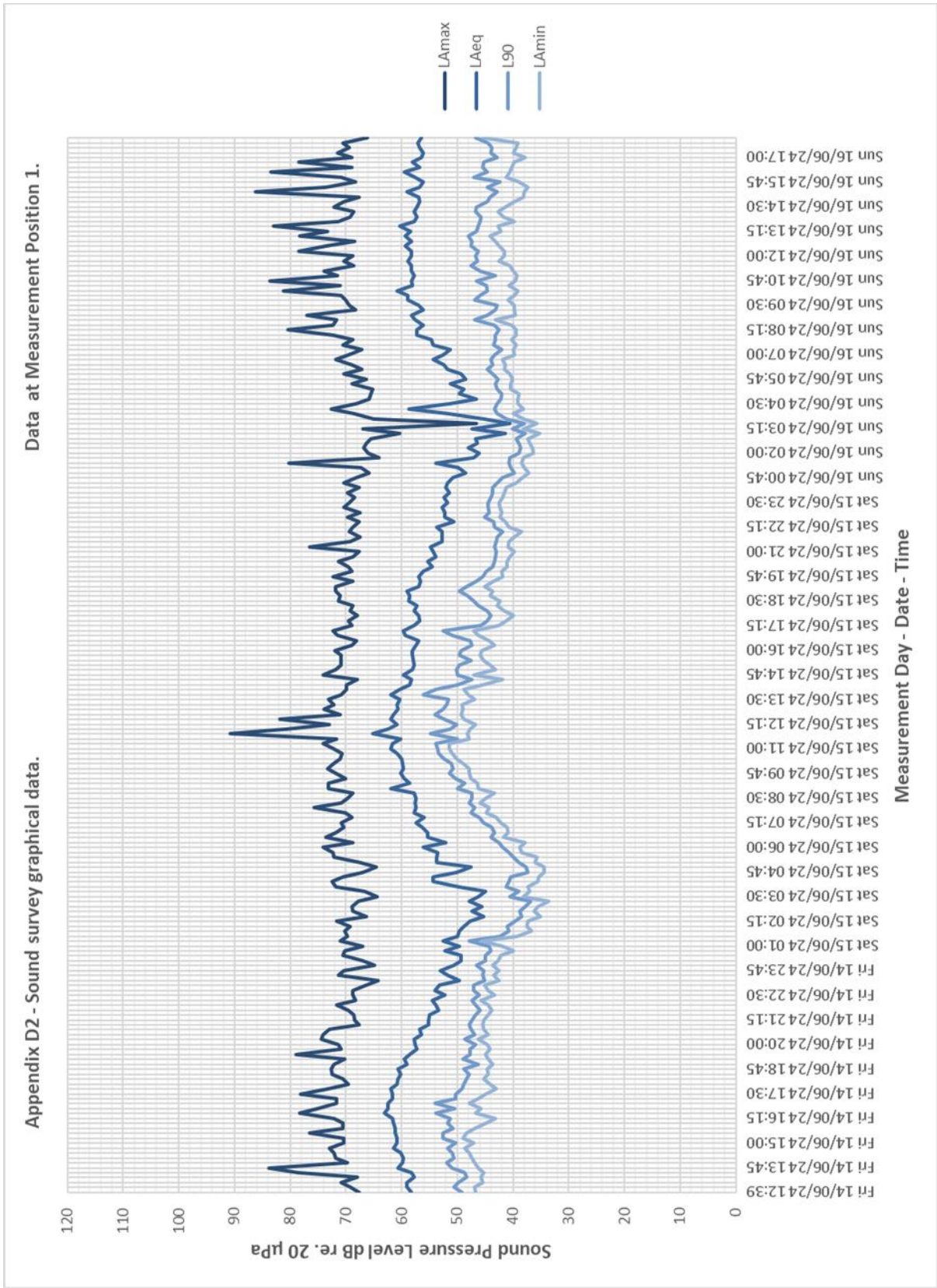
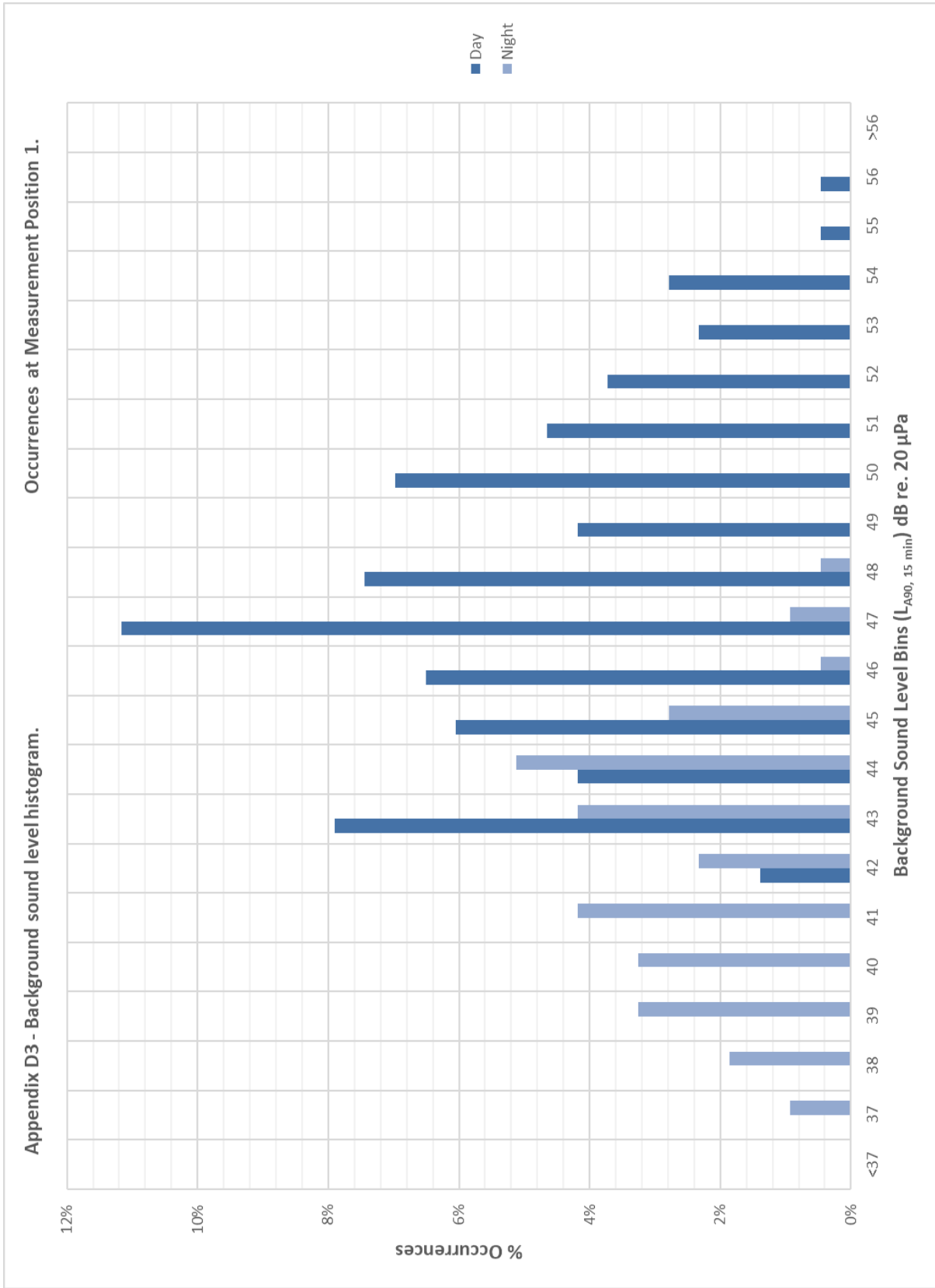
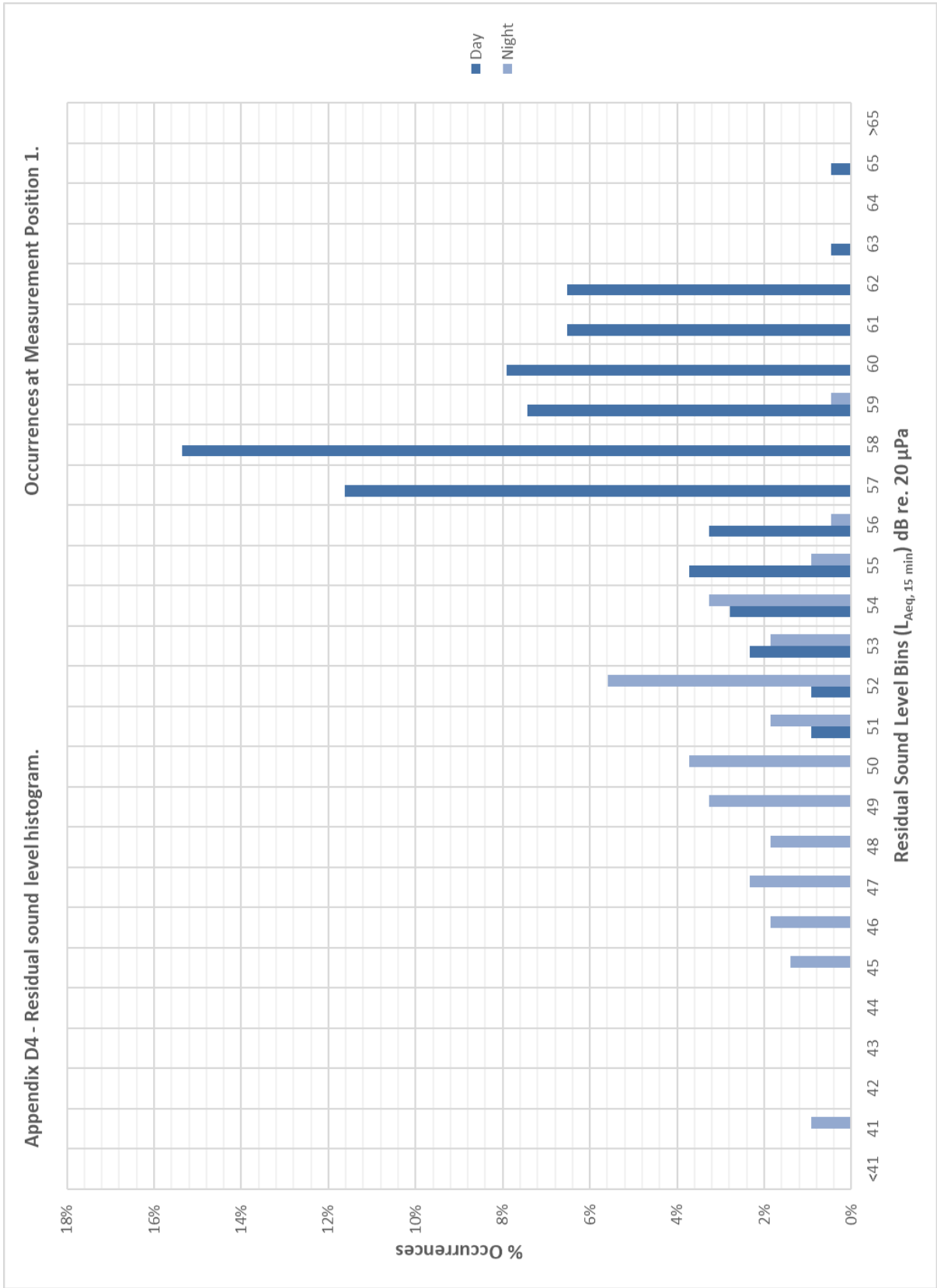


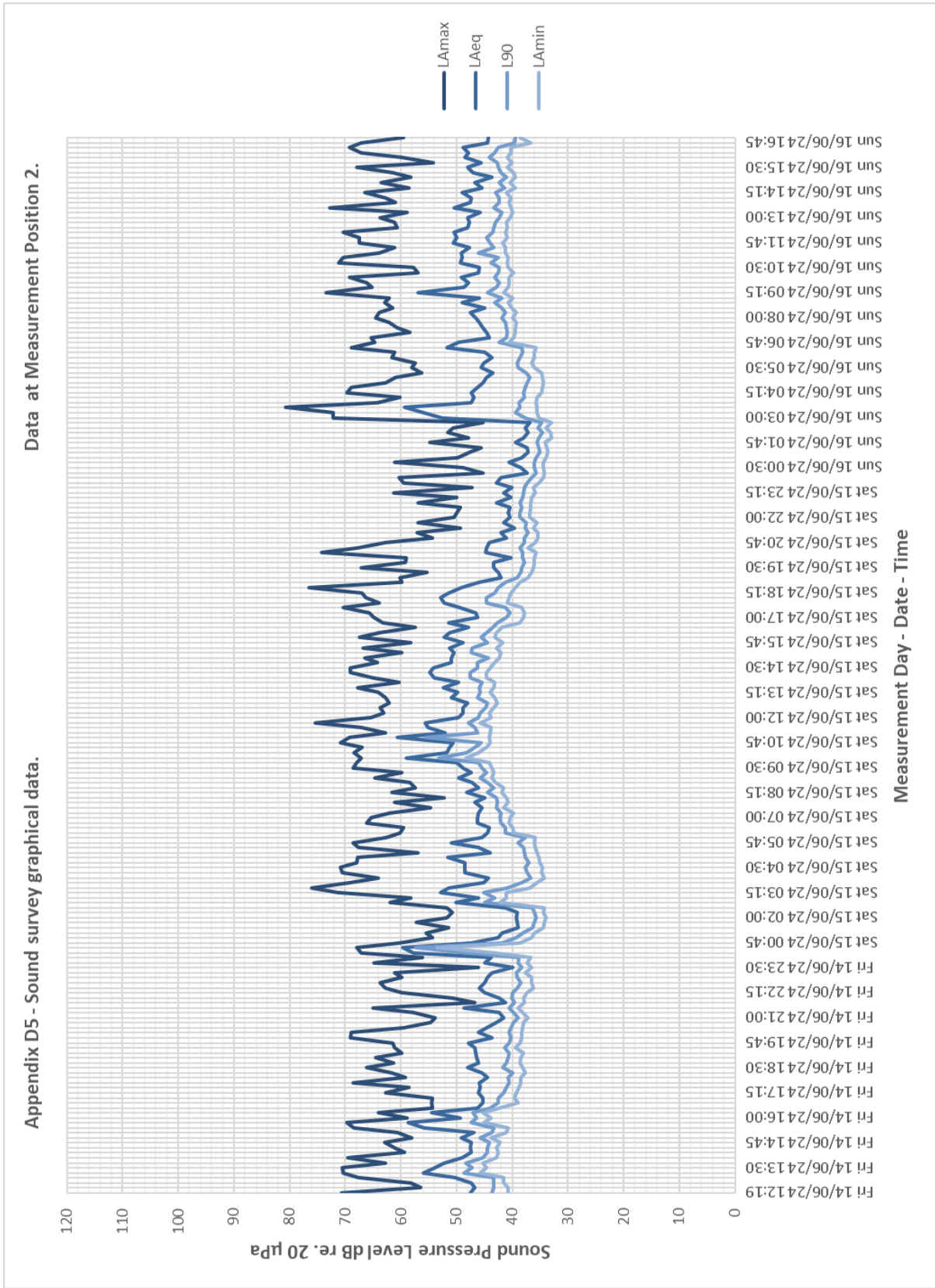
Figure D1 – Photo highlighting Measurement Position L1.

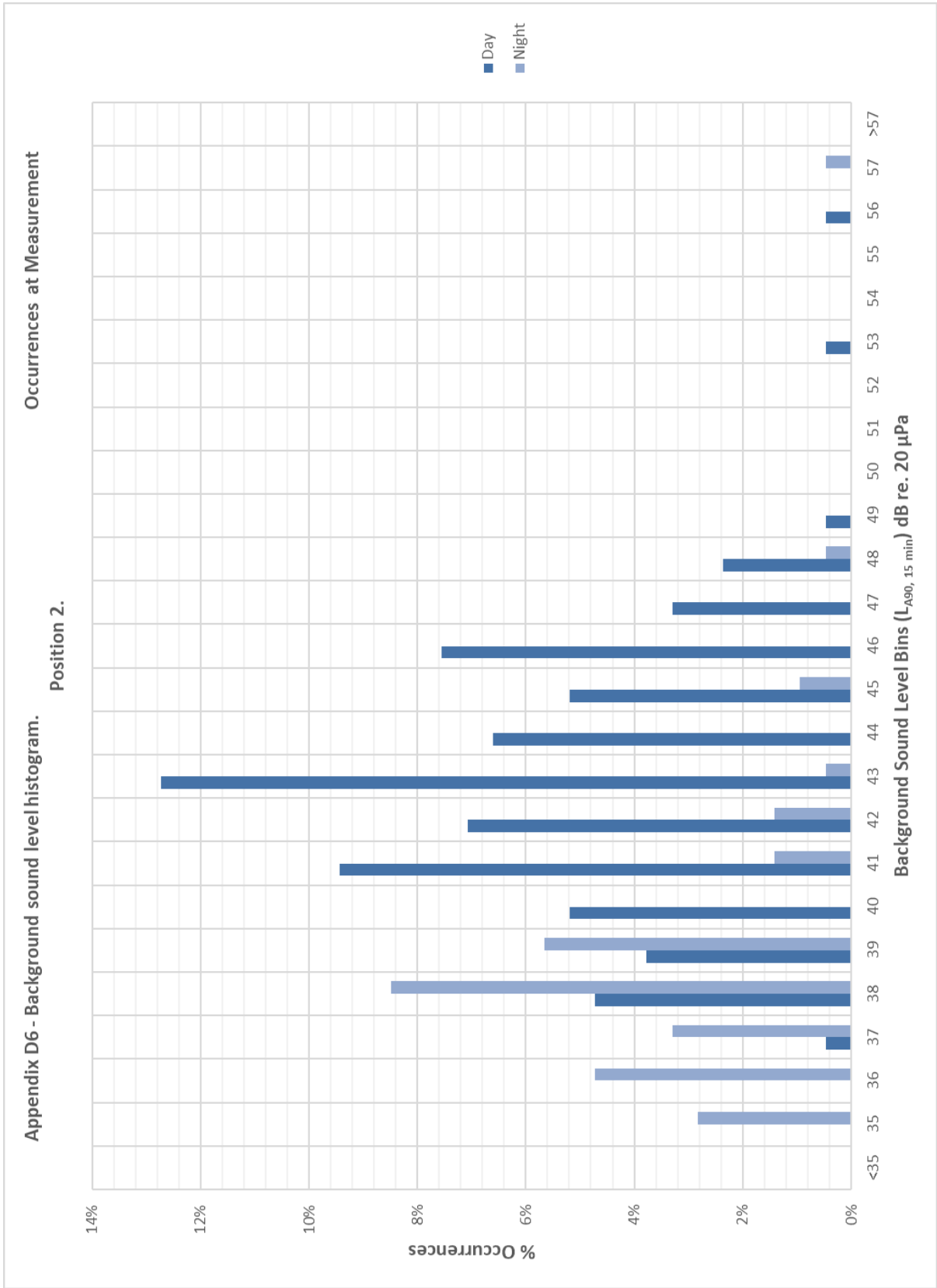
Position L2) Microphone set at 4.5 m AGL at the northern boundary of the development site, representative of the nearest noise sensitive receptors. Incident sound was observed predominantly from road traffic noise.

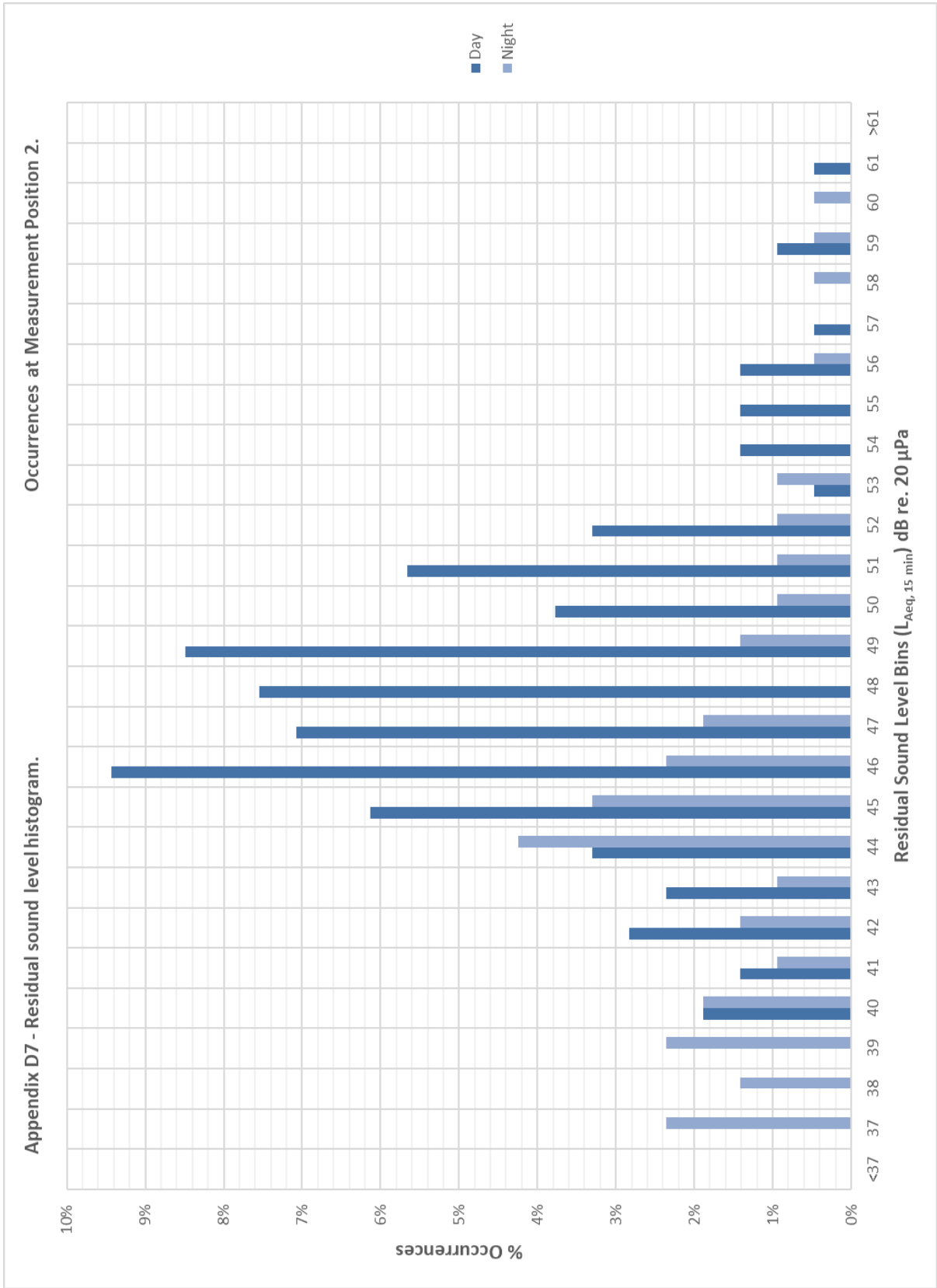












Appendix E: Noise Model Outputs

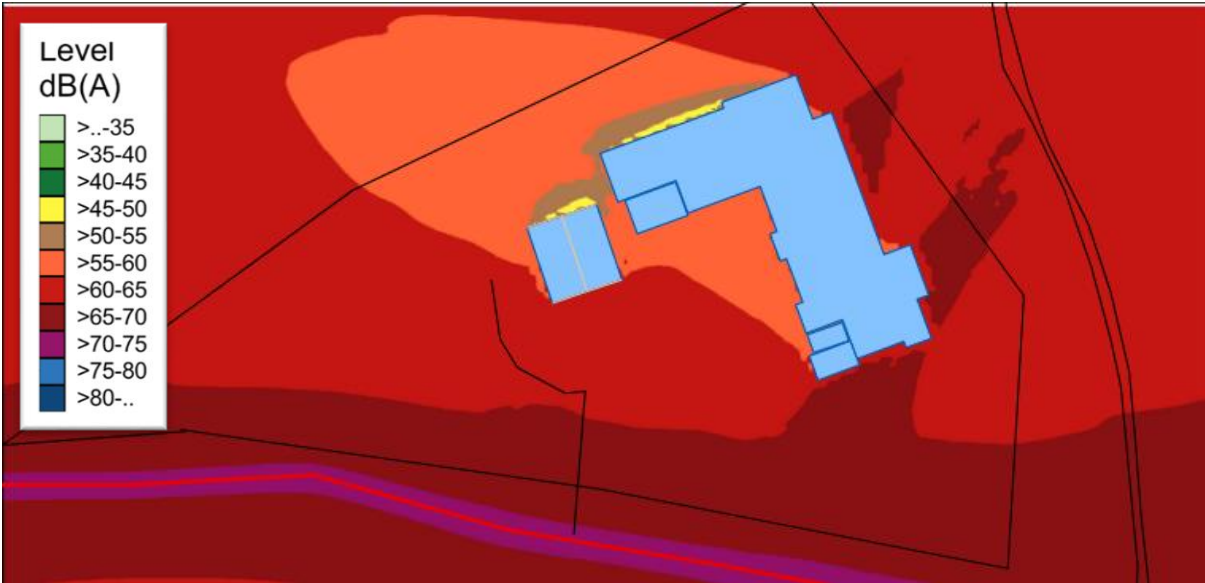


Figure E1 – Predicted noise levels – Daytime grid, dB ($L_{Aeq, 16h}$).

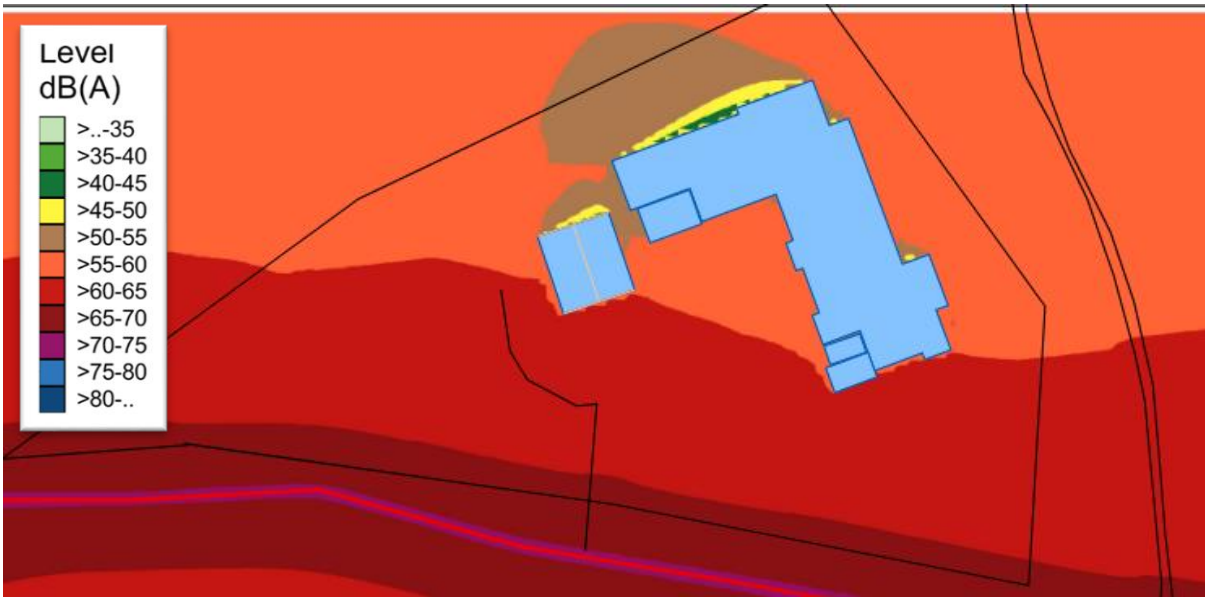


Figure E2 – Predicted noise levels – Night-time grid, dB ($L_{Aeq, 8h}$).



Figure E3 – Predicted noise levels –night-time grid, dB (L_{Amax}).

Appendix G: Acousticians Qualifications and Status

Prepared By: Ed Anderson BSc. (Hons) AMIOA

Position Held: Acoustic Consultant.

Qualifications: BSc. (Hons) Audio and Music Technology, IOA Diploma.

Affiliations: Associate Member of the Institute of Acoustics.

Acoustics Experience: 5 years.

Checked By: Dominic Attwell BEng. (Hons) MIOA

Position Held: Senior Acoustic Consultant.

Qualifications: BSc. (Hons) Audio Acoustics.

Affiliations: Member of the Institute of Acoustics.

Acoustics Experience: 8 years.

