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STARBUILD LTD

**THE COPSE PHASE 2, WORTHING ROAD, HORSHAM,
WEST SUSSEX**

NOISE IMPACT ASSESSMENT

TECHNICAL REPORT: RFE-0690-25-01-02

DATE: FEBRUARY 2026

PROJECT TITLE: THE COPSE PHASE 2, WORTHING ROAD, HORSHAM, WEST SUSSEX

REPORT REF: RFE-0690-25-01-02

DATE: FEBRUARY 2026

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DOCUMENT HISTORY		
Status	Description	Date
01	Draft report for client comment	15/12/2025
02	Final report issue	06/02/2026

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CONTENTS

1	INTRODUCTION	3
2	SITE DESCRIPTION AND PROPOSED DEVELOPMENT.....	4
2.1	Site Description.....	4
2.2	Proposed Development.....	4
2.3	Existing Sound Sources	4
3	ASSESSMENT CRITERIA.....	5
3.1	Noise Policy Statement for England (NPSE)	5
3.2	National Planning Policy Framework.....	6
3.3	Planning Practice Guidance - Noise	6
3.4	Local Authority Requirements.....	9
3.5	British Standard BS8233:2014	9
3.6	World Health Organisation.....	9
3.7	ProPG: Planning & Noise	10
3.8	Approved Document O (AD-O).....	12
4	ENVIRONMENTAL NOISE SURVEY	13
4.1	Overview.....	13
4.2	Unattended Baseline Noise Survey	13
4.3	Attended Sound Measurements	14
4.4	Weather Conditions.....	15
4.5	Unattended Noise Survey Results	15
4.6	Attended Noise Survey Results	16
5	NOISE MODELLING.....	17
5.1	Calculation of Noise Levels Across the Site	17
6	PRO-PG ASSESSMENT.....	20
6.1	ProPG Stage 1 Assessment	20
6.2	ProPG Stage 2 Assessment	20
7	GLAZING AND VENTILATION STRATEGY	27
7.1	Glazing Strategy.....	27
7.2	Ventilation Strategy.....	27
7.3	Overheating	27
8	CONCLUSIONS	32



1 INTRODUCTION

RF Environmental Ltd (RFE) was commissioned by Starbuild Ltd in December 2025 to prepare an acoustic report to support an outline planning application to Horsham District Council (HDC) for 23 residential dwellings at The Copse, Worthing Road, Horsham, West Sussex.

A noise impact assessment has been carried out to determine the likely noise exposure from road traffic at the proposed dwellings and provide guidance on appropriate façade elements to ensure that desirable internal noise levels can be achieved. The report also presents a noise assessment of external amenity areas, based on the measured levels on site.

The existing site and proposed development are described in the following section of this report, whilst the legislation and criteria used for the assessment are included within Section 3. The noise survey is presented in Section 4. Details of the computer noise modelling is presented in Section 5, whilst the noise assessment is addressed in Section 6. A glazing and ventilation strategy for the development is presented in Section 7, along with an assessment and discussion on the potential impacts of overheating across the development. Finally, the conclusions of this study are summarised in Section 8. Figures and Tables are presented in Appendix A and B, respectively. A description of useful acoustic terms can be found in Appendix C.

The report has been produced by Jamie Pearson (MIOA) and reviewed by Richard Fenton (MIOA, MCIEH). Jamie and Richard are experienced in the production of noise impact assessments and have produced a significant number of assessments in consultancy roles and reviewed them in local authority roles.



2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 Site Description

The site is located to the north of the village of Southwater, on the western side of Worthing Road (B2237) and falls within the jurisdiction of Horsham District Council (HDC).

The location of the proposed development site is illustrated in Figure A1 of Appendix A.

The site is bound by open fields to the north and west and by private land and large residential gardens to the south. Existing residential dwellings are located to the east.

Worthing Road (B2237) and the A24 are located c. 280m and c. 340m to the east of the site.

The erection of a 70-bed care home was granted planning permission (ref: DC/24/0622) in March 2025. The care home is to be located c. 200m to the northeast of the site, and although not yet built, is shown in Figure A1 of Appendix A.

2.2 Proposed Development

The current proposals comprise:

- the redevelopment of the existing site to provide 23 residential dwellings, comprising 8 detached houses, 11 semi-detached houses, 3 terraced houses, and 1 flat.

The proposed site layout is displayed in Figure A2 of Appendix A.

2.3 Existing Sound Sources

The ambient noise climate in the immediate vicinity of the development site is dominated by road traffic noise on the A24, and to a lesser degree, road traffic on Worthing Road.



3 ASSESSMENT CRITERIA

3.1 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (March 2010)¹, sets out the long-term vision of Government noise policy.

The vision of the NPSE is to 'Promote good health and a good quality of life through the effective management and control of noise within the context of Government policy on sustainable development.' This 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 quality of life; and
- where possible, contribute to the improvement of health and quality of life.

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 (occupational noise).

The NPSE had adopted the following concepts, to help consider whether noise is likely to have 'significant adverse' or 'adverse' effects on health and quality of life:

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 noise.

LOAEL – Lowest Observed Adverse Effect Level

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

SOAEL – Significant Observed Adverse Effect Level

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

However the NPSE goes on to state 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.'

¹ Department for Environment, Food and Rural Affairs (DEFRA). Noise Policy Statement for England (NPSE), 2010.

3.2 National Planning Policy Framework

The NPPF 2024² does not include specific noise criteria to be applied in planning decisions. It contains the following relevant guidance relating to noise and development:

“15. Conserving and enhancing the natural environment

198. Planning policies and decisions should also ensure that 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; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

200. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

201. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”

The Noise Policy Statement for England is referred to in the footnote of the NPPF.

3.3 Planning Practice Guidance - Noise

Planning Practice Guidance (PPG) on noise³ was issued in March 2014 and updated in July 2019. This web-based guidance advises local planning authorities that “Noise needs to be

² Department of Communities and Local Government. National Planning Policy Framework, 2024

³ Department for Communities and Local Government: Planning Practice Guidance – Noise paragraph 001 Ref. ID: 30-001-20190722. Revision date July 2019.



considered when new developments may create additional noise (including any anticipated changes to that environment from activities that are permitted but not yet commenced)...” It states that...

“noise can override other concerns, where justified, although it is important to look at noise in the context of the wider characteristics of a development proposal, its likely users and its surroundings, as these can have an important effect on whether noise is likely to pose a concern”

As regards planning decisions, the PPG advises that the decision taker ‘should take into account the acoustic environment, and in doing so consider the following:

“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.”

“In line with the explanatory note of the noise policy statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.” (paragraph 003)

The PPG paragraph 004 refers to the NSPE ‘observed effect levels’ but states that ‘while the word ‘level’ is used, this does not mean that the effects can only be defined in terms of a single value of noise exposure.

Paragraph 005 includes a noise exposure hierarchy table which is set out below. It is based on the ‘likely average response,’ and gives example outcomes.

The hierarchy table provides guidance regarding how the concept of SOAELs and LOAELs, introduced through the NPSE, can be applied; and allows for informed subjective perceptions to be made in respect of the noticeability of noise in the context of potential effect levels. The PPG states that *“Although the word ‘level’ is used here, this does not mean that the effects can only be defined in terms of a single value of noise exposure. In some circumstances adverse effects are defined in terms of a combination of more than one factor such as noise exposure, the number of occurrences of the noise in a given time period, the duration of the noise and the time of the day the noise occurs”.*

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Present	No Effect	No Observed Adverse Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present of disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

TABLE 3.1: PPG NOISE EXPOSURE HIERARCHY

(Source –Planning Practice Guidance)

The PPG paragraph 006 advises that:

“The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:

- the source and absolute level of the noise together with the time of day it occurs...
- for a new noise making source, how the noise from it relates to the existing sound environment;
- for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- the spectral content of the noise...”

- the local arrangement of buildings...”

3.4 Local Authority Requirements

Local Authorities in Sussex, including Horsham District Council (HDC), have produced a planning guidance document ‘Planning Noise Advice Document – Sussex⁴ which sets out the required approach for undertaking a noise assessment, for certain types of development.

For new residential dwellings, the guidance refers to BS8233:2014, WHO (2009) and ProPG (2017). The guidance also states “residential dwellings, *apply the indoor ambient noise levels in Tables 4 and 6 of BS8233.*”

3.5 British Standard BS8233:2014

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings⁵ gives recommendations for the control of noise in and around buildings. The Standard suggests appropriate criteria and limits for different situations to guide the design of new or refurbished buildings undergoing a change of use.

Desirable upper noise levels inside residential habitable rooms are specified in the Standard and are reproduced below in Table 3.2.

Activity	Room	Ambient Indoor Noise Level 07:00 to 23:00 hrs, dB L _{Aeq,16 hr}	Ambient Indoor Noise Level 23:00 to 07:00 hrs, dB L _{Aeq,8 hr}
Resting	Living Room	35	-
Dining	Dining room/ area	40	-
Sleeping (daytime resting)	Bedroom	35	30

TABLE 3.2: BS8233 DESIRABLE INDOOR AMBIENT NOISE LEVELS FOR DWELLINGS

Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

In external amenity spaces, such as private gardens and patios, BS 8233 indicates that it is desirable that the external noise level in these areas does not exceed 50 dB L_{Aeq,T} with an upper guideline value of 55 dB L_{Aeq,T} in noisier environments.

3.6 World Health Organisation

The most recent WHO guidelines ‘*Environmental Noise Guidelines for the European Region*’⁶ acknowledge that ‘single event noise indicators such as the maximum sound pressure level

⁴ The Planning Noise Advice Document: Sussex. 2021.

⁵ British Standard BS 8233: 2014. Guidance on sound insulation and noise reduction in buildings.

⁶ World Health Organisation. 2018. Environmental Noise Guidelines for the European Region.

are warranted in specific situations such as night time railway or aircraft noise events that can clearly elicit awakenings', however, the guidance indicates that 'the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative' and therefore does not make any recommendations for single event noise indicators.

However, guideline values for community noise in specific environments are presented in the WHO's 'Guidelines for Community Noise'⁷ document. The guideline values are presented in Table 3.3.

Specific Environment	Critical Health Effect(s)	dB $L_{Aeq,T}$	Time Base hours	dB $L_{Amax,F}$
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45

TABLE 3.3: WHO GUIDELINE NOISE VALUES

Note 1: For a good sleep, the WHO states that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night.

The Night Noise Guidelines (NNG) for Europe⁸ is described as an extension of the WHO Guidelines for Community Noise publication. The threshold levels of noise exposure presented in the document are described as milestones in the process of evaluating the health consequences of environmental exposure. The health-based guideline values for the assessment and control of night noise exposure were derived from a review of available scientific evidence on the health effects of night noise. These include the effects and threshold levels for night time $L_{Amax,F}$, which are lower than those presented in the WHO community noise guidelines. These revised levels are presented in Table 3.4 below.

Effect	Description	Indicator	NOEL Threshold
Sleep Quality	Waking up in night and/or too early in the morning	dB $L_{Amax,F}$	42

TABLE 3.4: WHO NIGHT-TIME NOISE GUIDELINES

3.7 ProPG: Planning & Noise

ProPG (Professional Practice Guidance: Planning and Noise)⁹ was 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

⁷ World Health Organisation. 1999. Guidelines for Community Noise.

⁸ World Health Organisation. Night Noise Guidelines for Europe. 2009.

⁹ Institute of Acoustics (IOA), Association of Noise Consultants (ANC) and Chartered Institute of Environmental Health (CIEH), "Professional Practice Guidance on Planning & Noise," 2017.

Practitioners in assessing the suitability for residential development on sites predominantly exposed to airborne transport noise. Practitioners in assessing the suitability for residential development on sites predominantly exposed to airborne transport noise.

ProPG introduced a sequential 2-stage approach allowing for early consideration of noise issues at Stage 1 followed by more detailed consideration of noise issues at Stage 2, should this be identified as necessary in Stage 1.

Stage 1 introduces the concept of noise risk categories ranging from Negligible Risk to High Risk to help LPAs in making accelerated straightforward decisions for low risk sites and to provide guidance for more detailed consideration associated with challenging higher risk sites.

Following the outcome of Stage 1, Stage 2 then applies to sites assessed as low to high risk. This stage should not be necessary for sites assessed as negligible risk.

Stage 2 requires consideration be given to four key elements:

- Element 1: Good Acoustic Design Process;
- Element 2: Internal Noise Level Guidelines;
- Element 3: External Amenity Area Noise Assessment; and
- Element 4: Other Relevant Issues.

Further details on these elements are discussed in the acoustic design section of this report. Table 3.5 below provides a summary of ProPG's noise risk categories and their associated free-field noise levels, along with the assessment implications.

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	> 70 dB	> 60 dB	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.

TABLE 3.5: PROPG STAGE 1 - INITIAL SITE NOISE RISK ASSESSMENT

Notes [1] Noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures. [2] 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 not dominant; [3] $L_{Aeq,16hr}$ is for daytime 07:00-23:00, $L_{Aeq,8hr}$ is for night-time 23:00 to 07:00; and [4] An indication that there may be more than ten noise events at night (23:00-07:00) with $L_{Amax,F} > 60$ dB means the site should not be regarded as negligible risk.

3.8 Approved Document O (AD-O)

Approved Document O 'Overheating'¹⁰ was released in December 2021 and came into effect in England on 15th June 2022. It introduces requirements for various types of residential premises to limit unwanted solar gains in summer and provide an adequate means to remove heat from the indoor environment.

Requirement O1(2)(a) of the regulation requires that account must be taken of the safety of an occupant, and their reasonable enjoyment of the residence. There is also a requirement (O2(b)) that mechanical cooling may only be used where sufficient heat cannot be removed from the indoor environment without it.

The statutory guidance to support Requirement O1(2)(a), Approved Document O contains information relating to noise at night.

Paragraph 3.3 of AD-O states:

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

- *40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am); and*
- *55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).*

¹⁰ Approved Document O – Overheating (2021). HM Stationary Office. 2021.

4 ENVIRONMENTAL NOISE SURVEY

4.1 Overview

RFE undertook a noise survey at the site in 2023 to support the planning application for the care home development (ref: DC/24/0622).

The principal noise source in the area is road traffic on the A24. Traffic flow data from the DfT count point (90210) indicates that between 2023 and 2024, the number of motor vehicles on the A24 increased by approximately 5%. This change corresponds to an estimated increase of 0.2 dB in road traffic noise, which is considered negligible. Although traffic count data for 2025 is not yet available, applying the same rate of increase from 2024 to 2025 would similarly result in a negligible (0.2 dB) increase (0.4 dB in total) in noise. Accordingly, the existing noise data is considered robust and has been reused for this assessment.

4.2 Unattended Baseline Noise Survey

Unattended continuous monitoring of existing noise levels was undertaken at the monitoring location shown as LT1 on Figure A1 of Appendix A. The equipment used during the survey is presented in Table 4.1 below.

Manufacturer	Model No.	Description	Serial No.
Norsonic	NOR-140	Sound Level Meter	140326
Larson Davis	CAL200	Acoustic Calibrator	12981

TABLE 4.1: SOUND MONITORING EQUIPMENT

Note: All measurements were taken within the laboratory calibration parameters in effect at the time of the survey.

The sound level meter was powered by dry cell batteries and stored inside a weatherproof security box.

Measurements were obtained using the 'F' time weighting and A-weighting frequency network. The equipment was calibrated before and after the survey to generate a calibration level of 114.0 dB at 1 kHz.

15-minute measurements of $L_{Amax,F}$, $L_{Aeq,15min}$ and $L_{A90,15min}$ noise levels were obtained at this monitoring location between 10:00 hrs Tuesday 21st February 2023 and 11:00 hrs Monday 27th February 2023, with the microphone position set at a height of approximately 1.5 m above local ground level in free-field conditions.

A photograph of the monitoring equipment is shown in Figure 4.1 below.



FIGURE 4.1: PHOTOGRAPH OF UNATTENDED MONITORING EQUIPMENT

4.3 Attended Sound Measurements

Supplementary short-term attended noise measurements were obtained on Tuesday 21st February 2023 between 10:16 hrs and 11:06 hrs at the monitoring locations labelled as ST1, ST2 and ST3 on Figure A1 of Appendix A. The purpose of the attended noise monitoring was to understand the noise contribution from the various roads surrounding the site.

The equipment used for the attended measurements is presented in Table 4.2 below.

Manufacturer	Model No.	Description	Serial No.
Larson Davis	LxT	Sound Level Meter	0004968

TABLE 4.2: SOUND MONITORING EQUIPMENT

Note: All measurements were taken within the laboratory calibration parameters in effect at the time of the survey.

Attended noise measurements were made in free-field conditions, with the sound level meter fitted with a windshield and mounted on a tri-pod to elevate the microphone 1.5 m above local ground.

The sound level meter was configured to measure A-weighted noise indices, which included $L_{Amax,F}$, $L_{Aeq,5min}$ and $L_{A90,5min}$ levels.

Measurements taken on Tuesday 21st February 2023 at the attended monitoring locations were made over single 15-minute measurement intervals.

The sound level meter was calibrated before and after the survey using the acoustic calibrator described above in Table 4.1.

During the attended noise measurements, the LT1 noise monitor was also set to measure, with the clocks on both sound level meters synchronised.

4.4 Weather Conditions

Weather conditions during the site visits are presented below in Table 4.3.

Site Visit	Date and Time	Noted Weather
Noise monitor setup and attended noise monitoring	21/02/2023 10:00hrs	Dry; 8°C; 94% humidity; Average windspeeds <0.5 m/s
Noise monitor collection	28/02/2023 09:30hrs	Dry; 5 °C; 80% humidity; Average windspeeds <0.5 m/s

TABLE 4.3: WEATHER CONDITIONS DURING SITE VISITS

A history of the weather conditions during the continuous noise survey periods has been obtained from an internet source (www.wunderground.com).

Analysis of the data during the noise survey period between Tuesday 21st February 2023 and Monday 27th February 2023 indicates a period of mainly dry and calm weather.

There were periods of rainfall during the night-time period on Tuesday 21st February 2023 and during the daytime period on Wednesday 22nd February 2023, however, analysis of the noise dataset indicates these periods of rainfall did not significant influence the measured noise levels.

The weather conditions obtained for the noise survey periods are summarised in Figure A3 of Appendix A.

4.5 Unattended Noise Survey Results

The results of the unattended noise measurement survey are presented graphically in Figure A4 of Appendix A, tabulated in Table B1 of Appendix B and summarised below in Table 4.4.

Date	Measured Noise Levels, dB ^[1]					
	Daytime (07:00 - 23:00)			Night-time (23:00 - 07:00)		
	L _{Amax,F}	L _{Aeq,16hr}	L _{A90,16hr}	L _{Amax,F}	L _{Aeq,8hr}	L _{A90,8hr}
Tue 21/02/23 ^[1]	67(58-95)	55	49	58(53-73)	49	33
Wed 22/02/23	66(58-92)	57	53	57(53-73)	46	31
Thu 23/02/23	67(61-84)	57	54	59(54-72)	50	38
Fri 24/02/23	66(60-81)	57	53	60(54-87)	49	38
Sat 25/02/23	67(59-78)	56	52	61(55-87)	49	37
Sun 26/02/23	65(58-76)	55	50	60(51-79)	50	37
Mon 27/02/23 ^[1]	65(62-69)	58	55	-	-	-
Average	66(65-67)	56	52	59(57-61)	49	36

TABLE 4.4: SUMMARY OF UNATTENDED NOISE MEASUREMENTS, LT1

Note: [1] incomplete daytime period due to equipment setup/depleted battery

The results of the unattended noise measurement show that ambient daytime L_{Aeq,16hr} sound levels produced an arithmetic average of 56 dB L_{Aeq,16hr}. The ambient night-time L_{Aeq,8hr} sound levels produced an arithmetic average of 49 dB L_{Aeq,8hr}.

4.6 Attended Noise Survey Results

The results of the attended noise measurements obtained on Tuesday 21st February 2023 are summarised in Tables 4.5 below.

Monitoring Location	Date	Start Time (hh:mm)	Duration (mm:ss)	Measured Noise Levels, dB			Observations
				L _{Amax, F}	L _{Aeq, T}	L _{A90, T}	
ST1	21/02/2023	10:16	15:00	86.1	71.1	54.2	2m from roadside. Continuous sound from A24; local passes on Worthing Rd increase ambient L _{Aeq} and maximum values. When no passes on Worthing Road, ambient levels are c. 54 dB.
ST2		10:33	15:00	86.8	73.7	54.5	1m from roadside. Continuous sound from A24; local passes on Worthing Rd increase ambient L _{Aeq} and maximum values. When no passes on Worthing Road, ambient levels are noted to be c. 53 - 55 dB.
ST3		10:50	15:00	91.9	73.7	60.4	3m from carriageway. Continuous sound from A24. Worthing Road does not influence.

TABLE 4.5: SUMMARY OF ATTENDED NOISE MEASUREMENT RESULTS – TUESDAY 21ST FEBRUARY 2023

5 NOISE MODELLING

5.1 Calculation of Noise Levels Across the Site

Noise Prediction Model

A computer model of noise propagation has been constructed using SoundPLAN version 6.0. This commercial software package implements complex calculations using acoustical ray-tracing techniques, taking into account the acoustically reflective and absorptive properties of the building elements. The noise levels calculated in the noise model are based on the calculation procedures set out in '*Calculation of Road Traffic Noise, 1988*'¹¹.

Using the unattended and attended noise measurements, the noise model was calibrated to the measured mean average $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ values recorded during the baseline noise survey, as shown in Table 4.4 above.

Following calibration, the proposed development has then been constructed in the model, with calculation receptor positions included. These receptors are displayed in Figure A5 of Appendix A and are labelled as R1 to R16 and Ext1 to Ext15.

A screenshot of the computer noise model is presented below in Figure 5.1.



FIGURE 5.1: SCREENSHOT OF NOISE MODEL

The following assumptions have been considered in the computer model:

- ground cover has been modelled as a mixture of hard and soft ground;
- The topography of the surrounding area has been modelled using a LIDAR Digital Terrain Model (DTM) data available online from Bluesky Mapshop;

¹¹ Department of Transport. 1988. Calculation of Road Traffic Noise. London Stationary Office.



- receivers have been modelled at a height of 1.5 m above local ground, with a floor height of 2.5m, in free-field conditions;
- buildings and any other solid barriers, such as walls and other fencing, are modelled as reflective acoustic screens;
- to provide a worst case assessment, the proposed care home building located to the north-east of the site has been omitted from the model; and
- in addition, no screening from garden fences from the new development, or existing houses to the east of the development site, have been modelled.

The results of the calculated noise levels across the development site are presented in Table 5.1 below. Daytime and night-time noise contours are presented in Figures A6 and A7 of Appendix A, respectively.

Calculation Receptor	Façade	Predicted Free-field Daytime Noise Level $L_{Aeq,16hr}$	Predicted Free-field Night-Time Noise Level $L_{Aeq,8hr}$
R1	North	49	42
	East	47	40
	South	43	36
	West	45	39
R2	North	50	43
	East	47	40
	South	42	35
	West	44	37
R3	North	50	43
	East	50	43
	South	43	36
	West	45	38
R4	North	51	44
	East	50	43
	South	43	36
	West	45	38
R5	North	44	37
	East	49	42
	South	43	36
	West	44	37
R6	North	47	40
	East	48	41
	South	42	35
	West	43	36
R7	North	45	38
	East	47	40
	South	42	35
	West	44	37

TABLE 5.1: ESTIMATED DAYTIME & NIGHT-TIME NOISE LEVELS ACROSS THE DEVELOPMENT SITE

Calculation Receptor	Façade I.D.	Predicted Free-field Daytime Noise Level $L_{Aeq,16hr}$	Predicted Free-field Night-Time Noise Level $L_{Aeq,8hr}$
R8	North	47	40
	East	47	40
	South	41	34
	West	43	36
R9	North	46	39
	East	45	38
	South	41	34
	West	44	37
R10	North	46	39
	East	45	38
	South	40	33
	West	44	37
R11	North	46	39
	East	45	38
	South	40	33
	West	45	38
R12	North	45	38
	East	45	38
	South	41	35
	West	42	35
R13	North	47	40
	East	46	39
	South	41	34
	West	43	36
R14	North	48	41
	East	48	41
	South	42	35
	West	42	35
R15	North	47	40
	East	44	37
	South	42	35
	West	41	34
R16	North	45	38
	East	44	37
	South	42	35
	West	43	36

TABLE 5.1: ESTIMATED DAYTIME & NIGHT-TIME NOISE LEVELS ACROSS THE DEVELOPMENT SITE

6 PRO-PG ASSESSMENT

6.1 ProPG Stage 1 Assessment

Following ProPG guidance, a Stage 1 – Initial Site Noise Risk assessment has been undertaken to characterise the application site in terms of the likely risk of adverse effects from noise on the future occupants of the development.

Analysis of the modelled site noise levels presented in Table 5.1 indicates that the worst case façade noise levels at the site indicate a ‘Low Risk’ for both daytime (50 – 60 dB L_{Aeq}) and night-time (40 – 50 dB L_{Aeq}) periods, according to ProPG’s Stage 1 – Initial Site Risk Assessment.

Based on the results of the modelled site noise levels in Table 5.1 and following ProPG guidelines, a Full Stage 2 Assessment is required.

6.2 ProPG Stage 2 Assessment

Element 1 - Good Acoustic Design Process

Section 5 of BS 8233: 2014 contains guidance on the sequence of stages to be followed in the planning and early acoustic design of a new development. Section 5.4 of BS 8233:2014 outlines a general approach to determining appropriate noise control measures including the following suggested steps:

- a) Check the feasibility of reducing noise levels and/or relocating noise sources;
- b) Consider options for planning the site or building layout;
- c) Consider the orientation of proposed building(s);
- d) Select construction types and methods for meeting building performance requirements;
- e) Examine the effects of noise control measures on the requirements for ventilation, fire regulation, health and safety, cost, CDM (construction, design and management), etc; and
- f) Assess the viability of alternative solutions.

The designer should then decide which of the following options can be applied to reduce noise levels:

- a) Quietening or removing the source of noise;
- b) Attenuating the sound on its path to the receiver;
- c) Obstructing the sound path between source and receiver;



- d) Improving the sound insulation of the building envelope; and
- e) Using agreements to manage noise.

The main source of noise affecting the proposed development is road traffic noise from the nearby A24 and to a lesser degree, road traffic on Worthing Road (B2237).

The calculated noise levels across the site are generally low. However, it is recommended that the development incorporates appropriate mitigation measures, including suitable acoustic glazing and ventilation, to ensure acceptable internal noise levels and to protect future occupants from potential noise impacts.

Element 2 – Internal Noise Level Guidelines

Internal Ambient Noise Level Assessment

BS 8233:2014 contains recommended guideline levels of 35 dB $L_{Aeq,T}$ for resting inside bedrooms and living rooms during the daytime, 40 dB $L_{Aeq,T}$ for dining areas and 30 dB $L_{Aeq,T}$ for sleeping inside bedrooms at night.

The approximate sound reduction value for standard thermal double glazing is 30dB R_w .

Taking this typical sound reduction performance into consideration, and on the understanding that the external façade of the new dwellings will provide a similar sound reduction to a brick/block type construction, initial internal noise levels have been predicted inside the habitable rooms at the assessment positions listed.

Noise levels have been calculated using the sound reduction values discussed above. The results for each receptor location are summarised in Table 6.1.

Calculation Receptor	Façade I.D.	Predicted Free-field Daytime Noise Level $L_{Aeq,16hr}$	Predicted Daytime Internal Noise Level, dB $L_{Aeq,16hr}^{[1]}$	Predicted Free-field Night-Time Noise Level $L_{Aeq,8hr}$	Predicted Night-Time Internal Noise Level, dB $L_{Aeq,8hr}^{[1]}$
			Windows Closed		Windows Closed
R1	North	49	19	42	12
	East	47	17	40	10
	South	43	13	36	6
	West	45	15	39	9
R2	North	50	20	43	13
	East	47	17	40	10
	South	42	12	35	5
	West	44	14	37	7
R3	North	50	20	43	13
	East	50	20	43	13
	South	43	13	36	6
	West	45	15	38	8
R4	North	51	21	44	14
	East	50	20	43	13
	South	43	13	36	6
	West	45	15	38	8
R5	North	44	14	37	7
	East	49	19	42	12
	South	43	13	36	6
	West	44	14	37	7
R6	North	47	17	40	10
	East	48	18	41	11
	South	42	12	35	5
	West	43	13	36	6
R7	North	45	15	38	8
	East	47	17	40	10
	South	42	12	35	5
	West	44	14	37	7
R8	North	47	17	40	10
	East	47	17	40	10
	South	41	11	34	4
	West	43	13	36	6
R9	North	46	16	39	9
	East	45	15	38	8
	South	41	11	34	4
	West	44	14	37	7

TABLE 6.1: ASSESSMENT OF ESTIMATED INTERNAL DAYTIME AND NIGHT-TIME NOISE LEVELS

Note:

[1] assuming a 30dB(A) reduction for windows closed.

Calculation Receptor	Façade I.D.	Predicted Free-field Daytime Noise Level $L_{Aeq,16hr}$	Predicted Daytime Internal Noise Level, dB $L_{Aeq,16hr}^{[1]}$	Predicted Free-field Night-Time Noise Level $L_{Aeq,8hr}$	Predicted Night-Time Internal Noise Level, dB $L_{Aeq,8hr}^{[1]}$
			Windows Closed		Windows Closed
R10	North	46	16	39	9
	East	45	15	38	8
	South	40	10	33	3
	West	44	14	37	7
R11	North	46	16	39	9
	East	45	15	38	8
	South	40	10	33	3
	West	45	15	38	8
R12	North	45	15	38	8
	East	45	15	38	8
	South	41	11	35	5
	West	42	12	35	5
R13	North	47	17	40	10
	East	46	16	39	9
	South	41	11	34	4
	West	43	13	36	6
R14	North	48	18	41	11
	East	48	18	41	11
	South	42	12	35	5
	West	42	12	35	5
R15	North	47	17	40	10
	East	44	14	37	7
	South	42	12	35	5
	West	41	11	34	4
R16	North	45	15	38	8
	East	44	14	37	7
	South	42	12	35	5
	West	43	13	36	6

TABLE 6.1 (CTD.): ASSESSMENT OF ESTIMATED INTERNAL DAYTIME AND NIGHT-TIME NOISE LEVELS

Note:

[1] assuming a 30dB(A) reduction for windows closed.

Based on the assumed typical facade reduction described above, the noise predictions show that internal noise levels fall below the daytime and night-time guideline levels of 35dB $L_{Aeq,T}$ and 30dB $L_{Aeq,T}$, respectively, within habitable rooms on all façades at the proposed development.

Internal Maximum Noise Level Assessment

Single event noise indicators such as maximum $L_{Amax,F}$ noise levels generated at night have also been considered at the proposed development site.



The WHO 2009 guidance sets an internal sleep disturbance noise limit of 42 dB $L_{Amax,F}$ for the onset of critical health effects, which is a level which should not be exceeded on a regular basis. Based on an interpretation that for a noise to be regular, it needs to occur several (i.e. more than two) times per hour, the $L_{Amax,F}$ noise needs to be based upon an average of at least 10-15 events that are typical in nature.

The 90th percentile of 66 dB $L_{Amax, F}$, calculated using the 15-minute night-time $L_{Amax,F}$ noise levels measured at LT1, has been used to determine typical internal $L_{Amax, F}$ noise levels within bedrooms across the development site.

This $L_{Amax, F}$ noise level has then been used to calibrate the road source noise level in the noise prediction model, with the site in its current form, prior to adding the proposed development to the noise model to allow an estimate of $L_{Amax, F}$ noise levels across the site.

The typical facade reduction described above are then used to estimate internal $L_{Amax,F}$ noise levels across the development and presented in Table 6.2 below.

Calculation Receptor	Façade I.D.	Predicted Free-field Night-Time Noise Level $L_{Amax,F}$	Predicted Night-Time Internal Noise Level, dB $L_{Amax,F}$ ^[1]
			Windows Closed
R1	North	59	29
	East	57	27
	South	53	23
	West	56	26
R2	North	60	30
	East	57	27
	South	52	22
	West	54	24
R3	North	60	30
	East	60	30
	South	53	23
	West	55	25
R4	North	61	31
	East	60	30
	South	53	23
	West	55	25
R5	North	54	24
	East	59	29
	South	53	23
	West	54	24
R6	North	57	27
	East	58	28
	South	52	22
	West	53	23

TABLE 6.2: ASSESSMENT ON ESTIMATED $L_{Amax,F}$ LEVELS BASED ON TYPICAL MAXIMUM EVENTS

Notes: [1] assuming a 30dB(A) reduction for windows closed.

Calculation Receptor	Façade I.D.	Predicted Free-field Night-Time Noise Level $L_{Amax,F}$	Predicted Night-Time Internal Noise Level, dB $L_{Amax,F}^{[1]}$
			Windows Closed
R7	North	55	25
	East	57	27
	South	52	22
	West	54	24
R8	North	57	27
	East	57	27
	South	51	21
	West	53	23
R9	North	56	26
	East	55	25
	South	51	21
	West	54	24
R10	North	56	26
	East	55	25
	South	50	20
	West	54	24
R11	North	56	26
	East	55	25
	South	50	20
	West	55	25
R12	North	55	25
	East	55	25
	South	52	22
	West	52	22
R13	North	57	27
	East	56	26
	South	51	21
	West	53	23
R14	North	58	28
	East	58	28
	South	52	22
	West	52	22
R15	North	57	27
	East	54	24
	South	52	22
	West	51	21
R16	North	55	25
	East	54	24
	South	52	22
	West	53	23

TABLE 6.2 (CTD.): ASSESSMENT ON ESTIMATED $L_{Amax,F}$ LEVELS BASED ON TYPICAL MAXIMUM EVENTS

Notes: [1] assuming a 30dB(A) reduction for windows closed.



The results indicate that the WHO $L_{Amax,F}$ criteria is met within habitable rooms on all façades, assuming glazing with a sound level difference of 30dB.

Element 3 – External Amenity Area Noise Assessment

BS 8233 indicates that it is desirable that the external noise level in these areas does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ in noisier environments.

The external assessment locations are highlighted as Ext1 to Ext15 in Figure A5 of Appendix A.

The results for each receptor location are summarised in Table 6.3.

Calculation Receptor	Predicted Free-field Daytime Noise Level $L_{Aeq,16hr}$
EXT1	48
EXT2	48
EXT3	49
EXT4	49
EXT5	48
EXT6	46
EXT7	46
EXT8	45
EXT9	41
EXT10	40
EXT11	40
EXT12	43
EXT13	43
EXT14	42
EXT15	41

TABLE 6.3: CALCULATED NOISE LEVELS AT EXTERNAL RECEPTOR LOCATIONS

The results of the assessment show that the external noise levels are below the lower guideline level of 50 dB $L_{Aeq, 16hrs}$ within the amenity areas of all receptors.

Element 4 – Assessment of Other Relevant Issues

Element 4 is intended to consider other potential noise issues and/or sources that may be introduced by the proposed development.

No other noise source, such as fixed plant is proposed at this stage, however, should plant such as air source heat pumps be installed as part of the project proposals, the potential impact could cause disturbance when in operation. This will require consideration and will likely be subject to Local Authority requirements.

7 GLAZING AND VENTILATION STRATEGY

7.1 Glazing Strategy

Based on the noise assessment, it is considered that:

- Double glazing which can provide a minimum sound level difference of 30dB will be required for all habitable rooms on the development.

An example of suitable glazing product is presented in Table 7.1 below.

Façade	Sound Insulation Requirements	Typical Glazing Specification
All habitable rooms on all development façades	R_w 30dB	4mm glass / 16mm air gap / 4mm glass

TABLE 7.1: APPROPRIATE GLAZING SPECIFICATION FOR THE DEVELOPMENT

7.2 Ventilation Strategy

The results have shown that with appropriate glazing, desirable internal conditions can be achieved. However, the development will also need to incorporate a background ventilation system, in compliance with Approved Document F¹².

The ventilation requirements set out in Approved Document F can be delivered by a natural ventilation system or a mechanical ventilation system or a combination of both.

7.3 Overheating

The assessment of internal noise has shown that with an appropriate scheme of façade construction, adequate protection against existing external noise can ensure that the desirable guideline noise value presented in BS 8233:2014 can be achieved.

Consideration has also been given to the internal noise levels when windows to habitable rooms are open, for example, during the summer months, to help combat overheating.

Paragraph 3.3 of AD-O states that windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am); and
- 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).

Assuming a 10 dB¹³ difference between an external free-field noise level and internal noise level, an indication of internal $L_{Aeq,8hr}$ and $L_{Amax,F}$ noise levels have been estimated, assuming

¹² The Building Regulations 2010. Approved Document F.

¹³ Approved Document O Noise Guide. Version 1.1. November 2024.

windows are partially open for cooling purposes. The results are presented below in Tables 7.2 and 7.3 for the calculated internal ambient and maximum noise levels, respectively.

Calculation Receptor	Façade I.D.	Predicted Free-field Night-Time Noise Level $L_{Aeq,8hr}$	Predicted Night-Time Internal Noise Level, dB $L_{Aeq,8hr}$ ^[1]
			Windows Open
R1	North	42	32
	East	40	30
	South	36	26
	West	39	29
R2	North	43	33
	East	40	30
	South	35	25
	West	37	27
R3	North	43	33
	East	43	33
	South	36	26
	West	38	28
R4	North	44	34
	East	43	33
	South	36	26
	West	38	28
R5	North	37	27
	East	42	32
	South	36	26
	West	37	27
R6	North	40	30
	East	41	31
	South	35	25
	West	36	26
R7	North	38	28
	East	40	30
	South	35	25
	West	37	27
R8	North	40	30
	East	40	30
	South	34	24
	West	36	26

TABLE 7.2: ESTIMATE OF INTERNAL $L_{Aeq,T}$ NOISE LEVELS – WINDOWS OPEN

Notes: [1] allows for 10dB reduction through a partially open window.

Calculation Receptor	Façade I.D.	Predicted Free-field Night-Time Noise Level $L_{Aeq,8hr}$	Predicted Night-Time Internal Noise Level, dB $L_{Aeq,8hr}^{[1]}$
			Windows Open
R8	North	40	30
	East	40	30
	South	34	24
	West	36	26
R9	North	39	29
	East	38	28
	South	34	24
	West	37	27
R10	North	39	29
	East	38	28
	South	33	23
	West	37	27
R11	North	39	29
	East	38	28
	South	33	23
	West	38	28
R12	North	38	28
	East	38	28
	South	35	25
	West	35	25
R13	North	40	30
	East	39	29
	South	34	24
	West	36	26
R14	North	41	31
	East	41	31
	South	35	25
	West	35	25
R15	North	40	30
	East	37	27
	South	35	25
	West	34	24
R16	North	38	28
	East	37	27
	South	35	25
	West	36	26

TABLE 7.2 (CTD.): ESTIMATE OF INTERNAL $L_{Aeq,T}$ NOISE LEVELS – WINDOWS OPEN

Notes: [1] allows for 10dB reduction through a partially open window.

Calculation Receptor	Façade I.D.	Predicted Free-field Night-Time Noise Level $L_{Amax,F}$	Predicted Night-Time Internal Noise Level, dB $L_{Amax,F}^{[1]}$
			Windows Open
R1	North	59	49
	East	57	47
	South	53	43
	West	56	46
R2	North	60	50
	East	57	47
	South	52	42
	West	54	44
R3	North	60	50
	East	60	50
	South	53	43
	West	55	45
R4	North	61	51
	East	60	50
	South	53	43
	West	55	45
R5	North	54	44
	East	59	49
	South	53	43
	West	54	44
R6	North	57	47
	East	58	48
	South	52	42
	West	53	43
R7	North	55	45
	East	57	47
	South	52	42
	West	54	44
R8	North	57	47
	East	57	47
	South	51	41
	West	53	43
R9	North	56	46
	East	55	45
	South	51	41
	West	54	44
R10	North	56	46
	East	55	45
	South	50	40
	West	54	44

TABLE 7.3: ESTIMATE OF INTERNAL $L_{Amax,F}$ NOISE LEVELS – WINDOWS OPEN

Notes: [1] allows for 10dB reduction through a partially open window.

Calculation Receptor	Façade I.D.	Predicted Free-field Night-Time Noise Level $L_{Amax,F}$	Predicted Night-Time Internal Noise Level, dB $L_{Amax,F}^{[1]}$
			Windows Open
R11	North	56	46
	East	55	45
	South	50	40
	West	55	45
R12	North	55	45
	East	55	45
	South	52	42
	West	52	42
R13	North	57	47
	East	56	46
	South	51	41
	West	53	43
R14	North	58	48
	East	58	48
	South	52	42
	West	52	42
R15	North	57	47
	East	54	44
	South	52	42
	West	51	41
R16	North	55	45
	East	54	44
	South	52	42
	West	53	43

TABLE 7.3 (CTD.): ESTIMATE OF INTERNAL $L_{Amax,F}$ NOISE LEVELS – WINDOWS OPEN

Notes: [1] allows for 10dB reduction through a partially open window.

The results of the assessment have shown that during the night-time period, the predicted internal $L_{Aeq,8hr}$ and $L_{Amax,F}$ noise levels fall below the noise limits set-out in AD-O at all receptors.

Should the overheating strategy for the development rely on opening windows during the summer months for cooling purposes, it would not lead to a significant adverse noise impact.



8 CONCLUSIONS

RF Environmental Ltd (RFE) was commissioned by Starbuild Ltd in December 2025 to prepare an acoustic report to support an outline planning application to Horsham District Council (HDC) for a proposed development of 23 residential dwellings at The Copse, Worthing Road, Horsham, West Sussex.

The existing noise environment has been established, which is considered representative of the development site, through unattended and attended noise monitoring.

Subjective observations undertaken on site indicate that road traffic from the A24 is the primary source of noise, with additional contributions from Worthing Road (B2237).

Computer noise modelling software has been used to predict the external noise levels across the proposed development site.

The noise conditions on site indicate that it would be categorised as a 'Low Risk' site according to ProPG Stage 1 - Initial Site Risk assessment guidelines. Following this, a Stage 2 – Full Assessment has been undertaken, and advice has been given on the design of the building envelope to ensure that internal noise levels inside habitable rooms fall within guideline limits recommended in ProPG, BS 8233: 2014 and WHO Guidelines. A glazing and ventilation strategy, to ensure desirable internal conditions can be achieved in all habitable rooms on the development, is presented in Section 7.

The results indicate that in the external garden area, external levels will fall below the lower guideline values recommended in ProPG and BS8233.

With windows open to help combat overheating, the internal noise levels fall below the limits set out in Approved Document O. Therefore, should the overheating strategy for the development rely on opening windows during the summer months for cooling purposes, it will not lead to a significant adverse noise impact.

APPENDIX A: FIGURES



FIGURE A1: LOCATION OF PROPOSED DEVELOPMENT SITE

Note: Mapping obtained from Google Maps



FIGURE A2: PROPOSED SITE LAYOUT

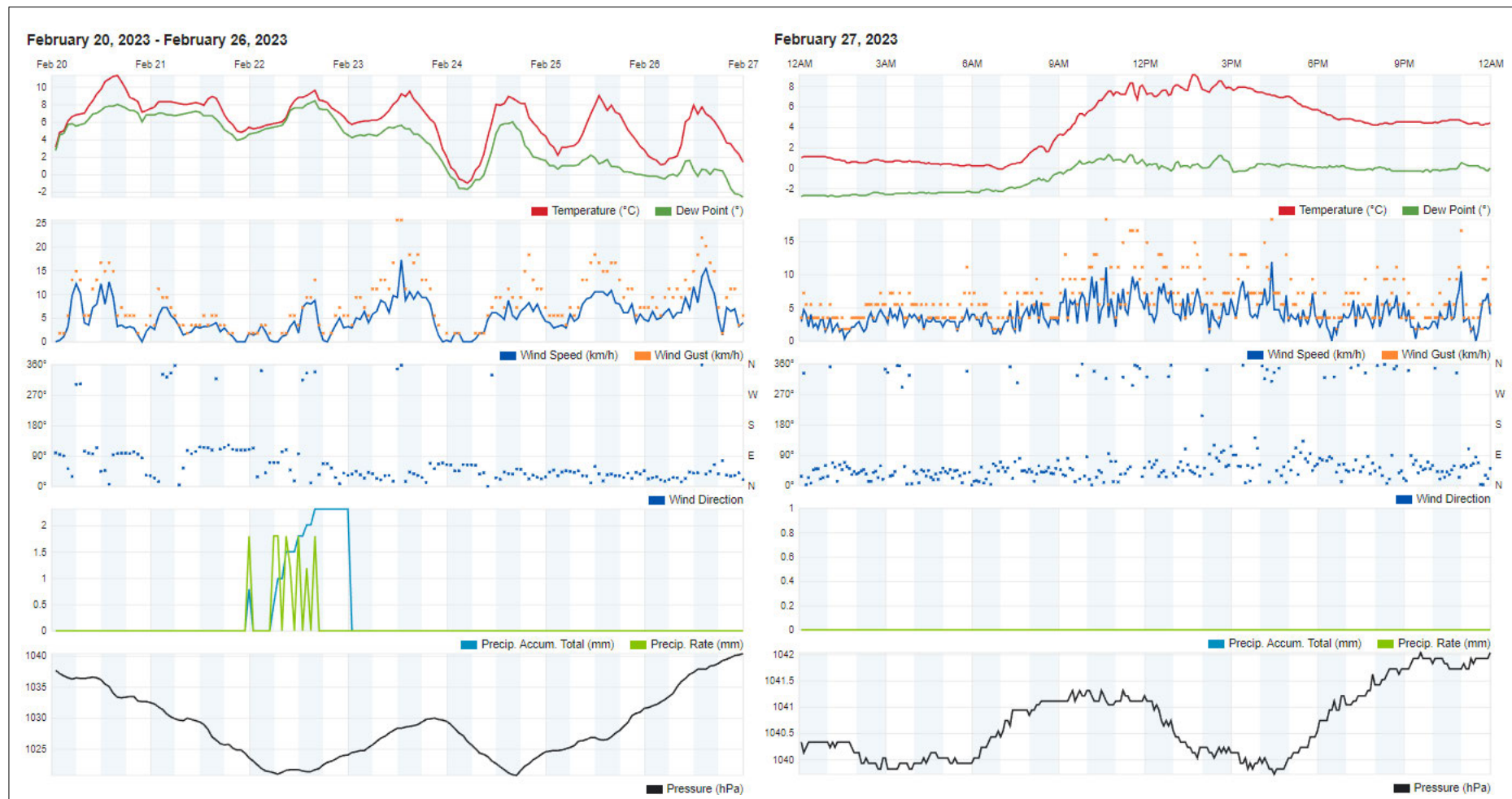


FIGURE A3: WEATHER DATA DURING NOISE MONITORING PERIOD

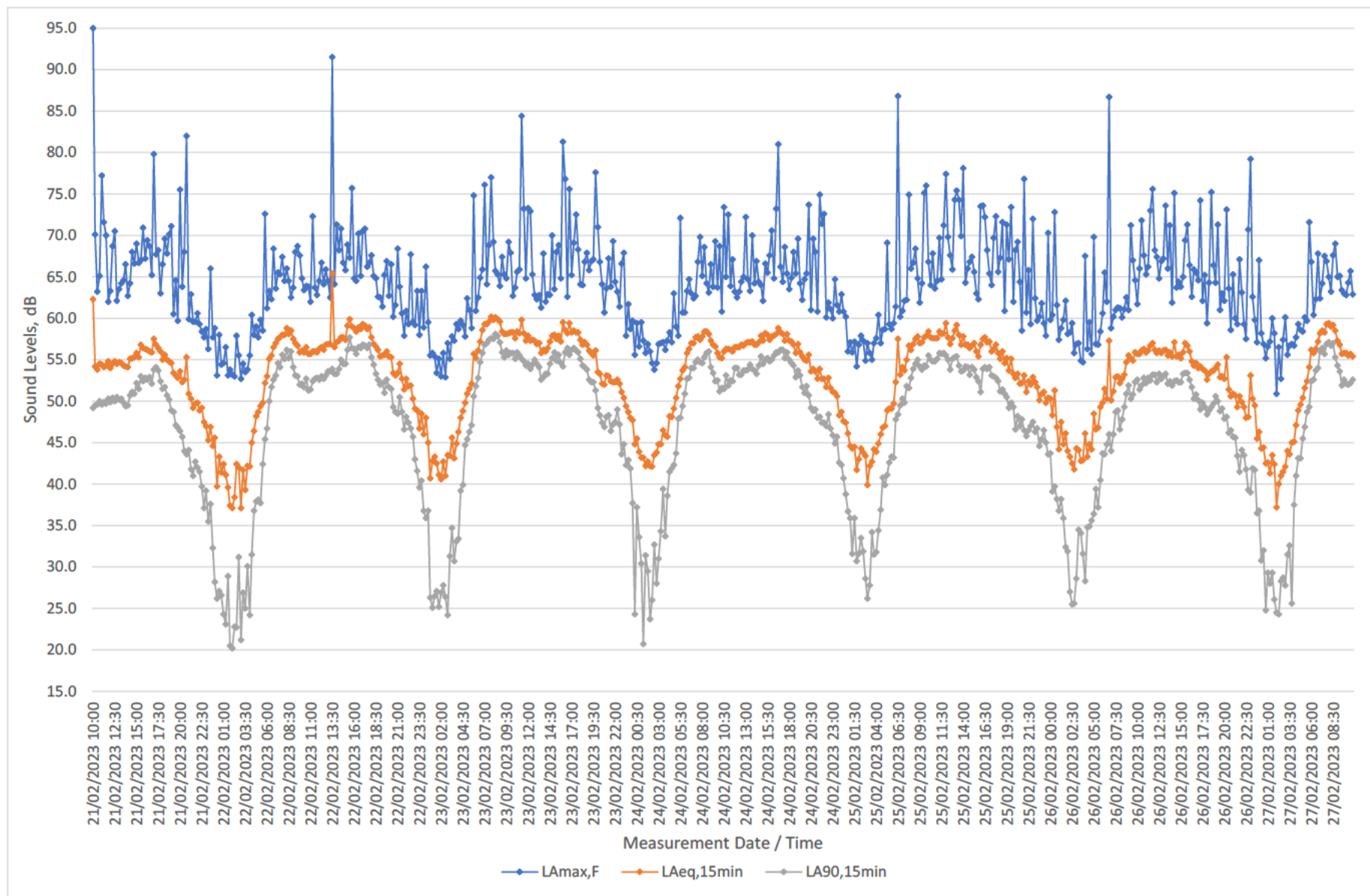


FIGURE A4: TIME HISTORY OF CONTINUOUS NOISE MONITORING DATA, LT1



FIGURE A5: CALCULATION RECEPTOR LOCATIONS

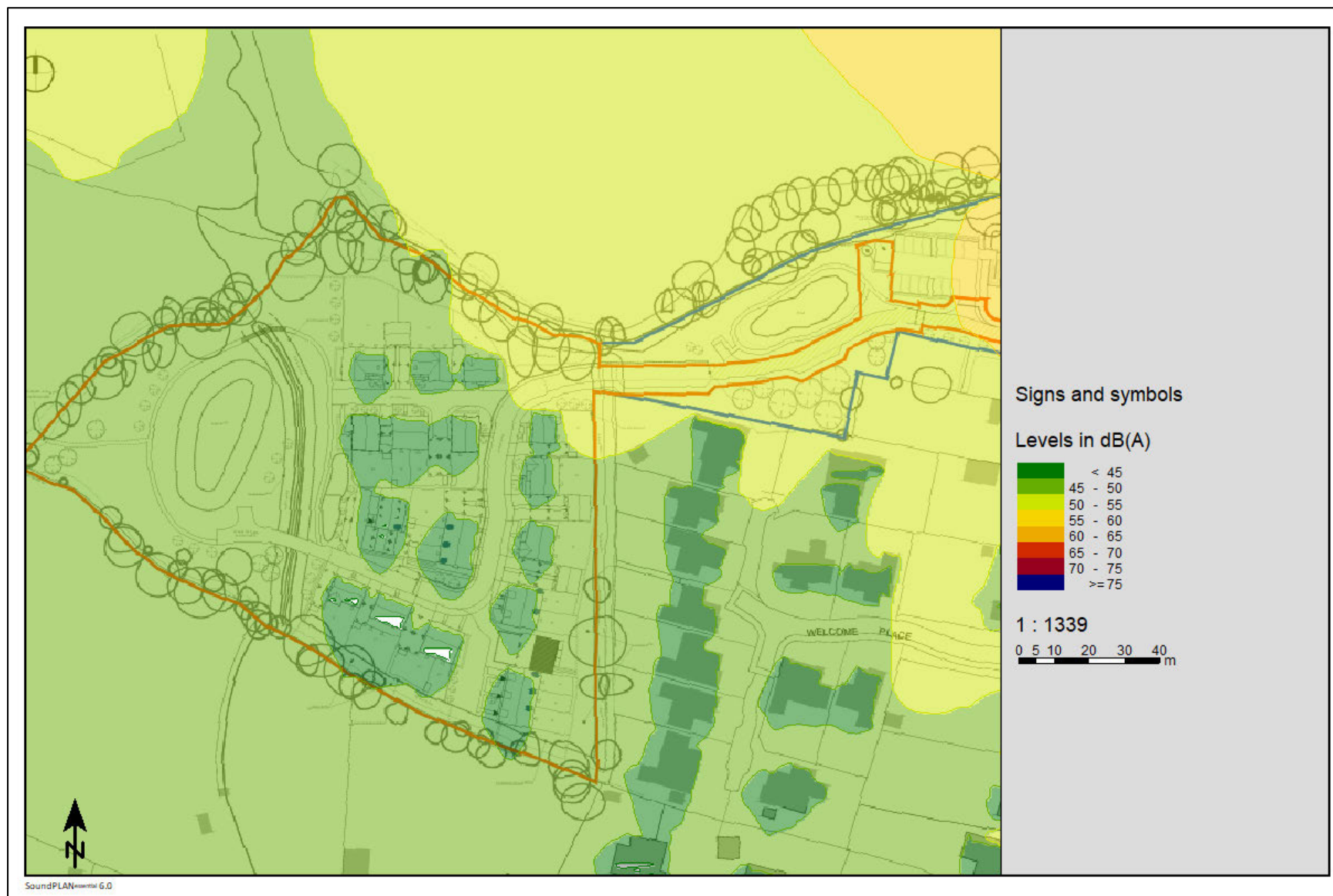


FIGURE A6: DAYTIME NOISE CONTOURS

Note: Contours calculated at second floor height (1.5m)

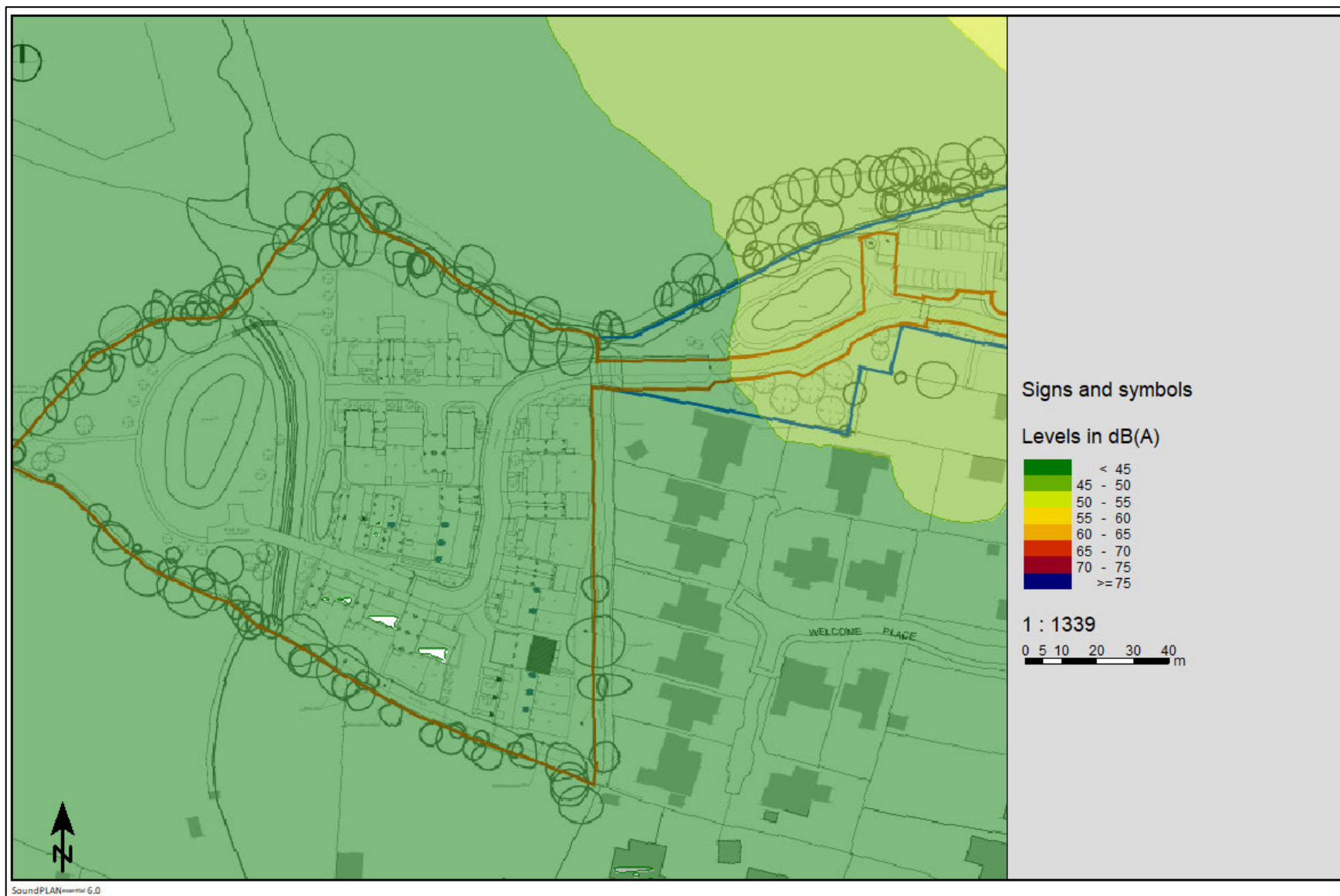


FIGURE A7: NIGHT-TIME NOISE CONTOURS

Note: Contours calculated at second floor height (4.0m)

APPENDIX B: TABLES

Date of Meas.	Start Time	Measured Noise Levels, dB		
		L _{Amax,F}	L _{Aeq,15min}	L _{A90,15min}
Tuesday 21 st February 2023	10:00	95.0	62.3	49.2
	10:15	70.1	54.2	49.5
	10:30	63.2	53.8	49.6
	10:45	65.1	54.5	50.0
	11:00	77.2	54.4	49.6
	11:15	71.6	54.1	49.9
	11:30	70.0	54.3	49.7
	11:45	62.0	54.8	50.3
	12:00	63.3	54.0	49.9
	12:15	68.7	54.5	50.4
	12:30	70.5	54.8	50.0
	12:45	62.1	54.5	50.5
	13:00	63.5	54.7	50.2
	13:15	64.2	54.6	50.3
	13:30	64.6	54.3	49.8
	13:45	66.5	54.2	49.4
	14:00	62.7	54.1	49.5
	14:15	64.2	55.1	50.7
	14:30	68.0	55.2	51.1
	14:45	66.6	55.3	50.9
	15:00	69.0	55.8	52.2
	15:15	66.7	55.3	51.5
	15:30	67.0	56.8	53.0
	15:45	70.9	56.4	52.4
	16:00	67.2	56.3	52.8
	16:15	69.4	56.2	52.6
	16:30	68.7	56.0	52.9
	16:45	65.2	55.9	52.1
	17:00	79.8	57.5	53.8
	17:15	67.7	56.8	54.1
	17:30	68.2	56.4	53.7
	17:45	63.0	56.0	52.4
	18:00	66.5	55.0	51.5
	18:15	69.6	55.6	51.7
	18:30	67.8	55.0	50.7
	18:45	70.1	54.8	50.2
	19:00	71.1	54.6	48.9
	19:15	60.5	53.4	48.7
	19:30	64.6	53.1	47.1
	19:45	59.7	52.8	46.8
	20:00	75.5	53.6	46.4
	20:15	63.8	52.3	45.7
	20:30	68.0	52.6	44.0
	20:45	82.0	55.3	43.6
	21:00	59.9	50.9	44.1

Wednesday 22 nd February 2023	21:15	62.9	50.3	41.8
	21:30	59.6	49.2	41.0
	21:45	59.6	49.7	42.7
	22:00	60.6	49.8	42.0
	22:15	59.3	48.9	41.5
	22:30	58.4	49.2	39.7
	22:45	57.7	47.5	37.1
	23:00	58.7	47.0	39.2
	23:15	56.3	45.3	35.5
	23:30	66.0	46.9	37.6
	23:45	57.7	44.6	32.3
	00:00	58.8	45.6	28.2
	00:15	53.1	39.7	26.2
	00:30	58.0	43.3	27.1
	00:45	54.4	41.4	26.6
	01:00	54.6	42.4	24.3
	01:15	56.5	41.1	23.1
	01:30	53.1	39.6	28.9
	01:45	53.8	37.4	20.5
	02:00	53.2	37.1	20.2
	02:15	53.0	38.4	22.8
	02:30	57.9	42.4	22.7
	02:45	55.5	42.0	31.2
	03:00	52.7	37.1	21.2
	03:15	54.5	41.7	26.9
	03:30	53.5	39.3	25.0
	03:45	53.8	42.2	30.1
	04:00	55.5	42.1	24.2
	04:15	60.4	45.0	31.5
	04:30	58.0	46.4	36.8
	04:45	59.0	48.2	37.9
	05:00	57.7	48.7	38.1
	05:15	59.8	49.4	37.7
	05:30	58.5	49.8	42.4
	05:45	72.6	52.2	45.4
	06:00	61.2	53.0	46.7
	06:15	63.3	55.1	50.0
	06:30	62.3	55.5	51.7
	06:45	68.4	56.5	52.6
	07:00	63.6	57.0	53.1
	07:15	65.5	57.5	54.6
	07:30	65.3	57.7	54.1
	07:45	67.4	58.0	55.6
	08:00	64.5	58.0	55.1
	08:15	66.0	58.8	56.2
	08:30	64.5	58.1	55.2
	08:45	62.5	58.5	56.0
	09:00	63.7	57.5	54.1

	09:15	68.0	57.0	53.1
	09:30	68.7	56.7	53.0
	09:45	67.6	55.9	52.0
	10:00	64.8	56.1	52.1
	10:15	63.4	55.9	51.7
	10:30	63.9	56.5	52.7
	10:45	63.8	55.7	51.3
	11:00	62.0	55.7	51.4
	11:15	72.3	56.0	52.4
	11:30	63.7	56.0	52.7
	11:45	62.8	55.9	52.8
	12:00	64.5	56.3	52.6
	12:15	66.7	56.5	53.0
	12:30	64.1	56.2	52.7
	12:45	65.9	56.8	53.1
	13:00	64.5	56.9	53.6
	13:15	62.5	56.9	53.6
	13:30	91.5	65.4	53.9
	13:45	64.1	56.5	53.3
	14:00	71.3	57.1	53.3
	14:15	68.2	57.3	53.9
	14:30	70.8	57.7	55.0
	14:45	66.7	57.7	54.5
	15:00	65.8	57.4	54.5
	15:15	68.9	59.1	56.2
	15:30	67.3	59.9	57.7
	15:45	75.7	59.0	56.4
	16:00	64.8	58.8	56.3
	16:15	64.5	58.4	55.7
	16:30	70.2	58.9	56.5
	16:45	65.1	58.7	56.4
	17:00	70.5	59.3	56.8
	17:15	70.8	59.1	56.7
	17:30	66.2	58.7	56.4
	17:45	66.7	58.9	56.8
	18:00	67.6	57.7	55.3
	18:15	65.1	56.9	54.4
	18:30	64.8	56.6	53.3
	18:45	62.6	56.2	52.6
	19:00	62.5	55.4	52.0
	19:15	61.4	55.5	52.2
	19:30	65.2	55.6	51.0
	19:45	66.9	56.0	52.6
	20:00	62.7	55.4	51.7
	20:15	66.5	55.3	51.5
	20:30	60.2	53.4	49.3
	20:45	61.6	53.1	48.7
	21:00	68.4	53.4	48.5

Thursday 23 rd February 2023	21:15	63.8	54.5	50.5
	21:30	60.6	52.7	48.7
	21:45	57.9	51.4	46.6
	22:00	60.9	52.7	48.1
	22:15	59.3	51.8	47.4
	22:30	67.7	51.9	46.7
	22:45	59.6	50.3	45.7
	23:00	59.2	49.1	43.0
	23:15	63.3	48.9	41.6
	23:30	58.0	46.7	39.6
	23:45	63.3	48.5	40.4
	00:00	58.9	46.0	36.8
	00:15	66.2	48.0	35.9
	00:30	59.5	45.0	36.8
	00:45	55.5	40.7	26.3
	01:00	55.8	42.8	25.1
	01:15	55.4	43.3	26.5
	01:30	53.4	42.5	27.1
	01:45	55.1	41.1	25.2
	02:00	53.0	40.6	26.9
	02:15	55.8	42.7	27.8
	02:30	52.9	41.0	26.4
	02:45	57.0	43.5	24.2
	03:00	55.1	43.4	31.3
	03:15	57.8	45.6	34.7
	03:30	57.3	43.1	30.7
	03:45	59.3	44.9	33.1
	04:00	58.7	46.3	33.4
	04:15	59.7	48.0	39.2
	04:30	59.2	48.8	39.9
	04:45	57.8	49.8	44.7
	05:00	62.4	50.9	45.4
	05:15	61.0	51.5	46.3
	05:30	58.8	52.1	47.1
	05:45	74.8	55.7	50.6
	06:00	60.9	55.2	51.8
	06:15	62.5	56.1	52.8
	06:30	64.9	57.2	54.7
	06:45	65.9	58.6	55.8
	07:00	76.1	59.3	56.8
	07:15	64.1	59.3	57.0
	07:30	68.8	59.6	57.4
	07:45	77.0	60.2	57.6
	08:00	69.2	59.8	57.5
	08:15	65.7	60.1	58.1
	08:30	65.3	59.9	57.9
	08:45	63.9	59.6	57.1
	09:00	67.4	58.4	55.9

	09:15	65.3	58.1	55.3
	09:30	64.8	58.1	56.1
	09:45	69.2	58.2	55.6
	10:00	67.9	58.3	55.8
	10:15	62.7	58.3	55.8
	10:30	63.7	57.6	55.1
	10:45	65.6	58.4	55.9
	11:00	65.9	58.2	55.5
	11:15	84.4	59.8	55.1
	11:30	73.2	58.2	54.8
	11:45	64.8	57.3	54.3
	12:00	73.3	57.9	54.5
	12:15	72.9	57.3	53.9
	12:30	65.3	57.4	54.4
	12:45	62.8	57.3	55.0
	13:00	62.3	56.9	54.5
	13:15	62.8	57.0	54.1
	13:30	61.3	55.8	52.6
	13:45	67.8	56.2	52.9
	14:00	62.0	56.0	53.3
	14:15	62.9	56.4	53.3
	14:30	62.8	57.2	54.5
	14:45	70.0	57.9	55.2
	15:00	63.5	58.0	55.9
	15:15	68.0	57.5	54.9
	15:30	68.8	57.9	55.6
	15:45	64.8	57.2	54.6
	16:00	81.3	59.5	54.2
	16:15	76.8	58.6	55.9
	16:30	62.6	58.2	56.4
	16:45	75.6	59.4	55.6
	17:00	65.2	58.3	56.2
	17:15	69.1	58.5	56.4
	17:30	72.5	58.3	56.1
	17:45	68.3	58.3	55.9
	18:00	64.1	57.4	55.1
	18:15	64.0	56.8	54.3
	18:30	66.8	57.1	54.1
	18:45	67.9	56.8	53.8
	19:00	65.8	56.1	52.6
	19:15	66.9	55.8	52.3
	19:30	67.1	55.5	52.3
	19:45	77.6	56.1	51.3
	20:00	71.0	53.5	49.2
	20:15	66.8	53.3	48.3
	20:30	64.1	52.1	47.4
	20:45	60.7	52.0	46.9
	21:00	63.6	53.1	48.1

Friday 24 th February 2023	21:15	67.2	53.0	48.3
	21:30	63.8	52.4	46.4
	21:45	69.3	52.3	47.2
	22:00	64.4	52.3	47.5
	22:15	63.2	52.6	49.0
	22:30	61.4	52.1	47.2
	22:45	66.6	51.1	43.6
	23:00	67.9	50.4	44.8
	23:15	57.9	49.4	42.3
	23:30	61.7	48.7	42.9
	23:45	58.7	48.0	41.9
	00:00	59.7	47.7	37.7
	00:15	55.6	44.8	24.3
	00:30	59.4	45.5	37.2
	00:45	56.6	43.9	33.6
	01:00	59.5	43.2	30.4
	01:15	57.3	43.2	20.7
	01:30	55.8	42.2	31.4
	01:45	56.9	42.7	29.5
	02:00	56.0	42.2	23.7
	02:15	54.6	42.1	26.0
	02:30	53.8	43.5	32.7
	02:45	54.6	43.8	28.0
	03:00	56.9	44.8	31.0
	03:15	57.0	44.8	34.3
	03:30	57.1	46.5	39.4
	03:45	56.2	45.9	33.7
	04:00	57.3	45.7	38.6
	04:15	58.3	48.2	41.5
	04:30	57.1	48.1	41.9
	04:45	63.0	49.1	42.3
	05:00	59.0	50.4	43.7
	05:15	57.9	51.8	47.9
	05:30	72.1	52.7	48.0
	05:45	60.7	53.7	49.4
	06:00	60.7	54.1	50.9
	06:15	63.3	55.8	52.7
	06:30	64.7	56.3	52.8
	06:45	63.0	57.0	54.0
	07:00	62.4	57.0	54.0
	07:15	62.7	57.7	54.7
	07:30	66.8	57.8	55.0
	07:45	69.8	57.4	54.7
	08:00	65.1	57.8	54.6
	08:15	68.6	58.4	55.3
	08:30	64.2	58.4	55.8
	08:45	63.1	58.1	56.0
	09:00	66.5	57.3	54.1

	09:15	63.8	56.8	53.4
	09:30	69.3	56.6	52.4
	09:45	63.7	55.8	52.5
	10:00	68.7	55.3	51.2
	10:15	60.8	55.2	51.6
	10:30	73.4	56.0	51.5
	10:45	65.0	56.3	53.1
	11:00	72.5	56.3	51.9
	11:15	63.9	56.2	52.5
	11:30	67.1	56.0	52.4
	11:45	63.2	56.5	54.0
	12:00	62.5	56.5	54.0
	12:15	63.2	56.5	53.2
	12:30	64.4	56.8	53.2
	12:45	65.0	56.7	53.7
	13:00	72.2	57.0	53.7
	13:15	64.7	57.1	53.8
	13:30	63.3	57.1	54.4
	13:45	70.0	57.2	53.9
	14:00	64.2	56.8	53.7
	14:15	66.9	56.8	53.3
	14:30	64.4	57.1	54.3
	14:45	64.0	57.9	55.4
	15:00	62.1	57.3	54.5
	15:15	66.6	58.2	55.0
	15:30	65.5	58.0	55.2
	15:45	67.6	57.4	54.8
	16:00	70.6	57.8	55.0
	16:15	64.8	57.9	55.5
	16:30	73.2	58.1	55.9
	16:45	81.0	58.8	55.9
	17:00	66.2	58.3	56.2
	17:15	64.4	58.1	56.2
	17:30	68.6	57.3	55.2
	17:45	65.4	58.1	55.9
	18:00	63.5	57.3	55.0
	18:15	64.9	57.2	54.6
	18:30	68.0	56.8	54.3
	18:45	65.4	55.8	52.9
	19:00	69.6	56.9	53.7
	19:15	64.2	55.9	53.1
	19:30	62.2	55.4	51.7
	19:45	64.7	55.0	51.0
	20:00	65.4	54.9	51.8
	20:15	73.7	55.6	50.7
	20:30	61.0	53.6	49.2
	20:45	69.6	53.9	48.8
	21:00	68.0	53.6	49.0

Saturday 25 th February 2023	21:15	60.8	52.7	48.0
	21:30	74.9	53.9	48.1
	21:45	71.4	52.7	47.4
	22:00	72.6	52.7	47.4
	22:15	60.1	51.7	47.0
	22:30	61.9	52.8	48.4
	22:45	61.1	51.6	46.7
	23:00	60.0	51.1	45.9
	23:15	64.7	51.0	44.9
	23:30	61.6	50.6	45.7
	23:45	60.8	48.3	42.6
	00:00	62.9	48.7	42.3
	00:15	60.8	47.6	40.7
	00:30	60.2	47.4	38.8
	00:45	56.0	46.1	36.7
	01:00	57.1	44.6	35.9
	01:15	55.9	44.3	31.6
	01:30	57.2	44.5	35.9
	01:45	54.2	41.7	30.7
	02:00	56.8	43.0	31.6
	02:15	57.9	44.3	33.5
	02:30	57.3	43.8	31.9
	02:45	54.9	43.4	28.6
	03:00	57.0	39.9	26.2
	03:15	55.8	42.2	27.8
	03:30	55.0	42.7	34.2
	03:45	57.0	44.2	31.5
	04:00	57.6	43.9	31.8
	04:15	60.4	44.9	34.4
	04:30	57.0	46.0	36.9
	04:45	58.6	46.8	40.8
	05:00	58.7	47.0	39.9
	05:15	69.1	48.9	41.1
	05:30	59.3	49.1	42.6
	05:45	58.7	49.1	43.3
	06:00	59.4	49.7	43.2
	06:15	61.4	52.3	47.8
	06:30	86.8	57.5	48.4
	06:45	60.2	53.2	49.5
	07:00	60.9	54.1	50.3
	07:15	62.1	53.7	49.8
	07:30	62.2	55.0	51.8
	07:45	74.9	56.7	51.6
	08:00	66.0	56.2	52.8
	08:15	66.7	56.9	53.9
	08:30	68.4	57.5	54.5
	08:45	64.8	57.8	55.0
	09:00	61.9	57.0	54.2

	09:15	64.2	57.1	53.8
	09:30	75.1	57.7	54.3
	09:45	76.0	57.9	54.2
	10:00	66.8	58.4	55.5
	10:15	64.0	57.7	55.0
	10:30	67.8	57.6	54.8
	10:45	63.6	57.6	54.8
	11:00	64.5	57.6	55.1
	11:15	69.7	58.4	55.8
	11:30	64.7	58.1	55.7
	11:45	71.2	58.2	55.8
	12:00	77.4	59.4	55.5
	12:15	69.8	57.7	55.0
	12:30	67.6	56.9	53.8
	12:45	65.9	57.6	55.1
	13:00	74.3	58.5	55.3
	13:15	75.4	59.2	55.4
	13:30	74.3	58.0	54.3
	13:45	69.9	56.8	53.6
	14:00	78.1	57.8	53.7
	14:15	64.3	56.8	54.2
	14:30	66.0	56.8	54.1
	14:45	66.8	56.4	53.2
	15:00	67.4	56.7	54.1
	15:15	65.6	57.0	53.8
	15:30	63.0	56.0	52.9
	15:45	62.3	55.4	52.4
	16:00	73.5	56.8	51.1
	16:15	73.6	57.5	53.9
	16:30	72.2	57.7	54.1
	16:45	68.2	57.1	53.9
	17:00	65.4	57.2	54.1
	17:15	64.0	56.0	53.1
	17:30	69.7	56.3	53.0
	17:45	72.3	56.8	52.8
	18:00	65.6	55.8	52.4
	18:15	67.3	55.1	51.2
	18:30	71.6	56.0	51.4
	18:45	60.9	54.6	50.9
	19:00	71.3	55.2	50.5
	19:15	67.1	53.7	49.2
	19:30	73.4	55.1	49.8
	19:45	62.0	53.3	49.3
	20:00	68.2	52.8	46.6
	20:15	69.2	53.3	48.2
	20:30	64.4	52.1	47.0
	20:45	58.5	52.2	47.8
	21:00	76.8	53.1	46.5

Sunday 26 th February 2023	21:15	60.7	51.1	45.8
	21:30	65.8	52.4	46.5
	21:45	59.3	52.0	47.0
	22:00	72.0	52.9	47.5
	22:15	62.4	52.3	46.3
	22:30	59.7	51.7	46.7
	22:45	60.2	50.1	44.6
	23:00	61.8	50.9	45.4
	23:15	59.4	51.1	46.5
	23:30	57.9	49.8	45.0
	23:45	70.3	50.4	43.6
	00:00	59.8	50.3	43.7
	00:15	60.4	48.3	39.1
	00:30	72.8	51.3	39.7
	00:45	61.6	46.9	38.2
	01:00	57.4	44.2	36.8
	01:15	58.8	47.5	38.2
	01:30	59.8	44.8	35.9
	01:45	62.1	46.1	32.4
	02:00	58.1	44.0	31.9
	02:15	58.3	43.3	27.0
	02:30	59.4	42.5	25.5
	02:45	55.8	41.8	25.6
	03:00	56.9	44.3	28.6
	03:15	57.0	44.1	34.5
	03:30	54.9	42.8	34.1
	03:45	54.7	42.9	31.6
	04:00	67.5	46.1	28.3
	04:15	56.3	43.3	34.8
	04:30	59.5	44.8	34.9
	04:45	55.7	44.2	35.6
	05:00	69.8	48.5	36.4
	05:15	56.9	46.6	39.4
	05:30	56.8	46.8	37.2
	05:45	58.4	49.3	40.5
	06:00	60.6	49.8	43.7
	06:15	65.5	51.5	43.6
	06:30	62.0	50.3	44.8
	06:45	86.7	57.3	46.0
	07:00	58.8	50.1	44.0
	07:15	60.2	51.2	46.0
	07:30	61.0	52.9	48.7
	07:45	61.3	53.0	48.9
	08:00	61.2	52.2	46.6
	08:15	60.1	52.7	47.8
	08:30	61.1	53.2	49.3
	08:45	62.5	54.7	50.9
	09:00	61.0	55.5	51.9

	09:15	71.2	55.1	50.3
	09:30	67.0	54.9	50.8
	09:45	64.6	55.9	52.3
	10:00	61.7	55.7	52.6
	10:15	66.0	55.7	51.4
	10:30	71.8	56.1	51.9
	10:45	67.6	56.3	52.8
	11:00	65.3	55.9	52.2
	11:15	66.2	56.1	52.8
	11:30	73.0	56.7	52.5
	11:45	75.6	57.0	53.2
	12:00	68.2	56.2	53.2
	12:15	67.4	55.8	52.3
	12:30	64.8	56.1	53.3
	12:45	66.9	55.8	52.7
	13:00	67.2	56.1	53.0
	13:15	73.6	56.2	53.3
	13:30	66.0	55.5	52.1
	13:45	71.2	55.9	52.4
	14:00	61.9	55.4	51.9
	14:15	75.1	57.1	52.4
	14:30	63.7	55.4	52.5
	14:45	64.4	55.6	52.3
	15:00	63.8	55.2	52.3
	15:15	65.0	55.9	53.3
	15:30	69.4	57.0	53.4
	15:45	71.3	56.7	53.4
	16:00	66.4	56.0	52.6
	16:15	62.6	54.8	51.7
	16:30	65.9	54.3	50.3
	16:45	65.5	54.6	50.8
	17:00	64.6	54.0	50.1
	17:15	74.2	54.2	49.0
	17:30	62.1	53.9	49.8
	17:45	65.2	53.7	49.3
	18:00	59.4	52.6	48.4
	18:15	64.3	53.3	48.9
	18:30	75.2	53.6	49.3
	18:45	66.4	53.7	49.7
	19:00	64.3	54.0	50.6
	19:15	71.3	54.4	50.0
	19:30	61.0	52.9	48.8
	19:45	63.0	53.0	49.1
	20:00	62.1	52.7	47.9
	20:15	73.1	55.3	48.1
	20:30	63.6	51.4	46.2
	20:45	58.6	50.6	46.5
	21:00	65.3	50.9	45.7

Monday 27 th February 2023	21:15	60.0	50.7	45.6
	21:30	59.3	49.3	43.4
	21:45	67.1	50.6	41.5
	22:00	63.1	49.9	44.1
	22:15	59.3	49.3	43.5
	22:30	57.5	48.0	41.8
	22:45	70.7	48.1	39.3
	23:00	79.2	53.1	39.0
	23:15	62.6	50.3	41.9
	23:30	59.8	49.5	41.7
	23:45	57.1	45.5	36.5
	00:00	67.0	46.3	36.8
	00:15	58.2	44.3	30.8
	00:30	56.9	44.4	32.0
	00:45	55.2	42.5	24.8
	01:00	56.6	42.6	29.3
	01:15	57.2	41.3	28.0
	01:30	60.0	43.5	29.3
	01:45	58.2	42.4	26.1
	02:00	50.9	37.2	24.5
	02:15	56.5	40.0	24.3
	02:30	52.7	41.0	28.3
	02:45	57.4	41.5	28.7
	03:00	60.1	42.1	27.8
	03:15	55.6	44.0	31.5
	03:30	56.7	43.6	32.6
	03:45	56.9	45.0	25.6
	04:00	56.7	45.1	37.5
	04:15	57.7	47.1	41.0
	04:30	59.3	48.9	43.1
	04:45	58.6	49.6	43.1
	05:00	58.4	50.4	45.5
	05:15	60.1	51.6	46.9
	05:30	59.7	52.4	48.7
	05:45	71.6	54.1	49.3
	06:00	66.8	56.2	52.4
	06:15	60.4	55.8	52.6
	06:30	62.3	56.3	53.7
	06:45	67.8	57.2	54.0
	07:00	62.4	58.2	56.0
	07:15	64.2	58.5	56.4
	07:30	67.5	58.3	55.7
	07:45	66.9	59.3	56.9
	08:00	65.0	59.4	57.1
	08:15	63.2	59.0	56.7
	08:30	67.6	59.2	57.0
	08:45	69.0	58.5	55.3
	09:00	65.0	57.3	54.3

	09:15	65.1	56.8	53.6
	09:30	63.4	55.7	51.9
	09:45	63.0	55.8	52.6
	10:00	62.8	55.8	52.1
	10:15	64.3	55.5	52.0
	10:30	65.7	55.7	52.2
	10:45	62.9	55.4	52.6

TABLE B1: CONTINUOUS NOISE MONITORING DATA AT LT1

APPENDIX C: GLOSSARY OF ACOUSTIC TERMS

Noise

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness. Noise is measured on a logarithmic scale in decibels (dB) because of the ears' sensitivity to a wide range of pressure changes. The sound pressure level (SPL) of a signal is denoted by the symbol L_p and defined by the equation $L_p = 10 \log (p/p_0)^2$ where p is the root mean square pressure of the signal and p_0 is the reference sound pressure (2×10^{-5} Pa).

An indication of the range of sound pressure levels commonly found in the environment is given below:

Location	$L_{pAdB}(A)$
Normal threshold of hearing	-10 to 20
Music halls and theatres	20 to 30
Living rooms and offices	30 to 50
Inside motor vehicles	50 to 70
Industrial premises	70 to 100
Burglar alarms at 1 m	100 to 110
Jet aircraft on take-off	110 to 130
Threshold of pain	130 to 140

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is “equivalent continuous A-weighted sound pressure level, in decibels” and is defined in British Standard BS 7445 as the “value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time”.

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

Community response to environmental noise sources is dependent on both acoustic and non-acoustic factors. The acoustic factors include absolute noise level, changes or exceedances of background and ambient levels as well as the characteristics, time, duration and frequency of noise.