

Acoustic South East



Planning Application - New Build Residential Development

Report by: Scott Castle BSc (Hons) CEnvH, MCIEH PGDip: Acoustics MIOA

Date: 18/03/2024

Project: J3791

Issue 1

Site: **Kivesborough, Littlehampton Road, Worthing. BN12 6PN**

Client: **Liberato Dichello**

Contents

1	Introduction and Executive Summary	- 3 -
2	Context, Noise Criteria & Noise Assessment Methodology	- 4 -
2.1	Context	- 4 -
2.2	Site Location	- 4 -
2.3	Proposed Plans	- 5 -
2.4	Internal Layouts	- 6 -
2.5	Soundscape.....	- 7 -
2.6	Planning Policy and Assessment Criteria	- 7 -
2.7	Methodology and Rationale	- 9 -
3	Sound Survey	- 9 -
4	Results of the Sound Survey	- 10 -
4.1	Unattended Measurements (Freefield Data).....	- 10 -
5	Discussion	- 12 -
5.1	Calculation of the Sound Reduction Index	- 12 -
5.2	Consideration of External Amenity Areas.....	- 14 -
5.3	Assessment of Opening Windows	- 15 -
5.4	Overheating Assessment.....	- 17 -
5.5	ProPG2017 Initial Site Risk Assessment.....	- 17 -
5.6	Rigorous Calculations.....	- 18 -
6	Recommendations	- 19 -
6.1	Glazing.....	- 19 -
6.2	Ventilation.....	- 19 -
6.3	Acoustic Fence	- 19 -
7	Conclusion	- 20 -

Tables

Table 1. BS8233:2014 Criteria	- 8 -
Table 2. Sound Survey.....	- 10 -

Figures

Figure 1. Site Location	- 4 -
Figure 2. Bundling of Firewood Close to Residential Entrance	- 5 -
Figure 3. Proposed Units to Left and Existing Residential to Right (blue)	- 5 -
Figure 4. 3D Render of Images with site access in the rear centre	- 6 -
Figure 5. Proposed Internal Layouts	- 6 -

Figure 6. Spatial Survey Distribution	- 9 -
Figure 7. Measured External Sound Pressure Levels (Day and Night)(Freefield and dB(A))	- 10 -
Figure 8. Assessment of L_{Amax} Events with an Open window and an SRI of 22dB.	- 11 -
Figure 9. Hourly Review of the Daytime Soundscape (All Days)	- 11 -
Figure 10. Hourly Review of the Daytime Soundscape (Poor Weather Days Removed)	- 12 -
Figure 11. Spectral content of the Worst Case Hour, as measured at the Survey Position	- 12 -
Figure 12. Review of Relevant Sound Reduction Index Options	- 13 -
Figure 13. Sound Reduction Index for Bedrooms	- 13 -
Figure 14. Sound Reduction Index for Kitchen/Living/Diner	- 13 -
Figure 15. Table B2 of Acoustics Ventilation and Overheating Guidance (AVOG), Jan 2020	- 14 -
Figure 16. External Amenity Areas	- 15 -
Figure 17. Level 1 Overheating Assessment Schematic (AVOG, 2020)	- 16 -
Figure 18. Simplified Assessment of Approved Document O - L_{Amax} Events above 55dB Internally	- 17 -
Figure 19. ProPG 2017 - Initial Site Risk Assessment	- 18 -

This report has been prepared by Acoustic South East with all reasonable skill, care and diligence and presents information included within the scope agreed with the client. If any third party whatsoever comes into possession of this report, they rely on it at their own risk and Acoustic South East accepts no duty or responsibility (Including in negligence) to any such third party.

Report by: Scott Castle BSc (Hons) CEnvH, MCIEH PGDip: Acoustics MIOA

Checked by: Peter Attwood BSc(Hons) MSc MCIOB MIOA

Issue 1	18/03/2024	Original Issue
---------	------------	----------------

1 Introduction and Executive Summary

Acoustic South East have been appointed to undertake an acoustic assessment to support a detailed planning application for three additional plots on an existing dwellings curtilage. Given the proximity of the Ferring Garden Centre adjacent, there are noted to be concerns over noise from firewood manufacture/processing and how this might impact the site.

Standards and guidance referenced for this assessment include:

- BS8233 (Sound insulation and noise reduction for buildings) 2014
- National Planning Policy Framework (NPPF), 2023
- Acoustics Ventilation and Overheating Guidance (AVOG), January 2020
- Building Regulations Approved Document O – Overheating
- ProPG2017 - Professional Practice Guidance on Planning & Noise

A single unattended class 1 sound level meter was left in situ at the boundary of the residential property (the application site) between 15th to 22nd February 2024 to measure the site soundscape.

Firewood processing does occur at the adjacent Ferring Nurseries (located to the West) and this was witnessed firsthand when setting up the survey equipment. The measured daytime (07:00-23:00 hours) sound pressure levels are 53dB $L_{Aeq, 16 \text{ hours}}$ with a worst-case hour identified of 59dB $L_{Aeq, 1 \text{ hour}}$ on both Thursday and Friday mornings (08:00-09:00 hours). The overnight (23:00-07:00 hours) measured sound pressure level was 47dB $L_{Aeq, 8 \text{ hours}}$.

Whilst the firewood processing occurs, this is a daytime use only and there are no obvious night time sound sources which impact the application site.

The resulting initial site risk assessment consistent with the ProPG2017 approach identifies a negligible to low risk in terms of noise mitigation measures required to develop the site and protect future occupants.

The sound reduction index required to protect future occupants ranges from 18dB to 24dB and it is concluded that the site is capable of being constructed with standard thermal double glazing (R_{traffic} of no less than 25dB(A)) and either trickle vents or passive through wall vents.

External amenity areas were also considered for plots 1, 2 and 3 and these are predominantly comfortably below the requirements of BS8233:2014 and World Health Organisation Guidelines for Community Noise dated 1999.

A level 1 overheating assessment, consistent with the approach in the Acoustics, Ventilation and Overheating Guidance dated Jan 2020 indicates that the BS8233:2014 Table 4 values for daytime and night time internal sound pressure levels are capable of being complied with for open windows using a 13dB outside to inside attenuation. The use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect.

Planning consent should not be withheld on noise grounds.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context

A detailed planning application is being made to Arun District Council for the erection of three plots on an existing residential garden premises. The existing residential demise is adjacent to a large agricultural nursery which undertakes firewood processing.

2.2 Site Location

The site is located to the East of Ferring Garden Centre. Existing residential properties exist to the East and South of the application site. A recent new build development is also noted to the North West which is very close to the garden centre.

Access to the site is off the A259 and along a shared driveway through the garden centre. The shared access also provides access to the residential demise to the South, Lynton.

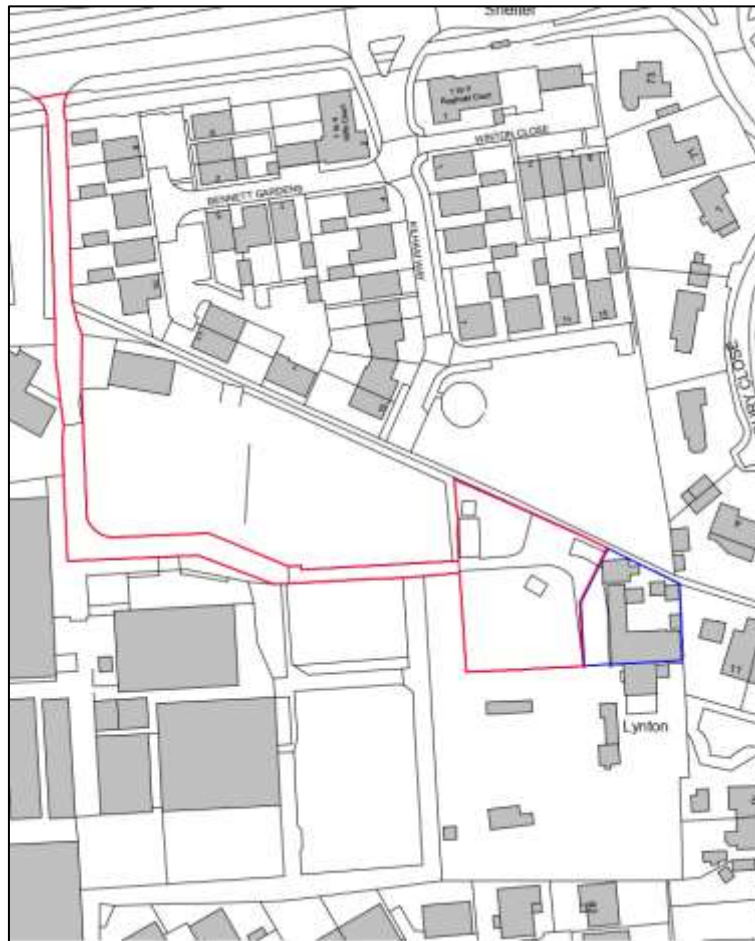


Figure 1. Site Location

Along the access route, finished and tied bundles of timber are present on the Garden centres land. This is shown in Figure 2 below.



Figure 2. Bundling of Firewood Close to Residential Entrance

2.3 Proposed Plans

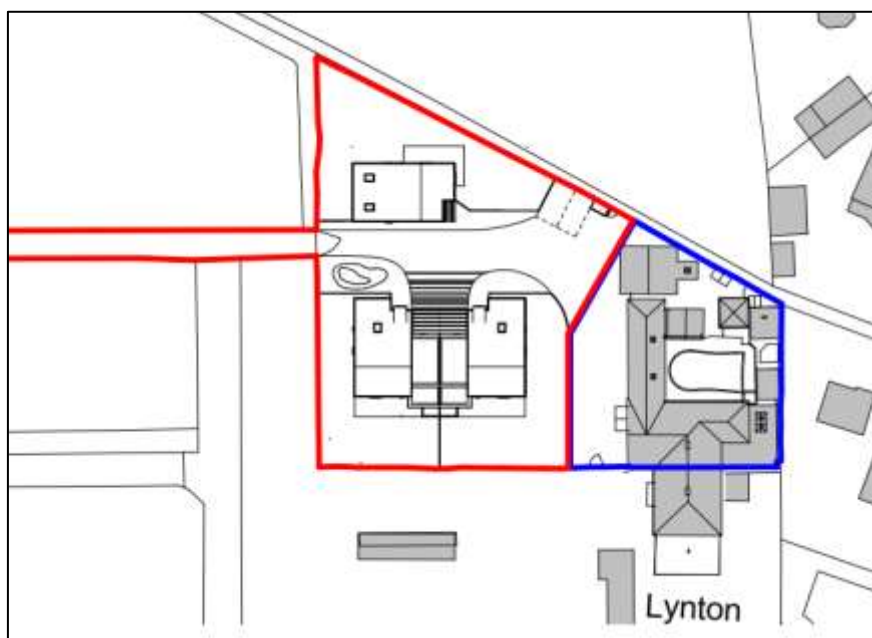


Figure 3. Proposed Units to Left and Existing Residential to Right (blue)



Figure 4. 3D Render of Images with site access in the rear centre

2.4 Internal Layouts

The internal layout for both plots is presented in Figure 5 below. All drawings are orientated North and it is noted that for the bedrooms, these do not overlook the garden centre site directly representing good acoustic design. Limited windows and small window sizes are also noted on the Western elevation which is likely to be the noisier elevation.

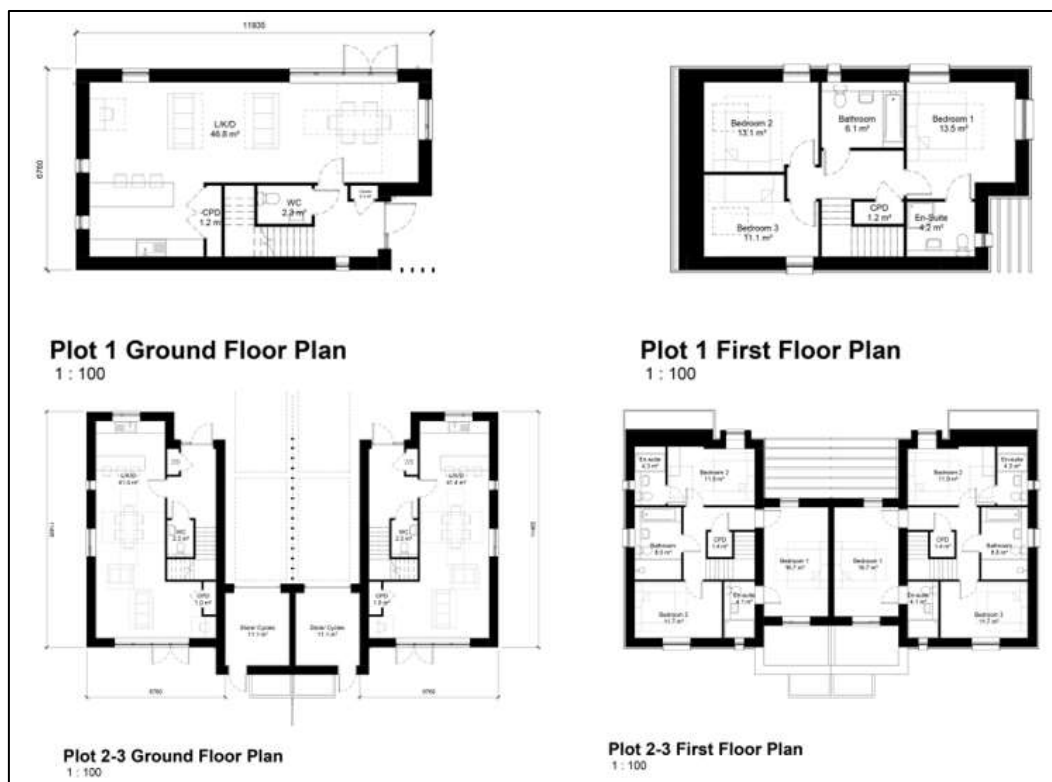


Figure 5. Proposed Internal Layouts

2.5 Soundscape

At the time of setting up the survey, firewood processing was occurring and was audible on the application site, albeit not with direct line of sight to be able definitely state what piece of equipment was generating which sounds.

Notwithstanding this, two types of reverse sounder were noted with the classic bleep bleep as well as a white noise sounder. A low frequency engine was also noted, possibly belonging to the tractor present in the processing area. Birdsong was also noted.

2.6 Planning Policy and Assessment Criteria

2.6.1 National Planning Policy Framework Dec 2023

The National Planning Policy Framework (Dec 2023) defines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so.

The following paragraphs are relevant within NPPF Section 15 (Conserving and enhancing the natural environment) states the following:

Paragraph 180(e) - Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability, and

Paragraph 191 - 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 impact 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

Paragraph 193– 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.

2.6.2 BS8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

Table 4 of BS8233:2014 provides the following guideline values:

Activity	Location	Time period of day	
		07:00-23:00	23:00-07:00
Resting	Living Rooms	35dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$

Table 1. BS8233:2014 Criteria

It is relevant to note that Table 4 criteria in BS8233:2014 relates to continuous and anonymous sound. It is highly likely that the soundscape originating from firewood manufacturing is not continuous and/or anonymous and accordingly, the internal criterion should be reduced or a worst-case hour considered. For the purposes of this assessment, a worst case hour has been applied.

2.6.3 ProPG2017

Planning guidance (ProPG2017) relates to new residential development and airborne transportation noise, which includes exposure to road traffic, railway and aviation noise. Whilst ProPG, 2017 generally mirrors the requirements of BS8233:2014 and the World Health Organisation Guidelines, 1999, it goes further in setting a limit for inside bedrooms for L_{Amax} events and specifically, no more than 10 L_{Amax} events per night time period above 45dB(A).

The internal bedroom L_{Amax} values will be used in accordance with ProPG2017.

2.6.4 BS4142:2014-A1:2019 – Methods for Rating and Assessing Industrial and Commercial Sound

It is noted that the firewood processing activities are not new and not proposed to be changing, yet the planning process seeks to introduce new residential properties nearby. With this in mind, section 8.5 of the British Standard states as follows.

8.5 Introduction of a new noise-sensitive receptor

Measure the background sound at the intended location of any new noise-sensitive receptor(s) in the absence of any specific sound.

NOTE Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it should be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation.

Rather than a BS4142:2014 assessment which would result in a rating level being calculated, this would be unlikely to yield any useful information on the proposed design and mitigation measures needed for the three new plots.

2.6.5 Planning Noise Advice Document Sussex, November 2023

A planning noise advice document which all Sussex local authorities have contributed to and signed up to (including Arun District Council) remains relevant. The guidance document has been followed in respect of measurement parameters and report presentation of data

2.7 Methodology and Rationale

A class 1 sound level meter was placed at the Western boundary over the course of a week to measure the site soundscape. The data was reviewed and focused on using a worst-case hour to determine the likely noise impact from the firewood processing.

A computer noise model with an area sound source was also used to assist in identifying how sound might propagate across the site and likely predictions at ground floor, first floor and garden areas including patios. Rigorous calculations were then undertaken to review the required glazing and/or ventilation requirements for the rooms/habitable spaces. For the rigorous calculations, these used the measured spectral data at the survey position.

3 Sound Survey

A single unattended sound survey position was used to characterise the site soundscape. This was located 2.4m from the Western boundary representing the building curtilage.

The measurement resolution was 1-minute for the 01dB Black Solo with the data post processed in dB Trait, consistent with the Planning and Noise Document, Sussex, dated 2023 which provides for a robust assessment of L_{Amax} events during the overnight period (23:00-07:00 hours). The microphone was placed in freefield conditions and the sound level meter was placed in a locked peli case with dry cell batteries.

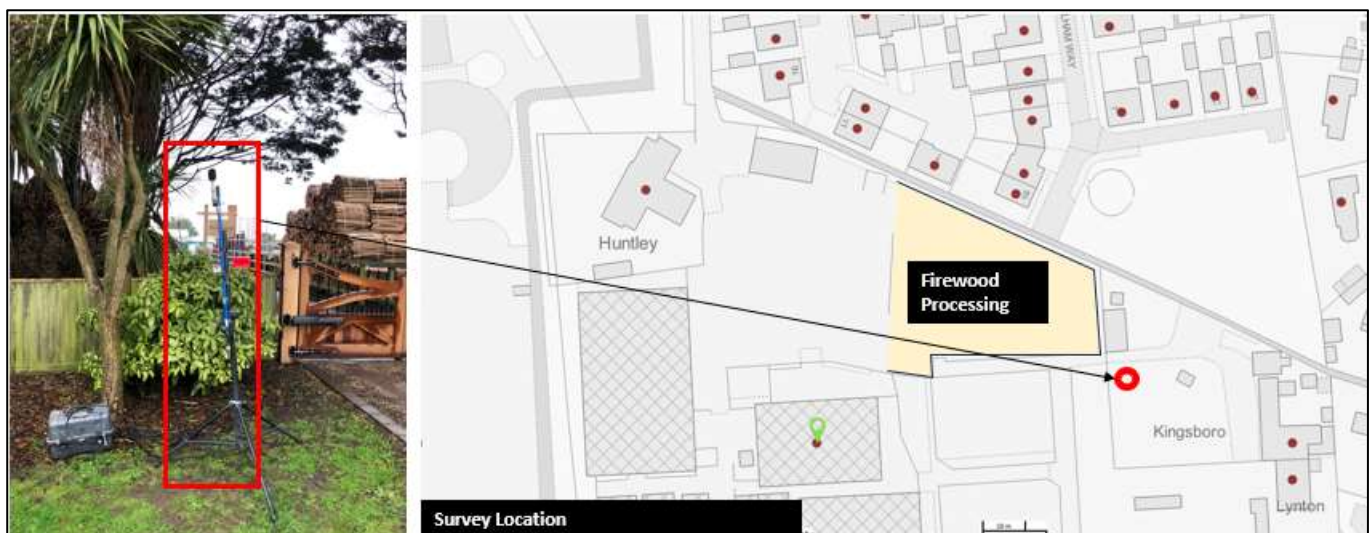


Figure 6. Spatial Survey Distribution

Survey(s) carried out by	Scott Castle BSc(Hons) Env Health, MCIEH CEnvH PGDip Acoustics MIOA
Equipment Used	Svantek Mirus 971 Class 1 Sound Level Meter – Mounted on Monopole
Equipment Used	Castle Acoustic Calibrator – Serial No. 041173
Location	01dB Black Solo – 2.1m above ground level WhatThreeWords – lined.rich.preoccupied
Duration	15 th to 22 nd February 2024

Table 2. Sound Survey

Feedback from the client indicates that firewood processing occurred as follows:

- 07:00-17:00 hours Monday to Friday
- 07:00 – 12/13:00 hours Saturday
- It was also stated that on odd occasions, the work would go onto later into early evening with large lorry loads of tree trunks transported to site and unloaded with two tractors.

4 Results of the Sound Survey

Continuous sound pressure levels ($L_{Aeq,T}$) are reported herein as are L_{Amax} events.

Given that the survey position was 2.4m from the Western boundary and the new build properties are approximately 4m from the boundary, the worst-case hour sound pressure is capable of being used. Given that the sound source is not able to be determined in terms of distance from the sound level meter, it is relevant to consider the worst-case hour.

4.1 Unattended Measurements (Freefield Data)

4.1.1 LT1 – Western Boundary

Logarithmically Averaged Day and Night time Periods (External - Freefield)-dB(A)			
$L_{Aeq, 16 \text{ hour-07:00-23:00}}$		$L_{Aeq, 8 \text{ hour 23:00-07:00}}$	
Day 1	54.9	Night 1	46.8
Day 2	55.2	Night 2	45.7
Day 3	50.2	Night 3	50.1
Day 4	52.1	Night 4	52.1
Day 5	52.7	Night 5	48.4
Day 6	56.5	Night 6	48.2
Day 7	53.7	Night 7	47.3
Arithmetic Average	53.0	Night 8	45.9
		Arithmetic Average	47.1

Figure 7. Measured External Sound Pressure Levels (Day and Night)(Freefield and dB(A))

The orange cells identify elevated sound pressure which on closer investigation with a local wunderground weather station were due to either increased wind speeds or rainfall. The orange shaded cells have not been included in the averaging.

No. of Occurrences of L_{Amax} between 23:00-07:00 hours above 45dB L_{Amax} (SRI-13dB)							
Night 1	Night 2	Night 3	Night 4	Night 5	Night 6	Night 7	Night 8
35	35	58	51	30	30	20	35

No. of Occurrences of L_{Amax} between 23:00-07:00 hours above 45dB L_{Amax} (SRI-22dB)							
Night 1	Night 2	Night 3	Night 4	Night 5	Night 6	Night 7	Night 8
8	4	18	11	8	7	5	2

Figure 8. Assessment of L_{Amax} Events with an Open window and an SRI of 22dB.

4.1.2 Hourly Review

A review of the daytime hours and measured $L_{Aeq,1 \text{ hour}}$ was undertaken as follows.

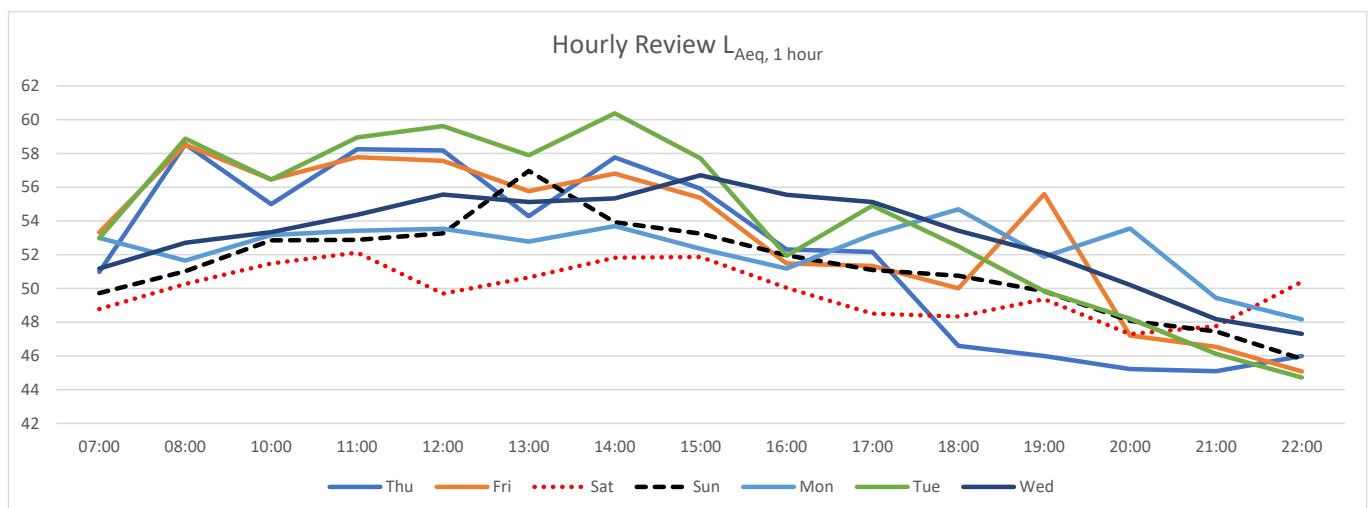


Figure 9. Hourly Review of the Daytime Soundscape (All Days)

The weekends have been marked as dashed lines.

Of note in Figure 9 above is the reduction at approximately 10:00 hours for possibly a break, 13:00 hours as a possible break and end of processing at 16:00 hours.

The Tuesday and Wednesday plots are both elevated and in reviewing a local Angmering weather station from Wunderground, both these days were unsuitable for environmental monitoring with windspeeds above 11mph/5m/s. Tuesday and Wednesday data has been removed for Figure 11 below.

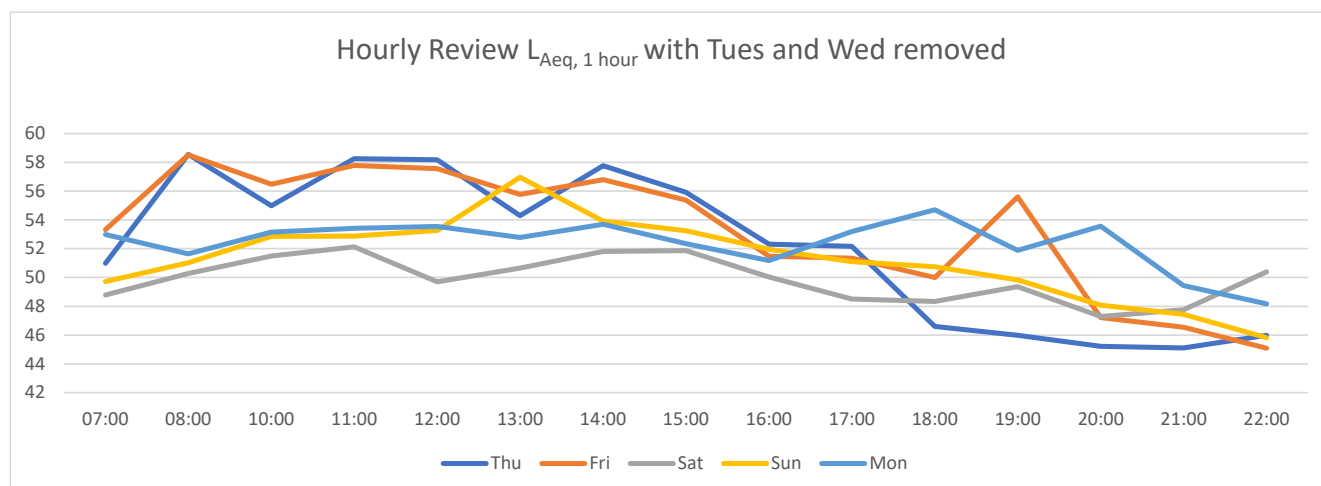


Figure 10. Hourly Review of the Daytime Soundscape (Poor Weather Days Removed)

A worst-case hour of 59dB $L_{Aeq, 1 \text{ hour}}$ has been identified for both the Thursday and Friday mornings. The spectral profile is as follows.

Worst Case Hour - Frequency (Linear-Hz)							Total A Weighted
125	250	500	1000	2000	4000	8000	
66.4	52.4	50.6	46.8	44.6	39.4	30.9	59 dB $L_{Aeq, 1 \text{ Hour}}$

Figure 11. Spectral content of the Worst Case Hour, as measured at the Survey Position

5 Discussion

5.1 Calculation of the Sound Reduction Index

By being aware of how the soundscape impacts the proposed properties, a noise modelling approach predicts external sound pressure levels around the building perimeters. Subsequently, the required Sound Reduction Index (SRI) to achieve satisfactory internal sound pressure levels can be calculated.

There are three drivers which impact the façade sound reduction index or SRI. These are the daytime continuous noise levels measured over 16 hours in $L_{Aeq,T}$, the night time continuous noise levels over 8 hours, also measured in $L_{Aeq,T}$. Thirdly, ProPG2017 requires a consideration of the number of L_{Amax} events which will occur in a bedroom during the night time period. Specifically, ProPG2017 requires no more than ten events exceeding 45dB L_{Amax} measured internally. Whichever of these drivers is highest is applied to ensure that the residents are protected from each criterion.

An assessment has been made below of all rooms at first floor levels.

It is relevant to note that living room and bedroom calculations differ, as whilst living rooms are subject to only the daytime predicted sound pressure levels, bedrooms must consider both daytime and night time continuous sound pressure levels as well as L_{Amax} events during the night to protect sleep.

The daytime SRI is the predicted external freefield sound pressure level minus 35dB as per the Table 4 values in BS8233:2014 and the same for the night time values (albeit minus 30dB).

The L_{Amax} SRI is achieved by using the predicted night time external sound pressure level and comparing this with the measured night time survey noise level. The SRI figure is then adjusted to prevent no more than 10 L_{Amax} events per night inside the bedroom environment above 45dB L_{Amax} . The adjustment process takes account of each of the 6 measured night time periods (during appropriate weather conditions) to ensure that no individual night exceeds 10 events of 45dB L_{Amax} inside the bedroom.

The long-term survey positions (LT1) have been used to assess night time data and L_{Amax} considerations. The SRI considerations have been split into bedrooms and living rooms accordingly.

As previously discussed, the generated site soundscape from firewood processing is not likely to be continuous and anonymous. Therefore, it is relevant to consider either a worst case or a reduction in internal criterion.

Sound Reduction Index Options	53dB $L_{Aeq, 16 \text{ hour}}$	47dB $L_{Aeq, 16 \text{ hour}}$
	Daytime	Night Time
Normal SRI - Day 35, night 30	18	17
Worst Case Hour (59dB $L_{Aeq, 1 \text{ hour}}$)	24	17
Reduction in daytime Internal SPL (ie 30dB $L_{Aeq, 16 \text{ hour}}$)	23	17
Protective and Relevant SRI	24	17

Figure 12. Review of Relevant Sound Reduction Index Options

Summary of Sound Reduction Index (SRI) Required for the Bedrooms								
Location	Highest Predicted Daytime External Sound Pressure Level ($L_{Aeq, 1 \text{ hour}}$)-Rounded	BS8233:2014 Daytime Criterion	Daytime SRI	Highest Predicted Night Time External Sound Pressure Level ($L_{Aeq, 8 \text{ hour}}$)-Rounded	BS8233:2014 Night Time Criterion	Night Time SRI	SRI to ensure less than 10 L_{Amax} events 45dB(A)	SRI to Apply
Survey Position	59	35dB $L_{Aeq, 16 \text{ hour}}$	24	48	30 dB $L_{Aeq, 8 \text{ hour}}$	18	22	24
All data presented is dB(A) and Freefield								

Figure 13. Sound Reduction Index for Bedrooms

Summary of Sound Reduction Index (SRI) Required for the Habitable Rooms			
Location	Highest Predicted Daytime External Sound Pressure Level ($L_{Aeq, 16 \text{ hour}}$)-Rounded	BS8233:2014 Daytime Criterion	Daytime SRI
Survey Position	59	35dB $L_{Aeq, 16 \text{ hour}}$	24

Figure 14. Sound Reduction Index for Kitchen/Living/Diner

The maximum Sound Reduction Index for the daytime is 24dB (rounded), 18dB (rounded) for night time and 22dB (rounded) for the L_{Amax} events for bedrooms during the night time period.

When considering the AVOG table below, passive ventilation is likely to be acceptable. Given the client's intention to provide type 3 ventilation, ie mechanical extract with permanent trickle vents, this is consistent with the requirements of the AVOG, dated 2020.

Table B-2 Potential level differences associated with different ventilation Systems from ADF

Ventilation System from ADF	Cont. equiv. (L_{Aeq}) or events (L_{Amax})	Level Difference, external free field level – internal reverberant level, dB	
		Typical windows and vent	Higher acoustic performance windows and vent
1, 2	L_{Aeq}	21	31
	L_{Amax}	22	35
3 (with trickle vent)	L_{Aeq}	23	33
	L_{Amax}	24	38
4 (no trickle vent)	L_{Aeq}	27	36
	L_{Amax}	31	45

Figure 15. Table B2 of Acoustics Ventilation and Overheating Guidance (AVOG), Jan 2020

5.2 Consideration of External Amenity Areas

The external amenity areas are shown as follows in Figure 15. It is noted that currently the site benefits from a very low fence line on the Southern side of the plot and an increased fence line and current building on the northern plot which is to be demolished.

The average sound pressure levels measured on the western boundary at 2.1m in height (53dB $L_{Aeq, 16 \text{ hour}}$) indicate that BS8233:2014 and WHO Guidance for external amenity areas will be achieved.



Figure 16. External Amenity Areas

It is noted that the firewood business operated involves storage close to the access road to the application site and possibly the site boundary to the North (See Figure 2 above)

Such storage may be operating as temporary noise barrier and if conditions changed to the business and which are outside the applicant's control, it would seem sensible to ensure a solid partition for the western boundary to future proof the site. Such a fence line should be a minimum of 2m in height and with a density/mass of at least 10kg/m²

Using the constructed noise model with the worst-case hour applied (ie calibrated to 59dB L_{Aeq, 1hour}), the three patio areas were assessed and these indicated as follows:

Plot 1 – Patio -56dB L_{Aeq, 1 hour}

Plot 1 Garden – 39dB L_{Aeq, 1 hour}

Plot 2 – 39dB L_{Aeq, 1 hour}

Plot 3 - 34dB L_{Aeq, 1 hour}.

5.3 Assessment of Opening Windows

A level 1 overheating assessment has been undertaken for the spaces with a 5dB tolerance built into the criterion. I.e for the daytime period, the internal sound pressure level is no more than 40dB L_{Aeq, 16 hour} and for the night time period, no greater than 35dB L_{Aeq, 8 hour}.

Assuming the daytime sound pressure level of 53dB L_{Aeq, 16 hour} and the night time as 47dB L_{Aeq, 8 hour}, a subtraction of 13dB which is consistent with the requirements of the AVOG would allow for 40dB internally L_{Aeq, 16 hour} (daytime) and 34dB L_{Aeq, 8 hour} (night time). Both results are within the 5dB tolerance indicating that windows may be opened during the daytime and night time periods to mitigate thermal overheating as a level 1 overheating assessment.

It should be noted that a level 1 overheating assessment uses 13dB of attenuation to represent the reduction in sound pressure levels from outside (freefield conditions) to inside reverberant conditions.

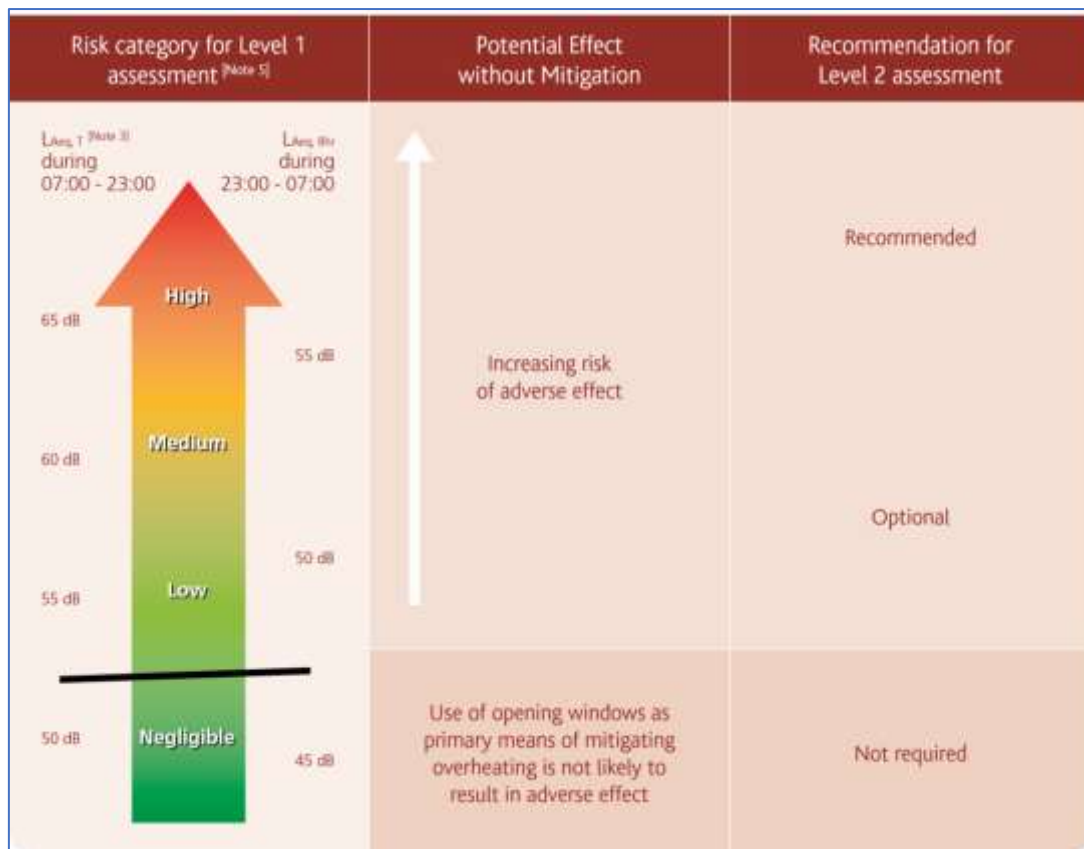


Figure 17. Level 1 Overheating Assessment Schematic (AVOG, 2020)

It should also be referenced that these relate to average sound pressure levels measured over the week and not singular hours.

Residents are free to open windows and it is important to recognise that there are no restrictions for purge ventilation.

5.4 Overheating Assessment

Recently introduced Part O of the building regulation requires an assessment of whether bedroom windows can be opened at night. It is assumed that bedroom windows will be closed if either of the conditions below are met:

- Internal noise level exceeds 40dB $L_{Aeq, 8\text{hour}}$
- L_{Amax} events exceed 55dB L_{Amax} more than 10 times a night.

In reviewing bedrooms for the overnight periods which exceeded 40B $L_{Aeq, 8\text{ hour}}$ and more than 10 events above 55dB L_{Amax} .

There is no dominant sound source for the night time period, and as presented in section 4.1, the measured night time values are relatively low (ie 47dB $L_{Aeq, 8\text{ hour}}$). With a 9dB subtraction made for a simplified overheating assessment this would provide an internal sound pressure level of 38dB $L_{Aeq, 8\text{ hours}}$ which is compliant with Approved Document O.

However, ADO also requires that the L_{Amax} events are taken into consideration and with a 9dB representation for an open window, the following is apparent. Even taking account of nights 3 and 4 for poor weather, there are elevated L_{Amax} events which would indicate that the windows would remain closed. A formalised TM59 dynamic overheating risk assessment is outside the remit of this report.

No. of Occurrences of L_{Amax} between 23:00-07:00 hours above 55dB L_{Amax} (SRI-9dB)							
Night 1	Night 2	Night 3	Night 4	Night 5	Night 6	Night 7	Night 8
20	7	39	17	14	19	14	13
For ADO, no more than 10 events per night are permissible							

Figure 18. Simplified Assessment of Approved Document O - L_{Amax} Events above 55dB Internally

It is reiterated that the Part O overheating assessment relates only to bedroom windows during the night time period.

5.5 ProPG2017 Initial Site Risk Assessment

In line with the requirements of ProPG2017, an initial site risk assessment has been undertaken which requires that the worst case/typical 24 hours are represented.

The assessment details a negligible to low impact and the grant of planning consent should not be withheld on noise grounds.

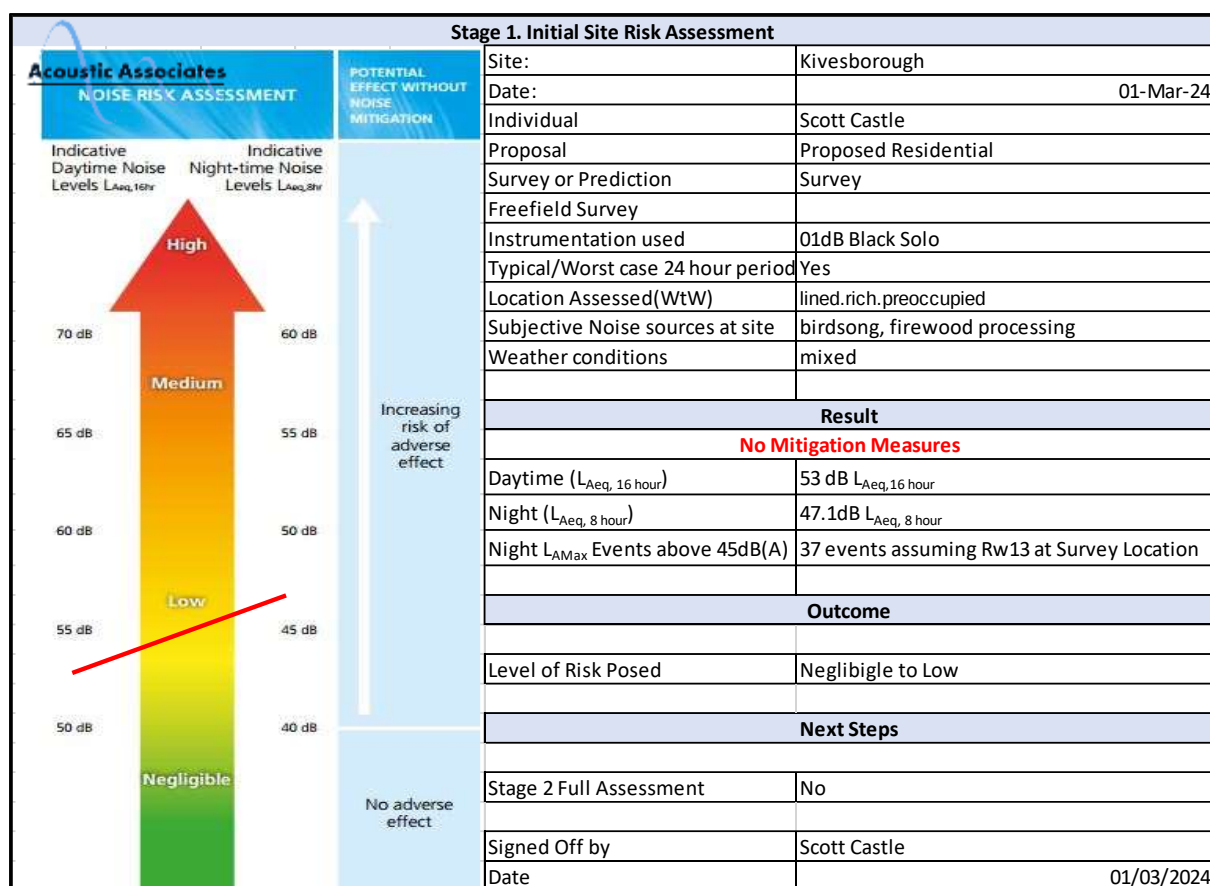


Figure 19. ProPG 2017 - Initial Site Risk Assessment

5.6 Rigorous Calculations

Rigorous calculations, as per Annex G2 of BS8233:2014 consider the worst-case measured external (freefield levels) sound pressure level, but rather than using a simplistic external to internal sound pressure level subtraction, the Sound Reduction Index (SRI) is achieved using ratios of window sizes, facades, glazing specification as well as the proposed ventilation considerations. Given the relatively low noise levels, the worst-case rooms (Unit 1) have been assessed. The rigorous calculations have taken account of the following:

- The worst case highest daytime sound pressure levels have been used for the single worst case hour.
- The spectral input for the worst-case hour was also applied to ensure accurate calculations.
- A noise model was used to place an area sound source which would account for more than one point source and was consistent with activities witnessed on the site
- All rigorous calculations use freefield data.
- The calculations have assumed a masonry cavity wall
- 35dB $L_{Aeq, 16 \text{ hour}}$ has been applied as the daytime criteria for a Kitchen/Lounge/Diner
- To establish the larger ground floor open plan plot for the kitchen living diner, the West, North and East facades were used with the assistance of the noise model and the internally generated sound pressure levels were summed to determine the cumulative internal sound pressure level.
- A 2m fence line was also created on the sites western boundary and incorporated into the model

- The rigorous calculations also assumed passive through wall vents for the habitable rooms, albeit with these not placed on the western façade.
- Where there was more than one openable window on a room (first floor), the glazed areas were summed and applied the noisier of the elevations as the external sound pressure level.
- For the calculations for plot 2 and 3, only the plot closest to the sound source was calculated, as the layouts are symmetrical and it follows that if the resulting internal sound pressure levels and glazing/ventilation combination work for the closer of the two plots, then by default, the plot further away will also work.

The calculations undertaken identify that the plots are capable of being constructed with standard thermal double glazing and trickle vents. The plots were also assessed using passive through wall acoustic vents with greater airflow and these were also considered to be acceptable.

6 Recommendations

6.1 Glazing

The assessment demonstrates that the development is capable of utilising standard thermal double glazing. Whilst Pilkington Glass has been used within the calculations, should alternative glazing providers be sought, then the only metric for relevant comparison is that of R_{traffic} or sometimes referred to as $R_w + C_{tr}$ which includes a low frequency correction. The minimum R_{traffic} for windows on the development is R_{traffic} 25dB(A)

6.2 Ventilation

The trickle vents used within the assessment were an off the shelf commercially available Greenwood EA5000 trickle vent (5230mm²), and Rytons through wall ventilators. For the latter, the Ryton AAC125 HP Look Ryt was used for bedrooms with a free area of 8500mm² and for the ground floor spaces, the Rytons 9x9 Airliner (12800mm²).

Should mechanical extract ventilation (System 3, MEV) be selected, this would have to be carefully specified (a mechanical noise level of 24-26dB $L_{Aeq,T}$ or less) to ensure that it does not add to the internal soundscape and that future occupants do not switch the system off resulting in poor air quality.

Through wall vents should be avoided on the Western facades as these will typically be exposed to increased sound pressure levels due to the garden centre activities.

6.3 Acoustic Fence

It is strongly advised that a minimum of a 2m fence line is applied to the Western boundary and also the southern and Northern boundaries to minimise the sound onto the site. The fence line should be continuous, rigid and without any holes or gaps. The fence line should reach all the way to the floor level and have a minimum mass of 10 kg/m².

7 Conclusion

A single unattended class 1 sound level meter was left in situ at the boundary of the residential property (the application site) between 15th to 22nd February 2024 to measure the site soundscape.

Firewood processing does occur at the adjacent Ferring Nurseries (located to the West) and this was witnessed firsthand when setting up the survey equipment. The measured daytime (07:00-23:00 hours) sound pressure levels are 53dB $L_{Aeq, 16 \text{ hours}}$ with a worst-case hour identified of 59dB $L_{Aeq, 1 \text{ hour}}$ on both Thursday and Friday mornings (08:00-09:00 hours). The overnight (23:00-07:00 hours) measured sound pressure level was 47dB $L_{Aeq, 8 \text{ hours}}$.

Whilst the firewood processing occurs, this is a daytime use only and there are no obvious night time sound sources which impact the application site.

The resulting initial site risk assessment consistent with the ProPG2017 approach identifies a negligible to low risk in terms of noise mitigation measures required to develop the site and protect future occupants.

The sound reduction index required to protect future occupants ranges from 18dB to 24dB and it is concluded that the site is capable of being constructed with standard thermal double glazing (R_{traffic} of no less than 25dB(A)) and either trickle vents or passive through wall vents.

External amenity areas were also considered for plots 1, 2 and 3 and these are predominantly comfortably below the requirements of BS8233:2014 and World Health Organisation Guidelines for Community Noise dated 1999.

A level 1 overheating assessment, consistent with the approach in the Acoustics, Ventilation and Overheating Guidance dated Jan 2020 indicates that the BS8233:2014 Table 4 values for daytime and night time internal sound pressure levels are capable of being complied with for open windows using a 13dB outside to inside attenuation. The use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect.

Planning consent should not be withheld on noise grounds.