



PLANNING NOISE ASSESSMENT

LAND OFF MILL LANE, SAYERS COMMON, BN6 9JA

CHRIS HARRIS

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PLANNING NOISE ASSESSMENT LAND OFF MILL LANE, SAYERS COMMON, BN6 9JA

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REVISION HISTORY

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1 INTRODUCTION

Anderson Acoustics Ltd have been commissioned by Chris Harris to undertake an initial noise assessment in support of a planning application for the development of 9 residential dwellings at Land off Mill Lane, Sayers Common, BN6 9JA.

This report summarises the results of the environmental noise survey undertaken on site and provides a series of noise contours produced with noise modelling software CadnaA 2026, based on measured noise levels and topographical conditions of the area. These results will assist in the assessment of the sound reduction performance specifications for glazing, ventilation and external wall constructions; as well as predicting noise levels in the external amenity areas of the scheme.

The advice provided in this report is indicative at this stage, given there are no elevations or internal layouts for the dwellings, and input from other disciplines (e.g., M&E, energy/thermal consultants) may be required to provide fully accurate results at a later stage.

Guidance relevant to the assessment has been presented and briefly discussed in Section 2.

A brief description of the site is given in Section 3.

The methodology and results of an environmental noise survey undertaken at the site are given in Section 4.

Section 5 details the ProPG Stage 1 assessment and subsequent discussions, with acoustic design considerations outlined.

Section 6 details the ProPG Stage 2 assessment and related elements.

Section 7 provides an assessment and discussion on the potential impacts of overheating in relation to internal noise levels within dwellings across the development.

The report is concluded in Section 8.

This report is technical in nature, please visit the [Anderson Acoustics website](#) for a full glossary of the technical terms used in this report.

2 RELEVANT GUIDANCE AND CRITERIA

2.1 British Standard 8233

BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* is the most relevant Standard in terms of noise and the scope of this report. All relevant details are incorporated into the Professional Practice Guidance on Planning & Noise (ProPG: Planning & Noise, 2017), as presented below, and so there is no need to represent the guidance here. Compliance with the ProPG ensures compliance with BS 8233.

2.2 ProPG: Planning & Noise

The ProPG 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 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 necessary.

Stage 1 introduces the concept of noise risk categories ranging from Negligible Risk to High Risk to help LPA's in making accelerated straightforward decisions for negligible-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
- Element 4: Other Relevant Issues

We have not undertaken a full assessment on all the above items, as for this to happen finalised internal layouts and elevations would be required for all dwellings, however indicative assessments of internal noise levels (Element 2) and external amenity areas (Element 3) have been provided in Section 6 of this memo.

Table 2.1 provides a summary of ProPG's noise risk categories and their associated external free-field noise levels, along with the assessment implications.

Table 2.1: Interpretation of the Stage 1 initial site noise risk assessment thresholds

Noise risk category	L _{Aeq,16h} (07-23)	L _{Aeq,8h} (23-07)	L _{AFmax} (23-07)	Stage 2 assessment?	Pre-planning application advice
High	> 70 dB	> 60 dB	> 10 events > 60 dB	Required	"...an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process..."
Medium	61 – 70 dB	51 – 60 dB			"...application may be refused unless a good acoustic design process is followed and is demonstrated... how the adverse impacts of noise will be mitigated and minimised, and... a significant adverse noise impact will be avoided..."
Low	51 – 60 dB	41 – 50 dB			"...the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed..."
Negligible	≤ 50 dB	≤ 40 dB	Less than the above	Not normally required	"...the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds."

As noted above, the rating or categorisation at this stage is not to be taken as the final word on the site, but rather an initial guide as to the degree of measures likely to be required to achieve an acceptable development.

With regard to Element 2, the internal noise level guidelines presented in ProPG are primarily based on the guidance in BS 8233, with further guidance incorporated based on the WHO guidelines and current good practice. The resultant internal levels and associated guidance is presented within Figure 2 of ProPG, which is reproduced as Table 2.2 below.

Table 2.2: ProPG Internal Noise Level Guidelines (as per ProPG Figure 2)

Activity	Location	07:00 – 23:00 Hrs	23:00 – 07:00 Hrs
Resting	Living room	35 dB L _{Aeq,16h}	-
Dining	Dining room/area	40 dB L _{Aeq,16h}	-
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq,16h}	30 dB L _{Aeq,8h} 45 dB L _{Amax,F} (Note 1)

Note 1. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB L_{Amax,F} more than 10 times a night.

With regard to Element 3, the external noise level guidelines presented in ProPG are primarily based on the guidance in BS 8233, which states that:

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB L_{Aeq,T}, with an upper guideline value of 55 dB L_{Aeq,T} which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

ProPG also states the following:

- 3(i) "If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended".

- 3(ii) *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB L_{Aeq,16hr}."*
- 3(iii) *"These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces."*
- 3(iv) *Whether or not external amenity spaces are an intrinsic part of the overall design, consideration of the need to provide access to a quiet or relatively quiet external amenity space forms part of a good acoustic design process.*
- 3(v) *Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:*
 - a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
 - a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or*
 - a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
 - a relatively quiet, protected, publically [sic] accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.*

In summary, therefore, key external amenity space should be designed such that noise levels are as low as practicable, and ideally not above 55 dB L_{Aeq,16hr}.

2.3 AVO Guide

The *Acoustics, Ventilation and Overheating Residential Design Guide (AVO Guide)* (Version 1.0, January 2020), recommends an approach to acoustic assessments for new residential development that take due regard of the interdependence of provisions for acoustics, ventilation, and overheating. Application of the AVO Guide is intended to demonstrate good acoustic design as described in the ProPG: Planning & Noise, May 2017 ('ProPG'), when considering internal noise level guidelines. Whilst provisions for both ventilation and mitigation of overheating may include façade openings that permit external noise ingress, and/or mechanical equipment that generates noise. In both cases, there is potential for noise impact.

It is noted in the guide that *There are other benefits for occupants from opening windows, such as the connection with the outside, sense of fresh air, experience of draughts when overheating, and sense of control over one's environment. Consideration of these factors is also beyond the scope of the AVO Guide.*

In the case of environmental noise ingress during the temporary overheating condition, a two-level assessment procedure is described in the AVO Guide (similar to the ProPG approach). The first level is a "site risk assessment" based on external noise levels and the assumption that opening windows are the primary means of mitigating overheating. The second level assessment considers the potential for adverse effect on occupants based on internal ambient noise levels.

The Level 1 site risk assessment is performed by comparing the relevant external ambient noise levels for the site/representative location of the key dwellings (as measured or otherwise determined) with Table 3-2 of the AVO Guide, as reproduced in Table 2.3 below.

Table 2.3: Guidance for Level 1 site risk assessment of noise from transport noise sources [NOTE 1] relating to overheating condition (as per AVO Guide Table 3-2)

Risk category for Level 1 assessment [NOTE 5]		Potential Effect without Mitigation	Recommendation for Level 2 assessment
	$L_{Aeq,T}$ [NOTE 3] during 07-23	Increasing risk of adverse effect	Recommended
	65 dB		Optional
	60 dB		
	55 dB	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required
	50 dB		

Note 1 The noise levels suggested assume a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.

Note 2 The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships.

Note 3 A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur.

Note 4 Where 78 dB L_{AFmax} is normally exceeded during the night-time period (23:00-07:00), a Level 2 assessment is recommended.

Note 5 The risk of an adverse effect occurring will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.

Note 6 To evaluate the risk category for a dwelling, all three aspects of external noise exposure (i.e. daytime, night-time and individual noise events) should be evaluated. The highest risk category for any of the three aspects applies.

It is noted that the categories (negligible, low, medium and high) do not necessarily correspond with a given threshold. These can be established, however, with help from the explanatory notes given in the AVO Guide (Section 3). A core factor is the assumption that the level difference between outside and inside conditions with a window open for ventilative cooling is 13 dB, and that a Level 2 assessment is not required if "reasonable" internal conditions are achieved, which are taken to be the BS 8233 criteria relaxed by 5 dB. For the most noise-sensitive spaces of living rooms and bedrooms, therefore, the thresholds are 53 dB (i.e. 35+5+13) and 48 dB (i.e. 30+5+13) for the daytime and night-time periods, respectively.

Applying a banding of 5 dB results in the following external ambient noise thresholds, which correspond well with the table above.

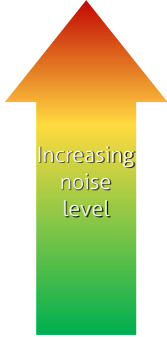
Table 2.4: Interpretation of the Level 1 site risk assessment noise thresholds relating to overheating condition

Risk category for Level 1 assessment	$L_{Aeq,T}$ (07-23)	$L_{Aeq,8h}$ (23-07)	Level 2 assessment?	L_{AFmax} (23-07)
High	> 63 dB	> 58 dB	Recommended	> 78 dB ("normally exceeded")
Medium	59 – 63 dB	54 – 58 dB	Optional/Recommended	n/a
Low	54 – 58 dB	49 – 53 dB	Optional	n/a
Negligible	≤ 53 dB	≤ 48 dB	Not required	n/a

The Level 2 assessment is performed by comparing the ambient noise levels within key habitable rooms with Table 3-3 of the AVO Guide, as reproduced below. It is noted that the "Examples of Outcomes" make references to "a change" or "changes" in condition(s) and/or

behaviour(s); however, since the guidance is aimed at new residential development (and thus new occupants), with the assumption that the environmental noise conditions will remain as assessed, it is more a case of the potential “difference” in behaviour compared to what might have been the case under lower noise conditions.

Table 2.5: Guidance for Level 2 assessment of noise from transport noise sources [Note 1] relating to overheating condition (as per AVO Guide Table 3-3)

Internal ambient noise level [NOTE 2]			Examples of Outcomes [NOTE 5]	
L _{Aeq,T} [NOTE 3] during 07-23 [NOTE 6]	L _{Aeq,8h} during 23-07	Individual noise events during 07-23 [NOTE 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB L _{AFmax}	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. 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.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behavioural changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. [NOTE 8]
			Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response [NOTE 9]. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.
≤ 35 dB	≤ 30 dB	Do not normally exceed L _{AFmax} 45 dB more than 10 times a night		

Note 1 The noise levels suggested in Tables 3-2 and 3-3 [of the AVO Guide] assume a steady road traffic noise source but may be adapted for other types of transport.

Note 2 The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships such as those described in a DEFRA 2014 study. With the exception of individual noise events, the references are based on evidence drawn from external noise levels. There is currently very little robust evidence linking internal averaged noise levels with health outcomes and occupant behaviour. Internal ambient noise levels would normally be considered for living rooms and bedrooms during the daytime. At night, the levels would normally only be applicable to bedrooms.

Note 3 A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur.

Note 4 Refer to references [1, 17, 18, 22] [in the AVO Guide] for further guidance regarding individual noise events. The L_{AFmax} indicator associated with the upper category is intended for road traffic; it may be more appropriate to use the “one additional noise-induced awakening” method for noise from rail traffic or aircraft.

Note 5 The potential for adverse effect will also depend on how frequently and for what duration the overheating condition occurs.

Note 6 The daytime levels presented in this table may not be appropriate for residential care homes or other situations where conditions for daytime resting are known to be of particular importance.

Note 7 When evaluating the potential for adverse effect, all three aspects of noise exposure (i.e. daytime, night-time and individual noise events) should be evaluated.

Note 8 BS 8233 states that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

Note 9 It is known that physiological responses do occur at lower levels of L_{AFmax} than 45 dB.

2.4 Building Regulations Approved Document O

In June 2022 the Building Regulations Approved Document O: *Overheating* came into force, setting standards to control overheating in new residential buildings. The document also

includes specific criteria with regard to noise levels in bedrooms during the overheating condition, as defined in the regulations.

Section 3 of ADO includes a sub-section on Noise, which states the following:

3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

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

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

NOTE: *Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020).*

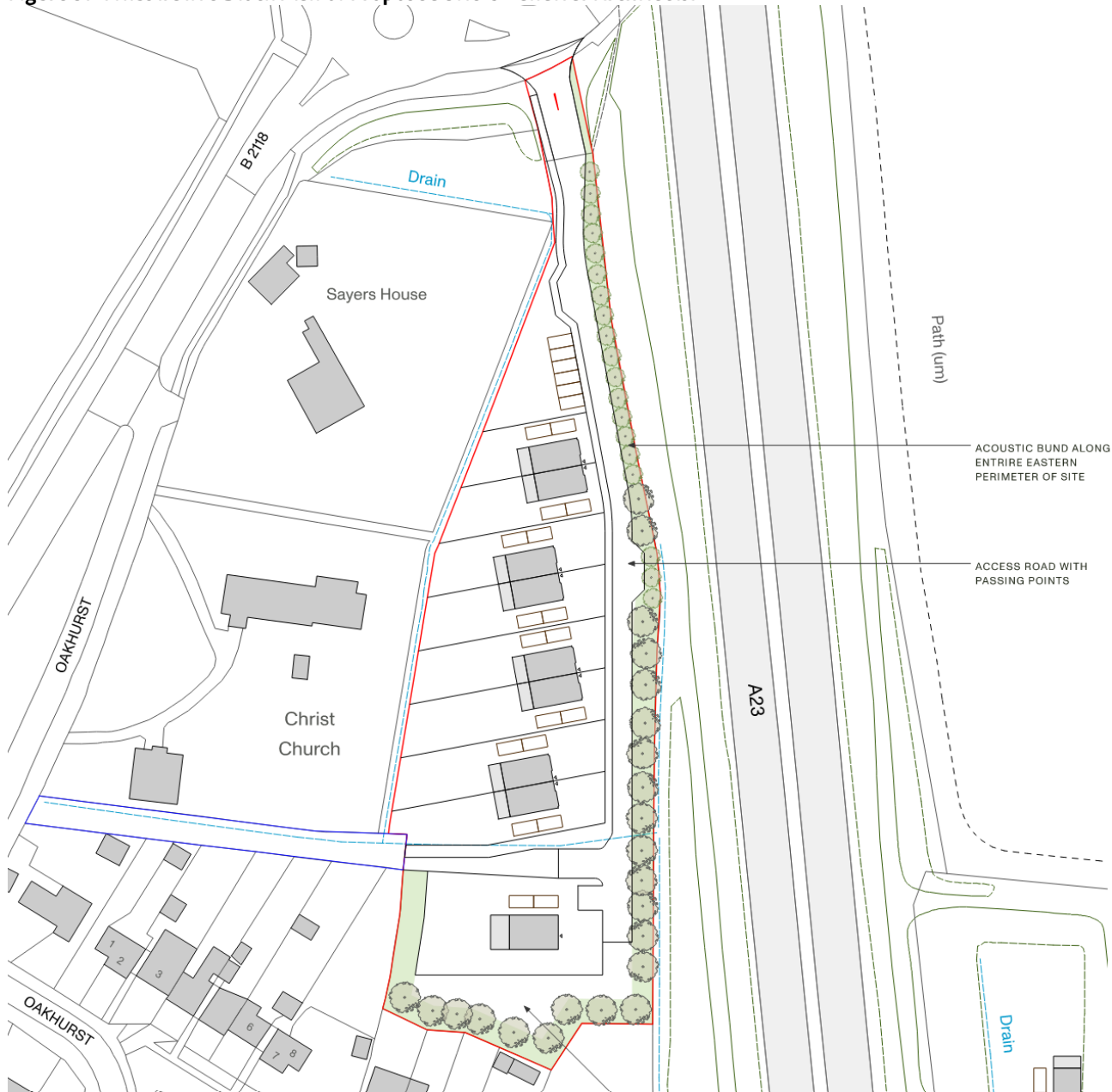
The above statements do not specifically mention living rooms or any other habitable room (only bedrooms) and are limited to the night-time period. The above criteria are likely to have been derived from BS8233 internal noise guidance levels + a 10 dB allowance during the overheating condition.

We have used the 2-stage site risk assessment process provided in the AVO guide to undertake the site suitability review from a noise perspective (as explained in Section 7).

3 PROPOSED DEVELOPMENT

The proposed development consists of 9 residential units (8 no. semi-detached, 1 no. detached), with access and private gardens. The proximity of the plots to the A23 ranges from 25 metres to 50 metres from the nearside lane as shown in Figure 3.1. At this stage, only an initial site plan has been produced, elevations and internal layouts are yet to be produced.

Figure 3.1: Illustrative Block Plan of Proposed Site © Landivar Architects.



4 BASELINE NOISE CONDITIONS

4.1 Introduction

A detailed environmental noise survey was undertaken on site between 4th and 10th February 2026. Long term unattended monitoring took place at the position indicated by the red dot (UMP) in Figure 4.1. A short-term survey was also carried out at the position AMP indicated by the blue dot.

Figure 4.1: Baseline noise monitoring locations



During our time on site, the noise climate was observed to be dominated by road traffic from the A23 to the east of the site.

4.2 Instrumentation

All noise measurements were undertaken by consultants certified as competent in noise monitoring. All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672. A full inventory of this equipment is shown in Table 4.1 below. All equipment's calibration certificates are available on request.

Table 4.1 Inventory of Measurement Equipment

Equipment ID	Item	Make and Model	Serial Number	Calibration	
				Certificate number	Expiry Date
1 (UMP)	Sound Level Meter	01 dB DUO	10664	TR-REP-10749	28/02/2026
2 (AMP)	Sound Level Meter	Rion NL-52	00743139	TCRT25/1371	09/05/2027
3	Sound Calibrator	Rion NC-74	35134397	TCRT25/1587	29/07/2026

The noise measurement equipment used during the survey was calibrated at the start and end of each measurement. The calibrator used had itself been calibrated by a UKAS accredited calibration laboratory within the twelve months preceding the measurements. No significant drift in calibration was found to have occurred.

4.3 Survey results

A summary of the daytime ambient $L_{Aeq,16hr}$ and night-time ambient $L_{Aeq,8hr}$ noise levels measured during the unattended survey is presented below in Tables 4.1 along with the typical background $L_{A90,T}$ noise levels and the typical $L_{Amax,F}$ level not exceeded more than 10 times per night.

Table 4.1: Noise survey results at UMP (free-field levels), dB – Overlooking A23

Monitoring Period	Daytime		Night-time		
	$L_{Aeq,16hr}$	Typical $L_{A90,T}$	$L_{Aeq,8hr}$	Typical $L_{A90,T}$	$L_{Amax,F}^{[1]}$
04/02/2026	66 ^[2]	65	63	44	74
05/02/2026	68	65	63	47	74
06/02/2026	68	66	61	48	73
07/02/2026	68	65	61	49	73
08/02/2026	67	64	63	44	74
09/02/2026	67	63	63	39	74
10/02/2026	69	66	-	-	-
Summary	68 ^[3]	64 ^[4]	62	44	74

Note ^[1]: The $L_{Amax,F}$ levels presented are representative of the value not exceeded more than 10 times each night.

^[2]: Data obtained during the daytime was not a full 16-hour measurement (start time = 16:25 hours).

^[3]: Logarithmic average (same for night-time).

^[4]: Modal value of all individual levels (same for night-time).

At average noise level of 70dB $L_{Aeq,T}$ was measured over a period of 30 minutes at the attended noise monitoring location, 3m from the kerb of Mill Lane.

5 PRO-PG STAGE 1: INITIAL SITE NOISE RISK ASSESSMENT

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

In order to predict the impact of road noise sources on the proposed development, the baseline noise measurement results presented in Section 4 were used to produce a detailed 3D noise model of the existing site, which was adjusted / calibrated to match the measured levels summarised above. Once the model was calibrated, the proposed development has been built into the model and future noise levels predicted across the site, with evenly distributed points around the buildings being predicted, approximately representing the mid-point of the windows on each floor.

The predictions were carried out using the noise-modelling suite Cadna/A 2026, in accordance with the CRTN and ISO 9613 prediction methodologies, which allow consideration of the effects of the acoustic screening provided by both existing buildings surrounding the site and buildings of the development itself.

The results of the noise modelling were used to determine the likely noise levels incident on each building across the completed site. These predictions have formed the basis of the mitigation recommendations.

In addition to the road source noise levels used in the predictions, the model considers the effects of the topographical conditions throughout the area, ground absorption, atmospheric absorption, acoustic reflections and acoustic screening, as well as applying a light downwind propagation correction to represent a worst-case.

Figures 5.1 and 5.2 below show the predicted noise contours across the site based on the noise risk categories in Table 2.1. Noise contours have been calculated at a height of 4.5m above ground level, representing a first-floor window.

Figure 5.1: ProPG Level 1 site noise risk assessment (daytime $L_{Aeq,16\text{hour}}$ noise contours predicted at 4.5 metres agl)

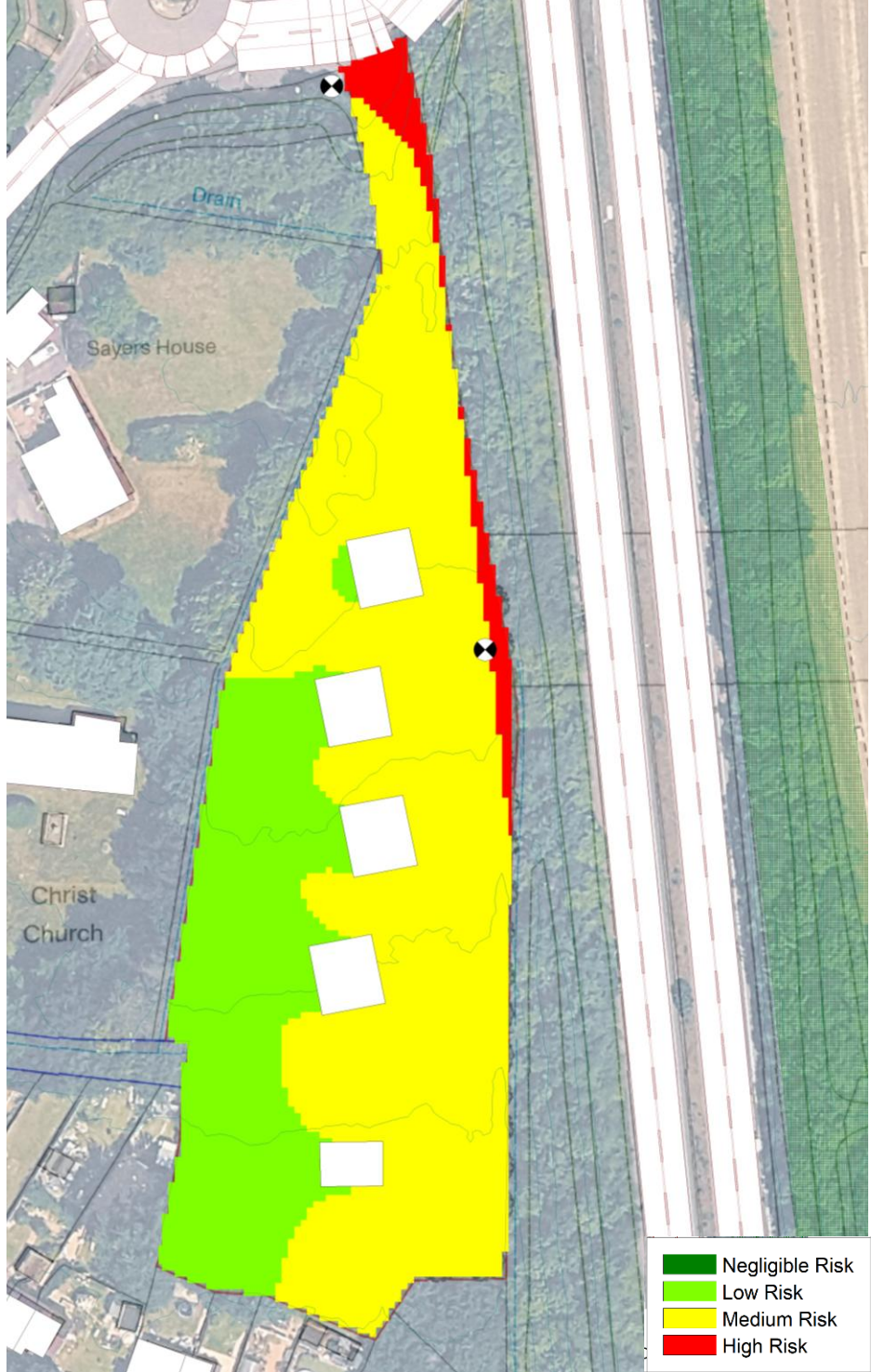


Figure 5.2: ProPG Level 1 site noise risk assessment (night-time $L_{Aeq,8hour}$ noise contours predicted at 4.5 metres agl)



If we compare the above predicted noise levels to the ProPG guidance presented in Table 2.1, we can see that the eastern facades of all plots fall in the medium noise risk category for the daytime period (0700-2300h), with the closest facades of the buildings just falling into the high risk category during the night period. During both the day and night periods, all north/south façades fall within the medium risk category while all western facades are low risk.

The site plan indicated the inclusion of an acoustic bund to the along the eastern boundary of the site. Since full details have not been worked up, the risks presented in 5.1 and 5.2 may be considered a worst case scenario. Discussions with the project architect have suggested the bund is likely to be 2m high with a 1.8m high solid fence running atop the length of the bund.

The model has been rerun with these mitigation measures in place with the results shown in Figures 5.3 and 5.4.

During the daytime, the whole site may be considered medium or low risk. The eastern facades of the plots are all medium risk while the north, west and south facades are all low risk.

During the night period, most of the site is medium risk. There is small area considered high risk but this follows the proposed access road while the screening of the buildings result in small low risk areas to the rear of the buildings.

Figure 5.3: ProPG Level 1 site noise risk assessment (daytime $L_{Aeq,16\text{hour}}$ noise contours predicted at 4.5 metres agl) with 2m earth bund and 1.8m fence



Figure 5.4: ProPG Level 1 site noise risk assessment (night-time $L_{Aeq,8hour}$ noise contours predicted at 4.5 metres agl) with 2m earth bund and 1.8m fence



With most of the site falling in the medium risk category, it should be noted that Table 2.1 states the "...application may be refused unless a good acoustic design process is followed and is demonstrated... how the adverse impacts of noise will be mitigated and minimised, and... a significant adverse noise impact will be avoided...".

Based on the above, a Stage 2 ProPG assessment would be required, when defined internal layouts and building elevations are fully developed.

An indicative assessment of Elements 2 and 3 of the ProPG guidance has been undertaken at this stage, such that glazing and ventilation strategies can be initially recommended for Fairview's reference.

6 PRO-PG STAGE 2: FULL ACOUSTIC DESIGN ASSESSMENT

6.1 Element 1: Good Acoustic Design Process

Following a good acoustic design process is implicit to achieving good overall design, as required by the Government's planning and noise policy documents NPSE and NPPF.

This process requires a high level, multi-faceted and integrated approach across all disciplines with a view to optimising acoustic conditions inside habitable rooms and in external amenity space.

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 (which may be iterative):

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

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

- i. Quietening or removing the source of noise.
- ii. Attenuating the sound on its path to the receiver.
- iii. Obstructing the sound path between source and receiver.
- iv. Improving the sound insulation of the building envelope.
- v. Using agreements to manage noise.

The main source of noise affecting the proposed development is road traffic noise from the nearby A23. These sources cannot be removed, or their noise levels directly reduced at source by the developer, therefore efforts should focus on providing attenuation via other alternatives from the elements stated above.

- Any opportunities to introduce screening to the site should be explored. As already mentioned, an earth bund topped with a solid fence will follow the eastern boundary. The height of these should be maximised as far as practicable.
- It is understood that continuous mechanical supply and extract with heat recovery systems (MVHR) will be installed throughout which will allow for the control external noise intrusion and provision of whole dwelling ventilation without the need to necessarily rely on opening windows to control either day-to-day ventilation or overheating (certainly if habitable rooms are proposed facing the A23).
- Although it may not be possible throughout, every effort should be made to locate habitable rooms (living rooms and bedrooms) away from eastern facade
- The distance between the main noise source (A23) and the dwellings should be maximised as much as possible. Non noise sensitive elements of the development (such as the access road) should be placed between the properties and the A23.

6.2 Element 2: Internal noise level guidelines

In order to achieve the internal noise guidelines as set out in Table 2.2, it is necessary to estimate internal noise levels with windows closed using glazing and ventilation products.

An assessment of the external building fabric elements has been undertaken based on the unattended spectral data of $L_{Aeq,T}$ and L_{AFmax} levels measured during daytime and night-time periods and assumptions on likely sizes and constructions of habitable rooms and external building fabric elements (wall, glazing, roof). Guidance is given in the following sections regarding suitable glazing, ventilation, and external wall configurations to achieve the required internal ambient noise levels within the proposed dwellings. Calculations have been undertaken following the general method set out in BS EN 12354-3:2017.

6.2.1 Assumptions

Given internal layouts are not developed at this stage, several assumptions have been considered in order to estimate likely glazing sound reduction requirements for habitable rooms. The following assumptions have been considered:

- Bedrooms are 12m² in size, 2.5m floor to ceiling height, single aspect (worst-case in terms of noise), glazing area 3m²;
- Living room size assumed 25m², double aspect, total glazing area 8m²;
- External wall based on a cavity masonry wall;
- Our analysis has assumed typical reverberation times in furnished bedrooms and living rooms of 0.5 seconds.

6.2.2 Ventilation

As discussed in Section 6.1, it is understood that MVHR will be installed throughout.

We have assumed that noise break-in through any ventilation opening is negligible (as any ventilation ducts will be located above the ceiling, not through the window or external wall within room height as it would be with an MEV system).

Please note that the dimensions of bedrooms and living rooms, as well as sizes of glazing and external wall, are indicative only at this stage; detailed calculations will be required at a later stage when dwelling layouts are completed.

Windows will still be openable for purge or rapid ventilation, as required by Approved Document F. Internal noise level guidelines are generally not applicable under these exceptional events, which should on occur occasionally (i.e. to remove odour from painting, cooking, etc.).

6.2.3 Glazing

Based upon the above assumptions, indicative calculations have been undertaken in accordance with BS 12354-3 to determine the minimum acoustic performances required for the glazed elements of the façade, in order to provide appropriate internal noise levels in habitable rooms, during both daytime and night-time periods. The resulting minimum performance requirements are presented in Table 6.2, with example specifications provided (only indicative at this stage).

Table 6.2: Indicative sound reduction performance R (dB) for the glazed elements of the façade

Scenario	Glazing Example	125	250	500	1k	2k	4k	$R_w / R_w + C_{tr}$
Without Screening	6/12/8mm	28	23	32	38	42	44	35 / 31
With Screening	4/12/6mm	23	22	27	38	40	41	35 / 29

The above recommendations could be subject to change once the final sizes of bedrooms, living rooms and glazing areas of each façade are defined.

In any case, windows will still be openable for purge or rapid ventilation, as requested by Building Regulations Approved Document F. Internal noise level guidelines are generally not

applicable under these exceptional events, which should only occur occasionally (i.e., to remove odour from painting, cooking, etc.).

6.2.4 Roof

The calculations have assumed the roof constructions shown in Table 6.3. Note that a sound absorbing layer is required in both options, while a double layer of plasterboard is required should no screening be provided. Please note that alternative constructions to the above, capable of achieving the below sound reduction performance, may also be suitable.

Table 6.3: Sound reduction index (dB) of the proposed roof construction

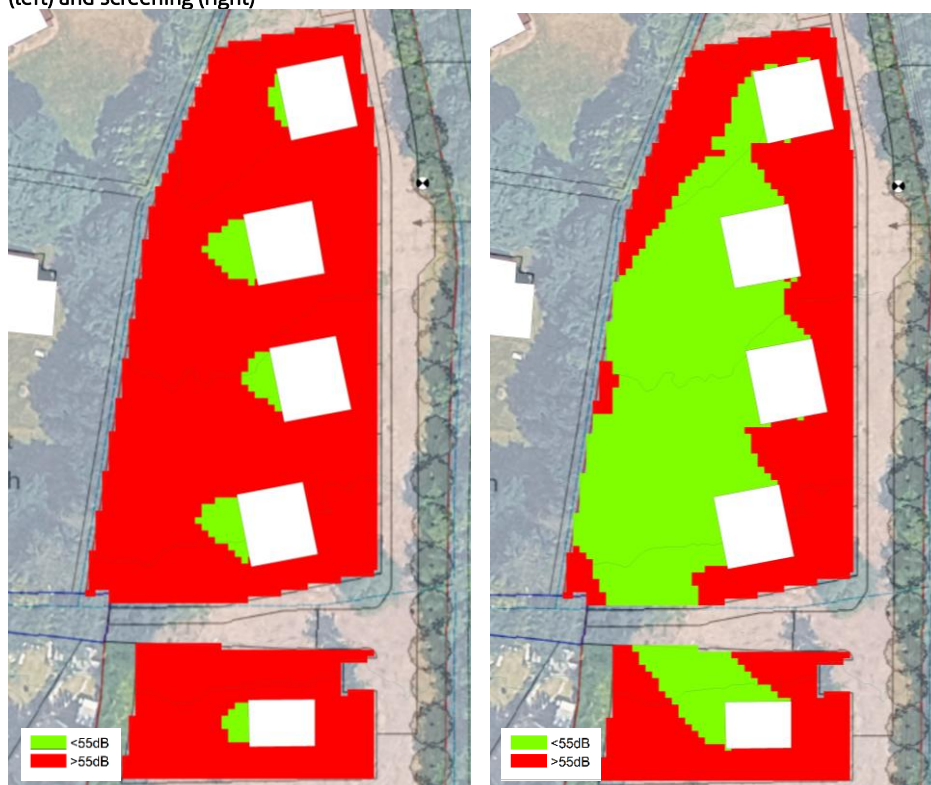
Scenario	Construction	125	250	500	1k	2k	4k	$R_w / R_w + C_{tr}$
Without Screening	Tiled/slatted roof, 25mm plasterboard ceiling, sound absorbing layer (e.g. 100m mineral wool)	24	34	40	45	49	49	47/43
With Screening	Tiled/slatted roof, 12mm plasterboard ceiling, sound absorbing layer (e.g. 100m mineral wool)	27	37	43	48	52	52	44/40

6.3 Element 3: external amenity area noise assessment

The detailed masterplan shows that all dwellings in the development will contain private gardens, which are considered amenity areas. Given that the proposed development is neighboured by a large infrastructure (A23), BS8233's upper external noise limit of 55 dB $L_{Aeq,T}$ has been considered appropriate for our assessment, in accordance with ProPG.

Figure 6.1 shows a noise contour across the development calculated at a height of 1.5 m. It can be most of the gardens, with the exception of small areas directly behind the buildings, will experience external noise levels above the upper guideline limit of 55 dB $L_{Aeq,16hr}$ recommended in ProPG, with no mitigation in place.

Figure 6.1: External amenity area noise contour (predicted $L_{Aeq,16hr}$ at 1.5 metres above ground level) – no mitigation (left) and screening (right)



BS8233:2014 states that *"These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited."*

The image to the right of Figure 6.1 demonstrates that, with the inclusion of a 2m earth bund topped with a 1.8m solid fence, the noise levels are reduced such that a much greater proportion of the rear gardens meet the upper guideline limit of 55 dB $L_{Aeq,16hr}$. The fencing should have no gaps and have a minimum surface mass of 10 kg/m². The model does not take into account any additional screening by individual garden fences which would only serve to further reduce noise levels in the gardens.

With such mitigation measures, it may be considered that the lowest practicable noise levels are achieved across the site.

7 OVERHEATING CONSIDERATIONS

A qualitative assessment has been undertaken in this section to determine whether openable windows can be used to provide thermal comfort to the proposed dwellings.

When looking at the AVO Guide Level 1 site risk assessment thresholds, as shown in Table 2.4, we can see that the northern area of the site is generally in the high-risk category, with part of the central, southern, and eastern elevations falling in the medium risk.

The measurements undertaken on site indicate that the proposed dwellings are likely to be mostly affected by road traffic from nearby sources.

Glazing and ventilation systems are considered to be the 'acoustically weak' elements of a residential façade (i.e. most prone to external noise intrusion), however, both elements are central to the provision of thermal comfort. This section details the impact of using partially open windows as a form of controlling overheating, and the impact this may have on to the internal noise levels within dwellings.

It is best practice, from an energy efficiency standpoint, to allow the simple opening of windows for occupant control of overheating. This, however, may lead to increased risk of excessive noise intrusion where the proposed building(s) are exposed to external noise sources, forcing the occupant to choose between excessive heat or excessive noise break-in. The guidance levels in Table 2.5 of this report have been used to estimate the impact of internal noise levels on occupants relating to the overheating condition.

The AVO Guide suggests that during the overheating condition, the criteria for internal ambient noise levels may be relaxed by between 5 and 10 dB compared to the levels recommended by BS 8233, depending on the expected duration and frequency of which the overheating condition occurs. Approved Document O allows for a 10 dB increase in internal ambient noise levels within bedrooms at night.

It is possible to determine the façades where opening windows can be used to prevent overheating based on the assumption that partially open windows at the façade typically provide a sound level difference from external free field to internal noise level of 13 dB.

The minimum nighttime external noise level across all dwellings will be 55dB $L_{Aeq,8hr}$. **Such a level would not allow the occupants to rely on open windows to control overheating.**

There are several systems that can be used to provide ventilative cooling, some examples are provided below:

- An MVHR system with an integrated tempered air supply (e.g. Zehnder ComfoCool Q);
- and MVHR system with an external cooling module (e.g. Nuaire MRXBOXAB-ECO5-AESC with CM-XBOX-INLINE cooling module);
- an MVHR system assisted with ceiling mounted purge vent fan(s) in habitable rooms (e.g. Titon HRV 1.6Q Plus with individual Titon Purge Vent Fans, or Vectaire Maxi Plus with individual Vectaire Microbox 200/2DC purge ventilation fans).

It should be noted that all the above systems have been provided for information purposes only and are based on very limited information on likely overheating risks (which would require a TM59 assessment undertaken by the relevant specialist) and any other passive design measures that could be incorporated into the buildings' specification. The design of any of the above ventilation and cooling strategies requires significant input from M&E and thermal/energy consultants, therefore remains their responsibility to design systems that can achieve the relevant cooling requirements of ADO and suitable ventilation rates for residential use as required by ADF.

The extent of the above measures will be subject to the results of the overheating assessment and will depend on the expected duration and frequency of the overheating condition in the proposed dwellings.

8 SUMMARY

This memo presents the results of noise impact assessment for the residential development proposed at Land off Mill Lane, Sayers Common. The main outcome of the assessment is as follows:

As the site stands, the noise conditions on site indicate that it would be mostly categorised as a 'Medium to High Risk' site according to ProPG Stage 1 - Initial Site Risk assessment guidelines. It is likely that mitigation in the form of a 2m high earth bund and 1.8m high solid fence will follow the eastern boundary of the site providing some screening from noise from the A23. This would reduce most of the site to medium risk.

Following this, an indicative Stage 2 assessment has been undertaken, the key points being:

- The external building fabric proposals should be sufficient to control external noise ingress to habitable spaces, providing glazing units to achieve a minimum sound insulation performance of up to $31 R_w + C_{tr}$ in bedrooms and living rooms
- It is understood that MVHR will be installed throughout.
- Where possible, habitable rooms should be located such that they do not overlook the A23.
- None of the dwellings may rely on open windows to provide cooling during the overheating condition and a form of ventilative cooling should be installed alongside the MVHR unit.
- Noise levels in external amenity areas will be reduced as far as practicable with the inclusion of the screening to the east of the site.

Based on the ProPG approach followed in this assessment, our recommendation to the decision maker with regard to noise is that "Planning consent may be granted subject to the inclusion of suitable noise conditions". These would be expected with regards to the achievement of appropriate internal noise levels within habitable spaces intended for residential use, as well as noise levels in external amenity areas.