



PLANNING NOISE IMPACT ASSESSMENT

“GILRIDGE”, BRIGHTON ROAD, HANDCROSS, RH17 6BZ

BARRY DAVIS & SOPHIE MOON

JULY 2024

PLANNING NOISE ASSESSMENT
"GILRIDGE", BRIGHTON ROAD, HANDCROSS, RH17
6BZ

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REVISION HISTORY

Version	Comments	Date	Changes made by	Approved by
1.0	First draft version	07/02/2024	WR	CB
2.0	Minor updates	07/05/2024	WR	CB
3.0	Updates following comments from Environmental Protection	07/05/2024	WR	CB
4.0	Updates following minor changes to scheme	05/07/2024	CB	PS
5.0	Updates following minor changes to scheme	08/07/2024	CB	PS

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1 INTRODUCTION

Anderson Acoustics Ltd have been commissioned by Barry Davis and Sophie Moon to undertake a noise assessment in support of a planning application for the redevelopment of "Gilridge", Brighton Road, Handcross, RH17 6BZ to provide 4 new dwellings across 2 adjacent plots.

This report summarises the results of the environmental noise survey undertaken on site. Based on measured noise levels, 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, and input from other disciplines (e.g., M&E, energy/thermal consultants) may be required to provide detailed construction specifications during the detailed design stages.

Please note; this report has been updated following comments from the LPA Environmental Protection Team, as such this supersedes our previous reports. The comments are summarised in Section 2.

In addition, this report revision captures the updates that were made to the scheme which are considered to further improve its acoustic design. This involves the introduction of a single storey dwelling (Plot 3) at the same location of where the previous semi-detached two-storey houses (Plots 3 and 4) were. The changes would mean that all habitable rooms will benefit from 'full' acoustic screening from the A23, which will be provided by the new acoustic barrier to be located on this site boundary.

Guidance relevant to the assessment has been presented and briefly discussed in Section 3.

A brief description of the site is given in Section 4.

The methodology and results of an environmental noise survey undertaken at the site are given in Section 5.

Section 6 details the ProPG Stage 1 assessment and subsequent discussions, with acoustic design considerations outlined.

Section 7 details the ProPG Stage 2 assessment and related elements.

Section 7.3 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 9.

This report should be cross-referenced with the following architects' drawings provided by Lightbox Architecture:

- 23/114/site
- 23/114/SK08/E
- 23/114/SK09/E
- 23/114/SK10/F
- 23/114/SK11/D
- 23/114/SK12/B
- 23/114/SK13/B

This report is technical in nature, please visit the [Anderson Acoustics website](https://www.anderson-acoustics.co.uk/) for a full glossary of the technical terms used in this report.

2 SUMMARY OF COMMENTS PROVIDED BY ENVIRONMENTAL PROTECTION

Following the initial submission of the planning application, the Environmental Protection team provided comments on the acoustic planning noise impact assessment report on 23rd April 2024 (ref. DM.24.0445). To summarise, concerns were raised on the following aspects:

1. How much area of each private garden exceeds $L_{Aeq, 16\text{-hour}}$ 55 dB
2. Further evidence that Good Acoustics Design has been followed in the design, given the vicinity of the A23
3. Whether alternative natural means of cooling can be provided, e.g. plenum windows

The full version of the comments are attached in Appendix C for further information.

This version of the revised report addresses the comments herein, where a summary is also provided in Section 8 of this report.

It should be noted that changes

3 RELEVANT GUIDANCE AND CRITERIA

3.1 Planning Noise Advice Document: Sussex

Mid Sussex District Council (MSDC) noise guidance is defined in Planning Noise Advice Document: Sussex March 2021 [1]. With regard to new noise sensitive developments, the document states the following:

2.5.2 Where the external L_{AFmax} sound levels are likely to exceed 60 dB during the night period, overnight monitoring will be necessary. A specific $L_{AFmax, 1\text{ minute}}$ risk assessment shall be provided for the whole night period. This could also apply to extensions/alterations to existing development.

6.5.2 Design control measures should aim to meet the recommended standards set out in table 4 of BS 8233:2014 and regular night time noise events such as scheduled aircraft or passing trains which can cause sleep disturbance shall be minimized and assessed as (L_{AFmax}), as recommended in the WHO's Night Noise Guidelines for Europe (2009), unless there are particular reasons why this is not considered appropriate. In such cases, a clear explanation of the reasons should be provided.

6.5.3 As the standards for BS 8233:2014 and the W.H.O. relate only to anonymous noise, e.g. distant road traffic and noise without characteristics such as impulsivity, low frequency content or tones then, if these are present, additional discussion will be required with the LPA for the purpose of establishing suitable assessment techniques and standards to be achieved e.g. BS 4142:2014 + A1: 2019 for delivery noise.

6.5.4 While noise mitigation measures can be used to achieve suitable internal sound levels, preference is to be given to criteria based on windows being partially open.

6.5.5 Where the property is at risk of overheating an overheating assessment shall be conducted in accordance with Acoustics Ventilation and Overheating (AVO) Residential Design Guide (January 2020) and CIBSE's Design Methodology for the Assessment of Overheating Risk in Homes (TM59: 2017).

6.5.7 Specific points for consideration include:

- *Provide appropriate distances between noise sensitive developments and noise sources;*
- *Land zoning to separate noisy uses from noise sensitive uses, for example, avoiding the siting of children's playing areas next to accommodation for the elderly;*
- *Careful orientation of building layout, such as at right angles to the noise source;*
- *Introduction of single aspect buildings;*

- Internal layout of dwellings, through the location of non-habitable rooms such as bathrooms, kitchens and circulation areas as buffers between the noise source and habitable rooms;
- Screening by non-noise sensitive structures or barrier blocks such as garages and walls;
- The introduction of acoustic screening such as bunding/embankments, fencing and walling;
- Protection of external residential amenity areas by positioning them towards the centre of the development sites.

6.5.8 The submission of details of layout and design should be supported by a scheme showing details of mitigation techniques. Computer modelling which shows the impact of the design measures should be produced.

With regard to plant noise emissions, the document states the following:

3.2.1. *“The rating level of the industrial or commercial sound source should, where practicable, achieve a level no greater than the representative background sound, when measured in accordance with BS 4142:2014 + A1:2019 [...] A rating level below background may be required if there are concerns for potential noise creep, for example in a High Street setting. It is considered that meeting this criterion would avoid adverse noise impacts, in the interests of ensuring a good standard of amenity and protecting human health.”*

Standards and guidance referenced within the above text are detailed below.

3.2 British Standard 8233

BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* [2] is the most relevant Standard in terms of noise and the scope of this report. All relevant guidance from the standard has been the basis of the Professional Practice Guidance on Planning & Noise (ProPG: Planning & Noise, 2017) [3], as presented below, and so there is no need to reproduce the guidance here. Compliance with the ProPG intrinsically ensures compliance with BS 8233.

3.3 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

Table 3.1 provides a summary of ProPG's noise risk categories and their associated external free-field noise levels, along with the assessment implications.

Table 3.1: 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."

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 [4] and current good practice. The resultant internal levels and associated guidance is presented within Figure 2 of ProPG, which is reproduced as Table 3.2 below.

Table 3.2: 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 for amenity areas (e.g., private gardens, terraces, etc.) 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 $L_{Aeq,16h}$.

3.4 Consideration of Overheating Risk

3.4.1 Building Regulations Approved Document O

In June 2022 the Building Regulations Approved Document O: Overheating [5] 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 AD-O 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.

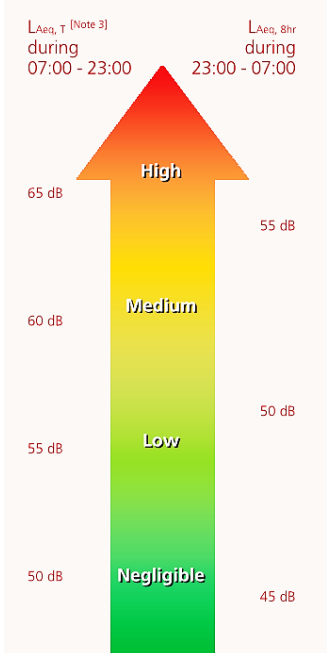
We have used the following 2-stage site risk assessment process provided in the AVO guide to undertake the site suitability review from a noise perspective.

3.4.2 Acoustics, Ventilation and Overheating Guide (AVO)– Residential Design Guide

Level 1 Site Risk Assessment

The *Acoustics, Ventilation and Overheating (AVO Guide) – Residential Design Guide* [6] has been used to assess the suitability of the development to use openable windows as a means of controlling overheating. Guidance includes target internal ambient noise levels, operational noise levels for mechanical services and detail on ventilation methods including their suitability for mitigating overheating within dwellings. A Level 1 site risk assessment of noise from transport noise sources relating to the overheating condition indicates a potential high risk on the western facades based on external noise levels measured during the unattended surveys.

Table 3.3: Level 1 Site Risk Assessment of External Noise Levels

Risk category for Level 1 assessment	Potential Effect without Mitigation	Recommendation for Level 2 Assessment
	 Increasing risk of adverse effect	Recommended
		Optional
	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not Required

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

3.4.3 Level 2 Assessment of Noise

Measurements undertaken at the site indicate that the proposed dwellings are likely to be affected by vehicle movements from the A23 to the west. 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 development is exposed to external noise sources, forcing the occupant to choose between excessive heat or excessive noise break-in. Table 3.4 has been included from the AVO guide to indicate the impact of internal noise levels on occupants relating to the overheating condition.

Table 3.4: Guidance for a Level 2 assessment of noise from transport sources relating to overheating condition

Internal Ambient Noise Level			Examples of Outcomes	
L _{Aeq,16hour} during 07:00 – 23:00	L _{Aeq,8hour} during 23:00 – 07:00	Individual noise events during 23:00 – 07:00		
> 50 dB	> 42 dB	Normally exceeds 65 dB L _{AF,max}	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 behaviour 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.
≤ 35 dB	≤ 30 dB	Do not normally exceed L _{Amax,F} 45 dB more than 10 times a night	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. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

The AVO Guide suggests that during the overheating condition, the criteria for internal ambient noise levels inside dwellings 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.

4 EXISTING SITE AND PROPOSED DEVELOPMENT

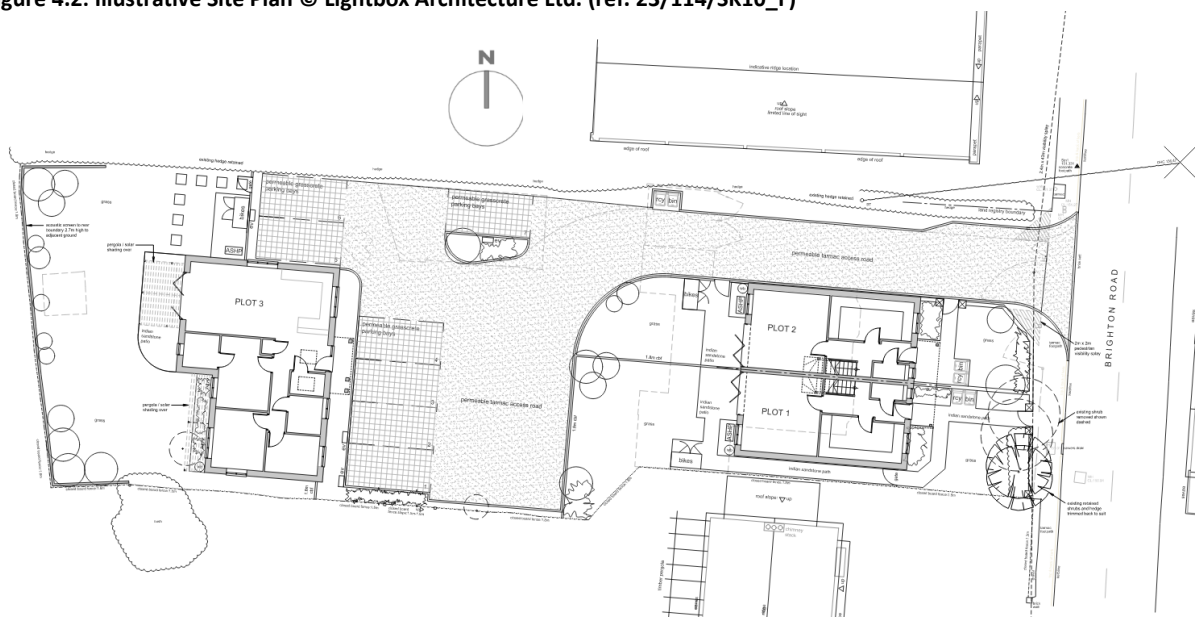
The site is located within the village of Handcross and is currently an occupied property. The site is bound by the A23 to the west and Brighton Road (B2110) to the east. Offices for a security system supplier (Municipal Security Ltd.) is located at the northern boundary of the site, while residential properties are situated to the south (see Figure 4.1).

Figure 4.1: Location Plan of Existing Site © Google Maps 2024



The proposals are for the development of the site to provide 3 residential units across 2 adjacent plots with a new access road, car parking, landscaping and amenity areas as shown in Figure 4.2. The residential units are located approximately 20 to 50 metres from the edge of the A23.

Figure 4.2: Illustrative Site Plan © Lightbox Architecture Ltd. (ref. 23/114/SK10_F)



5 BASELINE NOISE CONDITIONS

5.1 Introduction

A detailed environmental noise survey was undertaken on site between Tuesday 9th and Friday 12th January 2024, comprising long-term monitoring at two positions, as well as supplementary attended measurements on Tuesday 9th January 2024 (see noise monitoring positions in Figure 5.1 below). Full details of the survey can be found in Appendix A.

Figure 5.1: Baseline noise monitoring locations with proposed site boundary (red) (unattended = yellow dots, attended = blue dots)



During our time setting up the unattended monitors on site, the noise climate was observed to be generally dominated by road traffic noise from the A23 at the west of the site. At the east of the site, overlooking the less busy Brighton Road, the A23 was still audible but was masked when a vehicle passed by the front of the existing property. Outdoor condenser units belonging to Municipal Security offices were active and audible at the north-eastern boundary of the site but were also somewhat masked by road traffic noise on Brighton Road.

Correspondence with employees of Municipal Security stated that the outdoor condenser units are used to heat and cool the office space of the business and are only in operation during daytime office hours (0830 – 1800). In terms of other potential noise generating activities, it was mentioned that deliveries take place in the forecourt every other weekday, and forklift movements occurring for less than 30 minutes at a time, once a day. The survey data for UA2 shows a consistent ambient noise level across daytime hours, suggesting that there is no change in the overall daytime levels on days when deliveries and forklift movements occur. It is therefore considered that the noise impact from Municipal Security commercial activities is minimal.

A description of each monitoring position is provided below, with pictures provided in Appendix A:

- UA1 (Rear of property, overlooking A23): Noise environment dominated by A23. Noise monitor installed in a location representative of the western elevation of the proposed site, at a height of 3.1m above ground to simulate noise levels experienced at first floor level, measuring under free-field conditions.

- UA2 (Front of property, overlooking Brighton Road – B2110): Main constant noise source at this location was noted to be road traffic from A23 but was noted to be masked by less frequent vehicle movements on Brighton Road. Noise monitor installed in an approximate location representative to the eastern elevation of the proposed site, at a height of 3.3m above ground to simulate noise levels experienced at first floor level, measuring under free-field conditions.
- A1 and A2 (Rear and front of property, respectively): Noise monitor installed at a location representative of the western and eastern elevations of the proposed site at a height of 1.8m above ground to simulate noise levels experienced at ground floor level, measuring under free-field conditions.
- A3 (Northern boundary of site, towards Municipal Security): Noise monitor installed at site boundary towards outdoor condenser unit belonging to Municipal Security at a height of 1.5m, measuring under free-field conditions.

5.2 Survey Results

A summary of the daytime ambient $L_{Aeq,16hr}$ and night-time ambient $L_{Aeq,8hr}$ noise levels is presented below in Tables 4.1 and 4.2 for both measurement positions, 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. The time histories for each measurement position are presented in graphical form in Figures A.4 to A.5 in Appendix A.

Table 5.1: Noise survey results at UA1 (free-field levels), dB – Overlooking A23 (west of site)

Monitoring Period	Daytime		Night-time		
	$L_{Aeq,16hr}$	Typical $L_{A90,T}$	$L_{Aeq,8hr}$	Typical $L_{A90,T}$	$L_{Amax,F}^{[1]}$
Tue 09/01/2024	70 ^[2]	67	66	43	76
Wed 10/01/2024	71	68	66	43	76
Thu 11/01/2024	71	68	66	50	76
Summary	71 ^[3]	68 ^[4]	66 ^[3]	45 ^[4]	76

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 = 12:17 hours).

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

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

The measured overall L_{Aeq} noise levels at UA1 were found to be consistently high during both day and night-time periods, as well as the L_{max} levels measured at night, mostly due to the constant high road traffic activity on the A23. The design of the building envelope will require consideration at design stage to control external noise break-in inside dwellings along this boundary.

Table 5.2: Noise survey results at UA2 (free-field levels), dB – Overlooking Brighton Road (east of site)

Monitoring Period	Daytime		Night-time		
	$L_{Aeq,16hr}$	Typical $L_{A90,T}$	$L_{Aeq,8hr}$	Typical $L_{A90,T}$	$L_{Amax,F}^{[1]}$
Tue 09/01/2024	60 ^[2]	58	53	39	70
Wed 10/01/2024	60	56	54	41	70
Thu 11/01/2024	60	58	53	44	69
Summary	60 ^[3]	57 ^[4]	53 ^[3]	41 ^[4]	70

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 = 13:10 hours).

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

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

The measured overall L_{Aeq} noise levels at UA2 were found to be lower than what was experienced at UA1 during both day and night-time periods, as well as the L_{max} levels measured at night, mostly due to the less number vehicle movements on Brighton Road in comparison to the A23.

Results of the attended measurements are summarised below. 15-minute measurements were conducted simultaneously at the unattended measurements at a free-field location representative of the ground floor windows of the proposed development.

Table 5.3: Attended noise survey results on 9th January 2024 (free-field)

Measurement Location	Measurement Time	Duration	L _{Aeq,T}	L _{A90,T}	L _{Amax,F}
A1	12:30	15 mins	64	60	70
A2	13:15	15 mins	56	51	75
A3	13:30	15 mins	56	54	70

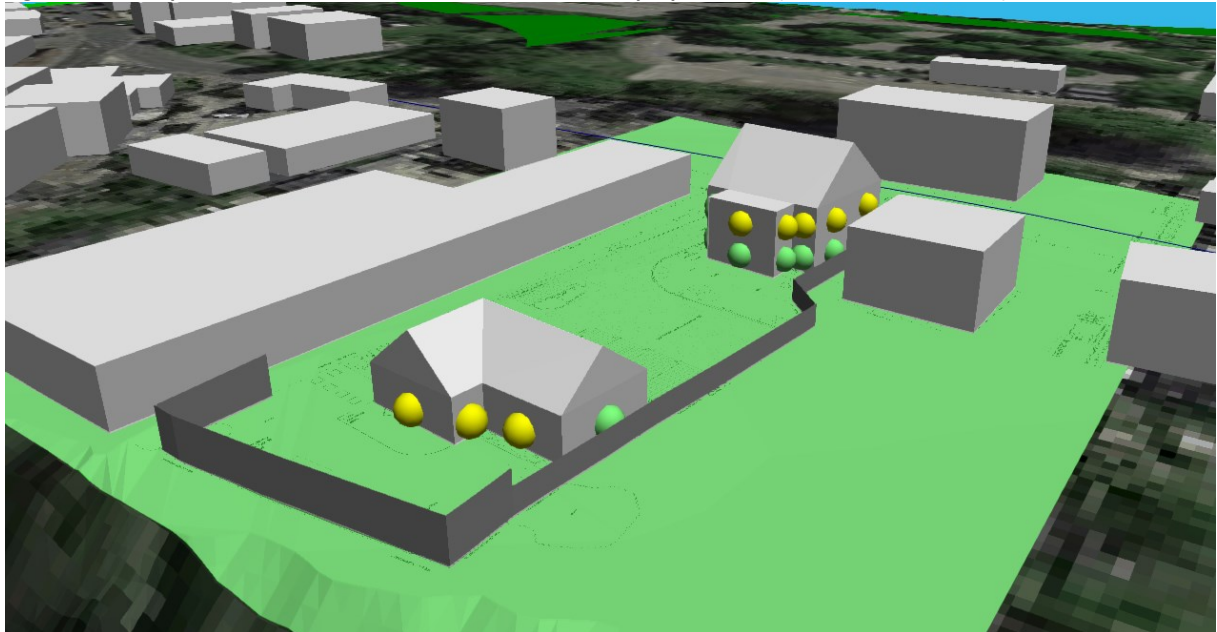
The attended measurement at position A1 shows a 7 dB reduction of the ambient noise level at ground floor level in comparison to first floor level. This is due to the shielding affect provided by the boundary fence at the end of the garden of the existing premises. The measurement at position A2 shows a 4 dB reduction, again, likely due to the shielding provided by the neighbouring buildings and boundary fence at the front of the existing property.

The survey results of the outdoor condenser unit at Municipal Security was measured at the same level as the ground floor measurements at position A2. It is therefore considered that the basing any façade recommendations on the measurements at UA2 and A2 will also mitigate against the effects of any noise produced by the neighbouring plant.

5.3 Noise Model

To predict the impact of road noise across the development site, the baseline noise measurement results presented in Section 5.2 were used to produce a detailed 3D environmental noise model, which was calibrated to match the measured levels summarised above.

Figure 5.2: Example 3D view of the environmental noise model proposed site (view from south west)



The predictions were carried out using the noise-modelling suite Cadna/A 2023, in accordance with the CRTN, CRN 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 proposals.

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 light downwind propagation correction to represent a worst-case.

The model was used to determine typical worst-case daytime (07:00 – 23:00) and night-time (23:00 to 07:00) L_{Aeq} and $L_{Amax,F}$ noise levels across the site.

6 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.

If we compare the above measured noise levels to the ProPG guidance presented in Table 3.1, we can see that the western plot towards the A23 falls in the high noise risk category for daytime and night-time periods and that the eastern plots towards Brighton Road fall in the low risk category for daytime and the medium risk category night-time periods.

Based on the above, a Stage 2 ProPG assessment would be required. 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 reference.

7 PRO-PG STAGE 2: FULL ACOUSTIC DESIGN ASSESSMENT

7.1 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 [7] and NPPF [8].

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 movements from the A23 and Brighton Road. These sources cannot be removed, or their noise levels directly reduced at source, therefore efforts should focus on providing attenuation via other alternatives from the elements stated above.

Dwellings within the high-risk category (those on the western boundary facing the A23) may require continuous mechanical supply and extract with heat recovery systems (MVHR) to control external noise intrusion and whole dwelling ventilation, without the need to necessarily rely on opening windows to control day-to-day ventilation. Opening windows may still be relied upon to control overheating in summer, subject to suitable design of window openings and frequency and duration windows may need to be open to control overheating.

Dwellings within the medium risk categories should be able to use a range of standard construction techniques to achieve suitable internal ambient noise levels and ventilation conditions within habitable spaces. Glazing could range between standard thermal double-glazed windows and enhanced, acoustic laminate glazing, depending on the location of acoustically sensitive rooms (e.g. bedrooms and living rooms) within dwellings. Different ventilation strategies could also be adopted (either passive background ventilation and intermittent extract fans or continuous mechanical extract MEV, both of which would use trickle ventilators for the provision of whole dwelling ventilation).

7.2 Element 2: Internal Noise Level Guidelines

In order to achieve the internal noise guidelines as set out in BS 8233 (see Table 3.2), 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 [9].

7.2.1 Room Reverberation

In order to calculate the internal ambient noise levels within habitable rooms, our analysis has assumed typical reverberation times in furnished bedrooms and living rooms, which have been based on a flat reverberation time of 0.5 seconds across the frequency spectrum between 125 Hz and 4kHz.

7.2.2 Ventilation

As discussed in Section 7.1, it is recommended that Plot 3 (falling under the high-risk category in ProPG's Stage 1 risk assessment are provided with MVHR ventilation systems. Plots 1 and 2 could be provided with either background ventilators and intermittent extract fans (as described in Approved Document F [10]) or continuous mechanical extract ventilation (both of which require trickle ventilators for the provision for whole dwelling ventilation to dwellings).

Our assessment has assumed MVHR units will be provided to Plot 3, and Plots 1 and 2 would be provided with either a MVHR or passive ventilation system. For the latter, we have allowed for 2 ventilators in living rooms and 1 ventilator in bedrooms, with a minimum required element normalised level difference shown in Table 7.1.

Table 7.1: Minimum element normalised level difference $D_{n,e}$ (dB) for trickle ventilators in all rooms in Plots 1 and 2

125	250	500	1k	2k	4k	$D_{n,e,w} / D_{n,e,w} + C_{tr}$
30	33	38	37	36	36	38 / 36

For unit ventilators, the measurements are based on BS EN ISO 10140-2:2021 *Acoustics. Laboratory measurement of sound insulation of building elements. Measurement of airborne sound insulation* and rated in accordance with BS EN ISO 717-1:2020 *Acoustics – Rating of sound insulation in buildings and of building elements*.

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 occur occasionally (i.e. to remove odour from painting, cooking, etc.).

7.2.3 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 7.2, with example specifications provided.

Table 7.2: Indicative sound reduction performance R (dB) for the glazed elements of the façade

Plots	Glazing Example	125	250	500	1k	2k	4k	$R_w / R_w + C_{tr}$
All elevations of Plots 1 and 2. North, south and east elevations of Plot 3	4/12/4mm	24	20	25	34	37	25	31 / 27
West elevation of Plot 3	6/12/8mm	30	30	39	44	48	51	34 / 30

The sound insulation requirements of the glazing examples provided above are applicable to the window system as a whole, including frames, mullions and panels.

Please note that the octave band sound reduction (R) performance shown above for the glazing is an indicative example, minor shortfalls in certain frequency bands could still achieve acceptable internal ambient noise levels in rooms, using alternative systems, where applicable.

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.).

7.2.4 Roof

The following roof construction has been used to undertake our calculations: 18mm cement particle board, 100mm cavity fully filled with denser mineral wool, sheathing board, 150mm cavity filled with denser mineral wool and a suspended plasterboard ceiling comprising 2 layers of 15mm dense plasterboard (combined mass $\geq 24 \text{ kg/m}^2$)

Table 7.3: Sound reduction index (dB) of the proposed roof construction

125	250	500	1k	2k	4k	$R_w / R_w + C_{tr}$
41	47	53	57	52	57	54 / 51

7.3 Consideration of Overheating Risk

A quantitative assessment has been undertaken in this section to determine whether openable windows can be used to control overheating in the proposed dwellings.

Partially open windows typically provide a sound level difference from external free field to internal noise level of 13 dB. Based on the measurements detailed in Section 4 of this report, the predicted internal noise levels are estimated to be as shown in Table 7.4 below.

Table 7.4: Predicted internal noise levels with windows partially open at the Plots 2 and 3

Plot	Room Description	Calculated Internal Ambient Noise Level with Partially Open Window
Plot 3 (west elevation of western plot)	Living Room (Ground Floor)	L _{Aeq, 16hours} 48 dB
	Bedroom (Ground Floor)	L _{Aeq, 16hours} 48 dB L _{Aeq, 8hours} 43 dB L _{Amax,F} 56 dB
Plot 2 (east elevation of eastern plot)	Living Room (Ground Floor)	L _{Aeq, 16hours} 46 dB
	Bedroom (First Floor)	L _{Aeq, 16hours} 46 dB L _{Aeq, 8hours} 38 dB L _{Amax,F} 56 dB

The above results show that, at the closest plot to the A23 (Plot 3 to the west of site) may require an alternative cooling strategy to control overheating, implying that standard openable windows should not be relied on during the overheating condition unless other cooling methods are introduced.

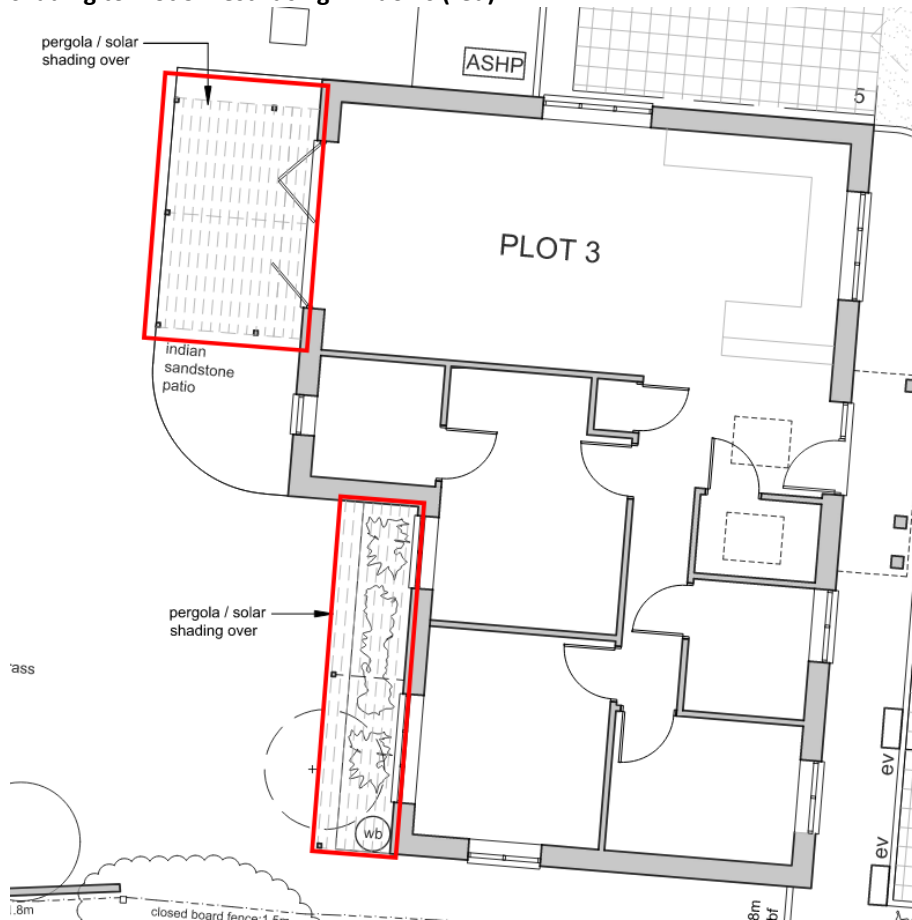
Internal noise levels within Plots 1 and 2 (to the east of site) are expected to be acceptable when relying on openable windows to mitigate the overheating condition. Therefore a passive ventilative cooling approach could be adopted by implementing the temporary opening of windows during the quietest and coolest periods of the day or night, or during periods where habitable rooms are generally unoccupied. This will directly be linked to the size and type of glazing, the direction the glazing is facing and the consideration of other potential internal heat gain.

7.3.1 Proposed Overheating Control Measures

Plot 3

Further to discussions with Lightbox Architecture, it is proposed to install two pergola structures which will provide solar shading to the west facing bedroom and living room windows of Plot 3. As detailed overheating calculations have not yet been carried out at this early planning stage, it is not known whether this will altogether alleviate the need to have openable windows to mitigate the overheating condition. However, it is certainly expected to reduce the need to. In any case, this will need to be demonstrated during the detailed design stages for compliance with the noise limits stipulated in Approved Document O of the building regulations. Where rooms are dual aspect (Bedroom 2 and Living/Dining Room), residents will have the option of opening a window on a quieter façade. Where this is not the case, i.e. in Bedroom 1, Lightbox Architecture have confirmed that an initial provision has been made to allow for an alternative cooling strategy to control overheating, implying that open windows should not be relied on during the overheating condition in this room.

Figure 7.1: Ground Floor GA plan showing proposed locations of external pergola structures to provide solar shading to Plot 3 west-facing windows (red)



There are various options which can be explored 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).

Images of the above example options are presented in Figure 7.2 to Figure 7.5, below.

Figure 7.2: Zehnder ComfoCool Q



Figure 7.3: Nuaire MRXBOXAB-ECO5-AESC with CM-XBOX-INLINE cooling module

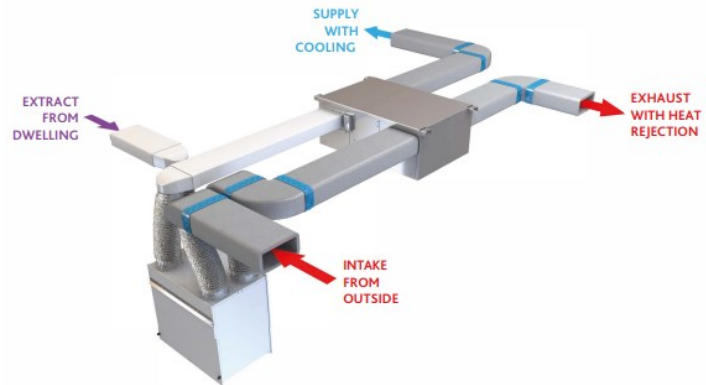


Figure 7.4: Vectaire MicroBox 200mm



Figure 7.5: Titon Purge Vent Fan



It should be noted that the above mechanical cooling 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 plots' 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 AD-O and suitable ventilation rates for residential use as required by AD-F.

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 affected rooms of the western plot.

There are several options in the market to provide comfort cooling to apartments affected by overheating and high external noise levels (those rooms onlooking the A23). The easiest (but also most expensive and less sustainable) solution would be standard air conditioning via DX split systems; but more cost and energy-efficient alternatives may involve MVHR units with tempered air supply; an enhanced MVHR unit combined with a purge extract fan serving the habitable rooms in apartments, which would only be used when additional ventilation / air movement is needed during overheating events (this would create a "cooling effect", even if not technically using cooler air from outside); etc. All the above could also be combined with passive design measures to the building fabric that could reduce the overheating risk, such as using additional external solar shading (e.g. using louvred screen above and to the sides of glazing) or introducing tenant-adjustable external or mid-pane blinds, etc.

Plots 1 and 2

The plots overlooking Brighton Road will likely be exposed to levels that sit in between the highest and lowest categories discussed in Table 7.4. A passive ventilative cooling approach could be adopted by implementing the temporary opening of windows during the quietest and coolest periods of the day or night, or during periods where habitable rooms are generally unoccupied. This will directly be linked to the size and type of glazing, the direction the glazing is facing and the consideration of other potential internal heat gain.

Discussions with the design team will therefore be required to coordinate mitigation strategies (some discussed above), such that both good quality acoustic and thermal conditions can be provided to all dwellings of the scheme.

7.4 Element 3: External Amenity Area Noise Assessment

The detailed masterplan shows that each dwelling in the development will own a private garden, which are considered to be external amenity areas.

Given that the proposed development is neighboured by a large infrastructure (A23 to the west of the site), the upper external noise limit suggested in BS 8233 is 55 dB $L_{Aeq,T}$ has been considered appropriate for our assessment, in accordance with ProPG.

The standard states that the guideline values in external amenity areas “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”.

The measured noise levels in Section 4 suggest that the western amenity areas of Plot 3 will be exposed to noise levels above the upper limit of 55 dB $L_{Aeq,T}$.

7.4.1 Introduction of an Acoustic Barrier

A solid acoustic barrier is proposed along the western boundary of the site, which would provide additional acoustic screening to the rear garden of Plot 3, as well as the wider development. The solid acoustic barrier to the west of site should have a minimum surface mass of 15 kg/m² and have a minimum height of 2.7m above ground level. The solid barrier should have very minimal perforations in the material and no gaps below or between the panels. Typical examples of suitable materials include a single layer of 24mm standard density plywood or 14mm cement particle board. The extent of the barrier should run along the full western site boundary and wrap around to the north and south boundaries as shown in Figure 7.6.

A 1.8m closed-board fence will also extend along the southern flank boundary of the site.

Figure 7.6 is a site plan markup which shows the proposed extent of the 2.7m acoustic barrier to the west of site.

Figure 7.6: Site plan markup showing proposed extent of 2.7m high acoustic barrier treatment on western site boundary

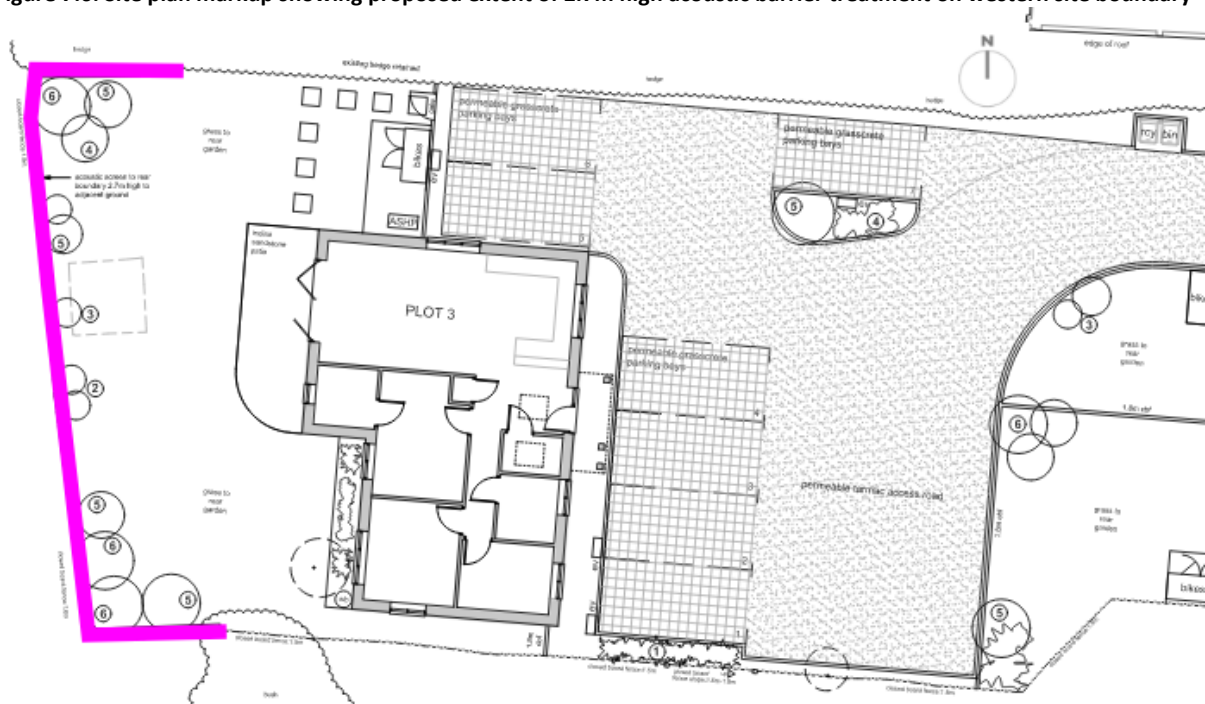
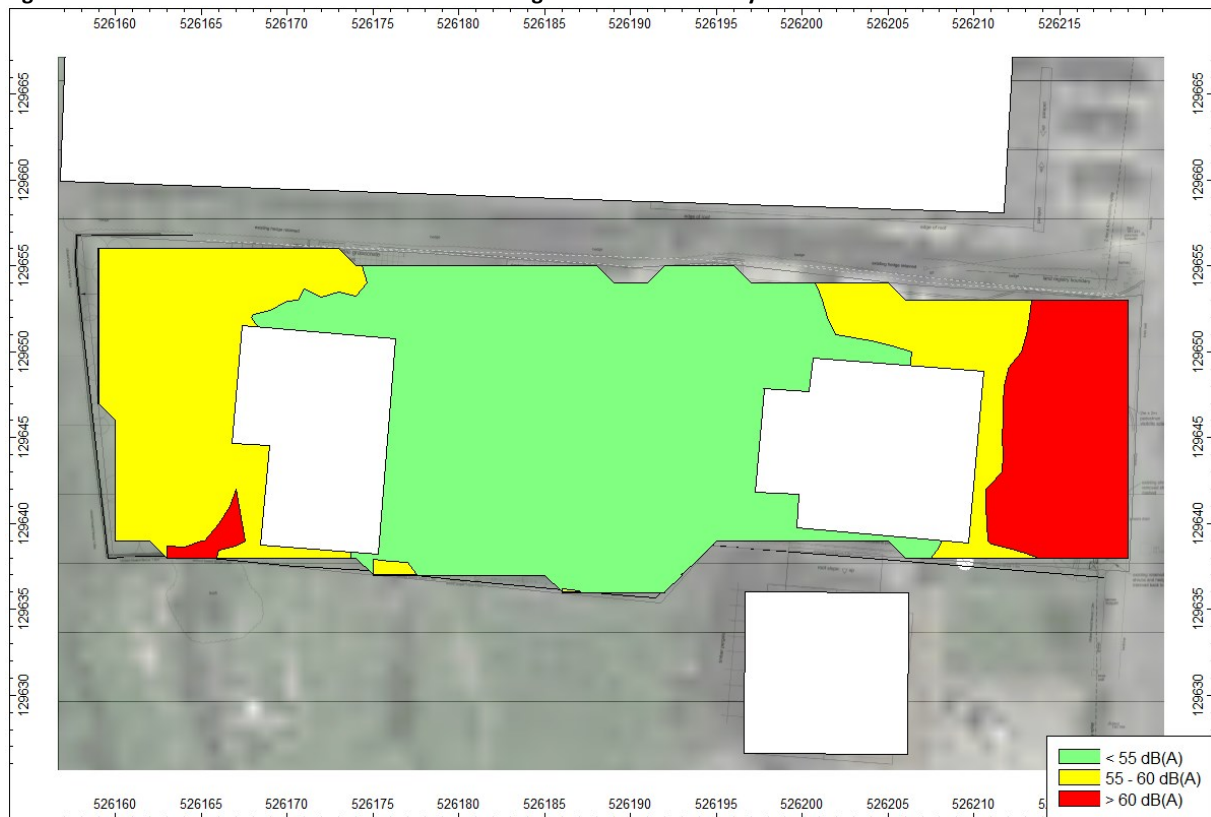


Figure 7.7 shows the noise contours predicted at a height of 1.5 m across the area representative of each of the private gardens with the proposed site boundary treatment in place. It can be seen that noise levels to the private garden to the west (Plot 3) fall within the 55-60 dB $L_{Aeq,16\text{ hour}}$ noise contour (yellow). Whereas the rear garden areas belonging to Plots 1 and 2 fall within the 50-55 dB $L_{Aeq,16\text{ hour}}$ contour (green).

It should be noted that the previous superseded assessment used a simple barrier calculation method to determine noise levels within the external amenity areas, as noise levels were predicted at a single location. Whereas the software noise model allows for a visual representation of noise levels across site which accounts for the various screening, acoustic reflections and topography conditions.

Figure 7.7: Plan screenshot from noise model showing the external amenity area noise assessment



Although the levels experienced within the private garden of Plot 3 marginally exceed the upper limit of BS 8233 by up to 4 dB, guidance provided within the ProPG document referring to this subject has been used; which suggests four alternatives to alleviate the potential impact of noisy external amenity areas in developments located in busy, urban areas.

The Stage 2 - Element 3 of the ProPG guidance document states that:

- 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, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquility) that is nearby (e.g. within a 5 minute walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.

It is noted that the Nymans National Trust site is accessible and is within a 5-minute walking time from the proposed development. The site will provide residents with a quieter, alternative amenity space. It has been advised by the applicant that residents of the village will be entitled to free access to Nymans House and the wider estate, which is part of the High Weald Area of Natural Beauty and Site of Special Scientific Interest. The

woodland area which surrounds the Nymans will also be accessible outside of the hours of the National Trust site.

Bearing the above in mind, the provision of nearby Nymans site will partially offset the noise impact on the amenity areas. Therefore, it is considered that the amenity areas which fall in the 55-60 dB $L_{Aeq, 16\text{-hour}}$ noise contour should not have a significant adverse impact on future residents.

8 RESPONSE TO COMMENTS PROVIDED BY ENVIRONMENTAL PROTECTION

We have summarised our responses to the key concerns the Environmental Protection team below:

1. *How much area of each private garden exceeds $L_{Aeq, 16\text{-hour}}$ 55 dB*

A calibrated 3D environmental noise model has been produced since the issue of our original report, where site-wide noise contours have been calculated, which include the proposed acoustic barrier treatment. These are shown in Figure 7.7. It can be seen that noise levels within the private gardens belonging to Plot 3 are predicted to be between $L_{Aeq, 16\text{hour}}$ 56 – 59 dB.

2. *Further evidence that Good Acoustics Design has been followed in the design, given the vicinity of the A23*

The following aspects of the design are considered to be Good Acoustics Design:

- Introduction of 2.7 high solid acoustic barrier to the west of site. The proposed minimum surface density of 15 kg/m² is higher than the minimum 10 kg/m² stated in ISO 9613-2 used by the noise modelling software. This is therefore expected to provide marginally more sound reduction than that predicted in Figure 7.7.
- Plot 3 is sufficiently set back from the west site boundary such that all ground floor windows are fully acoustically screened from the A23.
- External pergola structures are now introduced to the ground floor west-facing windows to provide solar shading. Where additional cooling is required (to be determined during the detailed design stages by the overheating consultant) this can be provided by opening a window on a quieter façade. An alternative cooling strategy can be introduced in rooms which are not dual aspect, where examples have been provided in Section 7.3.1.
- All residents of the development will have free access to the Nymans National Trust garden, which is a 2-minute walk from the redevelopment site.
- All residential plots are set back from the northern site boundary, which is shared with commercial use. This would further minimise any potential noise impact.

3. *Whether alternative natural means of cooling can be provided, e.g. plenum windows*

As per the above response, external solar shading has been provided and an allowance for alternative mechanical means of ventilative cooling has also been provided, should this be required.

9 SUMMARY

This report presents the results of noise impact assessment for 4 new dwellings across 2 plots at “Gilridge”, Brighton Road, Handcross, RH17 6BZ. The main outcome of the assessment is as follows:

- 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. Following this, a Stage 2 – Full Assessment has been undertaken, the key points being:
- The external building fabric proposals should be sufficient to control external noise ingress to habitable spaces during the normal ventilation condition, providing glazing units to achieve a minimum sound reduction performance of at least $27 R_w + C_{tr}$ in bedrooms and living rooms in Plots 1 and 2, and $30 R_w + C_{tr}$ in bedrooms of Plot 3.
- The above sound reduction has been calculated assuming ventilation is provided by MVHR ventilation systems in Plot 3. Plots 1 and 2 could be provided with either background ventilators and intermittent extract fans or continuous mechanical extract ventilation systems, as defined in ADF, with acoustic trickle ventilators fitted to the windows of all bedrooms and living rooms in Plots 1 and 2 achieving an element normalised level difference of at least $38 \text{ dB } D_{n,e,w} + C_{tr}$ (as detailed in Section 6.2.2 of this report).
- The noise impact on private amenity areas will be reduced due to the introduction of a 2.7m high solid barrier at the western boundary of the site and will also be partially offset with the provision of quieter publicly accessible parks in the immediate vicinity of the site, therefore complying with ProPG and BS 8233 guidelines.
- External pergola structures are now introduced to the ground floor west-facing windows to provide solar shading. Where additional cooling is required (to be determined during the detailed design stages by the overheating consultant) this can be provided by opening a window on a quieter façade. Alternatively, an alternative cooling strategy can be introduced where examples have been provided in Section 7.3.1.
- Although the site neighbours a commercial premises, attended measurements and observations made on site suggest that these will not affect the proposed development.
- Responses to the comments raised by Environmental Protection have been provided and are summarised in Section 8.

Based on the ProPG approach followed in this assessment, our recommendation to the decision maker with regard to noise is that “Planning consent should 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.

10 REFERENCES

1. Planning Noise Advice Document: Sussex, March 2021.
2. British Standards Institution. Sound Insulation and Noise Reduction for Buildings – Code of Practice. BS 8233: 2014.
3. Institute of Acoustics (IOA), Association of Noise Consultants (ANC) and Chartered Institute of Environmental Health (CIEH). Professional Practice Guidance on Planning & Noise. 2017.
4. World Health Organisation - Guidelines for Community Noise. 2000.
5. Building Regulations. Approved Document O. June 2022, Overheating.
6. The Association of Noise Consultants (ANC) & The Institute of Acoustics (IOA) – Acoustics, Ventilation and Overheating. Residential Design Guide. January 2020.
7. Department for Environment, Food and Rural Affairs, “Noise Policy Statement for England,” DEFRA, London, 2010.
8. Ministry of Housing, Communities & Local Government, “National Planning Policy Framework,” London, 2019.
9. British Standards Institution. Estimation of acoustic performance in buildings from the performance of elements. BS 12354-3:2023.
10. Building Regulations 1991: Approved Document F. Latest amendment 2021, Ventilation.

APPENDIX A

NOISE SURVEY DETAILS

A NOISE SURVEY DETAILS

A.1 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 A.1 below. All equipment's calibration certificates are available on request.

Table A.1 Inventory of Measurement Equipment

Equipment ID	Item	Make and Model	Serial Number	Calibration	
				Certificate number	Expiry Date
1 (UA1)	Sound Level Meter	RION NL-52	00743139	TCRT23/1336	28/04/2023
2 (UA2)	Sound Level Meter	RION NL-52	00342836	UCRT22/2004	12/08/2022
3 (A1 – A3)	Sound Level Meter	01 dB DUO	10664	1502008-2b	28/02/2024
4	Sound Calibrator	Rion NC-74	112518	1506425	28/08/2024

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.

Figure A.1 – UA1 (west of site, overlooking A23) Figure A.2 – UA2 and A2 (east of site, Brighton Road)



Figure A.3 – A1 (Attended Measurements at east of site)



Figure A.4 – A3 (Attended Measurements at north of site, towards Municipal Security)



Figure A.5: Unattended Survey Results at UA1 (A23)

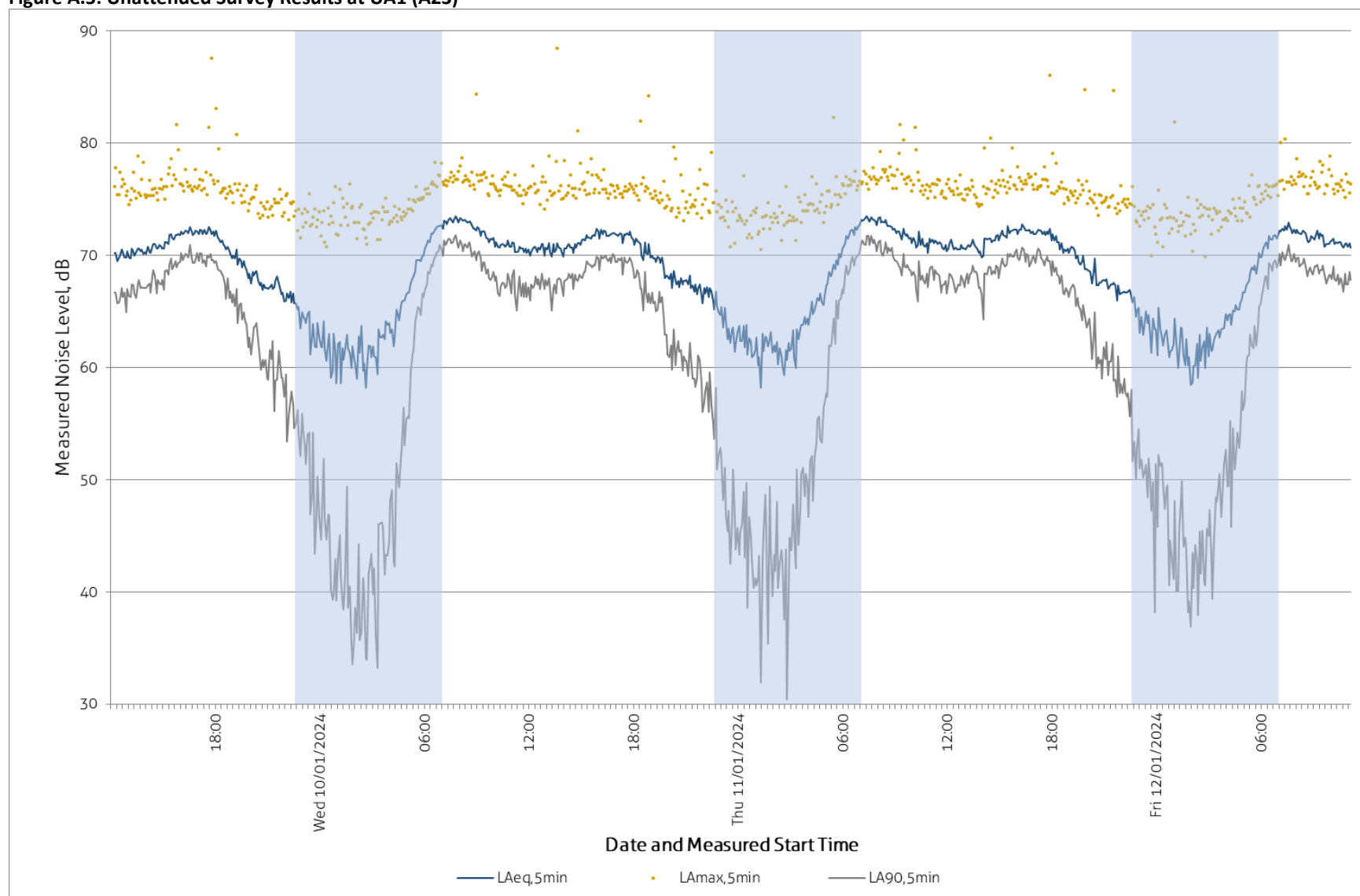
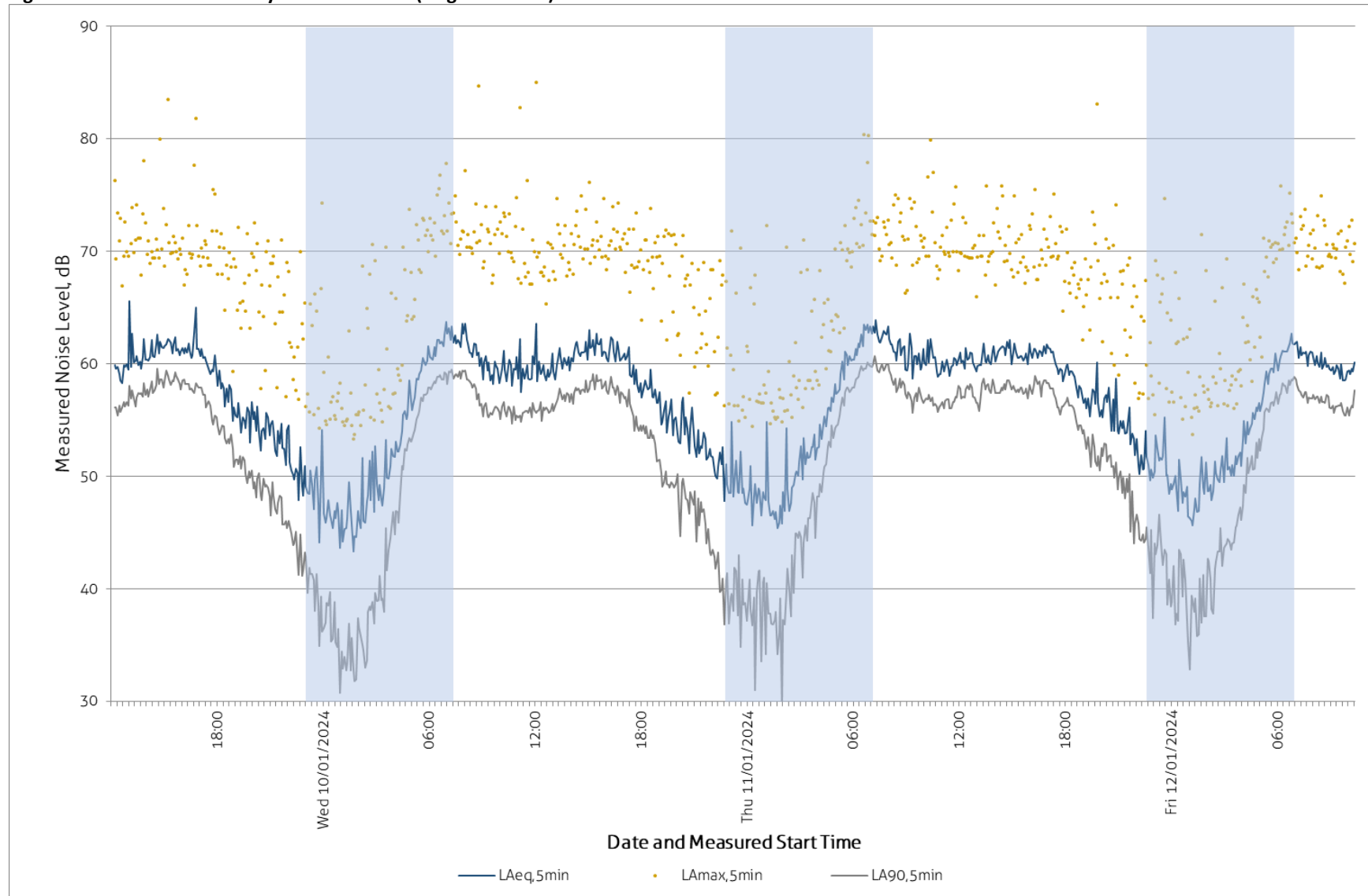


Figure A.6: Unattended Survey Results at MP2 (Brighton Road)



APPENDIX B

INTERNAL AMBIENT NOISE LEVEL CALCULATIONS

B INTERNAL AMBIENT NOISE LEVEL CALCULATIONS

Figure B.1: Internal Ambient Noise Level Calculations for Bedrooms – Plot 3

Job name:	"Gilridge", Brighton Road, Handcross, RH17 6BZ	RESULT SUMMARY:	L _{Aeq} Day	
Job no.:	7195	Predicted Internal Level:	27	dB L _{A eq, T}
Plot:	Plot 3 - West Elevation - GF	Criterion:	35	dB L _{A eq, T}
		Difference:	-8	dB L _{A eq, T}
SOUND INSULATION BY ELEMENT				
Formula	Description	Data	Units	Octave band centre frequency, Hz
				125 250 500 1000 2000 4000
				dB(A)
	Reverberation Time	0.5	s	0.5 0.5 0.5 0.5 0.5 0.5
	Receiver Room Volume	27.1	m ³	
Element 1				
L1	Wall (database)	Leq		56 52 54 60 51 34 61
-R	Brick-block cavity wall			41 45 45 54 58 58 52 Rw
+10logS	Element Area	19.0	m ²	13 13 13 13 13 13
-10logA	where A=0.16V/T			9 9 9 9 9 9
+3				3 3 3 3 3 3
=L2				21 13 16 12 -1 -18 16
L2tot	Running total			21 13 16 12 -1 -18 16
Element 2				
L1	Window (database)	Leq		56 52 54 60 51 34
-R	SGG 6/12/8mm			23 23 30 39 36 43 34 Rw
+10logS	Element Area	4.4	m ²	6 6 6 6 6 6
-10logA	where A=0.16V/T			9 9 9 9 9 9
+3				3 3 3 3 3 3
=L2				33 29 24 21 15 -9 26
L2tot	Running total			33 29 25 21 15 -9 27

Figure B.2: Internal Ambient Noise Level Calculations for Bedroom – Plot 3

Job name: "Gilridge", Brighton Road, Handcross, RH17 6BZ
 Job no.: 7195
 Façade: Plot 3 - West Elevation

RESULT SUMMARY:		LAeq Day	
Predicted Internal Level:	18	dB L _A	eq, T
Criterion:	35	dB L _A	eq, T
Difference:	-17	dB L _A	eq, T

SOUND INSULATION BY ELEMENT

Formula	Description	Data	Units	Octave band centre frequency, Hz						dB(A)
				125	250	500	1000	2000	4000	

Reverberation Time	0.5	s	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Receiver Room Volume	72.5	m ³								

Element 1

Formula	Description	Data	Units	Free-field						dB(A)
				125	250	500	1000	2000	4000	
L1	Wall (database)	Leq		49	45	47	53	44	27	54
-R	Brick-block cavity wall			41	45	45	54	58	58	52 Rw
+10logS	Element Area	16.1	m ²	12	12	12	12	12	12	
-10logA	where A=0.16V/T			14	14	14	14	14	14	
+3				3	3	3	3	3	3	
=L2				9	1	3	0	-13	-30	4
L2tot	Running total			9	1	3	0	-13	-30	4

Element 2

Formula	Description	Data	Units	Free-field						dB(A)
				125	250	500	1000	2000	4000	
L1	Window (database)	Leq		49	45	47	53	44	27	
-R	SGG 4/12/6mm			23	22	27	38	40	41	33 Rw
+10logS	Element Area	6.7	m ²	8	8	8	8	8	8	
-10logA	where A=0.16V/T			14	14	14	14	14	14	
+3				3	3	3	3	3	3	
=L2				23	21	18	12	1	-17	18
L2tot	Running total			23	21	18	12	2	-16	18

Figure B.3: Internal Ambient Noise Level Calculations for Bedrooms – Plots 1 and 2

Job name: "Gilridge", Brighton Road, Handcross, RH17 6BZ
 Job no.: 7195
 Plot: Plots 1 and 2 - East Elevation

RESULT SUMMARY: LAeq Day	
Predicted Internal Level:	31 dB LA eq,T
Criterion:	35 dB LA eq,T
Difference:	-4 dB LA eq,T

RESULT SUMMARY: LAeq Night	
Predicted Internal Level:	24 dB LA eq,T
Criterion:	30 dB LA eq,T
Difference:	-6 dB LA eq,T

RESULT SUMMARY: LAmax Night	
Predicted Internal Level:	41 dB LA eq,T
Criterion:	45 dB LA eq,T
Difference:	-4 dB LA eq,T

SOUND INSULATION BY ELEMENT

Formula	Description	Data	Units	Octave band centre frequency, Hz						dB(A)
				125	250	500	1000	2000	4000	
	Reverberation Time	0.5	s	0.5	0.5	0.5	0.5	0.5	0.5	
	Receiver Room Volume	33.8	m ³							

Octave band centre frequency, Hz						dB(A)
125	250	500	1000	2000	4000	
0.5	0.5	0.5	0.5	0.5	0.5	

Octave band centre frequency, Hz						dB(A)
125	250	500	1000	2000	4000	
0.5	0.5	0.5	0.5	0.5	0.5	

Element 1

		Free-field						Rw	Ctr
	Leq	59	57	57	57	50	41		
L1	Wall (database)								
-R	Brick-block cavity wall	41	45	45	54	58	58	52	48
+10logS	Element Area	4	4	4	4	4	4		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		15	9	8	0	-11	-21	8	
L2tot	Running total	15	9	8	0	-11	-21	8	

		Free-field						Rw	Ctr
	Leq	51	50	50	51	43	32		
L1	Wall (database)								
-R	Brick-block cavity wall	41	45	45	54	58	58	52	48
+10logS	Element Area	4	4	4	4	4	4		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		7	2	2	-6	-18	-30	1	
L2tot	Running total	7	2	2	-6	-18	-30	1	

		Free-field						Rw	Ctr
	Leq	67	66	67	68	61	49		
L1	Wall (database)								
-R	Brick-block cavity wall	41	45	45	54	58	58	52	48
+10logS	Element Area	4	4	4	4	4	4		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		23	18	19	11	0	-13	18	
L2tot	Running total	23	18	19	11	0	-13	18	

Element 2

		Free-field						Rw	Ctr
	Leq	59	57	57	57	50	41		
L1	Window (database)								
-R	4/12/4mm double glazing	24	20	25	34	37	35	31	27
+10logS	Element Area	1	1	1	1	1	1		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		29	31	26	17	7	0	27	
L2tot	Running total	29	31	26	17	7	0	27	

		Free-field						Rw	Ctr
	Leq	51	50	50	51	43	32		
L1	Window (database)								
-R	4/12/4mm double glazing	24	20	25	34	37	35	31	27
+10logS	Element Area	1	1	1	1	1	1		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		21	24	20	11	0	-9	20	
L2tot	Running total	21	24	20	11	1	-9	20	

		Free-field						Rw	Ctr
	Leq	67	66	67	68	61	49		
L1	Window (database)								
-R	4/12/4mm double glazing	24	20	25	34	37	35	31	27
+10logS	Element Area	1	1	1	1	1	1		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		37	40	36	28	18	8	36	
L2tot	Running total	37	40	36	28	18	8	36	

Element 3

		Free-field						Rw	Ctr
	Leq	59	57	57	57	50	41		
L1	Roof (database)								
-R	boarding, 12mm p'board ceiling	22	37	43	49	57	57	60	
+10logS	Element Area	12	12	12	12	12	12		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		42	25	18	12	-3	-12	26	
L2tot	Running total	42	32	26	18	7	0	30	

		Free-field						Rw	Ctr
	Leq	51	50	50	51	43	32		
L1	Roof (database)								
-R	boarding, 12mm p'board ceiling	22	37	43	49	57	57	60	
+10logS	Element Area	12	12	12	12	12	12		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		33	18	12	6	-9	-21	19	
L2tot	Running total	34	25	20	12	1	-9	22	

		Free-field						Rw	Ctr
	Leq	67	66	67	68	61	49		
L1	Roof (database)								
-R	boarding, 12mm p'board ceiling	22	37	43	49	57	57	60	
+10logS	Element Area	12	12	12	12	12	12		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		49	33	28	23	8	-4	35	
L2tot	Running total	49	41	37	29	19	8	39	

Element 4

		Free-field						Rw	Ctr
	Leq	59	57	57	57	50	41		
L1	Ventilator (database)								
-R	Acoustic trickle ventilator (generic)	30	33	38	37	36	36	38	36
+10logS	Reference Area	10	10	10	10	10	10		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		32	27	21	23	17	7	26.2	
L2tot	Running total	42	33	28	24	17	8	31.2	

		Free-field						Rw	Ctr
	Leq	51	50	50	51	43	32		
L1	Ventilator (database)								
-R	Acoustic trickle ventilator (generic)	30	33	38	37	36	36	38	36
+10logS	Reference Area	10	10	10	10	10	10		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		24	20	15	17	10	-2	19.7	
L2tot	Running total	34	26	21	18	11	-1	24.3	

		Free-field						Rw	Ctr
	Leq	67	66	67	68	61	49		
L1	Ventilator (database)								
-R	Acoustic trickle ventilator (generic)	30	33	38	37	36	36	38	36
+10logS	Reference Area	10	10	10	10	10	10		
-10logA	where A=0.16V/T	10	10	10	10	10	10		
+3		3	3	3	3	3	3		
=L2		40	36	31	33	28	15	36.5	
L2tot	Running total	50	42	38	35	28	16	40.6	

Figure B.4: Internal Ambient Noise Level Calculations for Living Rooms – Plots 1 and 2

Job name: "Gilridge", Brighton Road, Handcross, RH17 6BZ
 Job no.: 7195
 Façade: Plots 1 and 2 - East Elevation

RESULT SUMMARY:		LAeq Day	
Predicted Internal Level:	29	dB L _A	eq, T
Criterion:	35	dB L _A	eq, T
Difference:	-6	dB L _A	eq, T

SOUND INSULATION BY ELEMENT

Formula	Description	Data	Units	Octave band centre frequency, Hz						dB(A)
				125	250	500	1000	2000	4000	

Reverberation Time	0.5	s
Receiver Room Volume	62.5	m ³

Element 1

			Free-field							
			55	53	53	53	46	37		
L1	Wall (database)	Leq	55	53	53	53	46	37	56	
-R	Brick-block cavity wall		41	45	45	54	58	58	52 Rw	48 Rw+Ctr
+10logS	Element Area	23.3 m ²	14	14	14	14	14	14		
-10logA	where A=0.16V/T		13	13	13	13	13	13		
+3			3	3	3	3	3	3		
=L2			18	12	11	3	-8	-18	11	
L2tot	Running total		18	12	11	3	-8	-18	11	

Element 2

			55	53	53	53	46	37		
			55	53	53	53	46	37		
L1	Window (database)	Leq	55	53	53	53	46	37		
-R	4/12/4mm double glazing		24	20	25	34	37	35	31 Rw	27 Rw+Ctr
+10logS	Element Area	8.0 m ²	9	9	9	9	9	9		
-10logA	where A=0.16V/T		13	13	13	13	13	13		
+3			3	3	3	3	3	3		
=L2			30	32	27	18	8	1	27	
L2tot	Running total		30	32	27	18	8	1	28	

Element 3

			55	53	53	53	46	37		
			55	53	53	53	46	37		
L1	Ventilator (database)	Leq	55	53	53	53	46	37	56	
-R	Acoustic trickle ventilator (generic)		30	33	38	37	36	36		
+10logSo	Reference Area	20.0 m ²	13	13	13	13	13	13		
-10logA	where A=0.16V/T		13	13	13	13	13	13		
+3			3	3	3	3	3	3		
=L2			28	23	18	19	13	4	23	
L2tot	Running total		32	33	27	22	14	5	29	

APPENDIX C

COMMENTS PROVIDED BY ENVIRONMENTAL PROTECTION

C FULL COMMENTS PROVIDED BY ENVIRONMENTAL PROTECTION

DM.24.0445 Gilridge, Brighton Road, Handcross.

The proposed development is for residential premises on a site bounded by the A23, a “B” road and commercial premises. The proximity of these noise sources means that with the proposed design/layout, in order to avoid adverse noise impacts, most windows in the development will need to be kept closed, both day and night, and, according to the acoustic report, this will require an alternative ventilation strategy for the development.

Additionally, the gardens closest to the road will exceed the recommended British Standard noise levels. The acoustic report claims this is offset by having a nearby “publicly accessible” quiet, open space - Nymans, a National Trust site. However, this is only accessible to members or those paying a significant entrance fee, and the opening hours are limited. On this basis, it does not serve the purpose intended.

The National Planning Policy Framework encourages improved standards of design, and ProPG: Planning and Noise was published in May 2017 in order to encourage better acoustic design for new residential schemes in order to protect future residents from the harmful effects of noise. An example of good design in such circumstances might be a layout incorporating a completely enclosed courtyard in order to provide sheltered, and therefore quieter, facades for habitable rooms, especially bedrooms. Alternatively, the internal layout of dwellings can also mitigate such noise issues, through the location of non-habitable rooms such as bathrooms, kitchens and circulation areas as buffers between the noise source/s and habitable rooms.

It is our view that Good Acoustic Design, as advocated within National Policy, includes ventilation and overheating assessment and should be a fundamental consideration in the design of schemes. Closed window solutions should be considered only as a last resort and should be accompanied by a satisfactory Acoustic Design Statement (as per ProPG) and an appropriate overheating assessment (ie conducted in accordance with Acoustics Ventilation and Overheating (AVO) Residential Design Guide (January 2020) and / or CIBSE’s Design Methodology for the Assessment of Overheating Risk in Homes TM59: 2017).

In a recent (Nov 23) Appeal Decision where noise was one of the relevant issues, the Inspector made the following comments (APP/C3810/W/23/3318827):

It is reasonable that future residents of the development would expect to be able to open their windows, particularly in fine weather. Being able to open windows (and patio doors) in a dwelling is an essential part of everyday life, and something which most people take for granted. Forcing future residents to make a choice between opening windows and tolerating road noise at the levels identified in the Appellant’s noise evidence would create an oppressive living environment, inconsistent with the principles of good design.

The development referred to was adjacent to the A27 and the principle that the Inspector refers to is clear – occupiers should not have to choose between fresh air and a noise environment within safe levels.

It is for this reason that closed windows solutions are viewed as a last resort and should only be considered once it has been demonstrated that there is no other option. This is the purpose of the ADS as per ProPG. It should show the various design iterations that were considered and explain why they were not viable. From the submitted ADS, it is not clear whether other layouts and mitigation were considered.

As well as the layout of the site, plenum windows (illustrated above) offer a potential solution, allowing both fresh air and reduced noise levels.

Accordingly, as it is not yet fully or clearly demonstrated that Good Acoustic Design has been followed, we request that either the design is amended, or that the Acoustic Design Statement is updated to justify the present configuration (specifically addressing the issues raised above) before we make further comment. Residential properties that require windows to be kept closed are sub-optimal and, in our view, should only be considered where it can be demonstrated that there is no alternative.

Further clarification is also sought on how much of each garden is above 55dB. Is it the case that all the external areas are exposed to 56dB, or are some greater (or lesser) levels present?

23/4/24
Nick Bennett
Environmental Protection