Outline Planning – Noise Impact Assessment

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Date: 27/05/2025

Project: J3998

Issue 1

Site: **Land North of Guildford Road, Rudgwick**

Client: **Welbeck Strategic Land IV LLP**

Contents

Tables

Figures

Report by: Scott Castle BSc (Hons) CEnvH, MCIEH MIOA
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Issue 1	27/05/2025	Original Issue

1 Introduction and Executive Summary

Acoustic South East have been appointed to undertake an acoustic assessment to support an outline planning application for 90 dwellings at Land North of Guildford Road, Rudgwick.

Standards and guidance referenced for this assessment include:

- BS8233 (Sound insulation and noise reduction for buildings) 2014
- National Planning Policy Framework (NPPF), 2024
- ProPG2017
- Building Regulations Approved Document O – Overheating
- Planning Noise Advice Document Sussex, November 2023
- Acoustics Ventilation and Overheating Guidance dated Jan 2020

Two unattended class 1 sound level meters were used to identify the site soundscape between 19th and 24th March 2025. LT1 was placed in close proximity to the A281, Guildford Road and LT2 was placed on the site boundary with the school sports-field to the East of the site.

The A281, Guildford Road dominates the site soundscape and IMMI noise modelling software has been used to model the sound energy which propagates across the site. Consistent with good practice, the noise model utilised the highest measured daytime and night time sound pressure levels. The sports field has also been modelled to consider a worst-case measured hour.

The residential plot which represents the worst case is plot 29 which is closest to the A281, and requires a Sound Reduction Index on the Southern façade of 32dB. On the Northern façade, as expected, the SRI decreases to only 14dB. The worst-case plot is capable of being constructed and to present a robust case, a bedroom has been considered onto the Southern first floor façade and values utilised from BS8233:2014 Annex G2, given that the layouts and window sizes are not yet determined at an outline stage. The rigorous calculation identified that the bedroom glazing could be enhanced to Pilkington 10\12\6 ($R_{traffic}$ of 32dB(A)) and utilise a through wall acoustic vent to protect the future occupants against adverse noise levels.

It is apparent from the noise modelling, that value engineering can be applied to the site to ensure that a one size fits all approach is not implemented. Noise modelling has been used to show the locations where enhanced mitigation measures are required and these are only a small number of residential plots adjacent to the A281 (plots 20 and 29).

Consistent with good practice and ProPG2017 to inform stakeholders and decision makers alike, an initial site risk assessment has been carried out and concludes a low-medium risk of developing the site.

An assessment has also been made of external amenity spaces/gardens and all areas are below 50dB $L_{Aeq, 16 hour}$.

As an outline assessment, the calculations have shown through good acoustic design that sensitive spaces such as bedrooms can be placed onto the quieter facades and this can be reviewed in later iterations of planning. Notwithstanding this, the calculations have identified that as a worst case, bedrooms could be placed onto the noisier façade.

A noise modelling approach was also used to demonstrate areas where a simplified assessment for overheating is capable of being carried out to consider first floor bedroom windows being opened during the night time period.

In summary, planning permission should not be withheld on noise grounds and the site is capable of being developed for 90 dwellings.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context

The client proposes 90 dwellings on the site which is located to the North of Guildford Road, on the A281 in Rudgwick. The scheme includes some flats (plots 4-16 and 82-90).

The site is located in an area of land which has the A281 to the South, a 30mph single carriage way road. To the immediate North is agricultural land, which at the time of the site visits was used for grazing cattle. To the immediate East is a school playing field. The site is bordered to the West by Lynwick Street, a smaller road with infrequent traffic passing.

The dominant sound source is that of the A281 located to the South.

Residential properties already exist to the South and North of Guildford Road.

2.2 Site Location

The application site is detailed in red in Figure 1.

Figure 1. Site Location

2.3 Masterplan Layout

Figure 2. Masterplan

2.4 Soundscape

The soundscape noted from visits to the site was that of passing road traffic noise, birdsong and aviation.

2.5 Planning Policy and Assessment Criteria

2.5.1 National Planning Policy Framework, Dec 2024

The National Planning Policy Framework (Dec 2024) defines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so.

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

Paragraph 187(e) - Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability, and

Paragraph 198 - Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

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

2.5.2 BS8233:2014

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

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

Table 1. BS8233:2014 Criteria

It is relevant to note that Table 4 criteria in BS8233:2014 relates to continuous and anonymous sound. The soundscape on the site is continuous and anonymous.

2.5.3 ProPG2017

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

2.5.4 Building Regulations, Approved Document O – Overheating

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

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

2.5.5 Planning Noise Advice Document Sussex, November 2023

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

2.6 Methodology

Two class 1 sound level meters were placed over a number of days and nights to identify the site soundscape. These were placed close to the A281 on the Southern boundary of the site which was also close to the Fox Inn as a potential sound source which had external seating. A second long term sound level meter was placed to the immediate North East of the site to capture the soundscape generated by the School sports field.

3 Sound Surveys

The long-term survey measurements were made in Freefield conditions with Fast and A weighted filters applied. The class 1 sound level meters used within the surveys were calibrated at the beginning and end of the survey to ensure that the meters were operating correctly and that the data produced is capable of being relied upon.

The resolution period for measurements was 1minute in accordance with the Sussex Planning guidance.

All long-term sound level meters used dry cell batteries and were placed into a locked weatherproof peli case to prevent tampering and/or theft.

The positioning of the survey equipment can be seen in Figures 3 and 4 below and utilise WhatThreeWords to enable the positions to be further quantified.

Figure 3. Spatial Locations of LT1 and LT2

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Figure 4. LT1 and LT2

Survey(s) carried out by	Scott Castle BSc(Hons) Env Health, MCIEH CEnvH MIOA
Equipment Used	LT1 – Castle Mirus Class 1 Sound Level Meter LT2 – Svanek 971A - Class 1 Sound Level Meter
Equipment Used	Castle Acoustic Calibrator – Serial No. 041173
Location	LT1 – streaking.pavement.dominate LT2 – pushover.fight.nipped
Duration	19 March 2025 to 24 March 2025

Figure 5. Survey Data

4 Results of the Sound Surveys

4.1 LT1- Rudgwick Road

LT1			
Logarithmically Averaged Day and Night time Periods (External - Freefield)-dB(A)			
$L_{Aeq, 16\ hour}$- 07:00-23:00		$L_{Aeq, 8\ hour}$ 23:00-07:00	
Day 1	62.3	Night 1	57.3
Day 2	61.8	Night 2	55.4
Day 3	62.2	Night 3	55.3
Day 4	61.7	Night 4	53.6
Day 5	62.1	Night 5	56.5
Arithmetic Average	**62.0**	**Arithmetic Average**	**55.6**

Figure 6. LT1- Rudgwick Road Measured Data

4.2 LT2 – Sports Field

LT2			
Logarithmically Averaged Day and Night time Periods (External - Freefield)-dB(A)			
$L_{Aeq, 16\ hour}$- 07:00-23:00		$L_{Aeq, 8\ hour}$ 23:00-07:00	
Day 1	51.1	Night 1	44.2
Day 2	51.3	Night 2	44.5
Day 3	50.7	Night 3	43.0
Day 4	50.2	Night 4	43.3
Day 5	50.6	Night 5	41.4
Arithmetic Average	**50.8**	**Arithmetic Average**	**43.3**

Figure 7. LT2 – Sports-field Data

4.3 LT2 Hourly Assessment

Hourly Assessment of LT2					
Time	Day 1	Day 2	Day 3	Day 4	Day 5
07:00-08:00	54	52	51	52	51
08:00-09:00	52	50	50	48	51
09:00-10:00	50	49	51	48	47
10:00-11:00	51	50	52	50	49
11:00-12:00	51	50	51	50	49
12:00-13:00	50	52	51	54	53
13:00-14:00	50	52	50	47	51
14:00-15:00	53	54	51	49	53
15:00-16:00	52	55	52	49	55
16:00-17:00	52	53	50	50	47
17:00-18:00	53	51	51	50	52
18:00-19:00	51	51	52	53	50

Figure 8. LT2 - Hourly Assessment Table

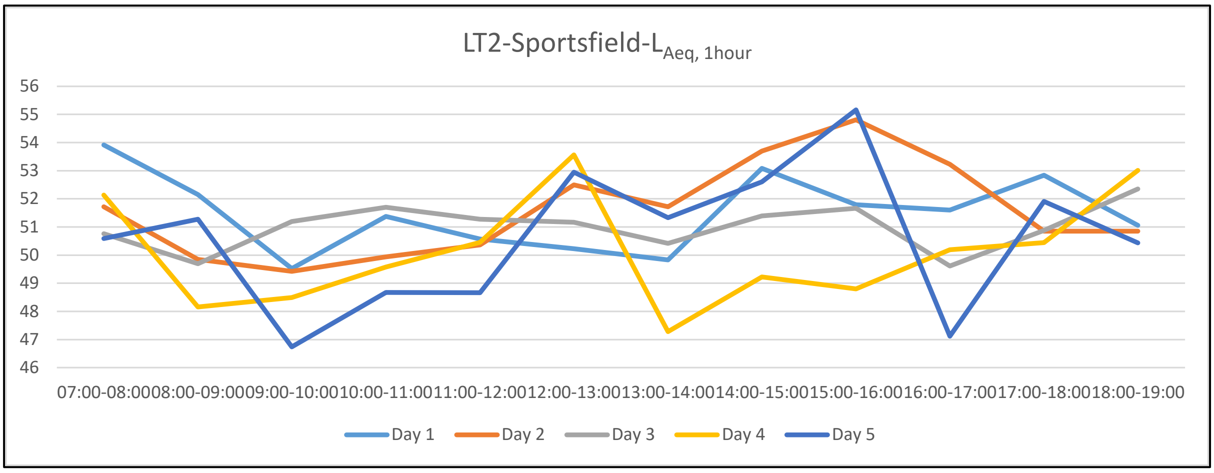

Figure 9. LT2 - Hourly Assessment Time Vs History Graph (Daytime)

Given that the sound from sports is not likely to be continuous and anonymous, it is relevant to consider use of a worst-case measured hour of 55dB $L_{Aeq,\ 1\ hour}$, as seen on day 2 of the assessment between 15:00-16:00 hours.

5 Computer Noise Modelling

In order to see how noise varies at different positions around the proposed development it is possible to produce a noise contour map. A computer noise model has been completed using the computer package IMMI. Drawings of the area have been used to complete the noise models and the topography of the location recreated. IMMI faithfully implements the propagation method of ISO-9613:1996; Acoustics – Attenuation of sound during propagation outdoors.

The noise modelling software predicts freefield and A weighted dB values.

5.1 Noise Model Inputs

The noise modelling input are as follows:

Houses entered as 9m

Single garages as 4m

Double garages as 5m

Model based on worst case measured daytime and night time periods.

Flats (Plots 89-98 and Plots 4-16) have been entered as 11m above ground level.

With the A281 plotted and the intervening properties plotted in between the road and LT2, the predicted/modelled sound pressure level at LT2 is only 40.6dB $L_{Aeq,16\ hour}$.

In order to reflect the elevated levels of 55dB $L_{Aeq,\ 1\ hour}$ (worst case hour) which were measured at LT2, an area sound source was placed onto the noise mapping and calibrated at 55dB $L_{Aeq,\ 1\ hour}$ to represent the sports field being used. The process of calibrating the sports field was done without the road traffic noise activated for the A281.

Barriers or fence-lines between properties or adjacent to the development have only been added between the following plots (3, 1-19, 20-22, 30-31, 32-35, 36-37, 37-38, 38-39, 98-100) at 2m in height.

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5.2 Noise Model Outputs

2D Noise modelling contours have been used to visually illustrate the areas where noise is a constraint.

For gardens, these have used a daytime noise model to illustrate areas below 50dB $L_{Aeq, 16 hour}$, areas between 50-55dB $L_{Aeq, 16 hours}$ and areas above 55dB $L_{Aeq, 16hour}$. The areas above 55dB $L_{Aeq,16 hour}$ are marked in red, albeit for the 90-dwelling scheme, this is not relevant, as all gardens are below 50dB $L_{Aeq,16 hour}$. The external amenity areas are shown in Figure 12 below.

For the Approved Document O and areas where bedrooms may be considered for a simplified assessment, these have either been marked in green where an assessment may be carried out or red where it may not. In short, a simplified assessment, ie subtracting 10dB from the outside soundscape may ONLY be carried out when the soundscape is below 50dB $L_{Aeq, 8 hour}$ during the night time period. It must be remembered that the overheating constraint applies only to bedrooms for the night time period. The Simplified ADO 2D assessment is shown in Figure 13 below.

For the daytime mitigation measures, these have used the AVOG Table B2 to identify where there is an SRI requirement which exceeds 21dB. In simple terms, a standard thermal double glazed unit and trickle vent can provide 21dB of attenuation. Where this is permissible, the shaded contours are green. Where the contours are red, enhanced mitigation measures are needed. This has been calculated as follows:

For daytime – the required internal value is 35dB $L_{Aeq, 16 hours}$. Including a 21dB SRI makes this 56dB $L_{Aeq, 16 hour}$ externally. The 2D contours therefore focus on below 56dB $L_{Aeq, 16 hour}$ and above 56dB $L_{Aeq, 16 hour}$, the latter of which are red. See Figure 14 below.

For the night time, the same concept has been applied, albeit with a lower starting value of 30dB $L_{Aeq, 8 hour}$. Therefore, the shaded contours indicate below 51dB $L_{Aeq, 8 hour}$ as green and above 51dB $L_{Aeq 8 hours}$ as red. See Figure 15 below.

Figures 10 and 11 below are made with a 4m above ground level grid height. For gardens in Figure 12, the grid height has been reduced to a height of 1.5m above ground level.

5.2.1 Daytime Noise Contours – $L_{Aeq, 16\ hour}$

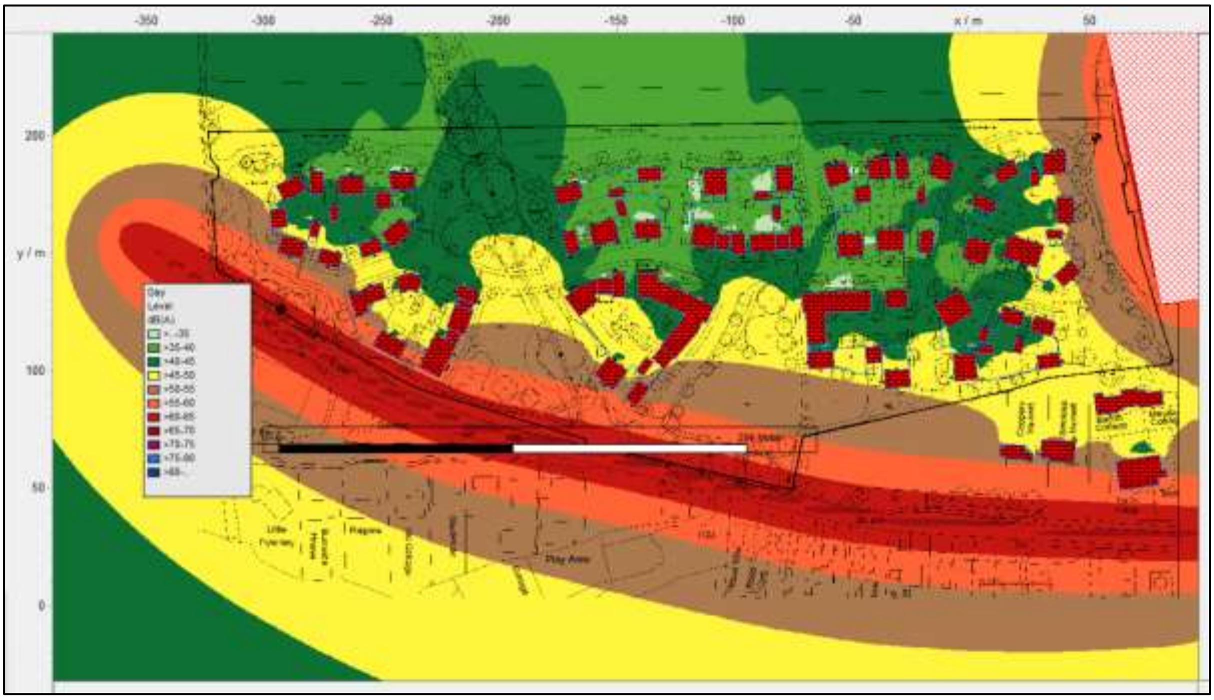


Figure 10. 2D Daytime Noise Contours – $L_{Aeq, 16\ hours}$

5.2.2 Night Time Noise Contours – $L_{Aeq,8\ Hour}$

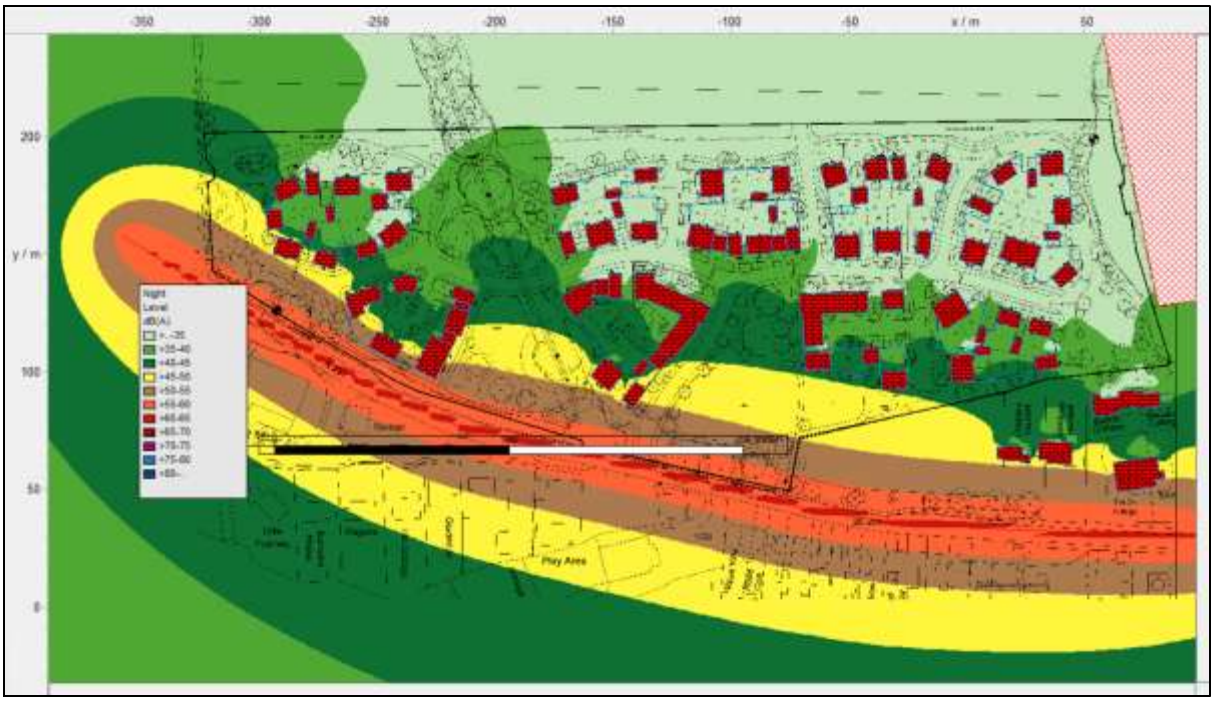


Figure 11. 2D Night Time Noise Contours- $L_{Aeq, 8\ hour}$

5.2.3 External Amenity/Garden Assessment

Figure 12. 2D Daytime - External Amenity Area Assessment

5.2.4 Approved Document O – Areas for Simplified Assessment for Overheating

Figure 13. Approved Document O - Simplified Assessment Method (ie below 50dB $L_{Aeq, 8 hour}$)

5.2.5 Areas where Additional Mitigation Measures are Required (Day and Night)

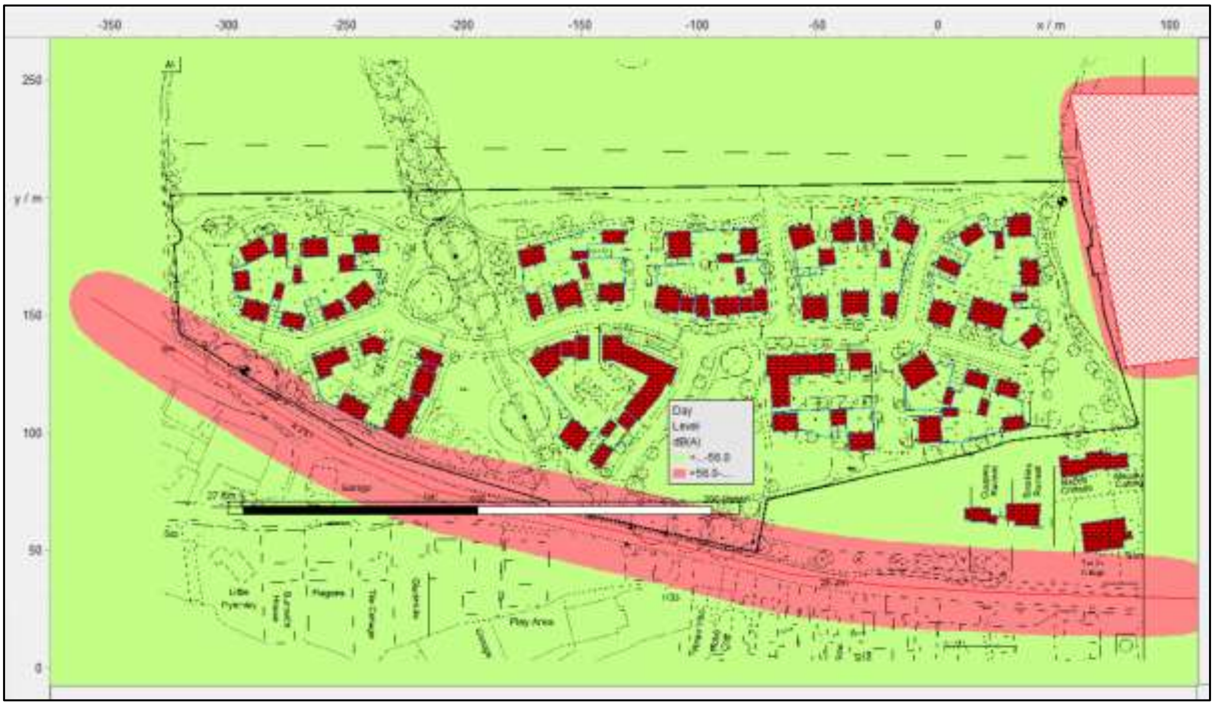


Figure 14. 2D Noise Contours - Daytime - Enhanced Attenuation Required

Figure 15. 2D Noise Contours - Night Time - Enhanced Attenuation Required

6 Discussion

6.1 Sound Reduction Index

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

There are three drivers which impact the façade sound reduction index or SRI. These are the daytime continuous noise levels measured over 16 hours in $L_{Aeq'T,}$ the night time continuous noise levels over 8 hours, also measured in $L_{Aeq'T.}$ Thirdly, ProPG2017 requires a consideration of the number of L_{Amax} events which will occur in a bedroom during the night time period. Specifically, ProPG2017 requires no more than ten events exceeding 45dB L_{Amax} measured internally. Whichever of these drivers is highest is applied to ensure that the residents are protected from each criterion.

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

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

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

The L_{Amax} SRI is achieved by using the predicted night time external sound pressure level and comparing this with the measured night time survey noise level. The SRI figure is then adjusted to ensure no more than 10 L_{Amax} events per night inside the bedroom environment above 45dB L_{Amax}. The adjustment process takes account of each of the 5 measured night time periods to ensure that no individual night exceeds 10 events of 45dB L_{Amax} inside the bedroom.

The long-term survey positions (LT1 and LT2) have been used to assess night time data and L_{Amax} considerations.

Given the outline consent, the worst-case properties closest to the road (plots 20 and 29) have been selected and assessed for proximity to the roadside and Plots 61 and 70 assessed for the proximity to the sports-field to the East.

Predicted SRI for 4 Worst Case Plots					
Location	Predicted External Daytime Freefield Sound Pressure Level	Predicted External Night Time Freefield Sound Pressure Level	SRI Day	SRI Night	SRI - LAMax
Plot 20 GF Rear	50.1	45.1	15.1	15.1	22
Plot 20 FF Rear	55.2	50.2	20.2	20.2	27
Plot 20 Front GF	54.7	49.7	19.7	19.7	27
Plot 20 Front FF	56.6	51.6	21.6	21.6	29
Plot 20 South GF	57.8	52.8	22.8	22.8	30
Plot 20 South FF	59.3	54.3	24.3	24.3	31
Plot 29 North GF	38.3	33.2	3.3	3.2	10
Plot 29 North FF	42.0	37.0	7.0	7.0	14
Plot 29 East GF	50.7	45.7	15.7	15.7	23
Plot 29 East FF	55.9	50.9	20.9	20.9	28
Plot 29 South GF	58.1	53.1	23.1	23.1	30
Plot 29 South FF	59.5	54.5	24.5	24.5	32
Plot 29 West GF	50.5	45.5	15.5	15.5	23
Plot 29 West FF	55.7	50.7	20.7	20.7	28
Plot 61 North GF	49.5	19.9	14.5	-10.1	0
Plot 61 North FF	50.9	20.7	15.9	-9.3	0
Plot 61 East GF	50.8	24.9	15.8	-5.1	2
Plot 61 East FF	52.2	25.5	17.2	-4.5	3
Plot 61 South GF	46.5	24.0	11.5	-6.0	1
Plot 61 South FF	48.6	26.3	13.6	-3.7	3
Plot 61 West GF	34.3	22.8	-0.7	-7.2	1
Plot 61 West FF	36.4	27.1	1.4	-2.9	4
Plot 70 North GF	47.7	20.1	12.7	-9.9	0
Plot 70 North FF	50.2	20.8	15.2	-9.2	0
Plot 70 East GF	50.7	26.4	15.7	-3.6	3
Plot 70 East FF	52.1	27.3	17.1	-2.7	4
Plot 70 South GF	47.0	24.0	12.0	-6.0	1
Plot 70 South FF	48.4	30.1	13.4	0.1	7
Plot 70 West GF	33.9	23.5	-1.1	-6.5	1
Plot 70 West FF	37.1	28.7	2.1	-1.3	6

Figure 16. Sound Reduction Index Requirements (SRI) - Plots 20,29, 61 and 70

Figure 16 above considers only bedrooms, as these have an enhanced requirement to consider both continuous daytime and night time sound pressure levels as well as L_{Amax} events for the night time period.

The worst-case SRI for the façade of Plot 29 closest to the road will be 25dB for the daytime, 25dB for the night time and 32dB for the L_{Amax} events.

If the SRI is desired to be calculated for living rooms, this is the daytime predicted external sound pressure level minus 35dB.

6.2 Rigorous Calculation – Plot 29

Given the outline application, it is noted that room orientations and window sizes are not yet developed. Notwithstanding this, sample calculations from BS8233:2014 may be used to predict internal sound pressure levels.

Figure 17 below presents the relevant external sound pressure level of 59.5dB $L_{Aeq, 16 hour}$ and demonstrates that with enhanced glazing (Pilkington 10/12/6) and either a through wall vent (Rytons AAC125HP or a Rytons 9x9 Airliner) or an 18mm open plenum window, 32, 33dB and 34dB SRI are achievable with regards to the required SRI. Internally, these would provide internal sound pressure levels of 28, 28 and 25dB $L_{Aeq, 16 hour}$.

As previously discussed, the requirement for an SRI of 31dB accounts for the L_{Amax} events should a bedroom be placed onto the noisiest façade, albeit good acoustic design would dictate that bedrooms or sensitive rooms might be placed onto the quieter facades.

The Rw+Ctr or Rtraffic for 10/12/6 glazing is 32dB(A).

Non Frequency Dependent Variables		
Term	**Derivation**	**Value**
Ao	Given in BS EN 20140-10 = 10 (m^2)	10
Sf	Total Facade Area (m^2)	10
Swi	Window Area (m^2)	1.5
Sew	External Wall Area (m^2)	8.5
Srr	Ceiling Area (m^2)	15
S	Total Area sound enters the room (m^2)	25

Key for Table Below	
Rwi	Sound Reduction of Window (Octave)
Rew	Sound Reduction Index of External Wall (Oct
Rrr	Sound Reduction Index of Roof/Ceiling (Octa
A	Equivalent Absorbtion Area of Rx Room
Dn,e	Insulation of Trickle Vent (BS EN 20140-10)

Frequency Dependent Variables							
		Octave Band Centre Frequency					
Term	**Description**	**125**	**250**	**500**	**1000**	**2000**	**4000**
Leq,ff	Free-Field External Noise Level	61.4	57.4	55.4	55.4	52.4	45.4
Dn,e	Rytons AAC125HP Look Ryt	42	37	34	43	57	64
Rwi	10_12_6	26	27	34	40	38	46
Rew	8233 Example (WALL)	40	44	45	51	56	56
Rrr	8233 EXAMPLE (Roof)	28	34	40	45	49	49
A	Equivalent Absorbtion Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00

BS8233 Calculation Details						
	Octave Band Centre Frequency					
Term From Equation Below	**125**	**250**	**500**	**1000**	**2000**	**4000**
Leq,ff	61.4	57.4	55.4	55.4	52.4	45.4
Ao/S . 10^(-Dn,e/10)	2.52E-05	7.98E-05	0.000159	2E-05	7.98E-07	1.59E-07
Swi/S . 10^(-Rwi/10)	0.000151	0.00012	2.39E-05	0.000006	9.51E-06	1.51E-06
Sew/S . 10^(-Rew/10)	0.000034	1.35E-05	1.08E-05	2.7E-06	8.54E-07	8.54E-07
Srr/S . 10^(-Rrr/10)	0.000951	0.000239	0.00006	1.9E-05	7.55E-06	7.55E-06
10log10(S/A)+3	6.565473	5.51812	4.9382	4.9382	5.218487	5.218487
Leq,2	38.61337	29.46879	24.3845	17.12537	10.3404	0.650493
A-Weighting	-16.1	-8.6	-3.2	0	1.2	1
A-Weighted Leq	**22.51337**	**20.86879**	**21.1845**	**17.12537**	**11.5404**	**1.650493**

A-Weigted Level Outside	**59.5**
BS8233 Predicted Internal A-Weigted Level	**27**
Prediced Building Envelope SRI	**33**

Plot 29-South Façade-First Floor

BS8233 Calculation can be seen below:

$$L_{eq,2} \approx L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Figure 17. Rigorous Calculation Plot 29 Front (First Floor)

Non Frequency Dependent Variables		
Term	Derivation	Value
Ao	Given in BS EN 20140-10 = 10 (m^2)	10
Sf	Total Facade Area (m^2)	10
Swi	Window Area (m^2)	1.5
Sew	External Wall Area (m^2)	8.5
Srr	Ceiling Area (m^2)	15
S	Total Area sound enters the room (m^2)	25

Key for Table Below	
Rwi	Sound Reduction of Window (Octave)
Rew	Sound Reduction Index of External Wall (Oct
Rrr	Sound Reduction Index of Roof/Ceiling (Octa
A	Equivalent Absorbtion Area of Rx Room
Dn,e	Insulation of Trickle Vent (BS EN 20140-10)

Frequency Dependent Variables							
		Octave Band Centre Frequency					
Term	Description	125	250	500	1000	2000	4000
Leq,ff	Free-Field External Noise Level	61.4	57.4	55.4	55.4	52.4	45.4
Dn,e	Rytons 9x9 Airliner (12800mm2)	42	37	34	43	57	64
Rwi	10_12_6	26	27	34	40	38	46
Rew	8233 Example (WALL)	40	44	45	51	56	56
Rrr	8233 EXAMPLE (Roof)	28	34	40	45	49	49
A	Equivalent Absorbtion Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00

BS8233 Calculation Details						
	Octave Band Centre Frequency					
Term From Equation Below	125	250	500	1000	2000	4000
Leq,ff	61.4	57.4	55.4	55.4	52.4	45.4
Ao/S . 10^(-Dn,e/10)	2.52E-05	7.98E-05	0.000159	2E-05	7.98E-07	1.59E-07
Swi/S . 10^(-Rwi/10)	0.000151	0.00012	2.39E-05	0.000006	9.51E-06	1.51E-06
Sew/S . 10^(-Rew/10)	0.000034	1.35E-05	1.08E-05	2.7E-06	8.54E-07	8.54E-07
Srr/S . 10^(-Rrr/10)	0.000951	0.000239	0.00006	1.9E-05	7.55E-06	7.55E-06
10log10(S/A)+3	6.565473	5.51812	4.9382	4.9382	5.218487	5.218487
Leq,2	38.61337	29.46879	24.3845	17.12537	10.3404	0.650493
A-Weighting	-16.1	-8.6	-3.2	0	1.2	1
A-Weighted Leq	**22.51337**	**20.86879**	**21.1845**	**17.12537**	**11.5404**	**1.650493**

A-Weigted Level Outside	**59.5**
BS8233 Predicted Internal A-Weigted Level	**27**
Prediced Building Envelope SRI	**33**

Plot 29-South Façade-First Floor

BS8233 Calculation can be seen below:

$$L_{eq,2} \approx L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Figure 18. Rigorous Calculation Plot 29 Front (First Floor)

Non Frequency Dependent Variables			Key for Table Below	
Term	Derivation	Value		
Ao	Given in BS EN 20140-10 = 10 (m^2)	10	Rwi	Sound Reduction of Window (Octave)
Sf	Total Facade Area (m^2)	10	Rew	Sound Reduction Index of External Wall (Oct
Swi	Window Area (m^2)	1.5	Rrr	Sound Reduction Index of Roof/Ceiling (Octa
Sew	External Wall Area (m^2)	8.5	A	Equivalent Absorbtion Area of Rx Room
Srr	Ceiling Area (m^2)	15	Dn,e	Insulation of Trickle Vent (BS EN 20140-10)
S	Total Area sound enters the room (m^2)	25		

Frequency Dependent Variables							
		Octave Band Centre Frequency					
Term	Description	125	250	500	1000	2000	4000
Leq,ff	Free-Field External Noise Level	61.4	57.4	55.4	55.4	52.4	45.4
Dn,e	No Vent	100	100	100	100	100	100
Rwi	18mm open Plenum Window	23.2	29.7	39.8	48.3	44.2	49.7
Rew	8233 Example (WALL)	40	44	45	51	56	56
Rrr	8233 EXAMPLE (Roof)	28	34	40	45	49	49
A	Equivalent Absorbtion Area of Room (Copied from BS8233)	11.00	14.00	16.00	16.00	15.00	15.00

BS8233 Calculation Details						
	Octave Band Centre Frequency					
Term From Equation Below	125	250	500	1000	2000	4000
Leq,ff	61.4	57.4	55.4	55.4	52.4	45.4
Ao/S . 10^(-Dn,e/10)	4E-11	4E-11	4E-11	4E-11	4E-11	4E-11
Swi/S . 10^(-Rwi/10)	0.000287	6.43E-05	6.28E-06	8.87E-07	2.28E-06	6.43E-07
Sew/S . 10^(-Rew/10)	0.000034	1.35E-05	1.08E-05	2.7E-06	8.54E-07	8.54E-07
Srr/S . 10^(-Rrr/10)	0.000951	0.000239	0.00006	1.9E-05	7.55E-06	7.55E-06
10log10(S/A)+3	6.565473	5.51812	4.9382	4.9382	5.218487	5.218487
Leq,2	39.01073	27.92448	19.20506	13.87195	7.907765	0.185235
A-Weighting	-16.1	-8.6	-3.2	0	1.2	1
A-Weighted Leq	**22.91073**	**19.32448**	**16.00506**	**13.87195**	**9.107765**	**1.185235**

A-Weigted Level Outside	**59.5**	**Plot 29-South Façade-First Floor**
BS8233 Predicted Internal A-Weigted Level	**25**	
Prediced Building Envelope SRI	**34**	

BS8233 Calculation can be seen below:

$$L_{eq,2} \approx L_{eq,ff} + 10\log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10\log_{10}\left(\frac{S}{A}\right) + 3$$

Figure 19. Rigorous Calculation, Plot 29 Front (First Floor)

6.3 Good Acoustic Design

It is recognised as good practice and consistent with the advice in ProPG,2017 that sensitive spaces/habitable rooms such as bedrooms can be placed onto the quieter facades. From the information in Figure 16 above, it is noted that there is a 18dB(rounded) difference between the first floor front and rear facades of Plot 29. Placing a bedroom onto the rear facades would only incur an SRI of 14dB and less onerous glazing being required.

6.4 External Amenity Areas

BS8233:2014 in 7.7.3.2 states as follows

"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.

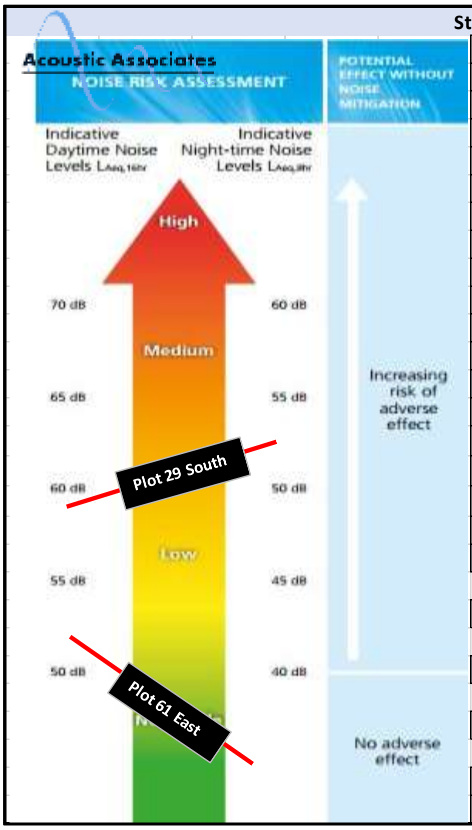
Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

The noise mapping predictions indicate that all garden spaces will be below 50dB $L_{Aeq, 16 hour}$ which comfortably achieves the requirements of BS8233:2014 and ProPG2017.

6.5 ProPG2017 Initial Site Risk Assessment

An initial site risk assessment, consistent with the requirements of ProPG2017 to inform stakeholders and decision makers alike is produced below in Figure 20. It is recognised that this presents the worst-case plot, ie plot 29 closest to the roadside. To ensure a fair approach, the assessment included the rear of the plot and additionally, Plot 68 closest to the Sports-field area.

The outcome of the initial site risk assessment is a low/medium risk for developing the site.



Stage 1. Initial Site Risk Assessment	
Site:	Land North of Guildford Road, Rudgwick
Date:	20-May-25
Individual	Scott Castle
Proposal	Proposed Residential
Survey or Prediction	Survey
Freefield Survey	
Instrumentation used	Castle Mirus and Svantek 971A
Typical/Worst case 24 hour period	
Location Assessed(Grid Ref)	0
Subjective Noise sources at site	Passing Vehicle traffic, birdsong
Weather conditions	mixed
Result	
No Mitigation Measures	
Daytime ($L_{Aeq, 16 hour}$)	60/55 dB $L_{Aeq,16 hour}$ (Plot 29 and Plot 61)
Night ($L_{Aeq, 8 hour}$)	54/26 dB $L_{Aeq, 8 hour}$ (Plot 29 and Plot 61)
Night L_{AMax} Events above 45dB(A)	219 events assuming Rw13 at Survey Location
Outcome	
Level of Risk Posed	Low
Next Steps	
Stage 2 Full Assessment	No
Signed Off by	Peter Attwood
Date	20-May-25

Figure 20. ProPG2017 Initial Site Risk Assessment

6.6 Building Regulations Approved Document O – Overheating

The 2D noise mapping indicates that the majority of the site can be assessed considering the simplified assessment method, whereby the night time external soundscape is below 50dB $L_{Aeq,\ 8\ hours}$.

It is relevant to note than an overheating assessment is not carried out for ground floor bedroom windows, only first floors and above.

Based on Figure 21 below it is evident that only the rear/North façade can be considered for a bedroom window having an openable window using the simplified assessment method Ie, the external predicted sound pressure levels are below 50dB $L_{Aeq,8\ hour}$)

The front and side windows can still be assessed, albeit not through the simplified route. This instead requires an analysis of how much of an openable window will be possible, see Figure 22 below.

Simplified Assessment of Openable Bedroom Window on North Façade of Plot 29							
Location	Predicted Night Time External Soundscape	Below 50dB $L_{Aeq,8\ hour}$	Open Window	Predicted Internal SPL	Below 40dB $L_{Aeq,8\ hour}$	Below 55dB L_{Amax} 10 Events per Night	Windows Openable
Plot 29 North FF	37.0	Yes	10	27.0	Yes	Yes	Yes

Figure 21. Approved Document O - Overheating Assessment (simplified)

Based on Figure 21 above, bedroom windows would be openable during the night time period if bedrooms were located onto the quieter northern façade of Plot 29. Such an approach remains consistent with the good acoustic design principles as ProPG2017.

Openable Window Assessment - Plot 29				
Location	Predicted External Night Time Continous Sound Pressure Level-dB(A)	Internal Condition (dB-$L_{Aeq,\ 8\ hour}$)	SRI Required	Openable Window (m^2)
Plot 29 East FF	50.9	40	10.9	0.322062
Plot 29 South FF	54.5	40	14.5	0.140585
Plot 29 West FF	50.7	40	10.7	0.337241

Figure 22. Approved Document O - Overheating Assessment (Openable Area)

Contextually, it is recognised that a standard through frame slot trickle vent is approximately 2500mm^2. This equates to 0.0025m^2. Therefore, an openable window in Figure 16 of any less than this will not be practical. The data should be shared with your M+E/overheating consultant. This does not apply to any of the front-facing windows in Fig 22 above.

The above data should be used by the client in combination with a detailed overheating dynamic risk assessment to determine the risk of overheating, where this occurs and what mitigation measures may be required to facilitate cooling of bedrooms.

7 Conclusion

Two unattended class 1 sound level meters were used to identify the site soundscape between 19th and 24th March 2025. LT1 was placed in close proximity to the A281, Guildford Road and LT2 was placed on the site boundary with the school sports-field to the East of the site.

The A281, Guildford Road dominates the site soundscape and IMMI noise modelling software has been used to model the sound energy which propagates across the site. Consistent with good practice, the noise model utilised the highest measured daytime and night time sound pressure levels. The sports field has also been modelled to consider a worst-case measured hour.

The residential plot which represents the worst case is plot 29 which is closest to the A281, and requires a Sound Reduction Index on the Southern façade of 32dB. On the Northern façade, as expected, the SRI decreases to only 14dB. The worst-case plot is capable of being constructed and to present a robust case, a bedroom has been considered onto the Southern first floor façade and values utilised from BS8233:2014 Annex G2, given that the layouts and window sizes are not yet determined at an outline stage. The rigorous calculation identified that the bedroom glazing could be enhanced to Pilkington 10\12\6 ($R_{traffic}$ of 32dB(A)) and utilise a through wall acoustic vent to protect the future occupants against adverse noise levels.

It is apparent from the noise modelling, that value engineering can be applied to the site to ensure that a one size fits all approach is not implemented. Noise modelling has been used to show the locations where enhanced mitigation measures are required and these are only a small number of residential plots adjacent to the A281 (plots 20 and 29).

Consistent with good practice and ProPG2017 to inform stakeholders and decision makers alike, an initial site risk assessment has been carried out and concludes a low-medium risk of developing the site.

An assessment has also been made of external amenity spaces/gardens and all areas are below 50dB $L_{Aeq, 16 hour}$.

As an outline assessment, the calculations have shown through good acoustic design that sensitive spaces such as bedrooms can be placed onto the quieter facades and this can be reviewed in later iterations of planning. Notwithstanding this, the calculations have identified that as a worst case, bedrooms could be placed onto the noisier façade.

A noise modelling approach was also used to demonstrate areas where a simplified assessment for overheating is capable of being carried out to consider first floor bedroom windows being opened during the night time period.

In summary, planning permission should not be withheld on noise grounds and the site is capable of being developed for 90 dwellings.