

# **Acoustic** South East



## Discharge of Condition, Land off East Street, Rusper

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Project: J4143

Issue 1

Site: **East Street, Rusper. RH12 4RE**

Client: **Devine Homes Plc**

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|         |            |                |
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## 1 Introduction and Executive Summary

Acoustic South East have been appointed to undertake an acoustic assessment to support a planning application for a discharge of condition. Specifically, it is proposed to discharge condition 6 of DC/25/0523, which relates to acoustics and a scheme of protection for future occupants.

Standards and guidance referenced for this assessment include:

- BS8233:2014 - Guidance on Sound Insulation and Noise Reduction for Buildings
- ProPG2017 - Professional Practice Guidance on Planning & Noise
- AVOG2020 – Acoustics, Ventilation and Overheating Guidance, Jan 2020

Horsham District Council consented the erection of 18 detached residential units under DC/25/0523 on 16<sup>th</sup> December 2025. Condition 6 was placed requiring an acoustic assessment.

Two class 1 sound level meters were used to measure the site soundscape from 5<sup>th</sup> to 12<sup>th</sup> January 2026 at the northern and southern site boundaries. Whilst present on site, the soundscape did include aviation noise from take offs in a westerly direction.

The measured data was consistent with the published 2024 Gatwick Noise Contours.

In using a noise modelling approach, the predicted sound pressure levels around the site were combined with the published noise contours to ensure a robust assessment and to prevent a situation whereby in a model, all the sound energy was wrongly attributed to the roadside passing vehicles.

The worst-case required sound reduction index (SRI) for a living room was 23dB and for a bedroom, 27dB. Rigorous calculations were carried out to demonstrate that the levels of attenuation necessary to protect the future occupants were capable of being achieved with standard thermal double glazing (4\12\4) and acoustic vents with either through frame or through wall passive vents. For the avoidance of doubt, the assessment ensured compliance with both Table 4 values in BS8233:2014 as well as the bedroom overnight  $L_{Amax}$  requirements in ProPG2017 to ensure future occupants remain protected against external noise levels.

Garden levels were also assessed and are likely be below 55dB  $L_{Aeq,16\text{ hour}}$ . For plots 7 and 13, these exceed by 1dB but this is largely as a result of the addition of the daytime aircraft noise contours.

Based on the above, the local planning authority may discharge condition 6 of DC25/0523.

## 2 Context, Noise Criteria & Noise Assessment Methodology

### 2.1 Context

This assessment supports a discharge of condition application being made to Horsham District Council. Specifically condition 6 is proposed to be discharged.

This relates to the erection of 18 new build properties and was consented by Horsham District Council (DC/25/0523) on 16/12/2025.

For ease of reference condition 6 is worded as follows:

*Prior to development above ground floor slab level a residential noise impact assessment shall be submitted to and approved in writing by the Local Planning Authority. The assessment shall take account of aircraft noise and shall set out a scheme of acoustic attenuation and ventilation sufficient to maintain thermal comfort and avoid overheating. Any mechanical ventilation (if required) shall be designed in accordance with the ANC Acoustics Ventilation and Overheating: Residential Design Guide 2020. The scheme shall also include performance details and a glazing plan sufficient to achieve the habitable room standards as detailed in BS8233:2014 [and appropriate consideration of LA<sub>max</sub>]. The dwellings shall be constructed in accordance with the approved details and the acoustic and ventilation measures shall be retained to an equivalent and/or superior standard thereafter.*

It should be noted that a proposed discharge of condition 12 relating to Air Source Heat Pumps has been carried out under a different report to avoid complication.

### 2.2 Site Location

The consented application site is detailed in red in Figure 1.

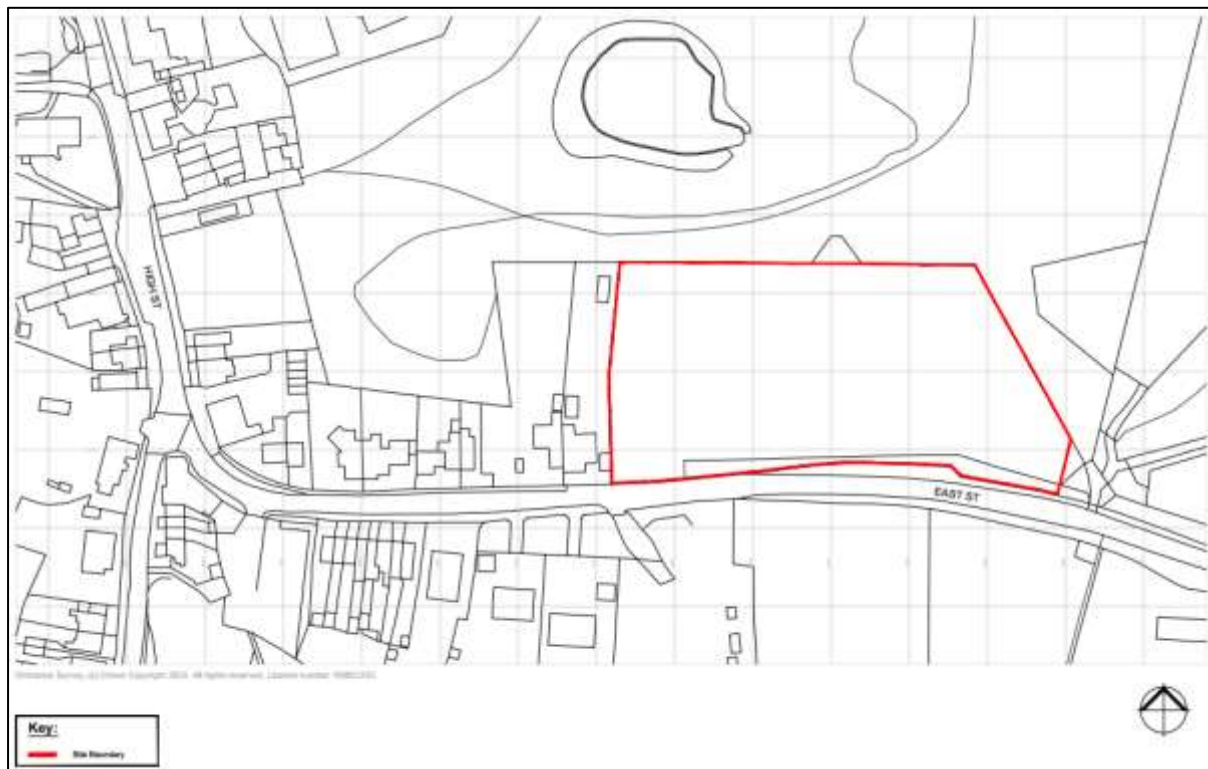


Figure 1. Site Location



### 2.5.1 BS8233:2014- Guidance on Sound Insulation and Noise Reduction for Buildings

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

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

Table 1. BS8233:2014 Criteria

It is relevant to note that Table 4 criteria in BS8233:2014 relates to continuous and anonymous sound.

### 2.5.2 World Health Organisation Guidelines for Community Noise dated 1999 (revised 2018)

The onset of moderate annoyance for the use of external amenity areas is considered to be 50dB  $L_{Aeq,16 hour}$ . The onset of serious annoyance for the use of external amenity areas is considered to be 55dB  $L_{Aeq,16 hour}$ .

### 2.5.3 ProPG2017 - Professional Practice Guidance on Planning & Noise

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

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

### 2.5.4 Building Regulations Approved Document O

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.

Whilst this is strictly a Building Regulations function, it is relevant to be able to convey to the client whether bedroom windows are likely to be openable during the night time period. The reference to overheating withing condition 6 is noted, so will be included within the assessment.

### 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.

### 2.5.6 Overheating Consultant

Doherty Energy provided an energy and sustainability statement to accompany the application dated 18<sup>th</sup> February 2025 (Ref E1485-ESS-00).

## 2.6 Methodology

Two class 1 sound level meters were installed at the application site to measure the site soundscape and inform a computer noise modelling approach. These were installed both at the roadside and the northern boundary to determine what, if any, difference there may be in the measured data.

Consistent with the Planning Noise Advice Document Sussex, Nov 2023, the resolution was set to 1-minute periods for both sound level meters. The Weighting was A-Weighted and Fast. Both positions, LT1 and LT2 were freefield.

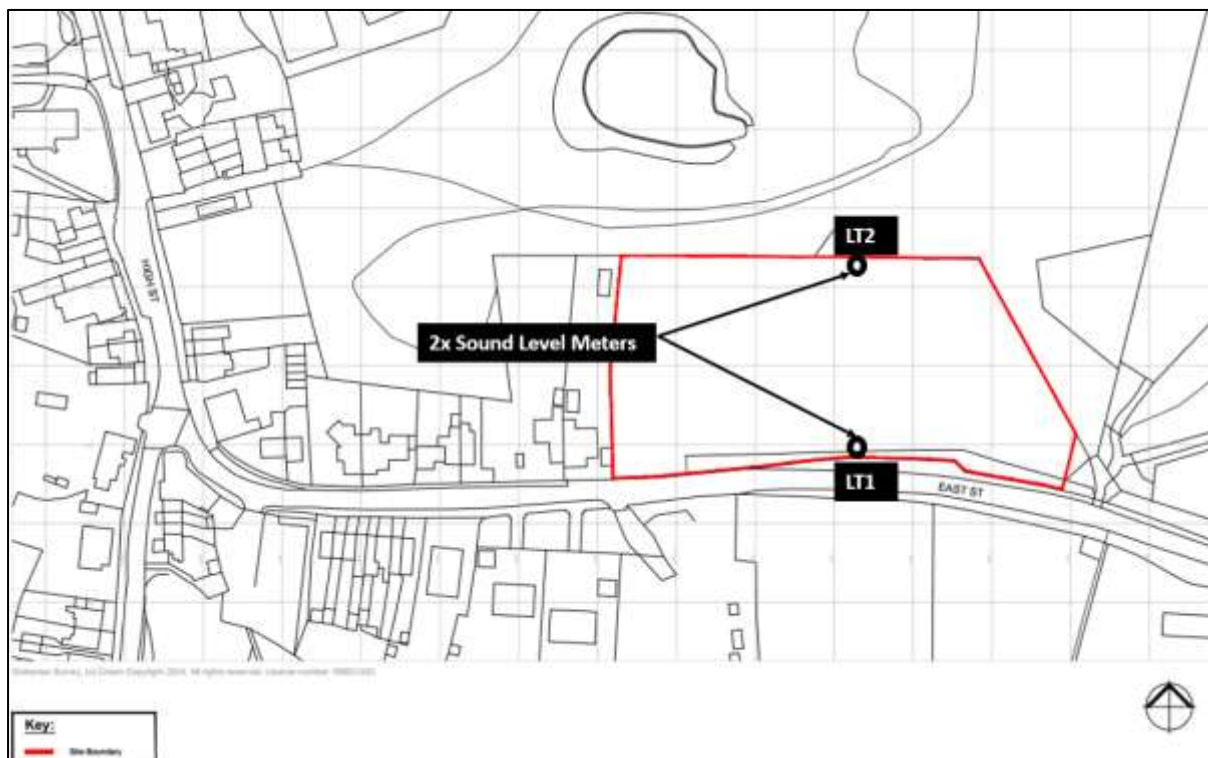


Figure 3. Location of Long-Term Monitoring Positions



Figure 4. Long Term Survey Locations

|                          |                                                                                                                         |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Survey(s) carried out by | Scott Castle BSc(Hons) Env Health, MCIEH CEnvH MIOA                                                                     |
| Equipment Used           | LT1 – Norsonic 140 Class 1 Sound Level Meter<br>LT2 - Svantek 971A Class 1 Sound Level Meter                            |
| Equipment Used           | Castle Acoustic Calibrator – Serial No. 041173                                                                          |
| Location                 | LT1-///being.aliens.alright, 1.85m (7.8m from roadside)<br>LT2 - ///staples.suitable.commuted. 2.1m above ground level. |
| Duration                 | 5 <sup>th</sup> January 2026 – 12 <sup>th</sup> January 2026                                                            |

Figure 5. Survey Details

### 3 Results of Noise Monitoring

Both locations were measured and are being reported in freefield conditions, with A-weighted and Fast time weightings applied. Note that LT1 data was terminated at 07:00 hours on 11 Jan 2026, this is discussed further in 4.1 below.

#### 3.1 LT1 (Roadside)

| LT1 Assessment |       |                         |       |                        |      |                 |            |                        |                        |
|----------------|-------|-------------------------|-------|------------------------|------|-----------------|------------|------------------------|------------------------|
| Day            | Date  | L <sub>Aeq</sub> 16/8Hr |       | 11th L <sub>Amax</sub> |      | Sound Reduction |            |                        |                        |
|                |       | Day                     | Night | 1 min                  | 2min | Day 16Hr        | Night 8 Hr | L <sub>Amax,1min</sub> | L <sub>Amax,2min</sub> |
| Mon            | 05/01 |                         | 50.3  | 72.5                   | 72.5 |                 | 20         | 28                     | 28                     |
| Tue            | 06/01 | 60.7                    | 52.9  | 73.5                   | 73.5 | 26              | 23         | 29                     | 29                     |
| Wed            | 07/01 | 60.7                    | 51.8  | 73.1                   | 73   | 26              | 22         | 28                     | 28                     |
| Thu            | 08/01 | 61.4                    | 53.0  | 74.2                   | 74.2 | 26              | 23         | 29                     | 29                     |
| Fri            | 09/01 | 61.1                    | 50.5  | 73.4                   | 73.4 | 26              | 20         | 28                     | 28                     |
| Sat            | 10/01 | 60.3                    | 50.4  | 72.2                   | 72.2 | 25              | 20.4       | 27.2                   | 27.2                   |
| AVERAGE:       |       | 61                      | 51    | 73                     | 73   | 26              | 21         | 28                     | 28                     |

Figure 6. External Measured Data at LT1

#### 3.2 LT2 (Northern Site Boundary)

| LT2 Assessment |       |                         |       |                        |      |                 |            |                        |                        |
|----------------|-------|-------------------------|-------|------------------------|------|-----------------|------------|------------------------|------------------------|
| Day            | Date  | L <sub>Aeq</sub> 16/8Hr |       | 11th L <sub>Amax</sub> |      | Sound Reduction |            |                        |                        |
|                |       | Day                     | Night | 1 min                  | 2min | Day 16Hr        | Night 8 Hr | L <sub>Amax,1min</sub> | L <sub>Amax,2min</sub> |
| Mon            | 05/01 |                         | 40.9  | 59.8                   | 59.4 |                 | 11         | 15                     | 14                     |
| Tue            | 06/01 | 54.2                    | 45.6  | 63.3                   | 63.1 | 19              | 16         | 18                     | 18                     |
| Wed            | 07/01 | 54.2                    | 42.6  | 62.9                   | 62.9 | 19              | 13         | 18                     | 18                     |
| Thu            | 08/01 | 53.6                    | 46.1  | 64.6                   | 64.5 | 19              | 16         | 20                     | 20                     |
| Fri            | 09/01 | 54.3                    | 44.6  | 67.9                   | 67.9 | 19              | 15         | 23                     | 23                     |
| Sat            | 10/01 | 53.8                    | 44.5  | 67.9                   | 67.0 | 19              | 15         | 23                     | 22                     |
| Sun            | 11/01 | 53.8                    | 45.8  | 66.7                   | 66.6 | 19              | 16         | 22                     | 22                     |
| AVERAGE:       |       | 54                      | 44    | 65                     | 64   | 19              | 14         | 20                     | 19                     |

Figure 7. External Measured Data at LT2

## 4 Review of Results

### 4.1 LT1

Unfortunately, despite enclosing the microphone in corrugated hosepipe casing, on the return visit, it was immediately apparent that sheep were in the field. In calibrating LT1, it was apparent that the microphone cable had been pulled from the box and chewed and would not calibrate. Having reviewed the dataset, this occurred at approximately 08:00 hours on Sunday 11<sup>th</sup> Jan 2026.

### 4.2 Expected Difference between LT1 and LT2

LT1 was located at approximately 7.8m North of East Street. LT2 was located an additional 61.5m North. Therefore, the anticipated difference in sound pressure levels between LT1 and LT2 assuming only the road as a line source would allow for a 9.4dB reduction in sound pressure levels ( $10\log(68.3/7.8)$ ).

### 4.3 Actual Difference Between LT1 and LT2

There is an average of 7dB difference between LT1 and LT2 indicating that sounds other than from road traffic noise at East Street are impacting the data, which is consistent with Gatwick departures overhead (see soundscape in section 2.4)

### 4.4 Civil Aviation Authority – Gatwick Noise Contours (2024)

From the published 2024 noise contours ERCD Report 2502, Rusper appears as follows:

Figure B13 – Gatwick Summer Day (78% West/22% East) – between 54-57dB  $L_{Aeq,16\text{ hour}}$

Figure B14 – Gatwick Summer Night (78% West/22% East) – between 48-51dB  $L_{Aeq,8\text{ hour}}$

Figure B15 – Gatwick Summer Day (75% West/25% East) – between 54-57dB  $L_{Aeq,16\text{ hour}}$

The contours and the consented site are presented in Figure 8 below. The noise contours are generally consistent with the LT2 data away from the roadside.

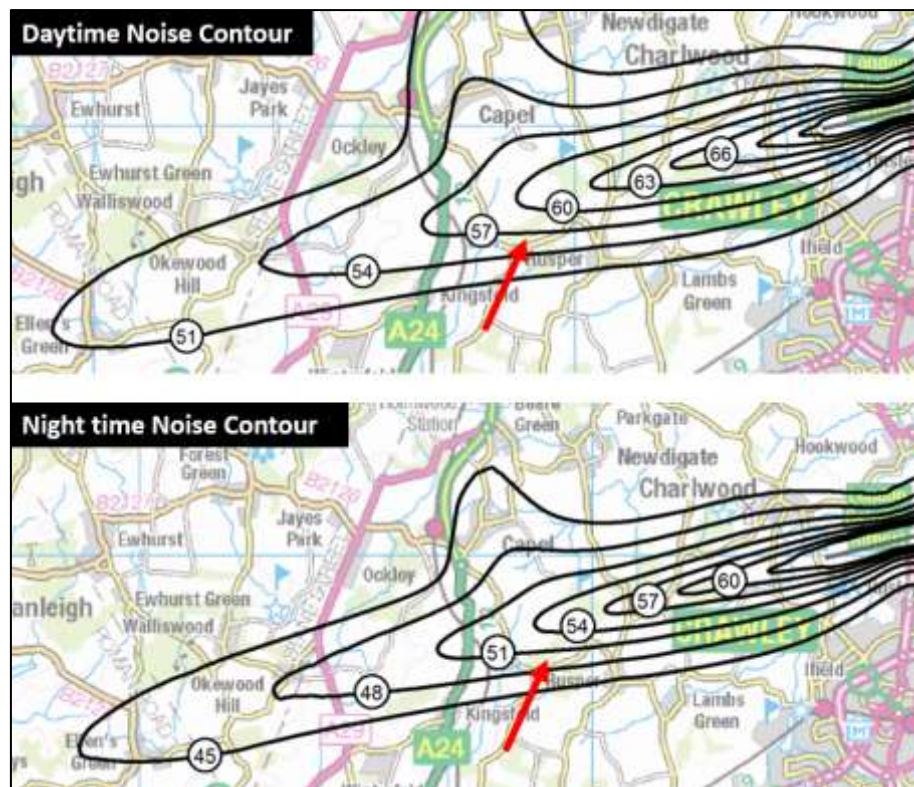


Figure 8. Gatwick Published Noise Contours (2024)

#### 4.5 Sound Reduction Index (SRI) at Long Term Measurement Positions

It was noted that there were intermittent construction sounds occurring to the South of the site across the road at the new and existing and more distant construction sites. However, whilst the intention was to compare a Sunday with the weekdays, this was not possible using the LT1 data.

However, it is clearly apparent that the driver for the SRI at both sound level meter positions is the overnight measured data and specifically the  $L_{Amax}$  data.

For LT1, the daytime required SRI is 26dB, the night time required SRI is 23dB and the overnight ProPG2017 requirement to ensure no more than 10 events per night inside a bedroom is 29dB.

For LT2, the daytime required SRI is 19dB, the night time required SRI is 16dB and the overnight ProPG2017 requirement to ensure no more than 10 events per night inside a bedroom is 23dB.

Whilst it is noted that the dwellings are set back further from the road, the SRI of the measurement positions is highlighted to demonstrate that it is the overnight period which is the noisier period and requires future occupants to be protected from.

## 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

Houses were constructed as per the approved plans in terms of location and heights.

Reception points were added to denote both ground floor kitchen/living/dining areas (1.5m above ground level), as well as first floor bedroom spaces (4.5m above ground level). For the 18 dwellings, bedrooms occur at first floor, with kitchens, living and dining rooms at ground floor spaces.

Receptor positions were also added for garden spaces at 1.5m above ground level in each of the 18 gardens.

East Street, Rusper was added as a single line source and calibrated to 61dB  $L_{Aeq, 16 \text{ hours}}$  for the daytime period and 41dB  $L_{Aeq, 8 \text{ hours}}$  for the night time period.

Fence-lines between properties were added at 1.8m above ground level.

### 5.2 Noise Model Outputs (Road Traffic Noise Only-East Street, Rusper)

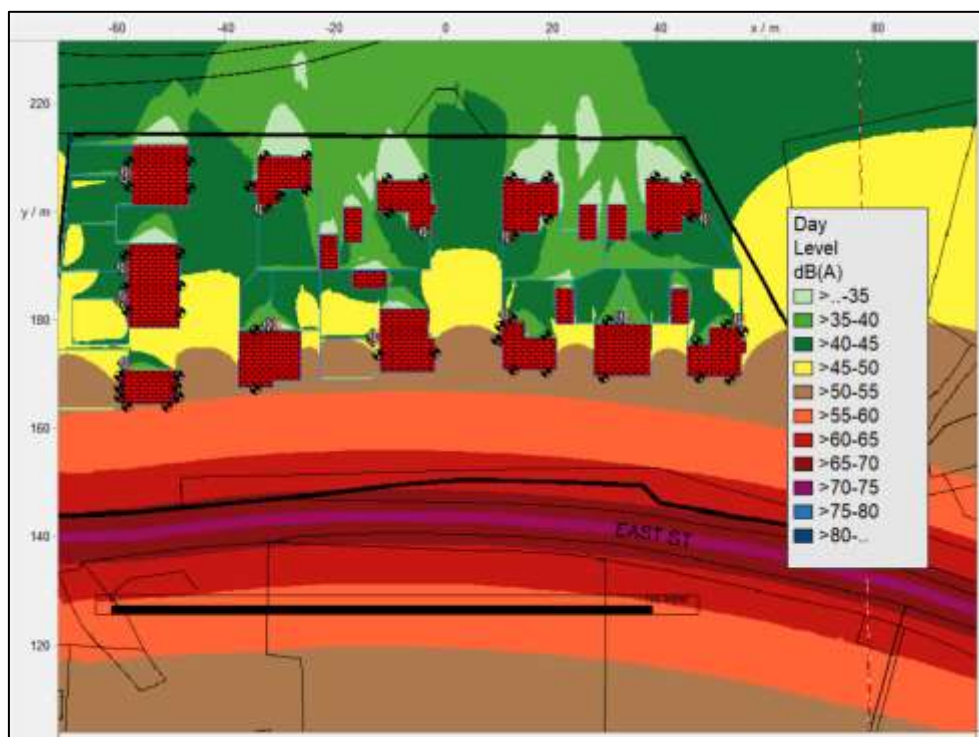


Figure 9. 2D Noise Modelling Contours (Road Traffic Only)- Daytime

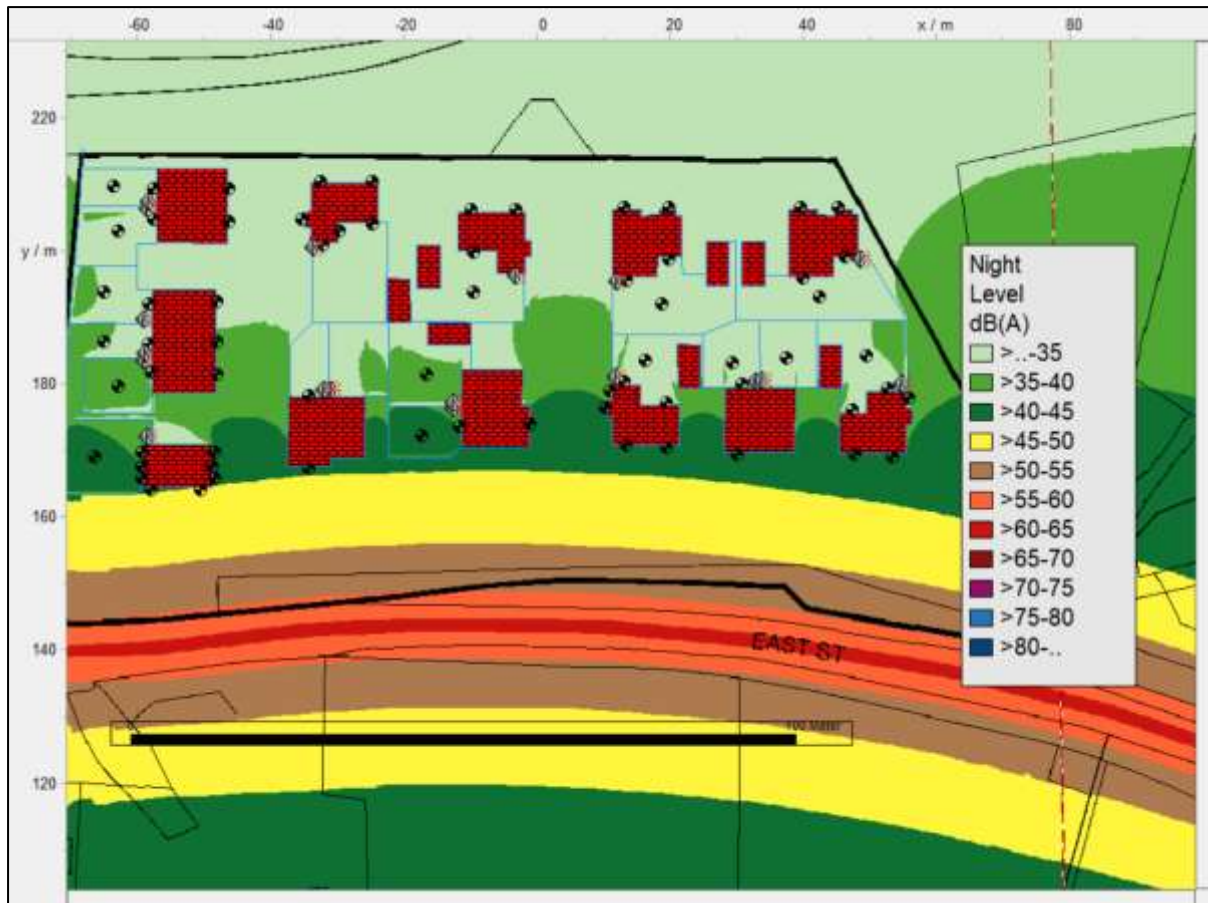


Figure 10. 2D Noise Modelling Contours (Road Traffic Only)- Night time

## 6 Discussion

### 6.1 Post Noise Modelling – Inclusion of Aviation Noise

To ensure the accuracy of the model for both road traffic noise and aviation noise, the Gatwick noise contours were added to the predicted daytime and night time sound pressure levels consistent with section 4.4 above.

The predictions (day and night) were logarithmically summed with the daytime and night time noise contours to produce a new combined sound pressure level.

For example, for plot 18 in the top North West Corner of the development, the predicted road only noise model predicted outcome would be 41.3dB. When combined with a 54dB daytime noise contour, this becomes 54.2dB ( $10 \cdot \log(10^{4.13} + 10^{5.4})$ ) = 54.2dB.

This ensures an accurate noise model whereby the sound does not just come from the road as a single sound source, but includes the impact from aviation also. It also prevents a situation whereby all the sound energy is placed into East Street as a line source.

## 6.2 Calculation of the Sound Reduction Index (SRI)

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.

All ground floor and first floor habitable rooms have been plotted.

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.

The SRI has been calculated using the following methodology:

The receptor positions from the noise model have been run.

The results both daytime and night time have been combined with the Gatwick noise contours.

The new predicted sound pressure levels (combined) around the site are then compared against 35dB to obtain the relevant daytime SRI which will be applicable to lounges/living rooms and kitchens. To determine the relevant night time SRI which includes an assessment of the 1-minute data for a ProPG analysis to ensure no more than 10 events per night inside a bedroom, the LT1 data was viewed to determine the difference between the required daytime SRI and the required SRI for the required  $L_{Amax}$  events. The difference between the maximum night time SRI (23) and the maximum SRI for  $L_{Amax}$  events was 6dB. Therefore, instead of using 30dB for the night time continuous period, 6dB was subtracted to account for both continuous and  $L_{Amax}$  events with 24dB used for the night time period.

The receptor positions were then compared against these values to determine the SRI, as seen in Figure 11 below which account for both living spaces (ground floors) as well as bedrooms for the consented 18 dwellings.

For the bedroom spaces, the maximum SRI is 27dB (rounded). For the living room spaces, the maximum SRI is 23dB (rounded).

| Living Room Spaces   |                   |             | Bedroom SRI      |                   |                      |             |
|----------------------|-------------------|-------------|------------------|-------------------|----------------------|-------------|
| Plot Number          | Predicted Daytime | SRI (Night) | Plot Number      | Predicted Daytime | Predicted Night Time | SRI (Night) |
| 13 Living (2)        | 57.6              | 22.6        | 13 bed 2(2)      | 59.0              | 50.7                 | 26.7        |
| 13 Kitchen-diner(2)  | 57.4              | 22.4        | 13 Bed 1         | 58.8              | 50.5                 | 26.5        |
| 11+12 Living room GF | 57.3              | 22.3        | 11+12 Bed 2      | 58.7              | 50.5                 | 26.5        |
| 2+3 Kitchen          | 57.0              | 22.0        | 2+3 Bedroom 2 FF | 58.0              | 50.1                 | 26.1        |
| 1 Living-Dining Grd  | 56.9              | 21.9        | 1 bed 1          | 58.0              | 50.1                 | 26.1        |
| 4 Living Room (s)-Gd | 56.7              | 21.7        | 1 Bed 3 FF       | 58.0              | 50.0                 | 26.0        |
| 4 KLD(1) Grd         | 56.6              | 21.6        | 13 bed 2         | 57.9              | 50.0                 | 26.0        |
| 13 Living Room GF    | 56.2              | 21.2        | 4 Bed 3          | 57.6              | 49.8                 | 25.8        |
| 7 Living room GF     | 55.7              | 20.7        | 4 Bed 1 FF       | 57.5              | 49.8                 | 25.8        |
| 1 KLD side Ground    | 55.5              | 20.5        | 13 bed 1(2)      | 57.4              | 49.7                 | 25.7        |
| 13 Kitchen-Diner     | 55.4              | 20.4        | 13 Bed 3         | 56.8              | 49.3                 | 25.3        |
| 7+8 KLD              | 55.4              | 20.4        | 7+8 Bed 2 FF     | 56.4              | 49.1                 | 25.1        |
| 14 Living-diner      | 54.5              | 19.5        | 13 Bed 1(3)      | 56.4              | 49.1                 | 25.1        |
| 15 Living diner      | 54.4              | 19.4        | 7+8 Bed 1        | 56.3              | 49.1                 | 25.1        |
| 16 living diner      | 54.3              | 19.3        | 14 Bed 2         | 55.1              | 48.5                 | 24.5        |
| 17 Live-Diner        | 54.3              | 19.3        | 14 Bed 1         | 55.1              | 48.5                 | 24.5        |
| 9 Kitchen-Diner S-G  | 54.3              | 19.3        | 1 Bed 2 Side FF  | 55.1              | 48.5                 | 24.5        |
| 6 Living S           | 54.3              | 19.3        | 15 Bed1          | 54.9              | 48.4                 | 24.4        |
| Plot 5 Dining        | 54.3              | 19.3        | 4 Bed 2(2) FF    | 54.9              | 48.4                 | 24.4        |
| 17 Kitchen           | 54.3              | 19.3        | 15 Bed 2         | 54.8              | 48.3                 | 24.3        |
| 10 kitchen Diner Gd  | 54.2              | 19.2        | 16 Bed 1         | 54.8              | 48.3                 | 24.3        |
| Plot 5 Living S      | 54.2              | 19.2        | 9 Bed 2 FF       | 54.7              | 48.3                 | 24.3        |
| 18 Live-diner        | 54.2              | 19.2        | 6 Bedroom 4      | 54.6              | 48.3                 | 24.3        |
| 18 Kitchen           | 54.2              | 19.2        | 16 Bed 2         | 54.6              | 48.3                 | 24.3        |
| 10 kitchen Diner Gd  | 54.2              | 19.2        | 17 Bed2+3        | 54.6              | 48.2                 | 24.2        |
| 9 Living Room S Grd  | 54.2              | 19.2        | Plot 5 Bed2      | 54.5              | 48.2                 | 24.2        |
| 10 Living SGF*       | 54.2              | 19.2        | 18 Bed 2+3       | 54.5              | 48.2                 | 24.2        |
| 6 Dining             | 54.1              | 19.1        | 10 Bed 2 FF      | 54.5              | 48.2                 | 24.2        |
| 10 kitchen Diner Eas | 54.1              | 19.1        | 6 Bed 2          | 54.4              | 48.2                 | 24.2        |
| 1 KLD Ground-REAR    | 54.1              | 19.1        | 17 Bed 1         | 54.4              | 48.2                 | 24.2        |
| 1 Living-Dining Grd2 | 54.1              | 19.1        | 18 Bed 1         | 54.3              | 48.1                 | 24.1        |
| 4 Living Room (n)-Gd | 54.1              | 19.1        | Plot 5 Bedroom 4 | 54.2              | 48.1                 | 24.1        |
| 2+3 Living-Diner     | 54.1              | 19.1        | 1 Bed2-REAR*     | 54.1              | 48.0                 | 24.0        |
| 11+12 Kitchen Diner  | 54.1              | 19.1        | 11+12 Bed 1      | 54.1              | 48.0                 | 24.0        |
| Plot 5 Kitchen       | 54.0              | 19.0        | 4 Bed 2 FF       | 54.1              | 48.0                 | 24.0        |
| 9 Kitchen-Diner-Grd  | 54.0              | 19.0        | 2+3 Bedroom 1    | 54.1              | 48.0                 | 24.0        |
| 6 Living N           | 54.0              | 19.0        | 9 Bed 1 FF       | 54.0              | 48.0                 | 24.0        |
| 10 Kitchen Diner Gd  | 54.0              | 19.0        | Plot 5 Bed 1     | 54.0              | 48.0                 | 24.0        |
| Plot 5 Living N      | 54.0              | 19.0        | 6 Bed 1          | 54.0              | 48.0                 | 24.0        |
| 10 Living N GF       | 54.0              | 19.0        | 6 Bedroom 3      | 54.0              | 48.0                 | 24.0        |
| 9 Living Room N Grd  | 54.0              | 19.0        | 10 Bed 3 FF      | 54.0              | 48.0                 | 24.0        |
| 6 Kitchen GF         | 54.0              | 19.0        | 9 Bed3           | 54.0              | 48.0                 | 24.0        |
|                      |                   |             | Plot 5 bedroom 3 | 54.0              | 48.0                 | 24.0        |
|                      |                   |             | 10 Bed 1 FF      | 54.0              | 48.0                 | 24.0        |

Figure 11. SRI For Bedrooms and Living Spaces

### 6.3 Consideration of the Sound Reduction Index vs AVOG 2020

The worst-case SRI to be achieved is 27dB. As per Figure 12 below, this indicates that this is achievable with passive ventilation and the use of enhanced glazing and acoustic vents.

For context, the Acoustics, Ventilation and Overheating Guidance dated Jan 2020 describes the relationship between the level difference between inside and outside sound pressure levels and how this might be achieved with different ventilation types, with types 1 and 2 being trickle vents, type 3 being mechanical extract ventilation (MEV) and type 4 being Mechanical Ventilation and Heat Recovery.

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

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

**Figure 12. AVOG Jan 2020 Extract Table B-2- Mitigation Measures**

From section 6.2 above, it is apparent that upgraded glazing and/or vents are likely to be required and these will be tested as part of rigorous calculations. It is vital to recognise that the number and sizing of windows will play a key role in what mitigation measures are required.

## 6.4 External Amenity Areas

Garden areas for plots 1-18 have been assessed by placing a receptor position at 1.5m above ground level, in the garden area of each plot.

To ensure an accurate prediction, to ensure the inclusion of aviation noise and a worst-case model, the daytime noise contour of 54dB  $L_{Aeq, 16 \text{ hour}}$  was added also. The results in Figure 13 below are therefore combined for road traffic and aviation noise and represent a worst case.

| Location       | Predicted External SPL-<br>$L_{Aeq, 16 \text{ hour}}$ |
|----------------|-------------------------------------------------------|
| Plot 1 Garden  | 54                                                    |
| Plot 2 Garden  | 54                                                    |
| Plot 3 Garden  | 54                                                    |
| Plot 4 Garden  | 54                                                    |
| Plot 6 Garden  | 54                                                    |
| Plot 5 Garden  | 54                                                    |
| Plot 9 Garden  | 54                                                    |
| Plot 8 Garden  | 55                                                    |
| Plot 7 Garden  | 56                                                    |
| Plot 13 Garden | 56                                                    |
| Plot 14 Garden | 55                                                    |
| Plot 15 Garden | 55                                                    |
| Plot 16 Garden | 54                                                    |
| Plot 17 Garden | 54                                                    |
| Plot 18 Garden | 54                                                    |

**Figure 13. Predicted Garden Areas (Road and Aviation Noise Combined)**

Given the location of LT2 as a long-term monitoring position at the northern boundary of the site, this was less likely to be impacted by road traffic noise. Accordingly, the garden areas are likely to be circa 54dB  $L_{Aeq, 16 \text{ hour}}$ .

The majority of the garden plots are below 55dB  $L_{Aeq, 16 \text{ hour}}$ , however plots 7 and 13 exceed this criterion by 1dB. Both of these plots are relatively close to East Street and already have included aviation noise in the measured data at LT1. The addition of the noise contours is very much around ensuring that properties away from the roadside have a reliable exposure to an aviation soundscape.

## 6.5 Overheating Assessment (Simplified)

### 6.5.1 Doherty Energy Assessment – Overheating

The following extract has been taken from the Doherty energy assessment.

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>5.0</b> | <b><u>OVERHEATING</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| a)         | It is important to consider the internal comfort conditions for the occupants of the dwelling. At design stage, this can be met through the use of the "cooling hierarchy". The cooling hierarchy seeks to reduce any potential overheating and also the need to cool a building through active cooling measures. Air conditioning systems are a very resource intensive form of active cooling, increasing carbon dioxide emissions, and also emitting large amounts of heat into the surrounding area. By incorporating the cooling hierarchy into the design process buildings will be better equipped to manage their cooling needs and to adapt to the changing climate they will experience over their lifetime. |
| b)         | The development shall reduce the potential for overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy: <ul style="list-style-type: none"><li>a) minimise internal heat generation through energy efficient design</li><li>b) reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls</li><li>c) manage the heat within the building through exposed internal thermal mass and high ceilings</li><li>d) passive ventilation</li><li>e) mechanical ventilation</li><li>f) active cooling systems (ensuring they are the lowest carbon options).</li></ul> |
| c)         | During the initial design, the initial SAP Assessment was carried out for the dwelling to help assess the energy demand and carbon emissions of the development. The SAP Assessment includes an overheating assessment in line with the requirements of the Building Regulations.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| d)         | Based on this SAP Assessment, the dwellings have a slight to medium risk of solar overheating. This is acceptable under the requirements of the Building Regulations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

- e) The internal heat generation has been minimised through energy efficient design. All of the luminaires shall be low energy which will also remove an internal heat generating load.
- f) The heat entering the building in summer is reduced through the optimisation of glazing area, the use of shading via building form and other protruding edges, together with the inclusion of very high performance façade materials and improved air tightness. The use of a solar control glazing, which has a coating applied to lower the G Value of the glass, can be applied. This acts in the same way that the low e coating lowers the U Value which helps reduce heat losses through the windows.
- g) The dwellings could have a mechanical ventilation system installed, which provides filtered fresh air to the dwelling. This is tempered by the crossover heat exchanger, which recovers waste heat from the extract air from the dwelling. The ventilation systems shall be controlled locally by the occupants.
- h) Low energy lamps shall be used in the luminaires to reduce heat gain. These lamps do not emit heat like traditional GLS lamps.
- i) It is also possible to include passive ventilation within the cores and staircase by utilising the smoke vents. The smoke vents are linked to thermostats and can be opened if the temperature exceeds an upper limit, thus providing passive and natural ventilation to these areas to remove any potential heat build-up.
- j) If required, during the detailed design phase of this project, dynamic thermal modelling, using IES software to produce an SBEM model, in accordance with CIBSE Guide A, TM52 and TM49, can be used to ensure that the finding of the initial overheating assessment are still valid and provide a more detailed assessment and prediction of the overheating risk for the development.

## 6.5.2 Building Regulations Approved Document O – Openable Window Assessment

An assessment has been made of the openable area for the bedroom windows. This is not a dynamic overheating risk assessment as per CIBSE TM59, however, the data should be shared with your consultants and design team to ensure that the openable areas are taken into consideration. This has been predicted in Figure 14 below and uses the guidance from the Association of Noise Consultants - dated November 2024.

| Openable Window Assessment |                            |                                                 |             |                                   |
|----------------------------|----------------------------|-------------------------------------------------|-------------|-----------------------------------|
| Unit/Plot                  | Internal Requirement (ADO) | SRI to achieve 40dB L <sub>Aeq</sub> Internally | Room Volume | Openable Window (m <sup>2</sup> ) |
| 13 bed 2(2)                | 40                         | 10.7                                            | 27.84       | 0.375                             |
| 13 Bed 1                   | 40                         | 10.5                                            | 38.64       | 0.545                             |
| 11+12 Bed 2                | 40                         | 10.5                                            | 30.96       | 0.437                             |
| 2+3 Bedroom 2 FF           | 40                         | 10.1                                            | 30.48       | 0.472                             |
| 1 bed 1                    | 40                         | 10.1                                            | 31.44       | 0.486                             |
| 1 Bed 3 FF                 | 40                         | 10.0                                            | 22.32       | 0.353                             |
| 13 bed 2                   | 40                         | 10.0                                            | 27.84       | 0.441                             |
| 4 Bed 3                    | 40                         | 9.8                                             | 22.32       | 0.37                              |
| 4 Bed 1 FF                 | 40                         | 9.8                                             | 31.44       | 0.521                             |
| 13 bed 1(2)                | 40                         | 9.7                                             | 38.64       | 0.656                             |
| 13 Bed 3                   | 40                         | 9.3                                             | 18.96       | 0.353                             |
| 7+8 Bed 2 FF               | 40                         | 9.1                                             | 27.84       | 0.542                             |
| 13 Bed 1(3)                | 40                         | 9.1                                             | 38.64       | 0.753                             |
| 7+8 Bed 1                  | 40                         | 9.1                                             | 38.16       | 0.744                             |
| 14 Bed 2                   | 40                         | 8.5                                             | 30.72       | 0.6877                            |
| 14 Bed 1                   | 40                         | 8.5                                             | 38.16       | 0.854                             |
| 1 Bed 2 Side FF            | 40                         | 8.5                                             | 32.4        | 0.725                             |
| 15 Bed1                    | 40                         | 8.4                                             | 38.16       | 0.874                             |
| 4 Bed 2(2) FF              | 40                         | 8.4                                             | 32.4        | 0.742                             |
| 15 Bed 2                   | 40                         | 8.3                                             | 30.72       | 0.72                              |
| 16 Bed 1                   | 40                         | 8.3                                             | 38.16       | 0.894                             |
| 9 Bed 2 FF                 | 40                         | 8.3                                             | 32.4        | 0.759                             |
| 6 Bedroom 4                | 40                         | 8.3                                             | 23.28       | 0.545                             |
| 16 Bed 2                   | 40                         | 8.3                                             | 30.72       | 0.72                              |
| 17 Bed2+3                  | 40                         | 8.2                                             | 18.96       | 0.454                             |
| Plot 5 Bed2                | 40                         | 8.2                                             | 27.84       | 0.667                             |
| 18 Bed 2+3                 | 40                         | 8.2                                             | 18.96       | 0.454                             |
| 10 Bed 2 FF                | 40                         | 8.2                                             | 32.4        | 0.777                             |
| 6 Bed 2                    | 40                         | 8.2                                             | 27.84       | 0.6678                            |
| 17 Bed 1                   | 40                         | 8.2                                             | 30          | 0.736                             |
| 18 Bed 1                   | 40                         | 8.1                                             | 30          | 0.736                             |
| Plot 5 Bedroom 4           | 40                         | 8.1                                             | 23.28       | 0.571                             |
| 1 Bed2-REAR*               | 40                         | 8.0                                             | 32.4        | 0.813                             |
| 11+12 Bed 1                | 40                         | 8.0                                             | 38.16       | 0.958                             |
| 4 Bed 2 FF                 | 40                         | 8.0                                             | 32.4        | 0.813                             |
| 2+3 Bedroom 1              | 40                         | 8.0                                             | 30.96       | 0.777                             |
| 9 Bed 1 FF                 | 40                         | 8.0                                             | 31.44       | 0.789                             |
| Plot 5 Bed 1               | 40                         | 8.0                                             | 33.12       | 0.831                             |
| 6 Bed 1                    | 40                         | 8.0                                             | 33.36       | 0.837                             |
| 6 Bedroom 3                | 40                         | 8.0                                             | 23.28       | 0.584                             |
| 10 Bed 3 FF                | 40                         | 8.0                                             | 22.32       | 0.56                              |
| 9 Bed3                     | 40                         | 8.0                                             | 22.32       | 0.56                              |
| Plot 5 bedroom 3           | 40                         | 8.0                                             | 23.28       | 0.584                             |
| 10 Bed 1 FF                | 40                         | 8.0                                             | 31.44       | 0.789                             |

Figure 14. Maximum Openable Window Area-m<sup>2</sup>

**Where**

$D_{2m,rT}$  is the is the façade level difference between the A-weighted level 2m in front of the façade ( $L_{1,2m}$ ), and the standardised internal A-weighted level ( $L_{eq,2,rT}$ ). In the absence of any better alternative method, the same principle can be applied to  $L_{AFmax}$

$V$  is the room volume ( $m^3$ )

$EA$  is the Equivalent Area of the open window ( $m^2$ )

Equation 2<sup>6</sup>  $EA \text{ based on freefield level difference} = V \times 10^{\left(\frac{-(D_{2m,rT} + 8)}{10}\right)}$

Contextually, when interpreting Figure 14 above, it should be recognised that a standard through-frame small slot trickle vent is approximately 2500mm<sup>2</sup>. This equates to 0.0025m<sup>2</sup>. Therefore, an openable window in Figure 14 above of any less than this would not be practical. Notwithstanding this, it is seen that the windows are capable of being opened.

Overheating assessments are not carried out for ground floor windows as these are not openable during the night time period on safety or security grounds.

## 6.6 Rigorous Calculations

It is relevant to review the worst-case requirements for room spaces with these being an enhanced living room requiring an SRI of 23dB (Plot 13) and an enhanced bedroom of 27dB (Plot 13, Bedroom 2).

As per Annex G2 of BS8233:2014, calculations have been undertaken to determine the sound reduction index performance of the worst-case residential spaces. The SRI takes account of both continuous daytime and night time sound pressure levels, but also the relevant SRI needed to protect against external  $L_{Amax}$  events.

Attention is drawn to section 6.2 above where the Sound Reduction Index for each of the facades has been calculated.

Rather than a simplistic outside to inside calculation, the rigorous calculations use the ratio of glazing to brickwork to more accurately calculate the noise break in. The following assumptions are made in carrying out the rigorous calculations:

The input data uses external predicted freefield values

Where there are rooms with glazing on more than one elevation, the glazing has been summed and assessed against the façade with the highest sound pressure levels. This is true for both the living room and bedroom 2 of Plot 13.

| Outcome of Rigorous Calculations |             |              |              |        |                                    |              |              |
|----------------------------------|-------------|--------------|--------------|--------|------------------------------------|--------------|--------------|
| Plot                             | Rooms       | External SPL | SRI Required | Window | Vent                               | Internal SPL | SRI Achieved |
| Plot 13                          | Living Room | 58           | 23           | 4\12\4 | 2X Titon SF5000                    | 31           | 28           |
| Plot 13                          | Living Room | 58           | 23           | 4\12\4 | Ryttons 9x9 Airliner (12800mm2)    | 30           | 29           |
| Plot 13                          | Bedroom 2   | 59           | 27           | 4\12\4 | 2X Titon SF5000                    | 31           | 28           |
| Plot 13                          | Bedroom 2   | 59           | 27           | 4\12\4 | Ryttons AAC125HP LookRyt (8500mm2) | 30           | 29           |

**Figure 15. Outcomes of the Rigorous Calculations**

Figure 15 above considers both trickle vents (through window frame) as well as passive through wall vents for both the living room and bedroom assessments of Plot 13. Note that for the bedroom, the calculation also considers the roof structure as a relevant pathway. The detailed assessment is presented in Figures 15 and 16 below for ease of reference.

The rigorous calculations demonstrate that the use of standard thermal double glazing (4\12\4) and acoustic vents achieves the Sound Reduction Index (SRI) requirements. Figure 15 demonstrates both through frame vents as well as through wall vents may be suitable.

| Non Frequency Dependent Variables |                                                    |          | Key for Table Below |                                                 |  |  |  |  |  |
|-----------------------------------|----------------------------------------------------|----------|---------------------|-------------------------------------------------|--|--|--|--|--|
| Term                              | Derivation                                         | Value    | R <sub>wi</sub>     | Sound Reduction of Window (Octave)              |  |  |  |  |  |
| A <sub>o</sub>                    | Given in BS EN 20140-10 = 10 (m <sup>2</sup> )     | 10       | R <sub>ew</sub>     | Sound Reduction Index of External Wall (Octave) |  |  |  |  |  |
| S <sub>f</sub>                    | Total Facade Area (m <sup>2</sup> )                | 32.88    | R <sub>rr</sub>     | Sound Reduction Index of Roof/Ceiling (Octave)  |  |  |  |  |  |
| S <sub>wi</sub>                   | Window Area (m <sup>2</sup> )                      | 4.6875   | A                   | Equivalent Absorption Area of Rx Room           |  |  |  |  |  |
| S <sub>ew</sub>                   | External Wall Area (m <sup>2</sup> )               | 28.1925  | D <sub>n,e</sub>    | Insulation of Trickle Vent (BS EN 20140-10)     |  |  |  |  |  |
| S <sub>rr</sub>                   | Ceiling Area (m <sup>2</sup> )                     | 0.00001  |                     |                                                 |  |  |  |  |  |
| S                                 | Total Area sound enters the room (m <sup>2</sup> ) | 32.88001 |                     |                                                 |  |  |  |  |  |

| Frequency Dependent Variables |                                                                        |                              |       |       |       |       |       |
|-------------------------------|------------------------------------------------------------------------|------------------------------|-------|-------|-------|-------|-------|
| Term                          | Description                                                            | Octave Band Centre Frequency |       |       |       |       |       |
|                               |                                                                        | 125                          | 250   | 500   | 1000  | 2000  | 4000  |
| Leq,ff                        | Free-Field External Noise Level                                        | 60                           | 56    | 54    | 54    | 51    | 44    |
| D <sub>n,e</sub>              | 2x Titon SF 5000                                                       | 34.5                         | 32.4  | 29.1  | 36.8  | 43.1  | 56.7  |
| R <sub>wi</sub>               | 4_12_4                                                                 | 24                           | 20    | 25    | 35    | 38    | 35    |
| R <sub>ew</sub>               | Cavity Masonry (Brick Cavity with Insulation lightweight block)        | 41                           | 39    | 44    | 52    | 60    | 65    |
| R <sub>rr</sub>               | Tile on Felt, Pitched Roof, 100mm mineral wool on plasterboard ceiling | 28                           | 34    | 43    | 43    | 43    | 43    |
| A                             | Equivalent Absorption Area of Room (Copied from BS8233)                | 11.00                        | 14.00 | 16.00 | 16.00 | 15.00 | 15.00 |

| BS8233 Calculation Details                                  |                              |          |          |          |          |          |  |
|-------------------------------------------------------------|------------------------------|----------|----------|----------|----------|----------|--|
| Term From Equation Below                                    | Octave Band Centre Frequency |          |          |          |          |          |  |
|                                                             | 125                          | 250      | 500      | 1000     | 2000     | 4000     |  |
| Leq,ff                                                      | 60                           | 56       | 54       | 54       | 51       | 44       |  |
| A <sub>o</sub> /S . 10 <sup>^</sup> (-D <sub>n,e</sub> /10) | 0.000108                     | 0.000175 | 0.000374 | 6.35E-05 | 1.49E-05 | 6.5E-07  |  |
| S <sub>wi</sub> /S . 10 <sup>^</sup> (-R <sub>wi</sub> /10) | 0.000568                     | 0.001426 | 0.000451 | 4.51E-05 | 2.26E-05 | 4.51E-05 |  |
| S <sub>ew</sub> /S . 10 <sup>^</sup> (-R <sub>ew</sub> /10) | 6.81E-05                     | 0.000108 | 3.41E-05 | 5.41E-06 | 8.57E-07 | 2.71E-07 |  |
| S <sub>rr</sub> /S . 10 <sup>^</sup> (-R <sub>rr</sub> /10) | 4.82E-10                     | 1.21E-10 | 1.52E-11 | 1.52E-11 | 1.52E-11 | 1.52E-11 |  |
| 10log <sub>10</sub> (S/A)+3                                 | 7.755393                     | 6.708039 | 6.12812  | 6.12812  | 6.408407 | 6.408407 |  |
| Leq,2                                                       | 36.46865                     | 35.03443 | 29.46871 | 20.69853 | 13.24586 | 7.036366 |  |
| A-Weighting                                                 | -16.1                        | -8.6     | -3.2     | 0        | 1.2      | 1        |  |
| A-Weighted Leq                                              | 20.36865                     | 26.43443 | 26.26871 | 20.69853 | 14.44586 | 8.036366 |  |

|                                            |    |                                  |
|--------------------------------------------|----|----------------------------------|
| A-Weighted Level Outside                   | 58 | Plot 13 Living Room (3x Windows) |
| BS8233 Predicted Internal A-Weighted Level | 31 |                                  |
| Predicted Building Envelope SRI            | 28 |                                  |

| BS8233 Calculation can be seen below:                                                                                                                                                                                                                                            |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| $L_{eq,2} \approx L_{eq,ff} + 10 \log_{10} \left( \frac{A_o}{S} 10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S} 10^{\frac{-R_{rr}}{10}} \right) + 10 \log_{10} \left( \frac{S}{A} \right) + 3$ |  |

Figure 16. Plot 13 Living Room Assessment

| Non Frequency Dependent Variabl+C2:J62es                                                                                                                                                                                                                                                                               |                                                                        |                              | Key for Table Below |                                                 |          |          |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------|---------------------|-------------------------------------------------|----------|----------|----------|
| Term                                                                                                                                                                                                                                                                                                                   | Derivation                                                             | Value                        | R <sub>wi</sub>     | Sound Reduction of Table Window (Octave)        |          |          |          |
| A <sub>o</sub>                                                                                                                                                                                                                                                                                                         | Given in BS EN 20140-10 = 10 (m^2)                                     | 10                           | R <sub>ew</sub>     | Sound Reduction Index of External Wall (Octave) |          |          |          |
| S <sub>f</sub>                                                                                                                                                                                                                                                                                                         | Total Facade Area (m^2)                                                | 18.24                        | R <sub>rr</sub>     | Sound Reduction Index of Roof/Ceiling (Octave)  |          |          |          |
| S <sub>wi</sub>                                                                                                                                                                                                                                                                                                        | Window Area (m^2)                                                      | 3.125                        | A                   | Equivalent Absorbtion Area of Rx Room           |          |          |          |
| S <sub>ew</sub>                                                                                                                                                                                                                                                                                                        | External Wall Area (m^2)                                               | 15.115                       | D <sub>n,e</sub>    | Insulation of Trickle Vent (BS EN 20140-10)     |          |          |          |
| S <sub>rr</sub>                                                                                                                                                                                                                                                                                                        | Ceiling Area (m^2)                                                     | 11.6                         |                     |                                                 |          |          |          |
| S                                                                                                                                                                                                                                                                                                                      | Total Area sound enters the room (m^2)                                 | 29.84                        |                     |                                                 |          |          |          |
|                                                                                                                                                                                                                                                                                                                        |                                                                        |                              |                     |                                                 |          |          |          |
| Frequency Dependent Variables                                                                                                                                                                                                                                                                                          |                                                                        |                              |                     |                                                 |          |          |          |
| Term                                                                                                                                                                                                                                                                                                                   | Description                                                            | Octave Band Centre Frequency |                     |                                                 |          |          |          |
|                                                                                                                                                                                                                                                                                                                        |                                                                        | 125                          | 250                 | 500                                             | 1000     | 2000     | 4000     |
| Leq,ff                                                                                                                                                                                                                                                                                                                 | Free-Field External Noise Level                                        | 61                           | 57                  | 55                                              | 55       | 52       | 45       |
| D <sub>n,e</sub>                                                                                                                                                                                                                                                                                                       | Ryttons AAC125HP Look Ryt                                              | 42                           | 37                  | 34                                              | 43       | 57       | 64       |
| R <sub>wi</sub>                                                                                                                                                                                                                                                                                                        | 4_12_4                                                                 | 24                           | 20                  | 25                                              | 35       | 38       | 35       |
| R <sub>ew</sub>                                                                                                                                                                                                                                                                                                        | Cavity Masonry (Brick Cavity with Insulation lightweight block)        | 41                           | 39                  | 44                                              | 52       | 60       | 65       |
| R <sub>rr</sub>                                                                                                                                                                                                                                                                                                        | Tile on Felt, Pitched Roof, 100mm mineral wool on plasterboard ceiling | 28                           | 34                  | 43                                              | 43       | 43       | 43       |
| A                                                                                                                                                                                                                                                                                                                      | Equivalent Absorbtion Area of Room (Copied from BS8233)                | 11.00                        | 14.00               | 16.00                                           | 16.00    | 15.00    | 15.00    |
|                                                                                                                                                                                                                                                                                                                        |                                                                        |                              |                     |                                                 |          |          |          |
| BS8233 Calculation Details                                                                                                                                                                                                                                                                                             |                                                                        |                              |                     |                                                 |          |          |          |
| Term From Equation Below                                                                                                                                                                                                                                                                                               |                                                                        | Octave Band Centre Frequency |                     |                                                 |          |          |          |
|                                                                                                                                                                                                                                                                                                                        |                                                                        | 125                          | 250                 | 500                                             | 1000     | 2000     | 4000     |
| Leq,ff                                                                                                                                                                                                                                                                                                                 |                                                                        | 61                           | 57                  | 55                                              | 55       | 52       | 45       |
| A <sub>o</sub> /S . 10 <sup>^</sup> (-D <sub>n,e</sub> /10)                                                                                                                                                                                                                                                            |                                                                        | 2.11E-05                     | 6.69E-05            | 0.000133                                        | 1.68E-05 | 6.69E-07 | 1.33E-07 |
| S <sub>wi</sub> /S . 10 <sup>^</sup> (-R <sub>wi</sub> /10)                                                                                                                                                                                                                                                            |                                                                        | 0.000417                     | 0.001047            | 0.000331                                        | 3.31E-05 | 1.66E-05 | 3.31E-05 |
| S <sub>ew</sub> /S . 10 <sup>^</sup> (-R <sub>ew</sub> /10)                                                                                                                                                                                                                                                            |                                                                        | 4.02E-05                     | 6.38E-05            | 2.02E-05                                        | 3.2E-06  | 5.07E-07 | 1.6E-07  |
| S <sub>rr</sub> /S . 10 <sup>^</sup> (-R <sub>rr</sub> /10)                                                                                                                                                                                                                                                            |                                                                        | 0.000616                     | 0.000155            | 1.95E-05                                        | 1.95E-05 | 1.95E-05 | 1.95E-05 |
| 10log10(S/A)+3                                                                                                                                                                                                                                                                                                         |                                                                        | 7.334061                     | 6.286708            | 5.706788                                        | 5.706788 | 5.987076 | 5.987076 |
| Leq,2                                                                                                                                                                                                                                                                                                                  |                                                                        | 38.72586                     | 34.53386            | 27.7331                                         | 19.31568 | 13.69906 | 8.22112  |
| A-Weighting                                                                                                                                                                                                                                                                                                            |                                                                        | -16.1                        | -8.6                | -3.2                                            | 0        | 1.2      | 1        |
| A-Weighted Leq                                                                                                                                                                                                                                                                                                         |                                                                        | 22.62586                     | 25.93386            | 24.5331                                         | 19.31568 | 14.89906 | 9.22112  |
|                                                                                                                                                                                                                                                                                                                        |                                                                        |                              |                     |                                                 |          |          |          |
| A-Weighted Level Outside                                                                                                                                                                                                                                                                                               |                                                                        | 59                           |                     |                                                 |          |          |          |
| BS8233 Predicted Internal A-Weighted Level                                                                                                                                                                                                                                                                             |                                                                        | 30                           |                     |                                                 |          |          |          |
| Prediced Building Envelope SRI                                                                                                                                                                                                                                                                                         |                                                                        | 29                           |                     |                                                 |          |          |          |
|                                                                                                                                                                                                                                                                                                                        |                                                                        |                              |                     |                                                 |          |          |          |
| BS8233 Calculation can be seen below:                                                                                                                                                                                                                                                                                  |                                                                        |                              |                     |                                                 |          |          |          |
| <div><math display="block">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</math></div> |                                                                        |                              |                     |                                                 |          |          |          |

Figure 17. Plot 13 Bedroom 2 Assessment

## 7 Recommendations

### 7.1 Glazing

The assessment concludes that standard thermal double glazing will be sufficient to protect future occupants from adverse noise levels. Whilst Pilkington 4/12/4 was used within the assessment, should the client and/or end developer seek to approach alternative glazing providers then the relevant metric to ensure like for like comparison is  $R_{\text{traffic}}$ . This is sometimes referred to as  $R_w+C_{tr}$  and includes a low frequency correction for road traffic noise.

The  $R_{\text{traffic}}$  for 4\12\4 glazing is 25dB(A).

*N.B. This is the required  $R_w+C_{tr}$  of the frame and glazing together. If the glazing supplier has test results for the glass on its own an  $R_w+C_{tr}$  value 2-3dB higher would be required (glazing tested on its own will outperform glazing that is tested within a window frame). Please note  $R_w+C_{tr}$  is also referred to as  $R_{\text{traffic}}$ .*

### 7.2 Ventilation

The rigorous calculations used commercially available acoustically treated slot trickle vent which is part of the window frame as well as a through wall vent. Both are passive vents and have the following specification:

- Trickle Vents – Titon SF Xtra Sound Attenuator – 5000mm<sup>2</sup> –  $D_{\text{new}}+C_{tr} = 47\text{dB(A)}$
- Living Room – 9x9 Rytons Airliner (12800mm<sup>2</sup>) –  $D_{\text{new}}+C_{tr} = 37\text{dB(A)}$
- Bedroom - Rytons AAC125LookRyt vent (8500mm<sup>2</sup>) these should have a  $D_{\text{new}}+C_{tr}$  of no less than 41dB(A)

It is critical when comparing vents, that only the OPEN data of the vents is compared.

Should the client decide that mechanical ventilation (ie MEV or MVHR) is proposed, then caution should be applied when specifying internal room conditions. This is to ensure a mechanical noise of no greater than 24-26dB  $L_{Aeq,T}$  to ensure that it does not add to the internal soundscape and that future occupants do not switch the system off resulting in poor air quality.

## 8 Conclusion

Horsham District Council consented the erection of 18 detached residential units under DC/25/0523 on 16<sup>th</sup> December 2025. Condition 6 was placed requiring an acoustic assessment.

Two class 1 sound level meters were used to measure the site soundscape from 5<sup>th</sup> to 12<sup>th</sup> January 2026 at the northern and southern site boundaries. Whilst present on site, the soundscape did include aviation noise from take offs in a westerly direction.

The measured data was consistent with the published 2024 Gatwick Noise Contours.

In using a noise modelling approach, the predicted sound pressure levels around the site were combined with the published noise contours to ensure a robust assessment and to prevent a situation whereby in a model, all the sound energy was wrongly attributed to the roadside passing vehicles.

The worst-case required sound reduction index (SRI) for a living room was 23dB and for a bedroom, 27dB. Rigorous calculations were carried out to demonstrate that the levels of attenuation necessary to protect the future occupants were capable of being achieved with standard thermal double glazing (4\12\4) and acoustic vents with either through frame or through wall passive vents. For the avoidance of doubt, the assessment ensured compliance with both Table 4 values in BS8233:2014 as well as the bedroom overnight  $L_{Amax}$  requirements in ProPG2017 to ensure future occupants remain protected against external noise levels.

Garden levels were also assessed and are likely be below 55dB  $L_{Aeq,16\text{ hour}}$ . For plots 7 and 13, these exceed by 1dB but this is largely as a result of the addition of the daytime aircraft noise contours.

Based on the above, the local planning authority may discharge condition 6 of DC25/0523.