



Report Ref. **CLI0521/R1/Rev.D**

# **Noise Impact Assessment Report for a Residential Development**

Land West of Clatterbury Lane, Hill Green, Clavering

01 December 2023

Report prepared for:

**Baya Homes Limited on Behalf of  
E&A Securities**

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## Document Information

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## Summary

This acoustic report has been prepared by Climate Acoustics in support of a planning application by BAYA Group Limited on behalf of E&A Securities for the proposed development, comprising an 'Outline application with all matters reserved except access for up to 28 dwellings (Class C3) including public open space, sustainable drainage systems, landscaping and associated infrastructure and development.' on land to the west of Clatterbury Lane, Clavering, Essex.

Uttlesford District Council has requested a comprehensive noise assessment report according to their noise criteria set out in [Section 2](#) of this report. This is particularly relevant to this application as the nearby road traffic and existing commercial noise could impact the proposed residential development.

Climate Acoustics have measured and assessed the existing noise climate and has provided appropriate sound insulation and mitigation measures to reduce noise emissions inside all habitable rooms and external areas. The primary noise affecting the proposed development is dominated by road traffic noise to the north of the site, Clatterbury Lane to the east, and B1038 to the southeast of the site ([Figure 1](#)). There was also intermittent roof exhaust plant noise from the adjacent Robson's Feed Supplies commercial unit audible to the southeast of the site.

Following Uttlesford District Council's guidance along with British Standard BS 8233:2014 and guidance given in ProPG: Planning & Noise Guidance and British Standard BS 4142:2014+A1:2019, the results of the noise survey have been used to calculate the required façade sound insulation and external amenity noise levels. Here is the summary of the outcome of the noise impact assessment and technical report:

**Existing Commercial Noise ([Section 4.2](#)):** [Section 4.2](#) of this report discusses the noise impact from the adjacent commercial operations to the proposed residential development. **The adjacent commercial noise sources measured during the assessment require specific noise control action shown in [Section 4.2.3](#) of this report to comply with Uttlesford District Council under British Standard BS 4142:2014 ([Appendix C3.3](#)).**

**Consideration for screening, the internal layout and non-habitable rooms facing commercial are discussed in [Section 4.2.3](#) of this report. Further mitigation measures will be necessary for all on-site proposed habitable room windows (i.e. living areas and bedrooms) facing the proposed commercial noise sources, discussed in [Section 4.5](#) of this report.**

**External Amenity Noise Levels ([Section 4.3](#)):** The proposed external amenity gardens/ balconies have been assessed in [Section 4.3](#) of this report. [Appendix D3](#) shows the daytime (07:00 - 23:00) predicted noise map results show that the garden amenity areas are equal to or below the British Standard BS 8233:2014 lower guideline value 50 dB  $L_{Aeq,16hours}$ .

**Therefore, should the mitigation measures discussed in [Section 4.3](#) of this report be followed, the noise levels in garden amenity areas will achieve the lower guideline value under British Standard BS 8233: 2014, and desirable noise levels would have been achieved.**

**Acoustic Ventilation and Overheating ([Section 4.4](#)):** As per 'The AVO Guide 2020' ([Appendix C3.4](#)), [Section 4.4.1](#) of this report shows a level 1 assessment to compare the noise measurement results and the daytime and night-time AVO Guidance values ([Figure 8](#)). The results show that the site is in the '**negligible risk**' category.

**As the whole site is in the 'negligible risk' category, a detailed AVO Level 2 assessment is not required. Therefore, no further mitigation is required, and openable windows are suitable for ventilation.**

**Internal Noise Levels ([Section 4.5](#)):** Typical suitable glazing and ventilation sound reduction requirements for the building façade design are set out in the table in [Section 4.5.1](#) of this report. Glazing and ventilation discussions are provided in [Section 4.5.2](#) and [Section 4.5.3](#), respectively. **If the specifications in the table in [Section 4.5.1](#) are adhered to, the internal noise levels set in British Standard BS 8233:2014 can be achieved.**

**Based on the above, the British Standard BS 8233:2014 requirements for internal noise levels should be achieved, and prior approval should be given.**

**Residential Plant Noise Emission Criteria/ Limits (Section 4.6):** As per British Standard BS 4142:2014+A1:2019 and Uttlesford District Council's noise guidance, if any proposed residential plant is selected that generates external noise, the cumulative noise output will need to adhere to the cumulative noise emission limits ( $L_{A,r,T,r}$ ) outlined in the table in [Section 4.6](#) of this report ( $\leq 5$  dB below the external background noise level).

**A suitable planning condition for noise can adequately control any proposed residential fixed plant.**

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# 1 Introduction

This acoustic report has been prepared by Climate Acoustics in support of a planning application by BAYA Group on behalf of E&A Securities for the proposed development, comprising an *'Outline application with all matters reserved except access for up to 28 dwellings (Class C3) including public open space, sustainable drainage systems, landscaping and associated infrastructure and development.'* on land to the west of Clatterbury Lane, Clavering, Essex.

Uttlesford District Council has requested a comprehensive noise assessment report according to their noise criteria set out in [Section 2](#) of this report. This is particularly relevant to this application as the nearby road traffic and existing commercial noise could impact the proposed residential development.

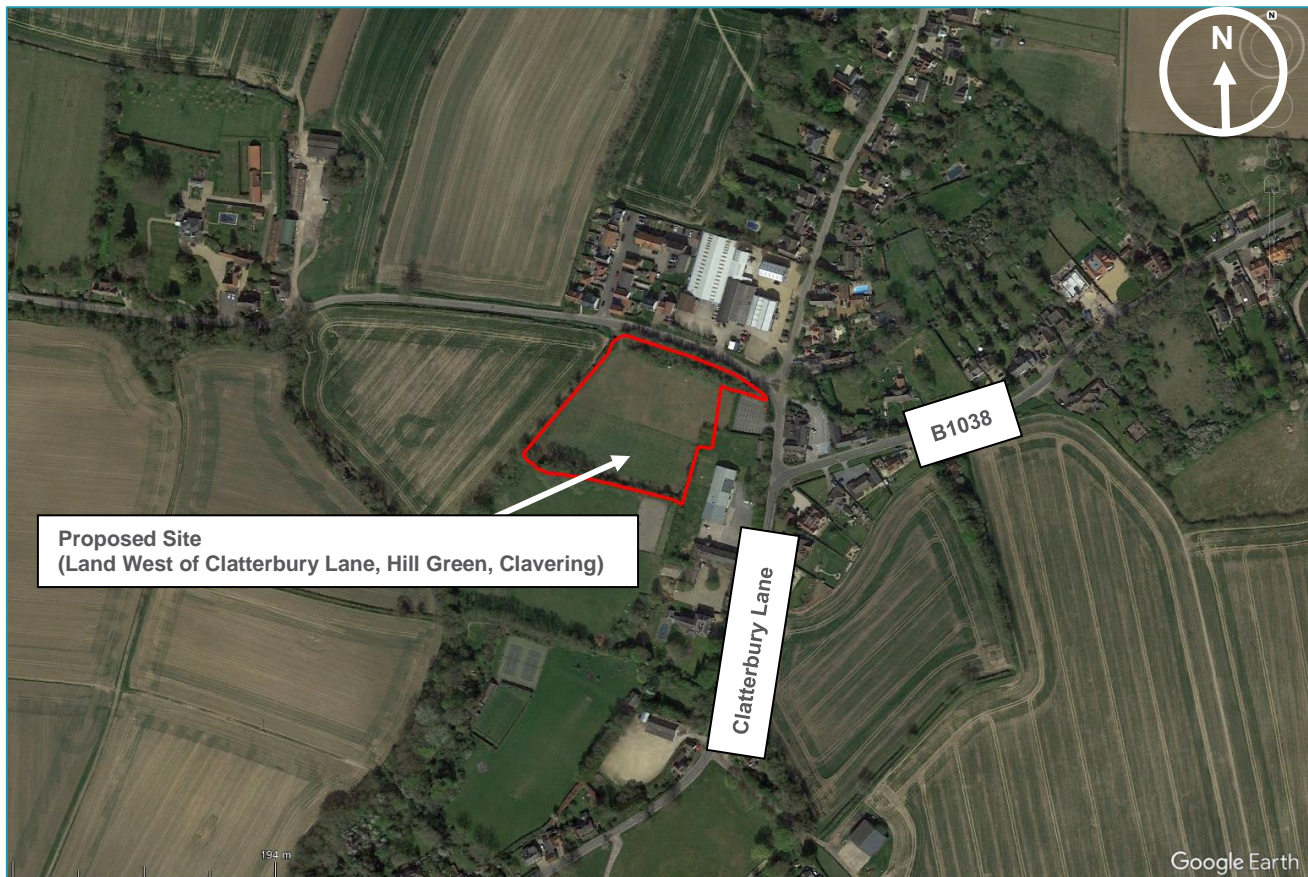
Climate Acoustics will measure and assess the existing external and internal noise climate, and we will suggest appropriate sound insulation and mitigation measures to reduce noise emissions inside all habitable rooms and external areas.

## 1.1. Site Description

[Figure 1](#) shows the location of the proposed residential scheme, and the site boundary is highlighted in **red**.

[Appendix B](#) provides a full overview of the surrounding premises, the site location plan ([Appendix B1](#)), and the proposed site plan ([Appendix B2](#)).

**Figure 1 – Site Boundary (Source: Google Earth™)**



## 2 Noise Criteria

### Uttlesford District Council Noise Criteria

For the new residential development, Uttlesford District Council has detailed that before planning permission is granted a comprehensive noise assessment should be submitted, as per Uttlesford District Council's Local Plan and Technical Guidance ([Appendix C1](#)):

### Residential Internal Design Criteria

Following ProPG reference is made to internal design criteria, and British Standard BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' ([Appendix C3.2](#)) contains guidance for internal design criteria, as shown in the following table.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq, 16hour	-
Dining	Dining room/area	40 dB LAeq, 16hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16hour	30 dB LAeq, 8hour 45 dB LAF,max*

### Plant Noise Criteria

Uttlesford District Council's Noise Assessment Technical Guidance ([Appendix C1.2](#)) requests the following:

*"20.2 The Council consider that new developments should contribute and enhance the area in which they are located and where possible, contribute to the improvement of people's health and quality of life as per the NPSE. With this in mind, the design objective should be:*

*'The development should be designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.*

### **British Standard BS 4142:2014+A1:2019**

British Standard BS 4142:2014+A1:2019 "Methods for Rating and Assessing Industrial and Commercial Sound" ([Appendix C3.3](#)) is used to assess the potential for adverse impact due to the agricultural noise sources at the relevant noise-sensitive property. The existing noise source levels are measured/calculated and compared to the existing background noise level (LA90).

Depending on the noise source characteristics (tonal, intermittent, or impulsive), the noise source is given a rating noise level (penalty additions) and compared to the 'lowest' background noise level (during operating hours). The significance of the existing noise sources can then be given a likelihood of adverse impact, which follows British Standard BS 4142:2014+A1:2019 advice:

*"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.*

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.



- *Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”*

**Subjective method:**

**Tonality:** *For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.*

**Impulsivity:** *A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.*

**Other sound characteristics:** *Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.*

*NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant, then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.*

**Intermittency:** *When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”*

## 3 Noise Climate

### 3.1. Noise Survey Details

[Appendix A1](#) shows the noise survey details, including personnel, instrumentation used, calibration information, calibration procedure, uncertainty, equipment operation time & dates, and the weather conditions.

### 3.2. Noise Climate

**Objective Data:** [Appendix A3](#), [Appendix A4](#) and [Appendix A5](#) shows the unattended and attended noise data. When attending the site, the current noise climate is dominated by road traffic noise to the north of the site, Clatterbury Lane to the east of the site, and B1038 to the southeast of the site ([Figure 1](#)).

There was also intermittent roof exhaust plant noise from the adjacent Robson's Feed Supplies commercial unit audible to the southeast of the site. Note: there was also occasional noise from a vehicles manoeuvring from the yard area outside The Furniture Barn to the southeast of the site.

The Cricketers was also noted to have a kitchen extraction unit serving it, but it was barely audible at the northeast boundary of the proposed site. The car park adjacent to the site was noted as an overflow car park with only a handful of cars parked.

**Subjective Opinion:** Road traffic noise to the north of the site, Clatterbury Lane to the east of the site, and B1038 to the southeast of the site were all dominant during the daytime and night-time assessment. Occasional commercial noise was audible as detailed in [Section 3.2](#), [Section 4.2](#) and [Appendix A5](#) of this report.

### 3.3. Noise Measurement Results

#### 3.3.1. Unattended Noise Monitoring Results (Locations U1 & U2):

The unattended measured day ambient noise level  $L_{Aeq,16\text{ hours}}$  (daytime) and  $L_{Aeq,8\text{ hours}}$  (night-time) and the typical maximum noise level  $L_{AF,max}$  (night) and background noise level  $L_{A90}$  (day and night) at Locations U1 & U2 (locations shown in [Appendix A2](#)) is summarised in the table below (all adjusted for free-field conditions).

A summary of the unattended noise data is presented in graph format in [Appendix A3](#) and [Appendix A4](#).

	Day 07:00 to 23:00 ( $L_{Aeq,16hr}$ )**	Night 23:00 to 07:00 ( $L_{Aeq,8hr}$ )**	Night 23:00 to 07:00 ( $L_{AF,max}$ )**
Location U1 – North Boundary:	48	39	61*
Location U2 – South-East Boundary:	47	38	58*

\*  $10^{th}$  highest measured  $L_{AF,max}$  noise level.

\*\* Noise levels already in free-field conditions.

	Day 07:00 to 23:00 ( $L_{A90,T}$ )***	Night 23:00 to 07:00 ( $L_{A90,T}$ )***
Location U1 – North Boundary:	26	17
Location U2 – South-East Boundary:	29	22

\*\*\* Minimum  $L_{A90,T}$  levels measured during the day and night.

### 3.3.2. Attended Noise Monitoring Results (Locations A1 to A5):

The attended measured noise levels at Locations A1 to A5 are summarised in the table below and a detailed attended noise survey table is shown in [Appendix A5](#) of this report.

The noise measurement results were under free-field conditions, as per the requirements of British Standard BS 8233:2014 and British Standard BS 4142:2014+A1:2019.

Date	Position	Start Time [hh:mm]	Duration	L <sub>Aeq,T</sub> , dB	L <sub>AF,max</sub> , dB	L <sub>A90,T</sub> , dB
06/11/2023	A1	12:02	10 mins	48	61	41
		13:01	10 mins	49	64	43
		14:00	10 mins	49	63	43
		14:50	10 mins	45	53	41
	A2	12:15	10 mins	52	62	45
		13:15	10 mins	50	60	45
		14:21	10 mins	50	67	43
	A3	12:27	10 mins	47	58	40
		13:27	10 mins	53	74	50
14:35		10 mins	46	56	41	
08/11/2023	A4	09:22	1 min	57	72	47
		09:24	1 min	51	66	47
	A5	09:23	1 min	44	49	42

## 4 Noise Impact Assessment

### 4.1. Initial Site Noise Risk Assessment (ProPG – Stage 1)

[Section 4.1](#) of this report shows the initial site noise risk assessment following ProPG.

[Appendix D1](#) & [Appendix D2](#) of this report shows the initial site noise risk assessment following ProPG at the first-floor level (4 metres). *Note: the topography is assumed not to alter significantly, and the proposed buildings are included in the initial site noise risk assessment.*

**Daytime ProPG Site Noise Risk Assessment ([Appendix D1](#)):** Indicative noise levels range from up to 42 dB  $L_{Aeq,16hr}$  facing B1023 to the east boundary of the site and 32 dB  $L_{Aeq,16hr}$  to the south-west boundary of the site. Under ProPG ([Appendix C3.1](#)) this is a **Low Risk** to **Negligible Risk**.

**Night-time ProPG Site Noise Risk Assessment ([Appendix D2](#)):** Indicative noise levels range from up to 53 dB  $L_{Aeq,16hr}$  facing B1023 to the east boundary of the site and 39 dB  $L_{Aeq,16hr}$  to the south-west boundary of the site. Under ProPG ([Appendix C3.1](#)) this is a **Low Risk** to **Negligible Risk**.

In accordance with “*ProPG Planning & Noise: New Residential Development (May 2017)*”, [Appendix C3.1](#) of this report shows that the indicative noise levels measured during the day and night provide the following ‘pre-planning application advice’:

**‘Negligible’ noise risk assessment:**

During the day the properties towards the east of the site the noise risk assessment is a ‘negligible’ noise risk, the pre-planning application advice states:

*“These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.”*

**‘Low’ noise risk assessment:**

During the day the properties towards the west of the site the noise risk assessment is a ‘low’ noise risk, whilst the properties towards the east of the site have a ‘low’ noise risk during the night, the pre-planning application advice states:

*“At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in the ADS (Acoustic Design Statement) which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.”*

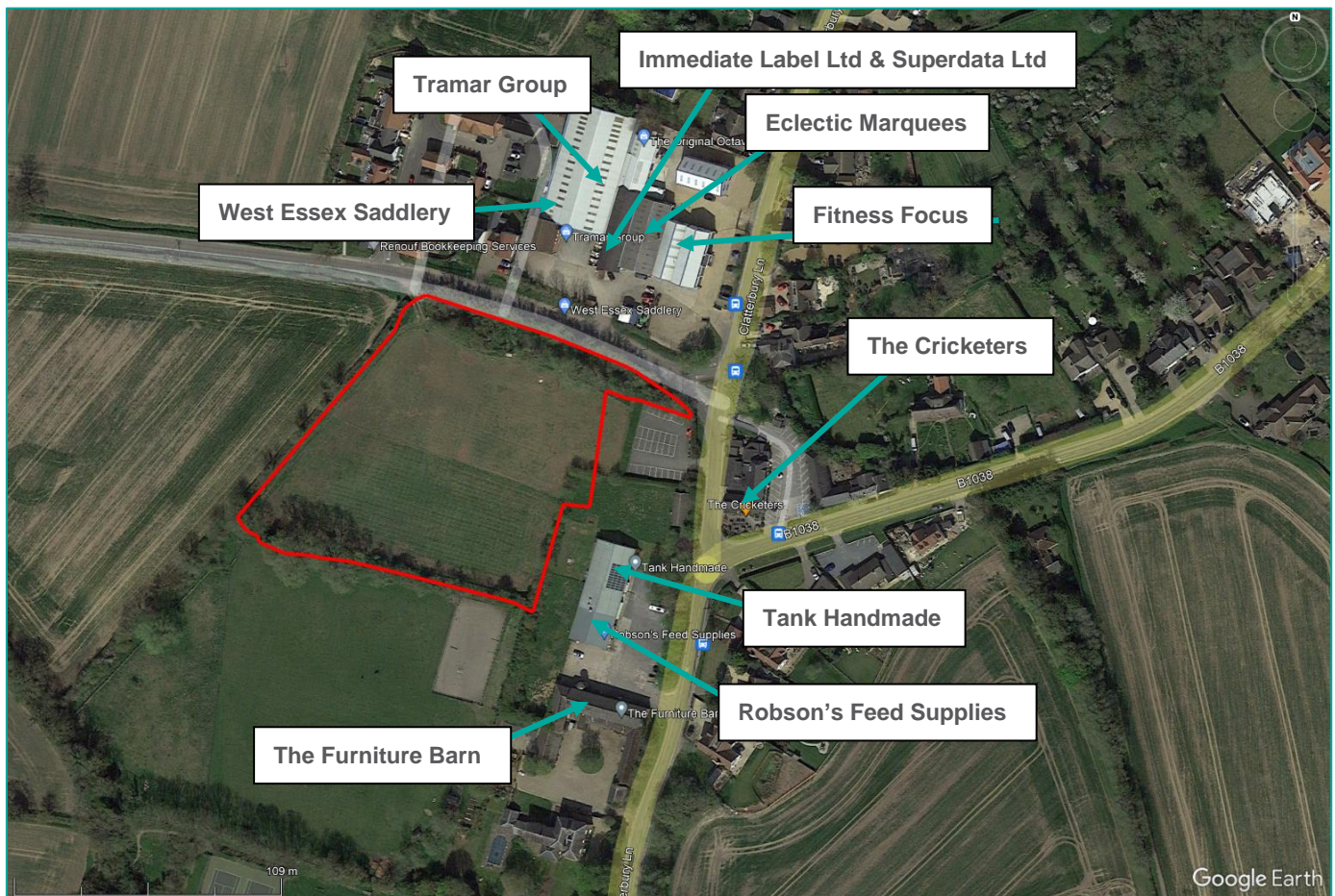
## 4.2. Existing Commercial Noise Impact

Section 3.2 of this report details the existing commercial noise impact assessment.

### 4.2.1. Existing Commercial

Figure 2 shows the nearby existing commercial premises and the operating hours are also listed below:

Figure 2 – Nearby Existing Commercial Premises



#### Commercial to the north boundary of the proposed site and operating hours:

- **West Essex Saddlery (Horseback Riding Service):** The operating saddlery is open during the following hours. *Opening hours: 09:30 - 17:00 Monday to Saturday, Closed Sunday.*
- **Tramar Group (Tile Store):** The operating tile store is open during the following hours.
  - *Opening hours: 09:00 - 17:00 Monday to Friday, 10:00 – 16:00 Saturday, Closed Sunday.*
- **Immediate Label Ltd (Digital Printing):** The operating digital printing supplier is open during the following hours.
  - *Opening hours: 09:00 - 17:00 Monday to Thursday, 08:00 - 14:00 Friday, Closed Saturday & Sunday.*
- **Superdata Ltd (IT Company):** The operating IT company is open during the following hours.
  - *Opening hours: 09:00 - 17:00 Monday to Thursday, 08:00 - 14:00 Friday, Closed Saturday & Sunday.*

- **Eclectic Marquees (Marquee Business)**: The operating marquee business is open during the following hours.
  - **Opening hours: 08:30 - 17:30 Monday to Friday, Closed Saturday & Sunday.**
- **Fitness Focus (Gym)**: The operating gym is open during the following hours.
  - **Opening hours: 06:30 - 21:00 Monday to Thursday, 06:30 - 19:00 Friday, 08:00 – 12:00 Saturday & Sunday.**

#### **Commercial to the east boundary of the proposed site:**

- **The Cricketers (Restaurant/ Hotel)**: The operating restaurant/ hotel is open during the following hours.
  - **Opening hours: 07:00 – 23:00 Monday to Friday, 08:00 - 23:00 Saturday & Sunday.**

#### **Commercial to the southeast boundary of the proposed site:**

- **Tank Handmade (Craft Shop)**: The operating craft shop is open during the following hours.
  - **Opening hours: Unknown (considered open during the daytime).**
- **Delta Wood Finishing (Furniture Repair)**: The operating furniture repair unit is open during the following hours.
  - **Opening hours: 08:00 - 17:00 Monday to Saturday, Closed Sunday.**
- **Robson's Feed Supplies (Equine Feed Supplier)**: The operating equine feed supplier is open during the following hours.
  - **Opening hours: 09:00 - 17:00 Monday to Friday, 08:30 – 16:30 Saturday, Closed Sunday.**
- **The Furniture Barn (Furniture Shop)**: The operating furniture shop is open during the following hours.
  - **Opening hours: 09:00 - 17:00 Wednesday to Saturday, 10:00 - 16:00 Sunday, Closed Monday to Tuesday**

#### **4.2.2. Existing Commercial Noise Sources**

[Appendix A5](#) of this report shows the measured noise from the nearby commercial premises shown in [Figure 2](#) shows that at attended measurement locations ([Appendix A2](#)) to the surrounding boundaries of the proposed residential development that commercial plant noise (roof exhaust fans) from Robson's Feed Supplies was subjectively determined as the dominant commercial noise source when in operation.

##### **Robson's Feed Supplies:**

1. **Humming noise from x3 No. exhaust fans to roof of Robson's Feed Supplies (cyclical hum clearly audible to the south-west boundary of the site)** – a low humming noise was noticeable from the three roof fans serving Robson's Feed Supplies. Noise present and intrusive (Lowest Observed Adverse Effect Level, mitigate and reduce to a minimum required).

As per ProPG guidance ([Appendix C3.1](#) of this report) relating to '**Site exposed to industrial and/or commercial noise**' that states:

***"2.15 Where industrial or commercial noise is present on the site and is considered to be "dominant" (i.e. where the impact would be rated as adverse or greater (subject to context) if a BS4142:2014 assessment was to be carried out), then the risk assessment should not be applied to the industrial or commercial noise component and regard should be had to the guidance in BS4142:2014. The judgement on whether or not to undertake a BS4142 assessment to determine dominance should be proportionate to the level of risk. In low-risk cases a subjective judgement of dominance, based on audibility, would normally be sufficient."***

**As the adjacent commercial noise source from Robsons Feed Supplies roof fans (x3 No.) is "dominant", as the humming noise was the only dominant commercial noise source. Therefore, [Section 4.2.3](#) of this report**

details further noise control will need to be applied and a daytime British Standard BS 4142 noise assessment has been completed in [Section 4.2.4](#) of this report below:

### 4.2.3. Noise Control

The proposed development requires segregation from the existing commercial noise sources. Therefore, a good acoustic design process has been followed. The nearest proposed residential buildings including the apartment block and associated parking areas to the south-east corner of the site has been relocated to the southeast corner of the site. The garden amenity areas have been relocated away from the commercial through natural shielding from the buildings to control commercial noise from commercial plant to the southeast boundary of the site (x3 exhaust fans at Robsons Feed Supplies). This has reduced the commercial noise impact by around 5-10 decibels to the garden amenity areas.

In addition, further protection for the proposed residential properties can be achieved by the location of close boarded fencing between the existing commercial, and the proposed residential dwellings, as detailed below:

#### Noise Control to Screen Noise:

It is recommended that close-boarded timber fencing with a minimum height of 2 metres (highlighted in **red**) be provided to the site. [Figure 3](#) shows the locations of the 2 m high close-boarded timber fencing marked up in **red**. All such close-boarded timber fencing should be continuous to ground level and have a minimum mass of 8 kg/m<sup>2</sup>.

**Figure 3 – Location of 2 m High Close Boarded Timber Fencing (highlighted in Red)**



Consideration for the internal layout and non-habitable rooms facing commercial, and upgrading habitable windows facing commercial should be followed during the design phase, as detailed below:

**Consider Internal Layout and Non-Habitable Rooms Facing Commercial to South-East Corner:** The internal layout should be considered, so that all proposed habitable room windows (i.e. living areas and bedrooms) of the proposed residential buildings should face away from Robsons Feed Supplies external plant to the southeast corner of the proposed site. This includes facing non-habitable rooms such as kitchens, bathrooms etc, to reduce the sound insulation measures required.

**Upgrade Habitable Windows Facing Commercial to South-East Corner:** All proposed habitable room windows (i.e. living areas and bedrooms) of the proposed residential buildings facing Robsons Feed Supplies external plant to the southeast corner of the proposed site, the façade assessment is discussed in [Section 4.5](#) of this report. This includes standard glazing specification and acoustic trickle vents so windows can remain closed at the occupants' discretion during the daytime.

**4.2.4. Daytime BS4142 Noise Impact Assessment Calculation from Commercial Noise Sources to the Nearest Noise Sensitive Residential Receptors (with Noise Control Applied)**

Using the existing commercial noise sources detailed in [Section 4.2.2](#) and the noise control measures detailed in Section 4.2.3 of this report, the daytime NoiseMap® Five noise model is shown in [Figure 4](#) (daytime noise model). The table below shows the predicted cumulative daytime noise levels to the nearest noise-sensitive residents':

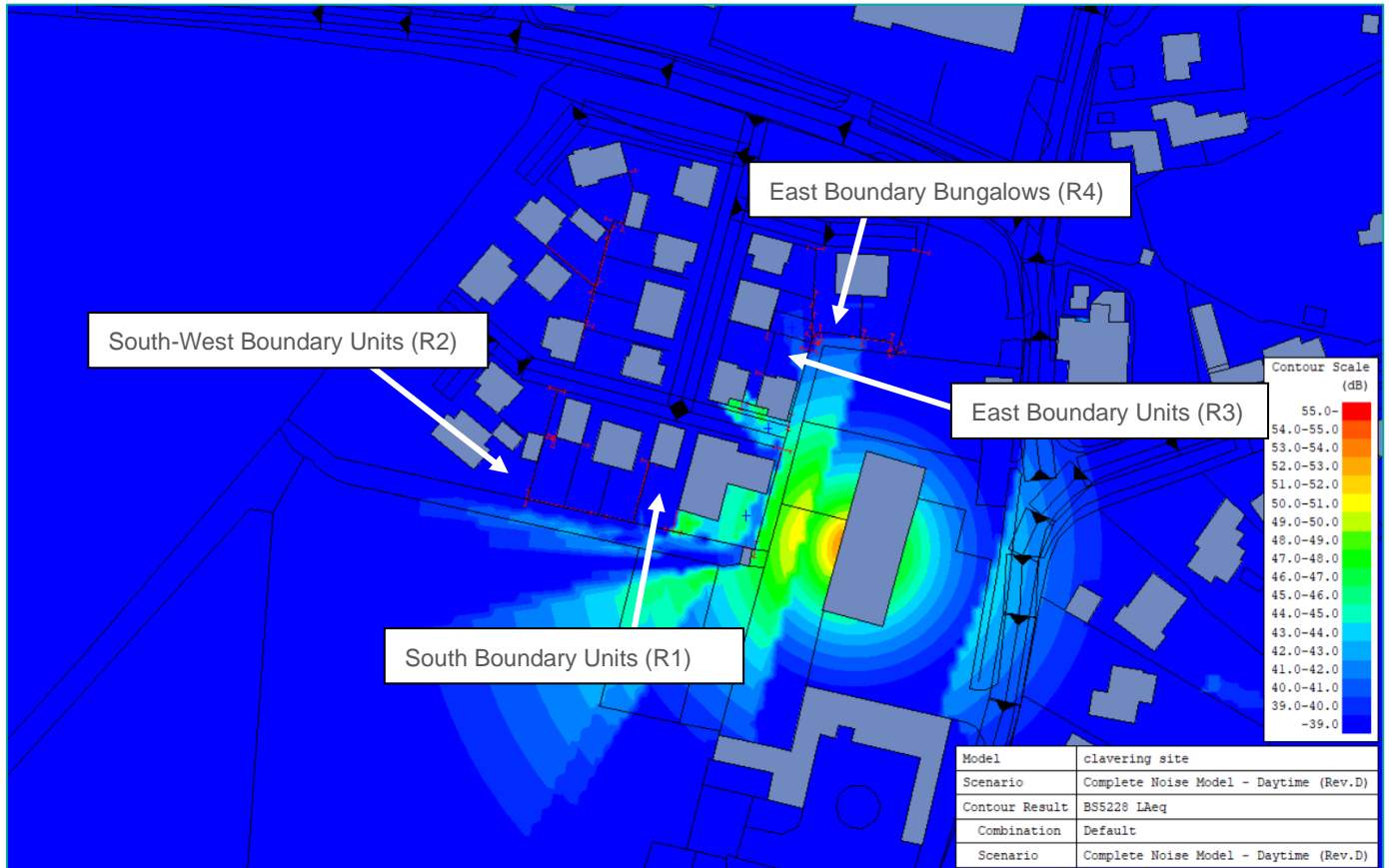
**NoiseMap® Predicted Daytime Sound Pressure Levels from Commercial at Nearest Residential Receivers:**

Receptors	Residential	NoiseMap® Predicted Daytime Sound Pressure Levels, $L_{Aeq,T}$ , dB
Receptor R1	South Boundary Units, Residential	36
Receptor R2	South-West Boundary Units, Residential	37
Receptor R3	East Boundary, Residential	40
Receptor R4	East Boundary Bungalows, Residential	35

The predicted daytime commercial noise impact assessment detailed in [Section 4.2.4](#) and [Figure 4](#) of this report shows the cumulative daytime noise levels to the proposed nearest noise-sensitive residents', as detailed in the table below.



Figure 4 – Daytime NoiseMap® noise model showing the impact of the Commercial noise sources on the proposed noise-sensitive residential properties.



**Note 1:** NoiseMap® Five Noise Model contour shown at 1.5 metres height above ground, as per Environmental Noise Directive.

**Note 2:** The contour scale key on the right-hand side is between 39 dB to >55 dB.

The table below summarises the daytime British Standard BS 4142 commercial noise impact assessment from roof exhaust fan noise sources from Robson’s Feed Supplies to the nearest proposed noise sensitive residential units, which is an *“indication of the specific sound source having a low impact”* on the proposed residents.

*Note\**: When the plant switches on and off the process does not indicate any acoustic features that warrant correction for tonality, impulsivity or other sound characteristics at the assessment location. Therefore, the cumulative rating noise levels were calculated with no character correction (0 dB correction) to the fixed plant.

Results	R1 – South Boundary Units	R2 – South-West Boundary Units	R3 – East Boundary Units	R4 – East Boundary Bungalows
<b>NoiseMap® Five predicted cumulative daytime sound pressure levels</b>	$L_{Aeq,1-hour} = 36 \text{ dB}$	$L_{Aeq,1-hour} = 37 \text{ dB}$	$L_{Aeq,1-hour} = 40 \text{ dB}$	$L_{Aeq,1-hour} = 35 \text{ dB}$
Residual sound level	$L_{Aeq,1-hour} = 45 \text{ dB}$	$L_{Aeq,1-hour} = 45 \text{ dB}$	$L_{Aeq,1-hour} = 45 \text{ dB}$	$L_{Aeq,1-hour} = 45 \text{ dB}$
Background sound level (daytime/ evening)	$L_{A90,1-hour} = 39 \text{ dB}$	$L_{A90,1-hour} = 39 \text{ dB}$	$L_{A90,1-hour} = 39 \text{ dB}$	$L_{A90,1-hour} = 39 \text{ dB}$
<b>The specific source is cyclical, the cycle times in total being less than the daytime reference time period with a 10-minute on-time. Therefore, an on-time correction is applied as in equation (4)</b>				
On-time correction [to nearest 0.1 dB as an intermediate step in equation (4) calculation]	$10\log(10/60) = -8 \text{ dB}$	$10\log(10/60) = -8 \text{ dB}$	$10\log(10/60) = -8 \text{ dB}$	$10\log(10/60) = -8 \text{ dB}$
Specific sound level	$L_{Aeq,1-hour} = [10\log(10^{3.6} - 10^{3.9}) - 8] = 28 \text{ dB}$	$L_{Aeq,1-hour} = [10\log(10^{3.7} - 10^{3.9}) - 8] = 29 \text{ dB}$	$L_{Aeq,1-hour} = [10\log(10^{4.0} - 10^{3.9}) - 8] = 32 \text{ dB}$	$L_{Aeq,1-hour} = [10\log(10^{3.5} - 10^{3.9}) - 8] = 27 \text{ dB}$
Acoustic Feature Correction*	<b>0 dB*</b>	<b>0 dB*</b>	<b>0 dB*</b>	<b>0 dB*</b>
<b>Rating level*</b>	<b>28 dB <math>L_{Ar,Tr,1-hour}</math></b>	<b>29 dB <math>L_{Ar,Tr,1-hour}</math></b>	<b>32 dB <math>L_{Ar,Tr,1-hour}</math></b>	<b>27 dB <math>L_{Ar,Tr,1-hour}</math></b>
Background level	$L_{A90,1-hour} = 39 \text{ dB}$	$L_{A90,1-hour} = 39 \text{ dB}$	$L_{A90,1-hour} = 39 \text{ dB}$	$L_{A90,1-hour} = 39 \text{ dB}$
<b>Excess of rating over background sound level</b>	<b>(28 – 39) dB = -11 dB</b>	<b>(29 – 39) dB = -10 dB</b>	<b>(32 – 39) dB = -7 dB</b>	<b>(27 – 39) dB = -12 dB</b>
<b>Uttlesford District Council Criteria Compliance (<math>\leq 5 \text{ dB}</math> below <math>L_{A90}</math>)</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>The daytime assessment is an 'indication of the specific sound source having a low impact, depending on the context' on the proposed residents' gardens to the south and east boundary of the proposed site.</b>				

Following industrial/ commercial noise sources being assessed above. The BS 4142:2014+A1:2019 table above shows that the calculated noise impact from the existing commercial noise from the existing Robsons Feed Supplies on the proposed premises garden areas is 7 dB to 12 dB below the typical background level during the evening (between 6 pm to 7 pm). British Standard BS 4142:2014, guidance indicates the specific sound source has a 'low impact' on the proposed residents' garden areas.

**Consideration for the internal layout and non-habitable rooms facing commercial is discussed in Section 4.2.3 of this report. Further mitigation measures will be necessary for all on-site proposed habitable room windows (i.e. living areas and bedrooms) facing the proposed commercial noise sources, discussed in Section 4.5 of this report.**

### 4.3. External Amenity Area Assessment (ProPG – Stage 2 - Element 3)

For outdoor areas, such as gardens and courtyards, ProPG refers to 'BS 8233:2014, Section 7.7.3.2' ([Appendix C3.2](#) of this report), which states:

*"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...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'.*

**Garden/ Balcony Amenity Noise Assessment:** [Appendix D3](#) shows the daytime (07:00 - 23:00) predicted noise map results show that the sites garden amenity areas are equal or below the British Standard BS 8233:2014 lower guideline value 50 dB  $L_{Aeq,16hours}$  (**dark blue colour**).

**Garden/ Balcony Amenity Mitigation:** The development is designed to achieve the lowest possible noise levels in the external garden amenity as:

- [Appendix D3](#) shows the location and the orientation of the proposed garden amenity areas, as shown in the site location plan and the proposed site plan in [Appendix B2](#).
- [Figure 3](#) shows that close boarded timber fencing (highlighted in **red**) should be installed at a height of 2 metre to shield the gardens areas of the site from road traffic and commercial roof fans serving Robsons Feed Supplies, which are expected to be exposed to below the lower guideline value  $\leq 50$  dB  $L_{Aeq,16hours}$ .

The close-boarded timber fencing is expected to reduce the road traffic noise level by around 5 decibels. Therefore, the private amenity garden areas to the site are predicted to achieve the lowest practicable levels in these external amenity spaces, as per British Standard BS 8233:2014 ([Appendix C3.2](#)).

- Therefore, the private amenity garden areas to the site are predicted to achieve the lowest practicable levels in these external amenity spaces, as per British Standard BS 8233:2014.

**Therefore, good acoustic design process has been followed, and noise levels in garden amenity areas do not exceed the lower guideline value in accordance with British Standard BS 8233: 2014, and desirable noise levels have been achieved.**

### 4.4. Acoustic Ventilation and Overheating

Our acoustic assessment of the proposed development includes an assessment of the risk of overheating. [Appendix C3.4](#) of this report details that a Level 1 risk assessment has been completed based on external noise levels and where a dwelling uses open windows. If the outcome of the assessment shows a Level 1 'high risk' category, it is recommended that a more detailed 'Level 2' risk assessment is completed, considering predicted internal ambient noise levels. [Section 4.4.1](#) of this report shows a level 1 assessment to compare the noise measurement results and the daytime and night-time AVO Guidance values ([Figure 8](#)).

#### 4.4.1. AVO 'Level 1' Risk Assessment and Discussion

**Daytime and Night-time 'Level 1' Risk Assessment:** [Appendix D4](#) shows the daytime (07:00 – 23:00) predicted noise map results and [Appendix D5](#) shows the night-time (23:00 - 07:00) predicted noise map results. These results show that the whole site is in the '**negligible risk**' category.

**Based on the above, a detailed AVO Level 2 assessment is not required. Therefore, no further mitigation is required and openable windows are suitable for ventilation.**

## 4.5. Façade Assessment (ProPG – Stage 2 – Element 2)

### External Façade Construction:

The glazing and ventilation elements of the façade are expected to be the weakest elements acoustically, and the external façade at the time of writing this report is assumed to be **brickwork construction (medium density 260 kg/m<sup>2</sup>)** is expected to perform well acoustically. The sound insulation performance of the glazing should be tested in a lab, and the performance requirement ( $R_w+C_{tr}$ ) achieved by both the glass and frame.

**Glazing/ Ventilation Sound Insulation Assessment:** The glazing and ventilation elements of the façade are expected to be the weakest elements acoustically. The sound insulation performance of the glazing should be tested in a lab and the performance requirement ( $R_w+C_{tr}$ ) achieved by both the glass and frame.

**Important:** As glazing should be specified using  $R_w+C_{tr}$  sound reduction values and not merely  $R_w$  values or the configuration. It is recommended that before selecting/ purchasing glazing and ventilation, the client/ architect/ main contractor should contact their acoustic consultant to clarify if the selected acoustic performance is sufficient.

### Representative 1/1 Octave Band Data – North Boundary:

Representative 1/1 octave band levels for day and night at Location U1 (shown in [Appendix A3](#)) of proposed development are detailed below:

<u>External noise levels (Free-field)</u>	<u>1:1 Octave Band Frequency Data (Hz)</u>							<u>dB(A)</u>
	63	125	250	500	1000	2000	4000	
Day $L_{eq,16-hour}$ (Free-Field)	56	51	47	45	45	39	36	<b>48</b>
Night $L_{eq,8-hour}$ (Free-Field)	47	42	33	32	36	33	24	<b>39</b>
Night $L_{Amax,F}$ (Free-Field)	70	59	59	55	58	53	49	<b>61</b>

### Representative 1/1 Octave Band Data – South-East Boundary:

Representative 1/1 octave band levels for day and night at Location U2 (shown in [Appendix A4](#)) of proposed development are detailed below:



<u>External noise levels (Free-field)</u>	<u>1:1 Octave Band Frequency Data (Hz)</u>							<u>dB(A)</u>
	63	125	250	500	1000	2000	4000	
Day $L_{eq,16-hour}$ (Free-Field)	54	48	47	44	44	38	34	<b>47</b>
Night $L_{eq,8-hour}$ (Free-Field)	46	42	38	35	33	28	26	<b>38</b>
Night $L_{Amax,F}$ (Free-Field)	65	54	52	51	56	52	41	<b>58</b>

#### 4.5.1. Glazing and Ventilation Requirements

Appendix D6 and Appendix D7 show the external noise levels during the daytime and night-time, respectively. For this scheme to meet the internal noise levels set in British Standard BS 8233:2014, a summary of the 'more rigorous calculation' of the noise break-in from traffic noise are available upon request, and the glazing and ventilation treatments is presented in Figure 5 and the table below and on the next page:

Figure 5 - Outline Glazing and Ventilation Treatments



Façade/ Noise Break-In	Room	Minimum Required Sound Reduction Values				Example Glazing/ Ventilation Configurations	Noise Break-In Reference Colour (Figure 5)
		Glazing ( $R_w+C_{tr}^*$ )		Ventilation ( $D_{n,eW} + C_{tr}^{**}$ )			
		( $R_w^*$ )	( $R_w^*$ )	( $D_{n,eW} + C_{tr}^{**}$ )	( $D_{n,eW}^{**}$ )		
East Boundary Dwellings, South and East Facades (Facing Commercial)	Living/ Kitchen/ Dining Rooms	26 dB***	30 dB***	36 dB***	37 dB***	4/20/4 mm Double Glazing/ Acoustic Trickle Vents***	
	Bedrooms						
All Other Dwellings, Facades	Living/ Kitchen/ Dining Rooms	26 dB***	30 dB***	29 dB***	29 dB***	4/20/4 mm Double Glazing/ Trickle Vents ***	
	Bedrooms						

\*  $R_w$  &  $R_w+C_{tr}$  – The A-Weighted Sound Reduction Index ( $R_w$ ) for glazing and frame with an adjustment ( $C_{tr}$ ).

\*\*  $D_{n,eW}$  &  $D_{n,eW}+C_{tr}$  – Sound reduction from ventilation ( $D_{n,eW}$ ) with an adjustment factor ( $C_{tr}$ ).

\*\*\* **Note 1:** As glazing should be specified using  $R_w+C_{tr}$  sound reduction values and not just  $R_w$  values or the configuration. And ventilation should be specified using  $D_{n,eW}+C_{tr}$  sound reduction values and not just  $D_{n,eW}$  values or configuration.

#### 4.5.2. Glazing Discussion

[Figure 5](#) and the Table in [Section 4.5.1](#) of this report shows that increased levels of glazing attenuation are required to all the habitable rooms of all dwellings and facades, it is recommended they are fitted with windows achieving a specification of **26 dB  $R_w+C_{tr}$  (30 dB  $R_w$ )** to ensure that the daytime and night-time noise criteria are not exceeded. This reduction could be achieved with **4/20/4 mm double glazed windows**.

#### 4.5.3. Ventilation Discussion

To meet internal noise criteria, windows are required to be closed, so appropriate ventilation will be required within all habitable rooms. The ventilation strategy advised will ensure windows do not have to be opened to maximise the façade acoustic performance. However, windows should remain openable to allow for rapid or purge ventilation, at the occupant's discretion.

Please note that the number of external trickle vents should be minimised as far as practicable.

[Figure 5](#) and the Table in [Section 4.5.1](#) of this report shows that ventilation to the all the habitable rooms of the east boundary dwellings, south and east facades facing commercial should offer improved attenuation of **36 dB  $D_{ne,W}+C_{tr}$  (37 dB  $D_{ne,W}$ )**. This reduction could be achieved with **acoustic trickle vents**.

All other dwellings and facades should offer an attenuation of **29 dB  $D_{ne,W}+C_{tr}$  (29 dB  $D_{ne,W}$ )**. This reduction could be achieved with **trickle vents**.

#### 4.5.4. Predicted Internal Noise Levels

Typical suitable glazing and ventilation sound reduction requirements for the building façade design are set out in the table in [Section 4.5.1](#) of this report. Glazing and ventilation discussions are provided in [Section 4.5.2](#) and [Section 4.5.3](#) respectively. **If the specifications provided in the table in [Section 4.5.1](#) are adhered to, the internal noise levels set in British Standard BS 8233:2014 can be achieved.**

**Note: we recommend during the design phase, before selecting glazing and ventilation, the client, the main contractor, or the architect should contact their acoustic consultant to confirm if the selected acoustic performance is sufficient.**

**Based on the above, the British Standard BS 8233:2014 requirements for internal noise levels should, therefore, be achieved and prior approval should be given.**

## 4.6. Residential Plant Noise Emission Limits/ Thresholds

**External Background Noise Levels:** The minimum daytime and night-time background noise levels measured at Location U1 (north boundary of the site) and Location U2 (southeast boundary of the site) are listed below.

### Location U1:

	Day 07:00 to 23:00 ( $L_{A90,T}$ ) <sup>***</sup>	Night 23:00 to 07:00 ( $L_{A90,T}$ ) <sup>***</sup>
Location U1 – North Boundary:	26	17
Location U2 – South-East Boundary:	29	22

**\*\*\* Minimum  $L_{A90,T}$  levels measured during the day and night.**

**Cumulative Residential Plant Noise Emission Limits/ Thresholds:** So that the cumulative noise level from any future fixed plant (if applicable) such as condenser units (AC units), air source heat pump units (ASHP units) or ground sources heat pump units (GSHP units) to 1-metre from the nearest noise-sensitive residential window must be equal to or greater than 5 dB below the measured background noise levels detailed above.

The maximum plant rating noise emission limits/ threshold are shown in the table below:

	Day 07:00 to 23:00 ( $L_{Ar,Tr,1-hour}$ ) <sup>***</sup>	Night 23:00 to 07:00 ( $L_{Ar,Tr,15-min}$ ) <sup>***</sup>
Maximum rating emission levels at 1 metre from nearest noise sensitive windows, $L_{Ar,Tr,1hour}$ (Day) and $L_{Ar,Tr,15-min}$ (Night)	$\leq 21$	$\leq 12$

If the cumulative noise emission limits ( $L_{Ar,Tr}$ ) outlined in the above table ( $\leq 5$  dB below the external background noise level) are adhered to at 1 metre from the nearest noise-sensitive residential receptor(s) window, the requirements of Uttlesford District Council's plant noise emission limits should be met.

Any proposed residential fixed plant will need to be adequately controlled by a suitable planning condition for noise.

# Appendix A – Noise Survey Details and Results Graph & Table

## Appendix A1 – Noise Survey Details

### Personnel present:

Alex Hancock – Climate Acoustics

### Instrumentation used and calibration info:

Svantek SV971, Svantek SV977 & Cirrus CR:811C – Sound Level Meters (\*calibration certificates available upon request.).

Larson Davis CAL200 – Calibrator (\*calibration certificates available upon request.).

### Climate Acoustics Calibrated Equipment

Unattended Noise Meter (Svantek SV971) – Position U1	
Class 1 Sound Level Meter	Svantek 971 – Serial Number C111649 (Date of Calibration: 04/07/2023*)
Microphone	ACO 7052E – Serial Number 78177 (Date of Calibration: 04/07/2023*)
Preamplifier	Svantek SV18 – Serial Number 32165 (Date of Calibration: 04/07/2023*)
Unattended Noise Meter (Cirrus CR:811C) – Position U2	
Class 1 Sound Level Meter	Cirrus CR:811C – Serial Number D21386FD (Date of Calibration: 20/07/2022*)
Microphone	Cirrus MK:224 – Serial Number 20043419 (Date of Calibration: 15/07/2022*)
Preamplifier	Cirrus MV:200C – Serial Number 2570 (Date of Calibration: 20/07/2022*)
Attended Noise Meter (Svantek SV977) – Position A1	
Class 1 Sound Level Meter	Svantek 977 – Serial Number 34186 (Date of Calibration: 04/07/2023*)
Microphone	MTG MK250 – Serial Number 10876 (Date of Calibration: 04/07/2023*)
Preamplifier	Svantek SV12L – Serial Number 33684 (Date of Calibration: 04/07/2023*)
Calibrator (Larson Davis CAL200)	
Calibrator	Larson Davis – CAL200 - Serial Number 6003 (Date of Calibration: 27/10/2023*)

### Calibration procedure:

The calibration procedure before and after the noise survey, the Svantek SV971, Cirrus CR:811C and Svantek SV977 sound level meters were calibrated using the Larson Davis CAL200, and no significant drift was measured before and after the survey (accuracy within  $\pm 0.3$  dB).

### Uncertainty:

For accurate measurements, the noise monitoring equipment is calibrated by traceable lab calibration:

- a Class 1 sound level meter and microphone are calibrated once every two years.



- a Class 1 calibrator is calibrated once every year.

Note: Any measurement is taken by a Class 1 sound level meter, a margin on uncertainty of +/- 1.1 decibels typically apply because of the equipment's tolerances. The uncertainty with the noise prediction calculations is limited, as using our experience and factors including distance, direct line of sight and reflections have been considered.

**Equipment operation times and dates:**

Midday on Monday 6<sup>th</sup> November 2023 to 9:25 am Wednesday 8<sup>th</sup> November 2023.

**Weather conditions:**

Weather conditions during the operation of noise monitoring equipment.

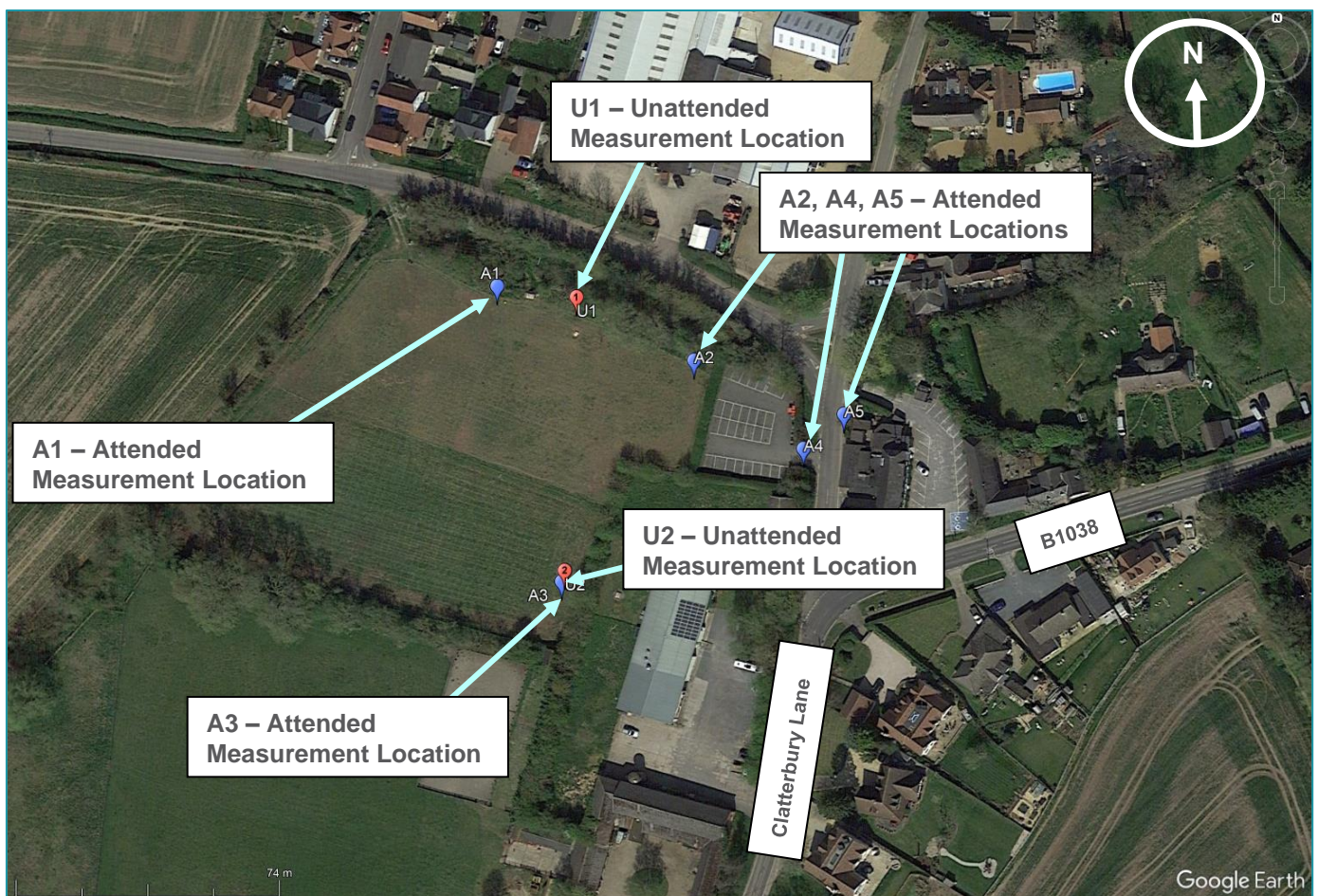
Date	Temperature (°C)	Weather Conditions	Wind
<b>Monday 6 November 2023</b>	7°C to 13°C	Cold/ Cool. Dry. Clear/ Passing Clouds/ Scattered Clouds.	<b>Light Breeze and Gentle Breeze (3-5 m/s)</b>
<b>Tuesday 7 November 2023</b>	4°C to 13°C	Cold/ Cool. Dry. Clear/ Passing Clouds/ Broken Clouds.	<b>Light Air to Gentle Breeze (1-5 m/s)</b>
<b>Wednesday 8 November 2023</b>	6°C to 11°C	Cold/ Cool. Dry/ Wet. Overcast / Broken Clouds with Occasional Light Rain.	<b>Light Air to Gentle Breeze (1-5 m/s)</b>

## Appendix A2 – Noise Survey Locations

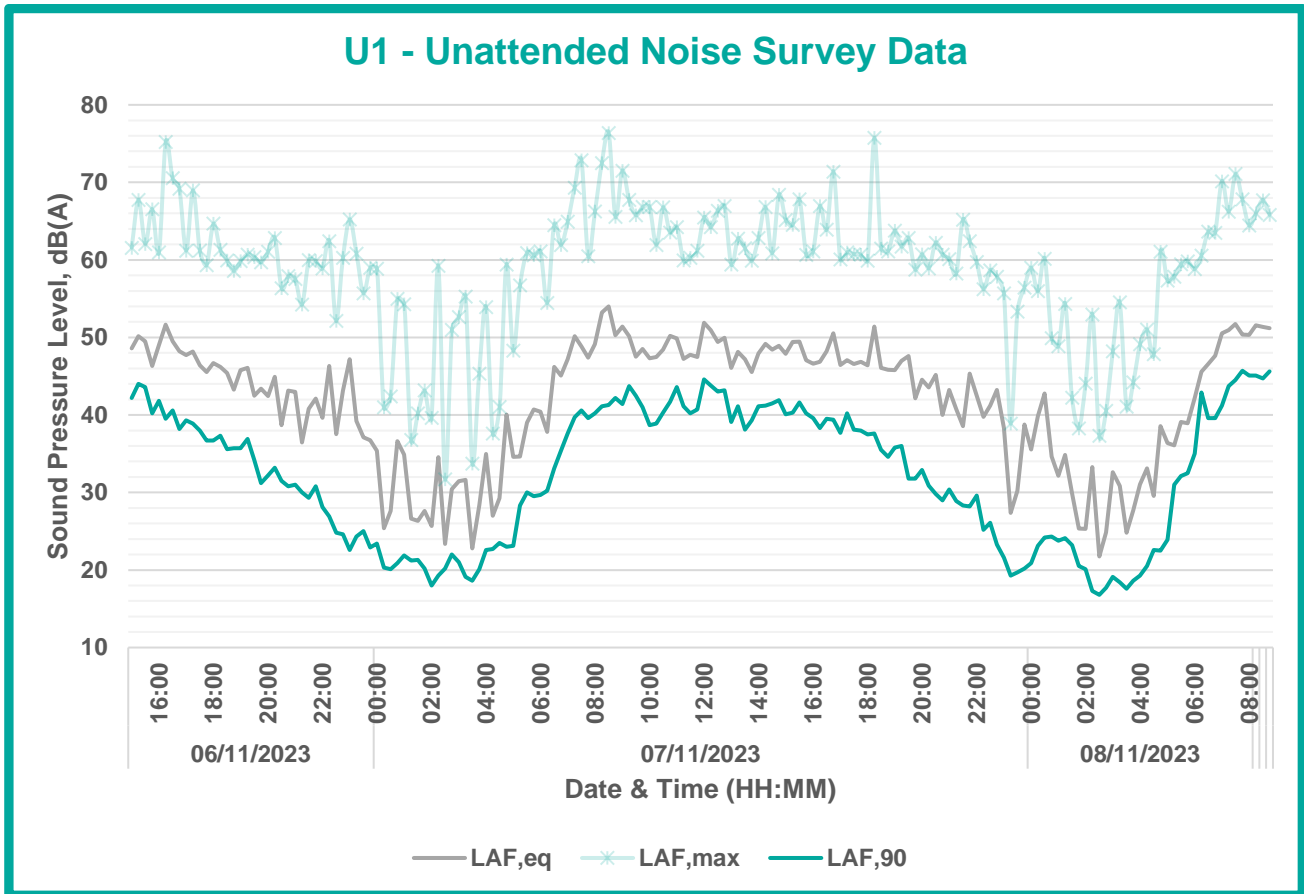
The Google Earth™ image in [Figure 6](#) below shows the unattended sound level meter locations at positions U1 and U2, and attended sound level meter positions A1 to A5; a description of each position is provided below:

- **Position U1:** The sound level meter microphone was set up on a tripod at 2 metres height, located to the north boundary of the proposed residential development site and is in ‘free field’ conditions.
- **Position U2:** The sound level meter microphone was set up on a tripod at 1.7 metres height, located to the southeast boundary of the proposed residential development site and is in ‘free field’ conditions.
- **Positions A1 to A5:** The sound level meter microphone was set up on a tripod at 1.5 metres height and is in ‘free field’ conditions.

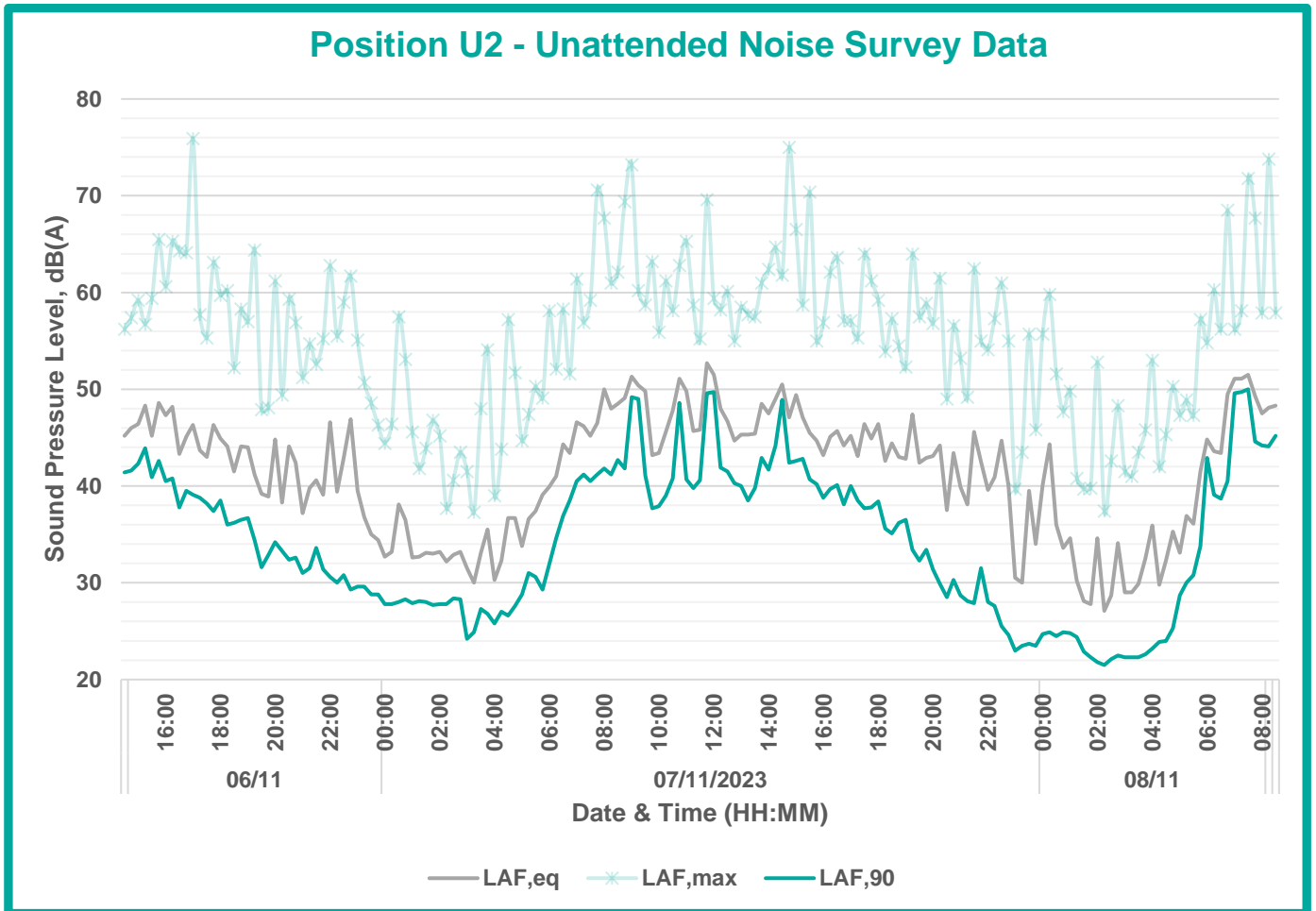
Figure 6 - Noise Measurement Positions U1, U2 and A1 to A5 (Source: Google Earth™)



Appendix A3 – Position U1– Unattended Noise Survey Graph.



Appendix A4 – Position U2– Unattended Noise Survey Graph.



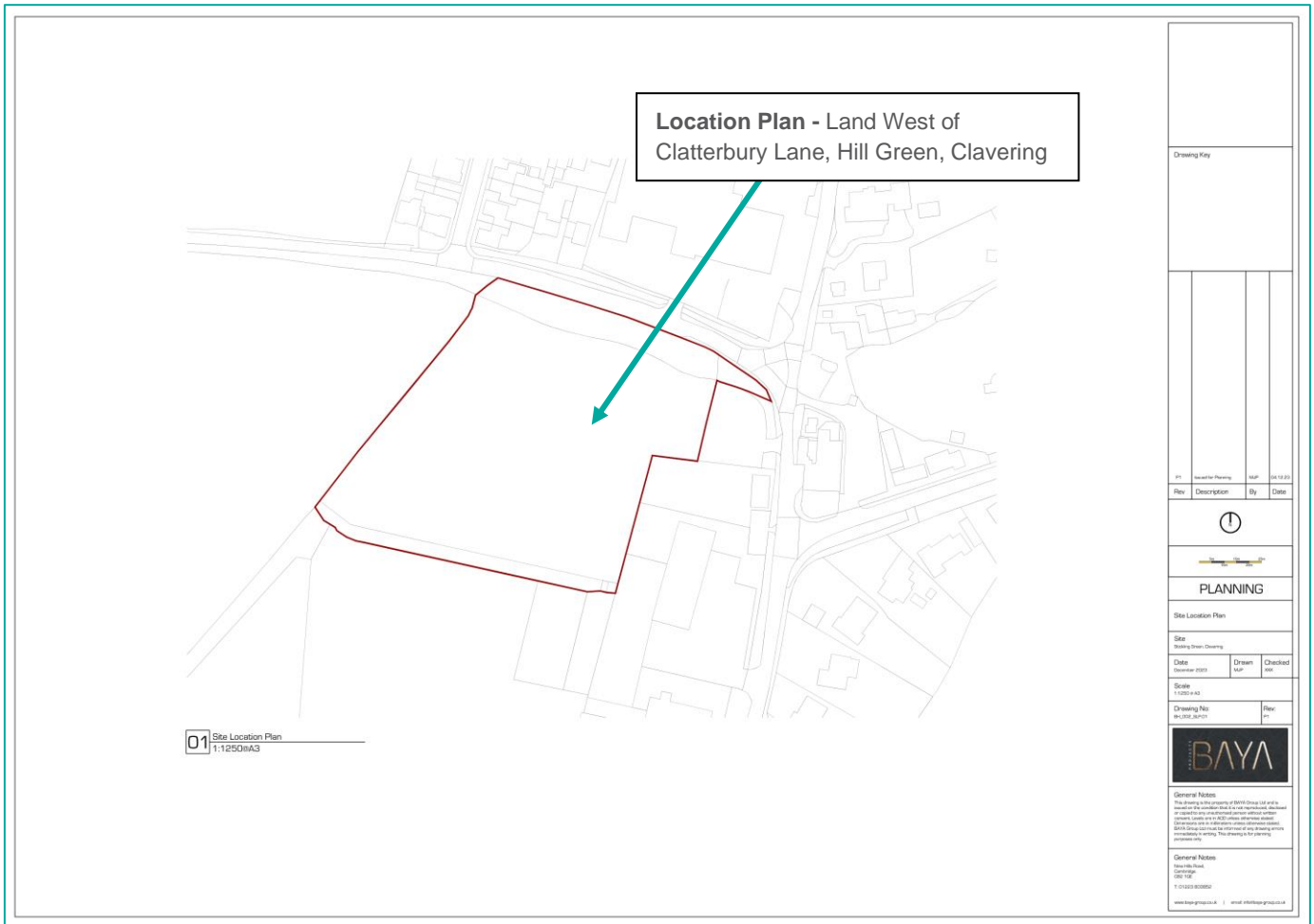
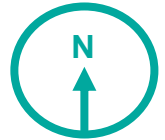
## Appendix A5 – Positions A1-A5 - Attended Noise Survey Table (Locations shown in [Appendix A2](#))

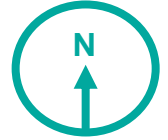
Date	Position	Start Time	Duration	L <sub>Aeq,T</sub>	L <sub>AF,max</sub>	L <sub>A90,T</sub>	Comments
06/11/2023	A1	12:02	10 mins	48	61	41	Road Traffic to North of Site - Dominant, L <sub>AF,max</sub> Trees rustling Aircraft overhead
		13:01	10 mins	49	64	43	Road Traffic to North of Site - Dominant, L <sub>AF,max</sub> (including lorry passing) Trees rustling Aircraft overhead
		14:00	10 mins	49	63	43	Road Traffic to North of Site - Dominant, L <sub>AF,max</sub> Trees rustling Aircraft overhead
		14:50	10 mins	45	53	41	Road Traffic to North of Site - Dominant, L <sub>AF,max</sub> Trees rustling Aircraft overhead
	A2	12:15	10 mins	52	62	45	Road Traffic to North of Site - Dominant, L <sub>AF,max</sub> Road Traffic on Clatterbury Lane - Dominant, L <sub>AF,max</sub> Trees rustling Aircraft overhead
		13:15	10 mins	50	60	45	Road Traffic to North of Site - Dominant, L <sub>AF,max</sub> Road Traffic on Clatterbury Lane - Dominant, L <sub>AF,max</sub> Trees rustling Aircraft overhead
		14:21	10 mins	50	67	43	Road Traffic to North of Site - Dominant, L <sub>AF,max</sub> Road Traffic on Clatterbury Lane - Dominant, L <sub>AF,max</sub> Trees rustling Aircraft overhead
	A3	12:27	10 mins	47	58	40	Road Traffic to North of Site Road Traffic on Clatterbury Lane Road Traffic on B1038 - Dominant, L <sub>AF,max</sub> Trees rustling Birdsong
		13:27	10 mins	53	74	50	Road Traffic to North of Site Road Traffic on Clatterbury Lane Road Traffic on B1038 - Dominant, L <sub>AF,max</sub> Trees rustling Dog Barking <b>Commercial: Robson's Feed Supplies</b> – x3 No. Roof Exhaust Flues – L <sub>A90</sub> (50 dB L <sub>A90</sub> ) <b>The Furniture Barn</b> – Vehicles manoeuvring in Yard Area.
		14:35	10 mins	46	56	41	Road Traffic to North of Site Road Traffic on Clatterbury Lane Road Traffic on B1038 - Dominant, L <sub>AF,max</sub> Trees rustling Dog Barking <b>Commercial: The Furniture Barn</b> – Vehicles leaving in Yard Area.

Date	Position	Start Time	Duration	L <sub>Aeq,T</sub>	L <sub>AF,max</sub>	L <sub>A90,T</sub>	Comments
08/11/2023	A4	09:22	1 min	57	72	47	Road Traffic on Clatterbury Lane - Dominant, L <sub>AF,max</sub> Road Traffic on B1038 <b>Commercial:</b> <u>The Cricketers</u> – Kitchen extraction unit barely audible.
		09:24	1 min	51	66	47	Road Traffic on Clatterbury Lane - Dominant, L <sub>AF,max</sub> <b>Commercial:</b> <u>The Cricketers</u> – Kitchen extraction unit barely audible.
	A5	09:23	1 min	44	49	42	<b>Commercial:</b> <u>The Cricketers</u> – Kitchen extraction unit audible – L <sub>A90</sub> (42 dB L <sub>A90</sub> )

# Appendix B – Drawings

## Appendix B1 – Site Location Plan





## Appendix B2 – Proposed Site Plan





# Appendix C – Noise Policy and Criteria

## Appendix C1 – Local Planning Policy

### Appendix C1.1 – Uttlesford District Council Local Plan 2005

Uttlesford District Council's Local Plan has two policies relating to noise 'Policy GEN2' and 'Policy ENV10', which are detailed below:

**Policy GEN2: Design** states, "*Policy GEN2 – Design Development will not be permitted unless its design meets all the following criteria and has regard to adopted Supplementary Design Guidance and Supplementary Planning Documents.*

- a) *It is compatible with the scale, form, layout, appearance and materials of surrounding buildings;*
- b) *It safeguards important environmental features in its setting, enabling their retention and helping to reduce the visual impact of new buildings or structures where appropriate;*
- c) *It provides an environment, which meets the reasonable needs of all potential users.*
- d) *It helps to reduce the potential for crime;*
- e) *It helps to minimise water and energy consumption;*
- f) *It has regard to guidance on layout and design adopted as supplementary planning guidance to the development plan.*
- g) *It helps to reduce waste production and encourages recycling and reuse.*
- h) *It minimises the environmental impact on neighbouring properties by appropriate mitigating measures.*
- i) *It would not have a materially adverse effect on the reasonable occupation and enjoyment of a residential or other sensitive property, as a result of loss of privacy, loss of daylight, overbearing impact or overshadowing."*

**Policy ENV10: Noise Sensitive Development and Disturbance from Aircraft** states, "*National guidance on Planning and Noise indicates the appropriate response to the level of noise by source. This includes road, rail and mixed sources as well as air noise. Policy ENV10 - Noise Sensitive Development and Disturbance from Aircraft*

*Housing and other noise sensitive development will not be permitted if the occupants would experience significant noise disturbance. This will be assessed by using the appropriate noise contour for the type of development and will take into account mitigation by design and sound proofing features."*

The existing local plan also references NPPF ([Appendix C2.1](#) of this report), and this document can be supplemented by ProPG (see [Appendix C3.1](#) of this report).

### Appendix C1.2 – Uttlesford District Council's – Noise Assessment Technical Guidance (June 2017)

#### "20.0 Industrial / commercial developments

20.1 *BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises (section 3.5). One of the indications of the impact of a BS 4142 assessment is the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

20.2 *The Council consider that new developments should contribute and enhance the area in which they are located and where possible, contribute to the improvement of people's health and quality of life as per the NPSE. With this in mind, the design objective should be:*

*'The development should be designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.*

20.3 Where this criterion cannot be achieved, the various noise control measures considered as part of the assessment should be fully explained (i.e. relocation of noise sources, use of quieter equipment, enclosures, screening, and restriction of the hours of operation) and the achievable noise level should be identified. This information will allow us to make a judgement concerning the application and its likely impact on the surrounding area.

20.4 In addition to the above, maximum noise levels should also be adequately controlled. Where uses generate high noise levels of a short duration (e.g. loud bangs) on a regular basis, these should aim to be controlled so as not to exceed 55 dB (LAmax) at the façade of noise sensitive premises nearby in accordance with the recommendations of the World Health Organisation.

20.5 Deliveries and collections are usually controlled by restricting operational hours but depending on the extent of these activities, a Noise Management Plan (NMP) may be requested, which would include an assessment of noise. This would usually involve assessing the noise upon arrival, loading/unloading period and then departure.

20.6 The NMP may also need to include controls such as acoustically sealed delivery bays, and restrictions on vehicle mounted refrigeration units and audible alarm systems. Where applicable, the noise assessment will take account of multiple noise sources operating simultaneously and state the cumulative level of these."

#### **"21.0 Noise and Vibration from Fixed Plant / Equipment**

21.1 Noise from fixed plant, equipment or machinery can be very annoying and disruptive to people living nearby particularly where that item involved emits a noise with impulsive or tonal characteristics.

21.2 Many of the noise complaints Environmental Health receive about noise from plant, equipment and machinery specifically concern the character of the noise emitted.

21.3 Any noise assessment needs to consider not only the overall level of noise emitted but also its particular characteristics. The noise assessment should be based on BS 4142: 2014 and any application for fixed plant, equipment or machinery must demonstrate that:

***'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.***

21.4 By designing the sound pressure level of any plant items to generate a noise impact of at least 5dB below the existing background level, any plant noise impact should be of a negligible level which should not give rise to complaints from users or occupiers of existing noise-sensitive usages."

## **Appendix C2 – National Planning Policy**

### **Appendix C2.1 – The National Planning Policy Framework (NPPF)**

The latest revision of NPPF (July 2021) sets out the Government's vision for sustainable development through economic, environmental, and social planning policies for England.

Paragraph 174. "Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of ... noise pollution ..."

Paragraph 185. "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 this development. In doing so they should:

a. mitigate and reduce to a minimum potential adverse impacts 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;”

NPPF also sets out that any planning policies and decisions should ensure that new development can be integrated effectively.

Paragraph 187. *“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.”*

### Appendix C2.2 – National Planning Practice Guidance (NPPG)

The Department for Communities and Local Government (DCLG) released a web-based resources at the time of the planning application relate to ‘Planning Practice Guidance’. The guidance advises the following:

#### **“How can noise impact be determined?”**

*Plan-making and decision making need to take account of the acoustic environment and in doing so consider:*

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.*

*In line with the Explanatory note of the noise policy statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.”*

#### **“What are the observed effect levels?”**

- *Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur.*
- *Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.*
- *No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.*

*Although the word ‘level’ is used here, this does not mean that the effects can only be defined in terms of a single value of noise exposure. In some circumstances adverse effects are defined in terms of a combination of more than one factor such as noise exposure, the number of occurrences of the noise in a given time period, the duration of the noise and the time of day the noise occurs.”*

#### **“How can it be established whether noise is likely to be a concern?”**

*At the lowest extreme, when noise is not noticeable, there is by definition no effect. As the noise exposure increases, it will cross the no observed effect level as it becomes noticeable. However, the noise has no adverse effect so long as the exposure is such that it does not cause any change in behaviour or attitude. The noise can*

*slightly affect the acoustic character of an area but not to the extent there is a perceived change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.*

*As the exposure increases further, it crosses the lowest observed adverse effect level boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).*

*Increasing noise exposure will at some point cause the significant observed adverse effect level boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.*

*At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring.*

**This table summarises the noise exposure hierarchy, based on the likely average response.”**

Response	Examples of outcomes	Increasing effect level	Action
<b>Not present</b>	No Effect	No Observed Effect	No specific measures required
<b>Present and not intrusive</b>	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
<b>Lowest Observed Adverse Effect Level</b>			
<b>Present and intrusive</b>	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
<b>Significant Observed Adverse Effect Level</b>			
<b>Present and disruptive</b>	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid

Response	Examples of outcomes	Increasing effect level	Action
<b>Significant Observed Adverse Effect Level</b>			
<b>Present and very disruptive</b>	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

**“How can the risk of conflict between new development and existing businesses or facilities be addressed?”**

*Development proposed in the vicinity of existing businesses, community facilities or other activities may need to put suitable mitigation measures in place to avoid those activities having a significant adverse effect on residents or users of the proposed scheme.*

*In these circumstances the applicant (or ‘agent of change’) will need to clearly identify the effects of existing businesses that may cause a nuisance (including noise, but also dust, odours, vibration and other sources of pollution) and the likelihood that they could have a significant adverse effect on new residents/users. In doing so, the agent of change will need to take into account not only the current activities that may cause a nuisance, but also those activities that businesses or other facilities are permitted to carry out, even if they are not occurring at the time of the application being made.*

*The agent of change will also need to define clearly the mitigation being proposed to address any potential significant adverse effects that are identified. Adopting this approach may not prevent all complaints from the new residents/users about noise or other effects, but can help to achieve a satisfactory living or working environment, and help to mitigate the risk of a statutory nuisance being found if the new development is used as designed (for example, keeping windows closed and using alternative ventilation systems when the noise or other effects are occurring).*

*It can be helpful for developers to provide information to prospective purchasers or occupants about mitigation measures that have been put in place, to raise awareness and reduce the risk of post-purchase/occupancy complaints.”*

**Appendix C2.3 – The Noise Policy Statement for England (NPSE)**

The Noise Policy Statement for England (NPSE) published in March 2010 sets out the Government’s policy on noise and introduced the concepts from toxicology currently being applied to noise impacts by the World Health Organisation. These are:

- **NOEL – No Observed Effect Level: This is the level below which no effect can be detected.**
- **LOAEL – Lowest Observed Adverse Effect Level: This the level above which adverse effects on health and quality of life can be detected.**
- **SOAEL – Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur.**

*The first aim of the NPSE is to avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*

*The second aim of the NPSE is to mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. This second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life.”*

## Appendix C3 – British Standards & Guidance

### Appendix C3.1 – ProPG: Planning & Noise – New Residential Development (2017)

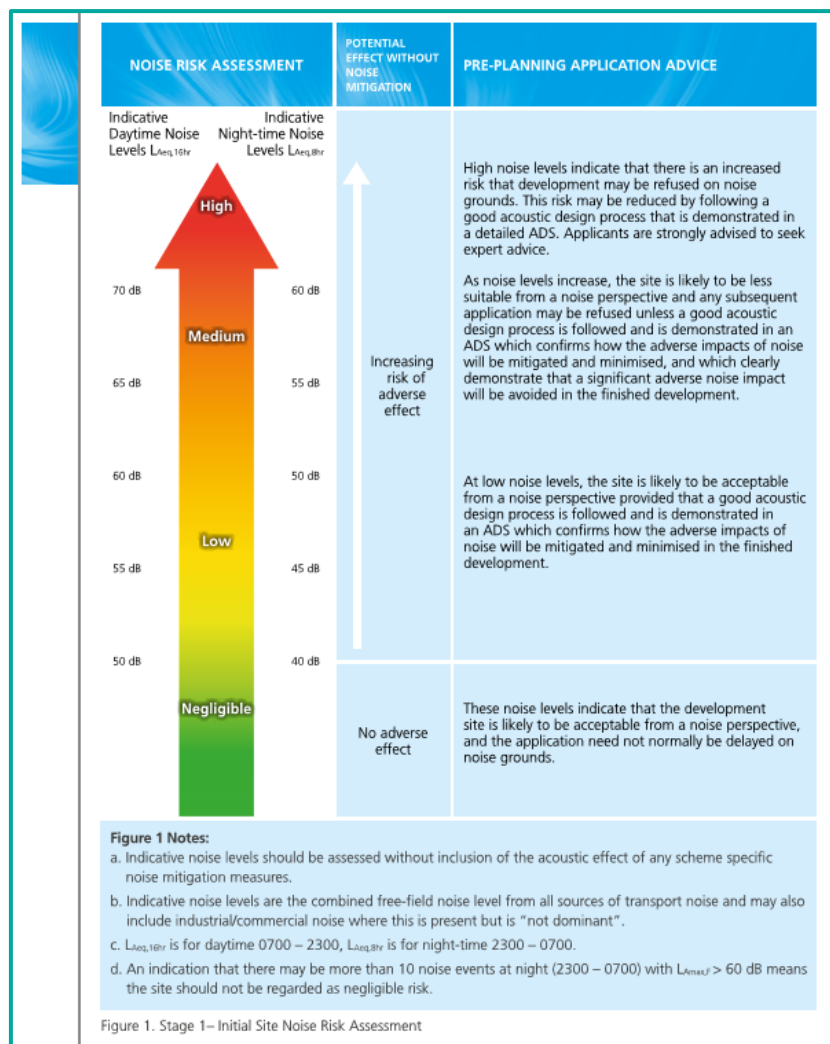
ProPG: 2017 guidance provides the recommended internal noise levels for various types of residential development, and three relevant bodies jointly created this document: The IOA, CIEH and the ANC.

ProPG is not an official government code of practice, but it does assist with bringing existing noise policies, including NPPF and helps fill in some gaps in knowledge with current guidance.

ProPG has a framework that requires a two-stage approach:

- “Stage 1 – an initial noise risk assessment of the proposed development site, and

Figure 7 – Stage 1 – Initial Site Noise Risk Assessment (Source: ProPG: 2017)



- **Stage 2 – a systematic consideration of four key elements. Element 1) demonstrating “Good Acoustic Design Process”, Element 2) observing internal “Noise Level Guidelines”, Element 3) undertaking an “External Amenity Area Noise Assessment”, and Element 4) consideration of “Other Relevant Issues.”**

ProPG gives reference to British Standard BS 8233:2014, which is detailed in [Appendix C3.2](#) of this report.

**“In the case of sites exposed to industrial and/or commercial noise:**

2.13 As stated in the Introduction, the scope of this ProPG is restricted to sites that are exposed predominantly to noise from transportation sources. The key concerns regarding new residential development near existing industrial and/or commercial land uses are:

- The future occupants of the new noise sensitive development may be subject to adverse effects of noise, and
- The existing industrial and/or commercial business may become subject to complaints from future occupants of the new noise sensitive development and at risk of having to modify operations and/or incur additional costs.

2.14 In the special case where industrial or commercial noise is present on the site but is “not dominant” (i.e. where the impact would be rated as lower than adverse (subject to context) if a BS4142:2014 assessment was to be carried out), its contribution may be included in the noise level used to establish the degree of risk (and if included, this should be clearly stated).

2.15 Where industrial or commercial noise is present on the site and is considered to be “dominant” (i.e. where the impact would be rated as adverse or greater (subject to context) if a BS4142:2014 assessment was to be carried out), then the risk assessment should not be applied to the industrial or commercial noise component and regard should be had to the guidance in BS4142:2014. The judgement on whether or not to undertake a BS4142 assessment to determine dominance should be proportionate to the level of risk. In low risk cases a subjective judgement of dominance, based on audibility, would normally be sufficient.”

**Appendix C3.2 - British Standard BS 8233:2014 – Guidance on Sound Insulation**

**Residential Internal Design Criteria**

Following ProPG reference is made to internal design criteria, and British Standard BS 8233:2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’ contains guidance for internal design criteria, as shown in the following table.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq, 16hour	-
Dining	Dining room/area	40 dB LAeq, 16hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16hour	30 dB LAeq, 8hour 45 dB LAF,max*

\* Pro PG: 2017 states; “NOTE 4: Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,F, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB LAmax,F more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).”

**Reference to World Health Organisation (WHO) Document number 12 relating to “Guidelines for Community Noise”:** Appendix A.12 of Pro PG: 2017 also states; “Consequently, the LAmax of noise events plus the number of events can be used as the basis of assessing impact; although this is subject to an upper limit. For example work which informs the WHO community noise guidelines recommendation that peak noise in bedrooms should not exceed 45 dB LAmax more than 10 to 15 times per night concluded that “It will be noted in particular that the tolerance to noise in regard to sleep passes through a maximum value for an optimum number of 10 to 15 flights per night and

*that beyond 20 to 25 occurrences of noise per night the aircraft need to be very quiet or the dwellings provided with excellent sound proofing”.*

### **Residential External Amenity Design Criteria**

For outdoor areas, such as gardens, courtyards and balconies, ProPG refers to BS 8233:2014 which states that:

*“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...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’.*

### **Appendix C3.3 - British Standard BS 4142:2014+A1:2019**

British Standard BS 4142:2014+A1:2019 “Methods for Rating and Assessing Industrial and Commercial Sound” is used to assess the potential for adverse impact due to the agricultural noise sources at the relevant noise-sensitive property. The existing noise source levels are measured/calculated and compared to the existing background noise level ( $L_{A90}$ ).

Depending on the noise source characteristics (tonal, intermittent, or impulsive), the noise source is given a rating noise level (penalty additions) and compared to the ‘lowest’ background noise level (during operating hours). The significance of the existing noise sources can then be given a likelihood of adverse impact, which follows British Standard BS 4142:2014+A1:2019 advice:

*“The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.*

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.*
- *Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”*

### **Subjective method**

**Tonality:** *For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.*

**Impulsivity:** *A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.*

**Other sound characteristics:** *Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.*

**NOTE 2** *Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant, then it might be*



*appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.*

***Intermittency:*** *When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”*

### Appendix C3.4 – AVO Acoustics Ventilation and Overheating – Residential Design Guide (The AVO Guide)

It is suggested here that the desirable internal noise standards within BS 8233:2014 should be achieved when providing adequate ventilation as defined by Building Regulations Approved Document F whole dwelling ventilation. However, for a whole dwelling ventilation system such as MVHR it is considered reasonable to allow higher levels of internal ambient noise from transport sources when higher rates of ventilation are required in relation to the overheating condition.

The Institute of Acoustics (IOA) and the Association of Noise Consultants (ANC) have published 'The AVO Guide: 2020' document jointly in January 2020. It provides guidance for those acousticians involved in the design of buildings to prevent noise ingress to reasonable internal levels. This provides valuable guidance on ventilation and overheating in support of the "Good Acoustic Design" principle advocated by ProPG. Along with guidance showing an acoustic assessment during the overheating condition:



The AVO Guide has a framework that has a two-level assessment procedure to estimate the potential impact on occupants:

- **AVO 'Level 1' risk assessment criteria** guide based on external free field ambient noise levels for dwellings relying on purge ventilation (i.e. opening windows) to prevent summertime overheating. AVO Guide Table 3-2 detailed in [Figure 8](#) below.

To assess the possibility of overheating it is reasonable to relax the BS 8233:2014 internal ambient noise levels from opening a window by 5 decibels (5 dB). Also, a partially open window is assumed to provide a sound reduction of 13 dB. Therefore, to achieve internal noise levels in line with BS 8233:2014 the façade external noise levels should fall inside the levels shown in the table on the next page.

**Figure 8 – Table 3-2 Guidance for Level 1 Site Risk Assessment of Noise from Transport Noise Source relating to Overheating Condition (Source: AVO: 2020)**

**Table 3-2** Guidance for Level 1 site risk assessment of noise from transport noise sources <sup>[Note 1]</sup> relating to overheating condition

Risk category for Level 1 assessment <sup>[Note 5]</sup>	Potential Effect without Mitigation	Recommendation for Level 2 assessment
$L_{Aeq,T}$ <sup>[Note 3]</sup> during 07:00 - 23:00 $L_{Aeq,8hr}$ during 23:00 - 07:00 	 Increasing risk of adverse effect	Recommended           Optional
50 dB Negligible 45 dB	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

### Maximum External Noise Levels to Allow Openable Windows

Room	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	53 dB $L_{Aeq, 16hour}$	-
Dining	Dining room/area	58 dB $L_{Aeq, 16hour}$	-
Sleeping (daytime resting)	Bedroom	53 dB $L_{Aeq, 16hour}$	48 dB $L_{Aeq, 8hour}$

The AVO guide seeks to determine the level of risk associated with overheating in a new development based on the existing noise climate. Using the above maximum external noise levels, the AVO risk categories are detailed in the table below:

### AVO Level 1 Risk Assessment

Daytime 07:00 to 23:00	Night-time 23:00 to 07:00	Risk Category	Mitigation
$\geq 63$ dB $L_{Aeq, 16hour}$	$\geq 55$ dB $L_{Aeq, 8hour}$	High Risk	Level 2 assessment recommended. Windows which are unopenable on grounds of noise will inevitably create issues for the overheating strategy.
54 - 62 dB $L_{Aeq, 16hour}$	49 - 54 dB $L_{Aeq, 8hour}$	Low/ Medium Risk	Level 2 assessment optional to give more confidence regarding the suitability of internal noise conditions
$\leq 53$ dB $L_{Aeq, 16hour}$	$\leq 48$ dB $L_{Aeq, 8hour}$	Negligible Risk	None required – openable windows suitable for ventilation

- **‘Level 2’ assessment of noise** is recommended where a dwelling using purge ventilation (i.e. open windows) reaches Level 1 ‘High’ risk category (Figure 8). The Level 2 assessment guidance notes (AVO Guide Table 3-3 detailed in Figure 9 on the next page) that where internal mean ambient noise levels are  $>50$  dB  $L_{Aeq, 16hr \text{ day}}$  or  $>42$  dB  $L_{Aeq, 8hr \text{ night}}$  then the outcome might be that the noise causes a material change in behaviour, e.g. having to keep windows closed most of the time, or potential for sleep disturbance.

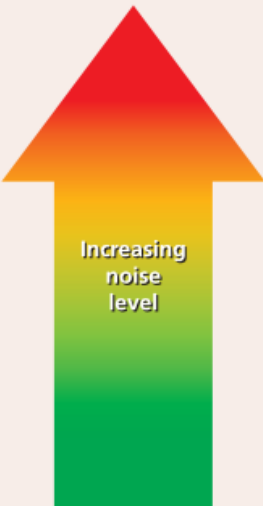
**Present Level 2 assessment to include the following minimum information:**

- Statement of the overheating criteria being applied.
- Description of the provisions for meeting the stated overheating criteria. This should include, where relevant, the area of facade opening.
- Details of the likely internal ambient noise levels whilst using provisions for mitigating overheating, and the method used to predict these.
- Estimation of how frequently and for what duration such provisions are required to mitigate overheating.

- Consideration of the effect of individual noise events.
- Assessment of adverse effect on occupants.

**Figure 9 – Table 3-3 Guidance for Level 2 Assessment of Noise from Transport Noise Source relating to Overheating Condition (Source: AVO: 2020)**

**Table 3-3** Guidance for Level 2 assessment of noise from transport noise sources<sup>[Note 1]</sup> relating to overheating condition

Internal ambient noise level <sup>[Note 2]</sup>			Examples of Outcomes <sup>[Note 5]</sup>	
$L_{Aeq,T}$ <sup>[Note 3]</sup> during 07:00 – 23:00 <sup>[Note 4]</sup>	$L_{Aeq,sh}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 <sup>[Note 4]</sup>		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{F,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. Having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
 <p>Increasing noise level</p>			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	<p>At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods.</p> <p>As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life.</p> <p>At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. <sup>[Note 6]</sup></p>
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{F,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response <sup>[Note 5]</sup> . Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

**Figure 10 – Table 3-4 Indoor ambient noise levels from mechanical services – ADF ventilation condition (Source: AVO: 2020)**

Ventilation condition	Possible system or design solution	Desirable internal ambient noise levels from mechanical services
ADF – Whole Dwelling Ventilation	System 3: Continuous mechanical extract (MEV), minimum low ventilation rates System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum low ventilation rates	Bedrooms $\leq L_{Aeq}$ 26 or 30 dB <sup>[Note 1]</sup> Living Rooms $\leq L_{Aeq}$ 30 dB
ADF – Extract Ventilation	System 1: Intermittent extract fans System 3: Continuous mechanical extract (MEV), minimum high ventilation rates System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum high ventilation rates	Bedrooms $\leq L_{Aeq}$ 26 or 30 dB Living / Dining Rooms $\leq L_{Aeq}$ 35 dB Bathroom / WC / Kitchen $\leq L_{Aeq}$ 45 dB
ADF – Purge Ventilation	Manually controlled fan exchanging a minimum 4 air changes per hour	No desirable noise levels are currently proposed based on the lack of evidence of acceptable noise levels when providing purge ventilation for the purpose of rapidly diluting indoor pollutants.

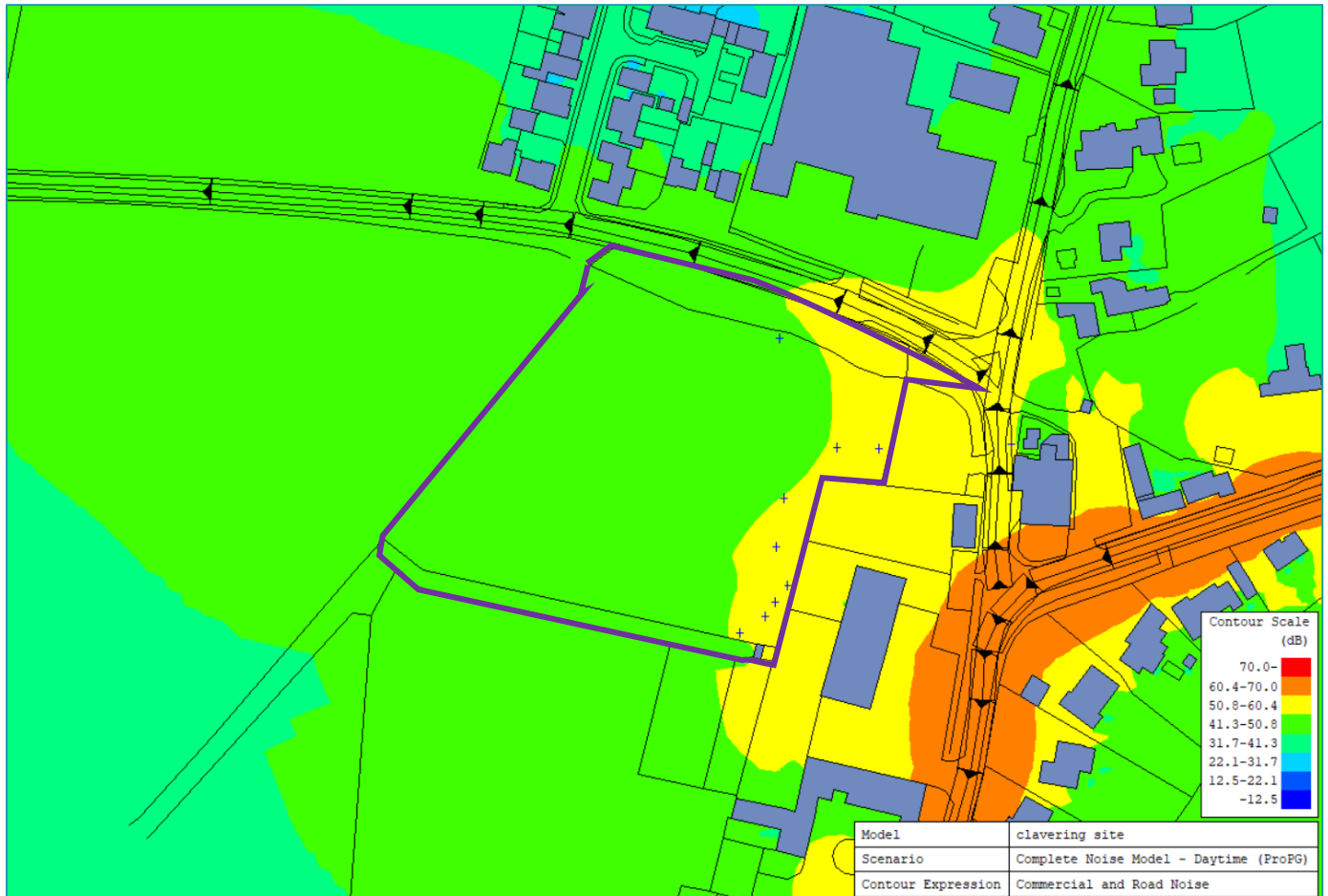
**Note 1** A lower level may be more appropriate; refer to paragraph 3.31.

**Figure 11 – Table 3-5 Indoor ambient noise levels from mechanical services – Overheating condition (Source: AVO: 2020)**

Possible system or design solution	Desirable upper internal ambient noise levels from mechanical services
Ventilative cooling or Comfort cooling	Bedrooms $L_{Aeq}$ 30 ( $\pm$ 5) dB Living / Dining Rooms $L_{Aeq}$ 35 ( $\pm$ 5) dB

# Appendix D – Noise Modelling

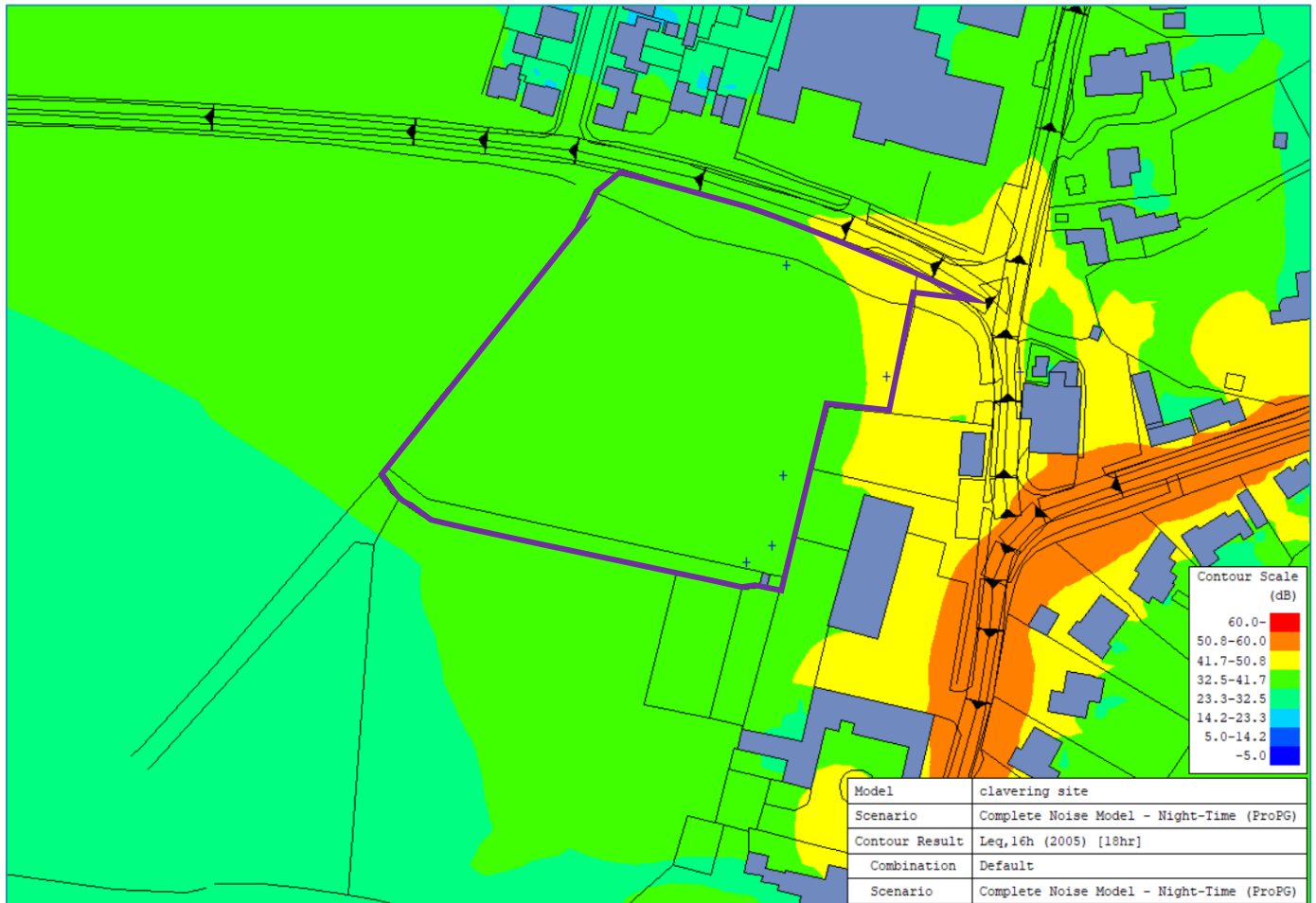
## Appendix D1 – Daytime ProPG Initial Site Noise Risk Assessment



**Note 1:** NoiseMap® Five Noise Model contour shown at 4 metres height above ground, as per Environmental Noise Directive.

**Note 2:** The contour scale key on the right-hand side is between 12.5 dB to >70 dB.

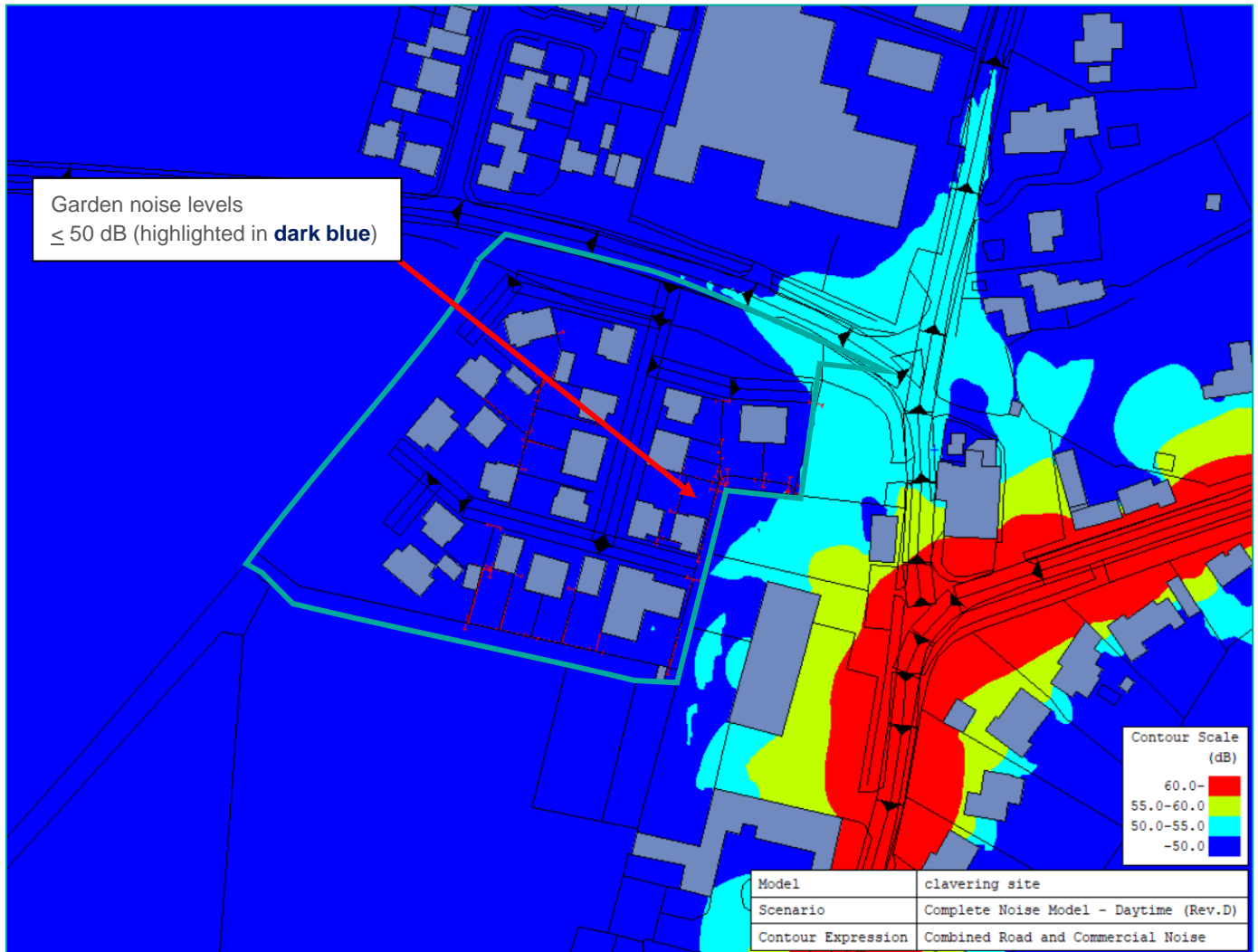
## Appendix D2 – Night-time ProPG Initial Site Noise Risk Assessment



**Note 1:** NoiseMap® Five Noise Model contour shown at 4 metres height above ground, as per Environmental Noise Directive.

**Note 2:** The contour scale key on the right-hand side is between 5 dB to > 60 dB.

## Appendix D3 – Proposed Garden Amenity Assessment - Daytime

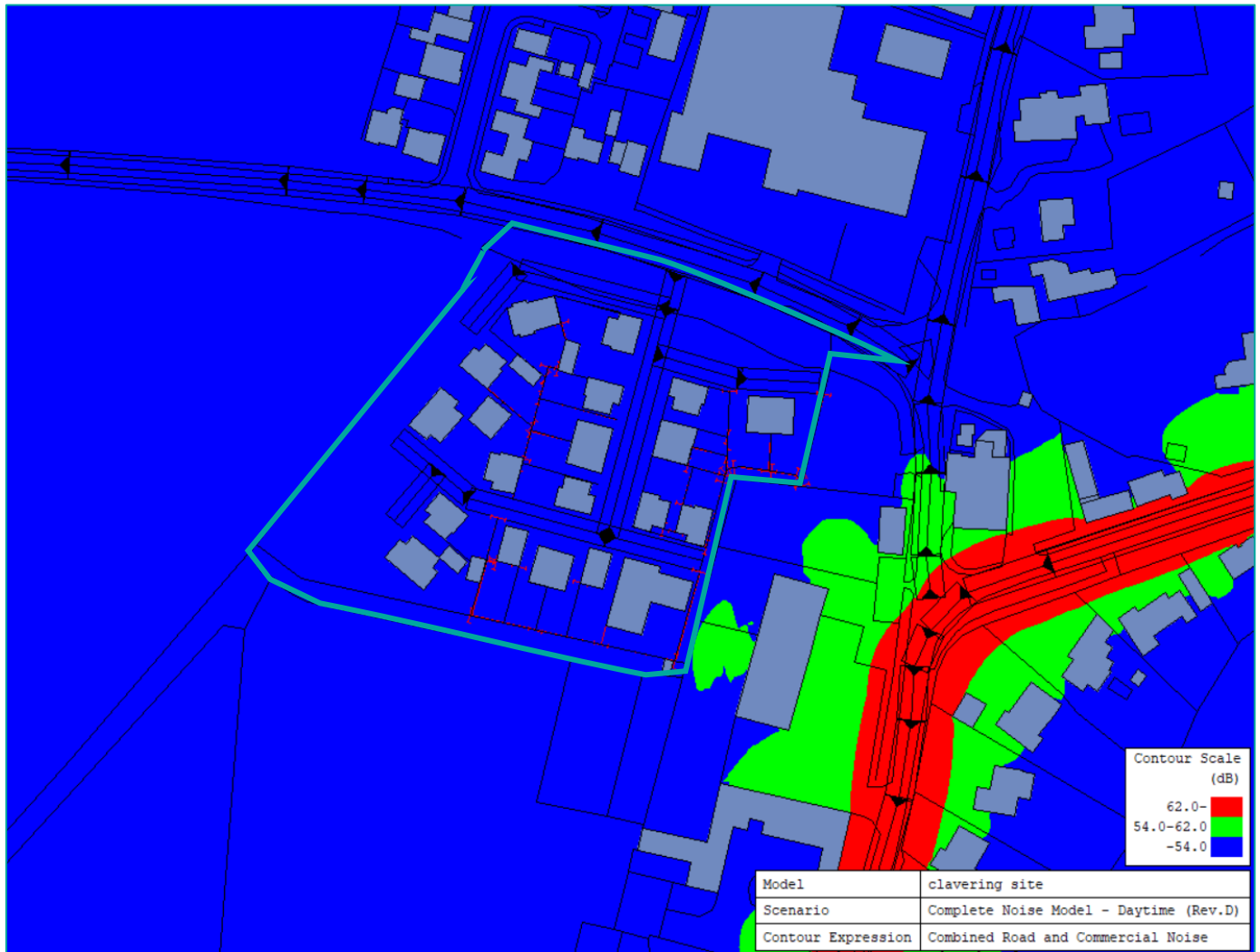


**Note 1:** NoiseMap® Five Noise Model contour shown at 1.5 metres height above ground.

**Note 2:** The contour scale key on the right-hand side is between 50 dB to >60 dB.



## Appendix D4 – AVO Level 1 Risk Category Assessment - Daytime



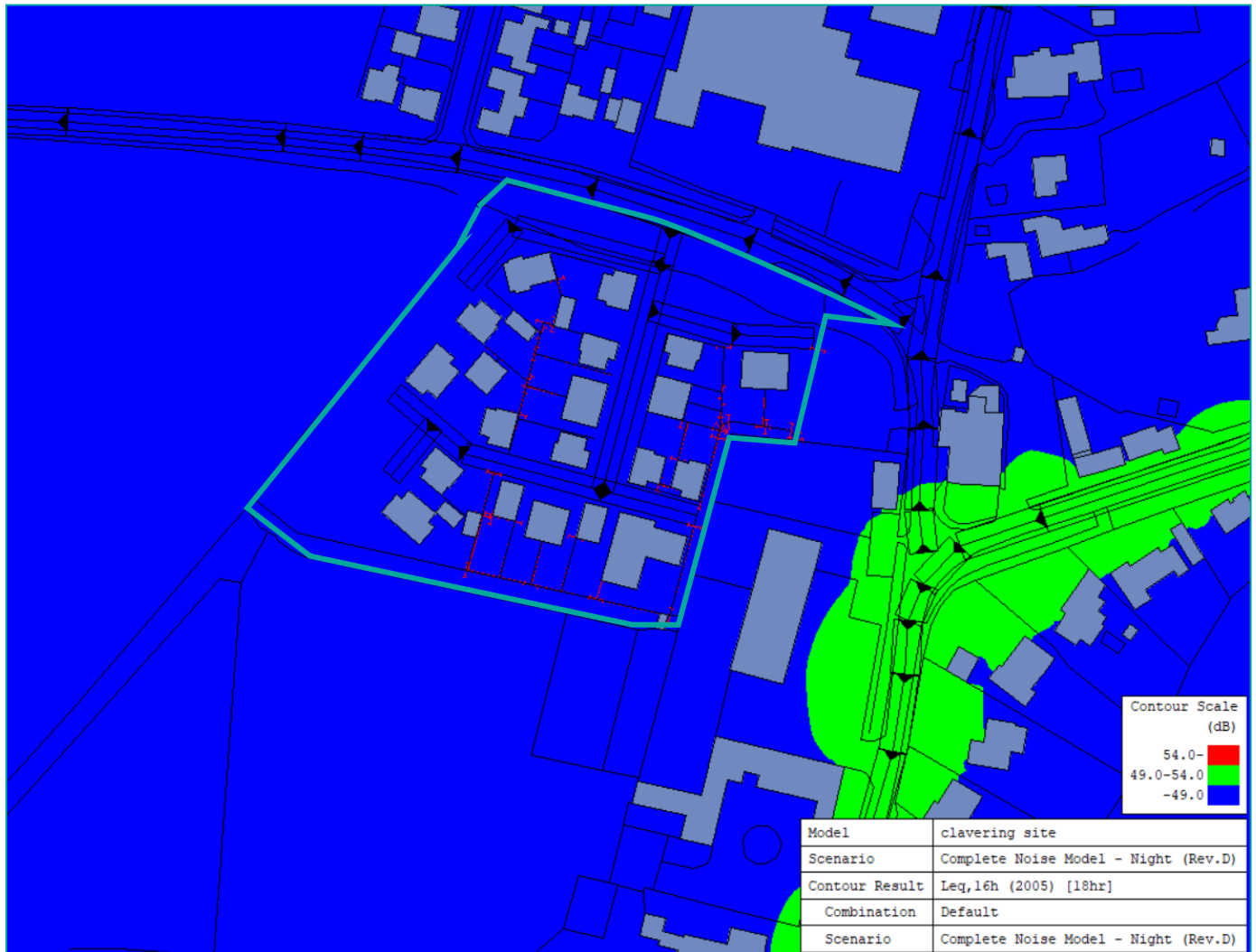
**Key:**

Contour Scale (dB)	
62.0-	High Risk
54.0-62.0	Low/ Medium Risk
-54.0	Negligible Risk

**Note 1:** NoiseMap® Five Noise Model contour shown at 4 metres height above ground, as per Environmental Noise Directive.

**Note 2:** The contour scale key on the right-hand side is between 54 dB to > 62 dB.

## Appendix D5 – AVO Level 1 Risk Category Assessment - Night-time



**Key:**

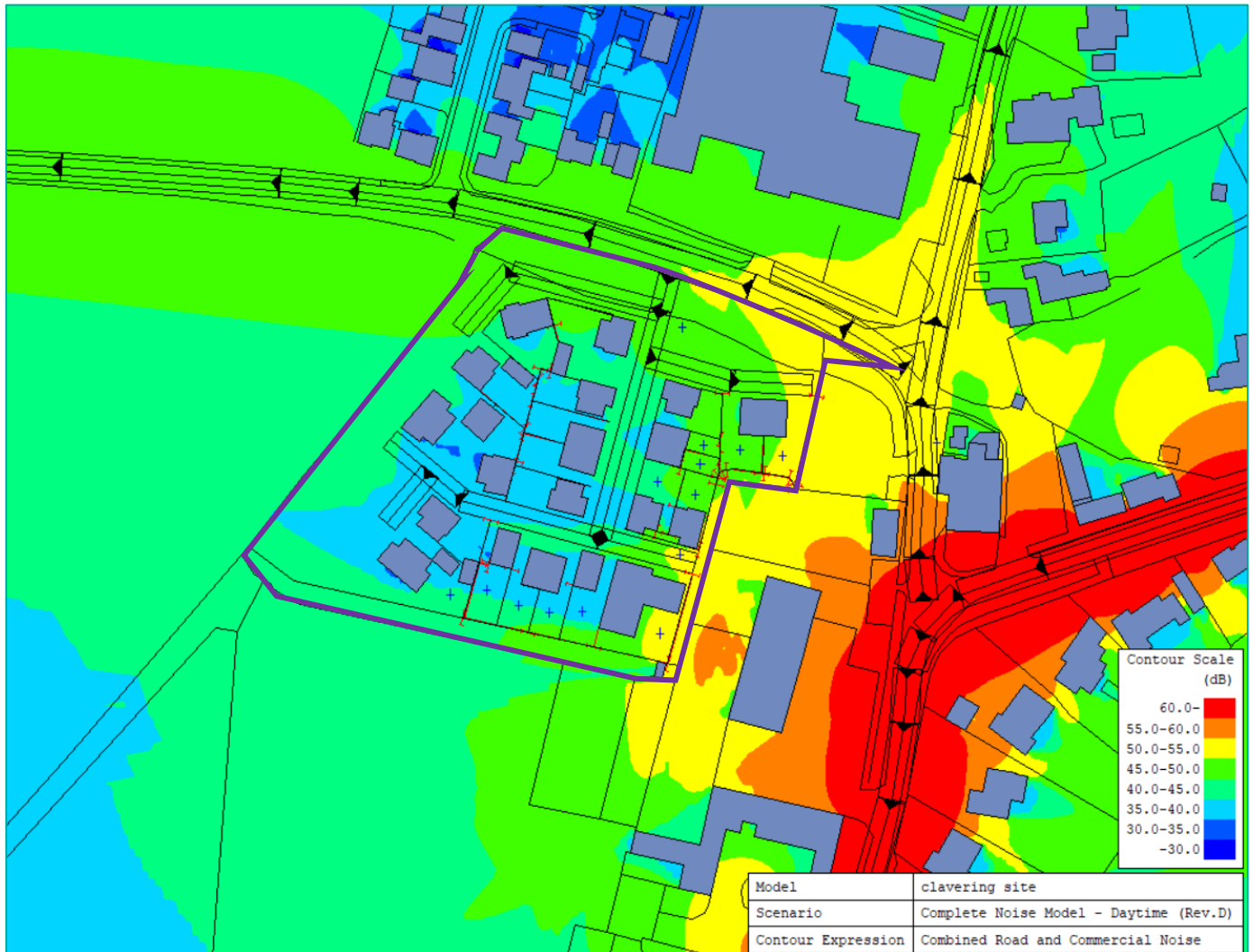
Contour Scale  
(dB)

- 54.0- High Risk
- 49.0-54.0 Low/Medium Risk
- 49.0 Negligible Risk

**Note 1:** NoiseMap® Five Noise Model contour shown at 4 metres height above ground, as per Environmental Noise Directive.

**Note 2:** The contour scale key on the right-hand side is between 49 dB to > 54 dB.

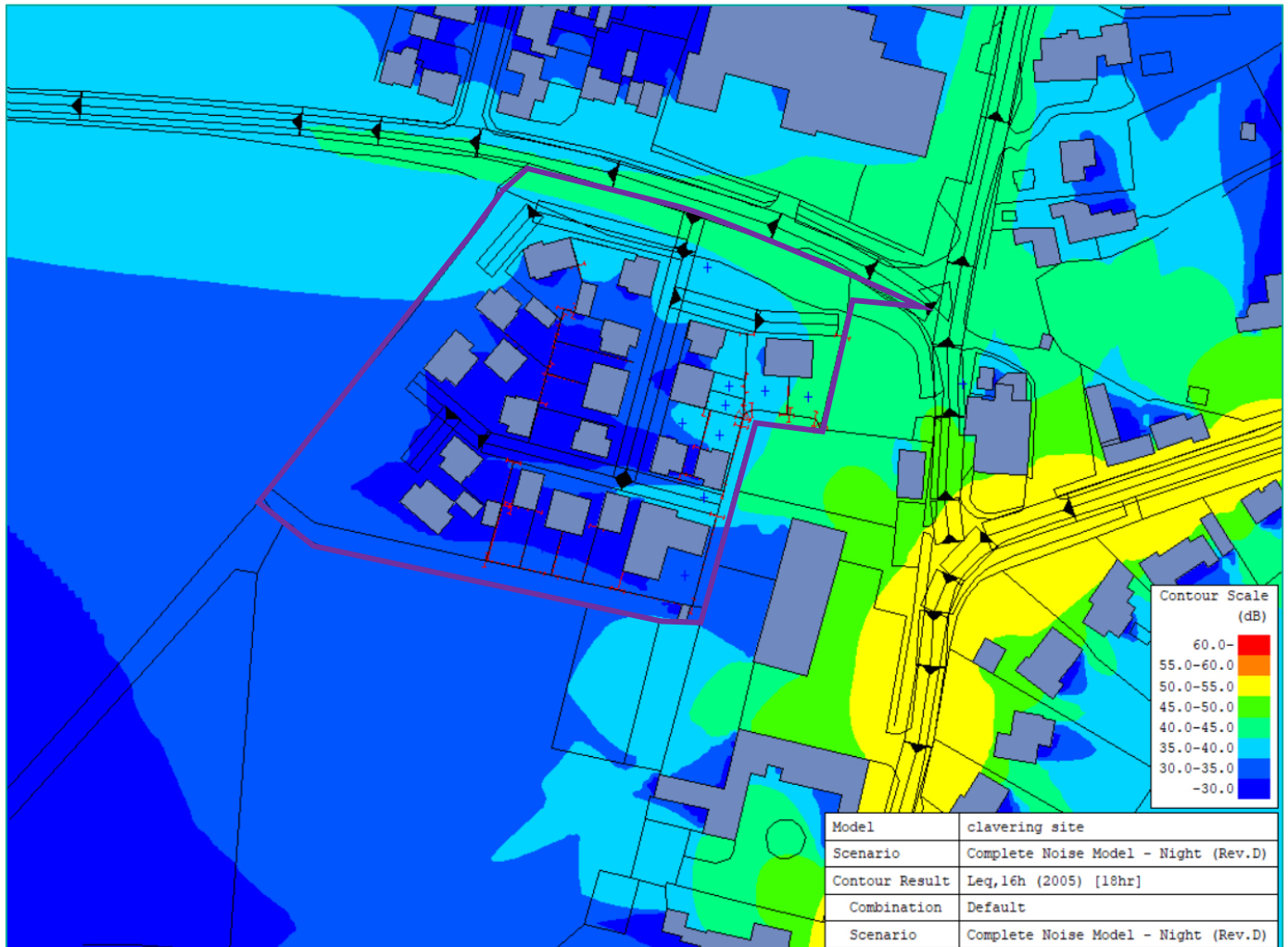
## Appendix D6 – Façade Noise Break-In Assessment - Daytime



**Note 1:** NoiseMap® Five Noise Model contour shown at 4 metres height above ground level.

**Note 2:** The contour scale key on the right-hand side is between 30 dB to >60 dB.

## Appendix D7 – Façade Noise Break-In Assessment - Night-time



**Note 1:** NoiseMap® Five Noise Model contour shown at 4 metres height above ground level.

**Note 2:** The contour scale key on the right-hand side is between 30 dB to >60 dB.