Report Ref. **CLI0239/R1/Rev.D**

# Noise Impact Assessment Report to Support Planning Application for New Residential Development

## Land at Pines Hill, Stansted Mountfichet

20 August 2021

Report prepared for:
**Luxus Homes Ltd**

Report prepared by:
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# Document Information

| Key information | |
|---|---|
| Client | Luxus Homes Ltd |
| Project | Land at Pines Hill, Stansted Mountfichet |
| Added Project Info | Proposed Residential Development (31 No. Units) |
| Author | Alex Hancock PG Dip (IOA), MIOA |
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| Date | 27/07/2021 |
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# Summary

The site is located at Land at Pines Hill, Stansted Mountfichet. The development is understood to include the construction of 31 No. residential units with associated garages, amenity space and new access to the public highway. Climate Acoustics has been appointed to complete a noise survey and assessment to support a planning application for noise.

Climate Acoustics have measured and assessed the existing noise climate and have provided appropriate sound insulation and mitigation measures to reduce noise emissions inside all habitable rooms and external areas. The primary sources of noise affecting the proposed development are road traffic to the west of the site, rail to the east of the site and commercial to the south.

Following British Standard BS 8233:2014, British Standard BS 4142:2014+A1:2019 and guidance given in ProPG: Planning & Noise Guidance, 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 noise impact assessment and report:

- **Existing industrial/ commercial noise impact (Section 4.3):** As the adjacent industrial/ commercial noise sources from R & N Engineering are expected to cause a significant adverse impact to Units 24, 25 and 26-31, the contribution from R & N Engineering plant has been added to the noise climate. Therefore, mitigation measures to the proposed development are discussed in Section 4.4 & 4.5 of this report.
- **External amenity noise levels (Section 4.4):** the external amenity gardens and balconies have been assessed in Section 4.4 of this report. Based on the noise control/ mitigation measures listed in Section 4.4 of this report, it is deemed that the lowest practicable noise levels have been achieved in the site's external amenity areas.

  **Note 1: it is recommended that during the design phase, before finalising the external garden and balconies, the client, the main contractor, or the architect should contact their acoustic consultant to clarify if the finalised garden and balcony locations achieve the lowest practicable noise levels.**
- **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 of this report, the internal noise levels set in British Standard BS 8233:2014 can be achieved.

  **Note 1: it is recommended that during the design phase, before selecting glazing and ventilation, the client, the main contractor, or the architect should contact their acoustic consultant to clarify if the selected acoustic performance is sufficient.**

  **Note 2: extra internal ambient noise may be introduced through mechanical ventilation to the residential rooms proposed to avoid the internal noise levels being too high; this should also be considered during the design phase.**

  **Note 3: it is recommended that, wherever possible, window openings of habitable rooms (i.e. bedrooms and living areas) are orientated away from the commercial premises and road traffic noise from Pines Hill. This will improve the acoustic design and reduce the level of noise impact.**
- **Plant Noise Emission Criteria/ Limit (Section 4.6):** As per the Uttlesford Council's Noise Assessment Guidance, if an MVHR system generates external noise should be 5dB(A) or greater below the typical existing background noise level measured at a representative location of the proposed dwellings, as shown in Section 4.6 of this report.

  **Note 1: it is recommended that during the design phase, before selecting the MVHR system, the client, the main contractor, or the architect should contact their acoustic consultant to clarify if the selected acoustic performance is sufficient.**

**Based on the above, the Planning Application requirements for noise should, therefore, be achieved.**

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# Table of Contents

# 1 Introduction

The site is located at Land at Pines Hill, Stansted Mountfichet. Climate Acoustics has been appointed to complete a noise survey and assessment to support a planning application for noise for the development of 31 No. residential units with associated garages, amenity space and new access to the public highway.

Uttlesford District Council has specified in their planning condition where an acoustic report *"The scheme must demonstrate that suitable internal noise levels can be achieved as set out in BS 8233: 2014, with provision for ventilation."*

Climate Acoustics will measure and assess the existing 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, which will include 31 No. residential units. Appendix B provides a full overview of the surrounding premises along with full architect's drawings that include site drawings.

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

# 2 Noise Planning Policy and Criteria

## 2.1. Local Planning Policy

### 2.1.1. Uttlesford District Council Local Plan 2005

**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** 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 (Section 2.2.1 of this report), and this document can be supplemented by ProPG (see Section 2.3.1 of this report).

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

***"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 ($L_{Aeq}$) below the typical background ($L_{A90}$) 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."*

## 2.2. National Planning Policy

### 2.2.1. 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."*

### 2.2.2. 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 |
|---|---|---|---|
| **Not present** | No Effect | No Observed Effect | No specific measures required |
| **Present and not intrusive** | 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 |

| Response | Examples of outcomes | Increasing effect level | Action |
|---|---|---|---|
| **Lowest Observed Adverse Effect Level** | | | |
| **Present and intrusive** | 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 |
| **Significant Observed Adverse Effect Level** | | | |
| **Present and disruptive** | 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 |
| **Present and very disruptive** | 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."*

### 2.2.3. 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."*

## 2.3. British Standards & Guidance

### 2.3.1. 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***

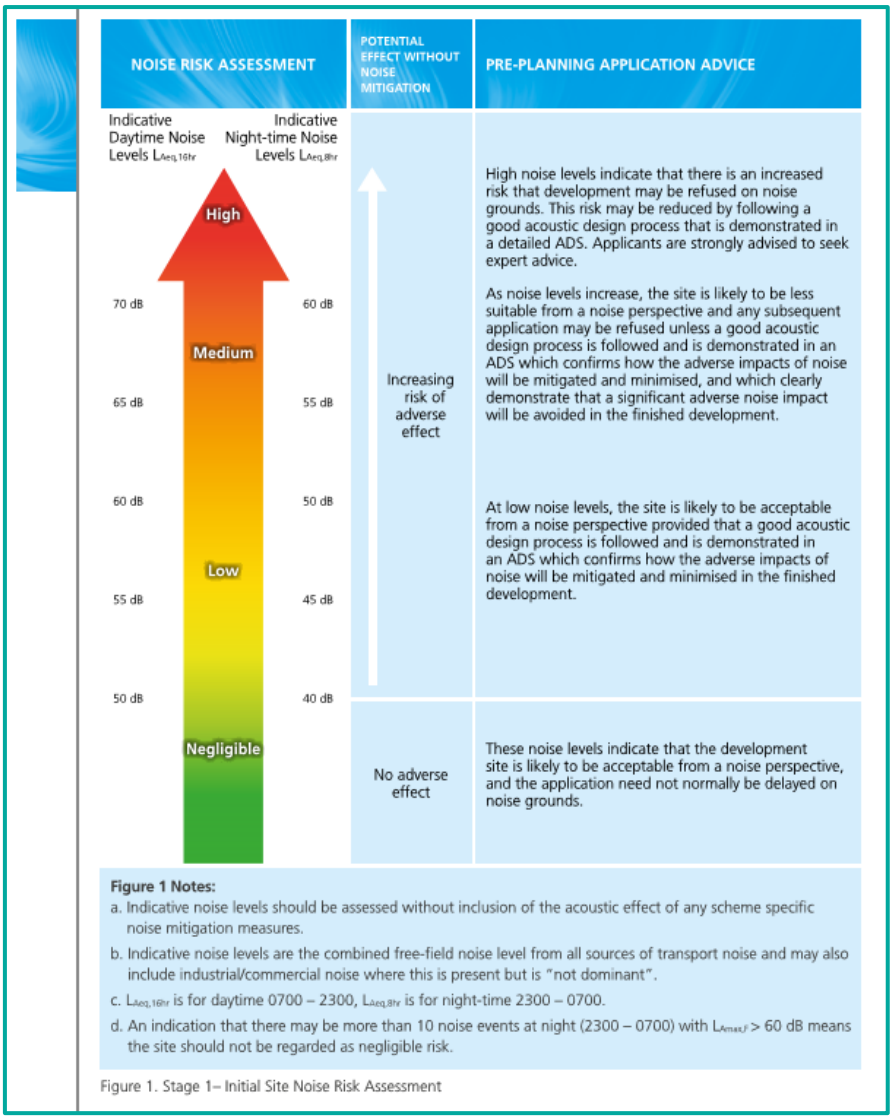


Figure 1. Stage 1– Initial Site Noise Risk Assessment

- ***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 Section 2.3.2 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."*

### 2.3.2. 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 $L_{Aeq, 16hour}$ | - |
| **Dining** | Dining room/area | 40 dB $L_{Aeq, 16hour}$ | - |
| **Sleeping (daytime resting)** | Bedroom | 35 dB $L_{Aeq, 16hour}$ | 30 dB $L_{Aeq, 8hour}$<br>45 dB $L_{AF,max}$* |

* 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 $L_{Amax,F}$, 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 $L_{Amax,F}$ 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)."*

Appendix A.12 of Pro PG: 2017 also states; *"Consequently, the $L_{Amax}$ 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 $L_{Amax}$ 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'.*

### 2.3.3. British Standard BS 4142:2014

British Standard BS 4142:2014 *"Methods for Rating and Assessing Industrial and Commercial Sound"* is used to assess the potential for adverse impact due to an industrial or commercial noise source at the relevant noise-sensitive commercial or residential property. The proposed or 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, impulsive, or other), the noise source is given a rating noise level (penalty additions) and compared to the *'lowest'* background noise level (during proposed operating hours). The significance of the proposed or existing noise source can then be given a likelihood of adverse impact, which follows British Standard BS 4142:2014 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."*

# 3 Existing Noise Climate

## 3.1. Survey Details

### 3.1.1. Personnel present

Alex Hancock – Climate Acoustics

### 3.1.2. Instrumentation and Calibration

Svantek 971 – Sound Level Meter (*calibration certificates available upon request.).

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

| Climate Acoustics Calibrated Equipment | |
|---|---|
| **Attended Noise Meter (Svantek 971)** | |
| Class 1 Sound Level Meter | Svantek 971 – Serial Number 34390 (Date of Calibration: 03/10/2019*) |
| Microphone | ACO 7052E – Serial Number 54420 (Date of Calibration: 03/10/2019*) |
| Preamplifier | SV18 – Serial Number 32165 (Date of Calibration: 03/10/2019*) |
| **Calibrator (Larson Davis CAL200)** | |
| Calibrator | Larson Davis – CAL200 - Serial Number 6003 (Date of Calibration: 16/10/2020*) |

### 3.1.3. Equipment operation, including the times and dates.

- 7 pm on Thursday 17 June 2021 to 10:30 am on Wednesday 23 June 2021
- 1.07 pm to 5.10 pm on Monday 5 July 2021

### 3.1.4. Weather conditions

The weather conditions during noise monitoring at the proposed site are as follows.

| Date | Temperature (°C) | Weather Conditions | Wind |
|---|---|---|---|
| **Thursday 17th June 2021** | 15°C to 20°C | Warm, dry with occasional light rain, and cloudy skies with approx. 50%-100% cloud cover | **Light breeze (<5m/s)** |
| **Friday 18th June 2021** | 12°C to 15°C | Warm, dry with occasional light rain, and cloudy skies with approx. 50%-100% cloud cover | **Gentle breeze (<5m/s)** |
| **Saturday 19th June 2021** | 12°C to 15°C | Warm, dry with occasional light rain, and cloudy skies with approx. 50%-100% cloud cover | **Gentle breeze (<5m/s)** |
| **Sunday 20th June 2021** | 12°C to 16°C | Warm, dry, and cloudy with approx. 50%-100% cloud cover | **Light breeze (<5m/s)** |

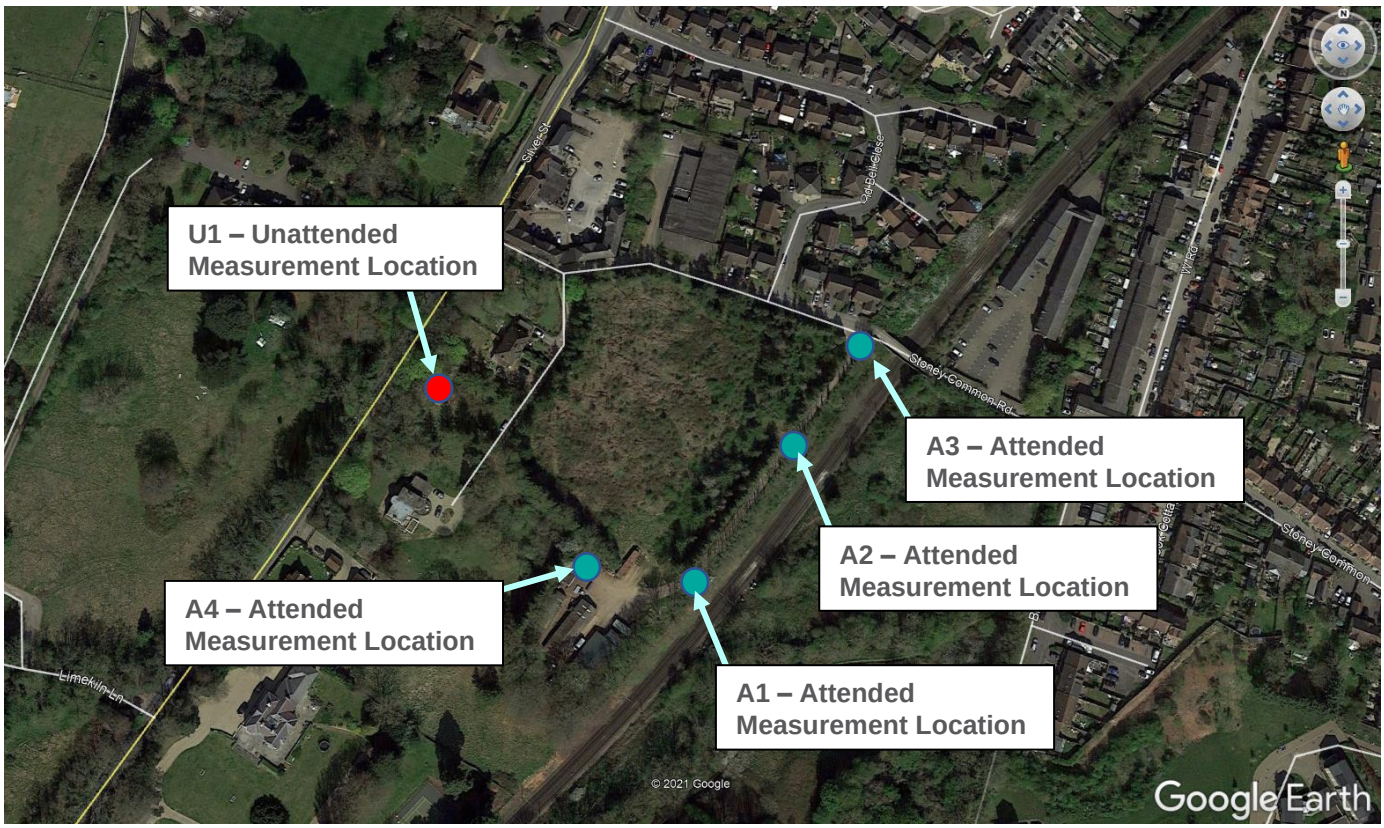
| Date | Temperature (°C) | Weather Conditions | Wind |
|---|---|---|---|
| **Monday 21st June 2021** | 10°C to 13°C | Warm, dry with occasional light rain, and cloudy skies with approx. 50%-100% cloud cover | **Gentle breeze (<5m/s)** |
| **Tuesday 22nd June 2021** | 6°C to 16°C | Cold/ Warm, dry, and cloudy with approx. 50%-100% cloud cover | **Gentle breeze (<5m/s)** |
| **Wednesday 23rd June 2021** | 7°C to 20°C | Cold/ Warm, dry, and cloudy with approx. 50%-100% cloud cover | **Light breeze (<5m/s)** |
| **Monday 5th July 2021** | 14°C to 21°C | Warm, dry with occasional light rain, and cloudy skies with approx. 50%-100% cloud cover | **Gentle breeze (<5m/s)** |

## 3.2. Methodology

**Attended and Unattended Noise Monitoring:**

Figure 2 shows the unattended sound level meter location at position U1 and the attended sound level meter positions A1 to A4; a description of each position is provided below:

**Figure 2 – Noise Measurement Locations (Source: Google Earth™)**



Position U1: The sound level meter microphone was set up on a tripod at 2 metres height and is in 'free-field' conditions.

Position A1 to A4: The sound level meter microphone was set up on a tripod at 1.7 metres height and are in 'free-field' conditions.

**Calibration Procedure:**

The calibration procedure before and after the noise survey, the Svantek 971 sound level meters were calibrated using the Larson Davis CAL200, and no significant drift was measured (accuracy within ±0.3 dB).

## 3.3. 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.

## 3.4. Noise Climate

When attending the site, the current noise climate is dominated by constant road traffic noise from the B1383 (Pines Hill) to the west of the site, Stoney Common Road to the north and trains passing to the east. There is also intermittent commercial/ industrial noise from the existing commercial/ industrial noise to the south of the proposed site.

Appendix B1 shows the surrounding residential and commercial premises. The existing commercial/ industrial premises at R & N Engineering is summarised below:

- **R & N Engineering:** Steel Fabrications Specialist (Commercial Unit): **Noise from machinery inside three commercial bays including metal plate puncher, disc sander, disc cutter, nut runner, hammering and guillotine**.

  **Note: The current operating hours are 8 am to 7 pm on Monday to Friday and closed on Saturday and Sunday.**

## 3.5. Noise Measurement Results

### 3.5.1. Train Movements - Attended Noise Monitoring Results (Location A1 to A3):

The attended measured noise levels are summarised in the table below, and Appendix A1 shows the attended noise survey data presented in a tabulated format with comments on measurements.

| Measurement Position | Comments | Single Event Level, SEL $L_{AE}$,dB | Maximum Noise Level during Event $L_{AFmax}$, dB |
|---|---|---|---|
| A1 | Northbound – Fast (3-carriage) | 82 | 75 |
| | Northbound – Fast (6-carriage) | 83 | 79 |
| | Northbound – Slow (9-carriage) | 85 | 80 |
| | Northbound – Slow (9-carriage) | 83 | 80 |
| | Southbound – Fast (6-carriage) | 85 | 81 |
| A2 | Southbound – Fast (5-carriage) | 81 | 75 |
| | Northbound – Fast (6-carriage) | 81 | 76 |
| | Southbound – Fast (3-carriage) | 83 | 77 |
| A3 | Southbound (Freight Train) | 83 | 74 |
| | Northbound - Fast (6-carriage) | 81 | 73 |
| | Southbound - Slow (6-carriage) | 78 | 72 |

**Calculated Railway Noise**

The calculated SEL's have been used with the typical daytime and night-time timetable information to calculate a daytime and night-time sound level for train movements at positions A1, A2 & A3. This is summarised in the table below.

| Timetable | Period | Approximate Number of Trains* | Calculated $L_{Aeq,T}$ (dB) | | |
|---|---|---|---|---|---|
| | | | A1 | A2 | A3 |
| Monday to Friday | Daytime 0700 hrs to 2300 hrs | 166** | 60 | 57 | 58 |
| | Night-time 2300 hrs to 0700 hrs | 27*** | 57 | 53 | 55 |

**** The approximate number of trains were obtained from 'Realtime Trains' timetable data including passenger trains and freight trains.***

***** Trains during the daytime includes 11 Freight Trains and 155 Passenger Trains (74 Northbound and 81 Southbound)***

****** Trains during the night-time includes 4 Freight Trains and 23 Passenger Trains (10 Northbound and 13 Southbound)***

### 3.5.2. Attended Baseline Noise Monitoring Results (Location A1 to A3):

The attended measured noise levels are summarised in the table below and Appendix A2 for the daytime baseline noise levels.

| Date | Position | Time | Duration | $L_{Aeq,T}$ | $L_{AF,max}$ | $L_{A90,T}$ |
|---|---|---|---|---|---|---|
| 05/07/2021 | A1 | 13:18 | 7 mins, 13 secs | 48 | 67 | 42 |
| | | 13:25 | 17 mins, 51 secs | 59 | 83 | 42 |
| | | 14:53 | 15 mins, 8 secs | 58 | 79 | 43 |
| | A2 | 15:17 | 7 mins, 57 secs | 51 | 78 | 44 |
| | | 15:32 | 10 mins, 6 secs | 58 | 81 | 44 |
| | A3 | 15:51 | 18 mins, 12 secs | 56 | 75 | 43 |
| | A1 | 16:11 | 5 mins, 31 secs | 48 | 60 | 44 |
| | | 16:18 | 34 secs | 48 | 55 | 45 |
| | | 16:21 | 1 min, 47 secs | 47 | 55 | 44 |
| | A3 | 16:25 | 15 mins, 3 secs | 53 | 69 | 45 |
| | A2 | 16:41 | 15 mins, 4 secs | 52 | 74 | 44 |

### 3.5.3. Commercial Premises - Attended Noise Monitoring Results (Location A4):

The attended measured from commercial noise sources are summarised in the table below and Appendix A3.

| Date | Position | Time | Duration | $L_{Aeq,T}$ | $L_{AF,max}$ | $L_{A90,T}$ |
|---|---|---|---|---|---|---|
| 05/07/2021 | A4 | 14:06 | 20 secs | 68 | 74 | 45 |
| | | 14:16 | 6 mins, 3 secs | 64 | 77 | 47 |
| | | 14:19 | 3 mins, 8 secs | 68 | 77 | 47 |
| | | 14:22 | 2 mins, 3 secs | 60 | 68 | 48 |
| | | 14:32 | 8 mins, 48 secs | 56 | 71 | 44 |
| | | 14:39 | 46 secs | 79 | 84 | 66 |
| | | 14:49 | 9 mins, 32 secs | 71 | 89 | 45 |
| | | 14:52 | 3 mins, 12 secs | 56 | 78 | 45 |
| | | 16:09 | 15 mins, 31 secs | 53 | 75 | 45 |

### 3.5.4. Unattended Noise Monitoring Results (Location U1):

The unattended measured day ambient noise level $L_{Aeq,16\ hours}$ (daytime) and $L_{Aeq,8\ hours}$ (night-time) and the typical maximum noise level $L_{AF,max}$ (night) and background noise level $L_{A90}$ (day and night) are summarised in the table below (all free-field conditions).

A summary of the unattended noise data is presented in graph format in 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 (Front of Site, Facing Road):** | 60 | 53 | 71 |

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

| | Day 07:00 to 23:00 ($L_{A90,T}$)** | Night 23:00 to 07:00 ($L_{A90,T}$)** |
|---|---|---|
| **Location U1 (Front of Site, Facing Road):** | 52 | 33 |

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

# 4 Noise Impact Assessment

## 4.1. Noise Modelling

To assess the noise impact from the surround road and rail networks along with commercial noise on the proposed residents premises an environmental noise model was completed using **NoiseMap ® Five** noise modelling software.

NoiseMap ® Five uses methodology in *'The Calculation of Road Traffic Noise 2005'* CRTN to predict noise from road traffic, the Department of Transport's Technical Memorandum *'Calculation of Railway Noise 1995'* CRN to predict noise from railway traffic. Commercial noise sources have been calculated using *'ISO 9613 Acoustics – Attenuation of sound during propagation outdoors'*.

The topography of the site and surrounding area have been determined from 2 metre resolution Digital Terrain Model (DTM) contour lines. The ground of the site is considered to roads and car parks are considered to be hard surfaces, where a ground absorption of zero has been assumed.

The results from the noise measurements detailed in Appendix A and Section 3.5 of this report.

Calculations predicted to the nearest noise-sensitive receptors consider the following:

**British Standard BS 4142: 2014+A1:2019 and British Standard BS 8233: 2014** – British Standards BS 4142:2014+A1:2019 & British Standard BS 8233:2014 considered in calculations given in Section 4.3, Section 4.4, and Appendix C of this report.

Following British Standard BS 4142:2014+A1:2019, noise penalties were not applied to the equipment that could attract attention at the nearest noise sensitive window:

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

Appendix C1 & C2 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 Site Noise Risk Assessment (Appendix C1):** indicative noise levels 61-62 dB $L_{Aeq,16hr}$ facing the commercial premises to the south, 52 dB $L_{Aeq,16hr}$ facing the rail to the east, and 60-62 dB $L_{Aeq,16hr}$. facing Pines Hill to the west (B1383).

**Night-time Site Noise Risk Assessment (Appendix C2):** indicative noise levels 48-49 dB $L_{Aeq,16hr}$ facing the rail to the east and 53-56 dB $L_{Aeq,16hr}$ facing Pines Hill to the west (B1383).

In accordance with *"ProPG Planning & Noise: New Residential Development (May 2017)"*, Section 2.3.1 of this report shows that the indicative noise levels measured during the day and night provide the following *'pre-planning application advice'*:

***'Low'* noise risk assessment:**

For the properties to the east boundary of the site (rail facing façades) and the noise risk assessment is a low noise risk, the pre-planning application advise 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."*

***'Medium'* noise risk assessment:**

For the properties facing Pines Hill (B1383) to the far west boundary of the site (west facing façades) and rear façades facing the commercial premises (south facing façades) the noise risk assessment is a medium noise risk, the pre-planning application advise in ProPG states:

*"As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development."*

## 4.3. Existing Industrial/ Commercial Noise Impact

Appendix B1 of this report shows the nearby adjacent industrial/ commercial premises at R & N Engineering:

**R & N Engineering: Steel Fabrications Specialist (Commercial Unit): Noise from machinery inside three commercial bays including metal plate puncher, disc sander, disc cutter, nut runner, hammering and guillotine.**

***Note: The current operating hours are as follows: 8 am to 7 pm on Monday to Friday and Closed on Saturday and Sunday.***

### 4.3.1. Existing Commercial Noise Impact Assessment

Appendix A3 shows that at attended measurement location A4 at R & N Engineering was subjectively determined as the dominant noise sources when in operation.

As per ProPG guidance (Section 2.3.1 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 industrial/ commercial noise sources from R & N Engineering are "dominant", therefore, a BS 4142 assessment has been carried out using NoiseMap ® Five. A summary of the results of the assessment are presented in the table below, and the proposed nearest residential units are identified to the south-east corner of the site.**

| Position | Description | NoiseMap® Predicted $L_{Aeq}$ dB from Noise Sources | Predicted Rating Noise Level, $L_{Ar,Tr}$, dB | Comparison Rating Noise Level Criteria (37 dB $L_{Ar,Tr,1\text{-hour}}$) | Likelihood of Impact |
|---|---|---|---|---|---|
| Unit 25 (R25) | Dwelling No. 25, Residential South Façade Window | 61 | **63** | **+26** | **Significant Adverse** |
| Unit 25 (R25 - Garden) | Dwelling No. 25, Residential Garden | 61 | **63** | **+26** | **Significant Adverse** |

| Position | Description | NoiseMap® Predicted $L_{Aeq}$ dB from Noise Sources | Predicted Rating Noise Level, $L_{Ar,Tr}$, dB | Comparison Rating Noise Level Criteria (37 dB $L_{Ar,Tr,1\text{-}hour}$) | Likelihood of Impact |
|---|---|---|---|---|---|
| Unit 24 (R24) | Dwelling No. 24, Residential South Façade Window | 62 | **64** | **+27** | **Significant Adverse** |
| Unit 24 (R24 - Garden) | Dwelling No. 24, Residential Garden | 63 | **65** | **+28** | **Significant Adverse** |
| Units 26-31 (R26-R31 - S) | Block Units No. 26-31, Residential South Façade Window | 59 | **61** | **+24** | **Significant Adverse** |
| Units 26-31 (R26-R31 – W) | Block Units No. 26-31, Residential East Façade Window | 59 | **61** | **+24** | **Significant Adverse** |

**The specific noise levels were calculated with an acoustic feature (+2 dB) applied to the rating level. As the adjacent industrial/ commercial noise sources from R & N Engineering are expected to cause a significant adverse impact to Units 24, 25 and 26-31, the contribution from R & N Engineering plant has been added to the noise climate.**

**Therefore, mitigation measures to the proposed development are discussed in Section 4.4 & 4.5 of this report.**

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

Section 4.4 of this report shows the predicted external amenity area noise levels. At the same time, the internal noise levels using an outline facade assessment has been assessed in Section 4.5 of this report.

For outdoor areas, such as gardens and balconies, ProPG refers to *'BS 8233:2014, Section 7.7.3.2'* (Section 2.3.2 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'.***

### 4.4.1. Proposed Garden and Balcony Amenity Areas:

Most garden areas show that noise levels are within the target external noise level range of 50 dB to 55 dB $L_{Aeq,16hr}$. Appendix C3 and C4 shows that the upper guideline value 55 dB $L_{Aeq,16hours}$ is expected to be exceeded to garden and balconies due to the site location near to the neighbouring commercial unit (R & N Engineering).

**Noise Control/ Mitigation Measures to Gardens:** The development is designed to achieve the lowest possible noise levels in the external garden amenity as:

- Appendix B2 & B3 shows the orientation of the gardens on the proposed residential buildings proposed for development.
- Appendix C3 shows it is recommended that a solid barrier (e.g. acoustic fence) to surround the boundary of gardens to Units 24 & 25 with a minimum height 2.2 metres with a minimum surface density of 12.5 kg/m$^2$. This is understood to screen the gardens from the commercial premises.
- Appendix C3 shows it is recommended that a basic close-boarded fence of a minimum height 1.8 metres (6" foot) and satisfactory length is understood to be proposed to surround each of the garden. This would be 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.

**Noise Control/ Mitigation Measures to Balconies:** The development is designed to achieve the lowest practicable noise levels in the external balcony amenity as:

- Appendix C4 shows the residential external balcony amenity should be provided with screening which can provide a sound reduction of between 5dB–10dB bringing the levels within the upper guideline value (55 dB $L_{Aeq,16hr}$).

**If the above noise control/ mitigation measures detailed in Section 4.4.1 of this report are adhered to, it is deemed that the lowest practicable noise levels have been achieved in the site's external amenity garden areas and balconies.**

## 4.5. Internal Noise Level Guidelines (ProPG – Stage 2 - Element 2)

### 4.5.1. Façade Assessment

As the site layout and building designs have not been finalised, we have incorporated indicative room and glazing sizes typical for residential dwelling living areas and bedrooms to predict the likely outline sound insulation performance necessary to meet internal noise level guidelines.

**Important: It is recommended that, wherever possible, window openings of habitable rooms (i.e. bedrooms and living areas) are orientated away from the commercial premises and road traffic noise from Pines Hill. This will improve the acoustic design and reduce the level of noise impact.**

**External Façade Construction:**

The glazing and ventilation elements of the façade are expected to be the weakest elements acoustically, and the external façade (understood to be brick/ block construction) is expected to perform well. The sound insulation performance of the glazing should be tested in a lab, and both the glass and frame achieves the performance requirement ($R_w+C_{tr}$).

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

### 4.5.2. Glazing and Ventilation Requirements:

Appendix C5 and C6 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, the table below provides the required glazing and ventilation sound reduction values necessary.

A summary of the outline noise break-in and glazing and ventilation treatments is presented in Figure 3 and the table below:

**Figure 3 - Outline Glazing and Ventilation Treatments**


| Room/ Floor Level | Required Sound Reduction Values | | Example Glazing/ Ventilation Configuration*** | Noise Break-In Reference Colour (Drawing Above) |
|---|---|---|---|---|
| | Glazing ($R_w$+$C_{tr}$*) | Ventilation ($D_{ne,W}$ + $C_{tr}$**) | | |
| Ground Floor, Lounge/ Dining | 32 dB*** | 49 dB*** | 10/16/6 Double Glazing/ **/ Mechanical Ventilation***** | |
| 1st Floor, Bedroom | 41 dB*** | 49 dB*** | **8.8/16/12.8 Double Laminated Glazing / Mechanical Ventilation***** | |

| Room/ Floor Level | Required Sound Reduction Values | | Example Glazing/ Ventilation Configuration*** | Noise Break-In Reference Colour (Drawing Above) |
|---|---|---|---|---|
| | Glazing ($R_w$+$C_{tr}$*) | Ventilation ($D_{ne,W}$ + $C_{tr}$**) | | |
| Ground Floor, Lounge/ Dining | 32 dB*** | 37 dB*** | 10/16/6 Double Glazing/ **/ Acoustic Trickle Ventilation***** | |
| 1st Floor, Bedroom | 35 dB*** | 39 dB*** | 10/16/6 Double Glazing/ **/ Acoustic Trickle Ventilation***** | |
| Ground Floor, Lounge/ Dining | 27 dB*** | 29 dB*** | 6/12/6 Double Glazing/ Trickle Ventilation*** | **Buildings Not Highlighted** |
| 1st Floor, Bedroom | 27 dB*** | 29 dB*** | 6/12/6 Double Glazing/ Trickle Ventilation*** | |

**** $R_w$+$C_{tr}$ – The Weighted Sound Reduction Index for glazing and frame.***

***** $D_{,n,eW}$+$C_{tr}$ – Sound reduction from ventilation.***

****** Note: we recommend that before selecting glazing and ventilation, either the client, the main contractor, or the architect should contact their acoustic consultant (Climate Acoustics) to clarify if their selected acoustic performance for glazing and ventilation is sufficient. Important: if an MVHR system is implemented, this will be expected to contribute to the internal noise levels internally.***

### 4.5.3. 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 4.5.2 of this report. If the specifications provided in Section 4.5.2 is adhered to, the internal noise levels set in British Standard BS8233:2014 can be achieved.

**Note 1: it is recommended that during the design phase before selecting glazing and ventilation, the main contractor should contact their acoustic consultant to clarify if the selected acoustic performance is sufficient.**

**Note 2: further internal ambient noise may be introduced through mechanical ventilation to the residential rooms proposed, to avoid the internal noise levels being too high this should also be considered during the design phase.**

**Note 3: when windows are opened for purge ventilation, the internal noise levels will increase.**

**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. Plant Noise Emission Limit as per Uttlesford District Council's, Noise Assessment Guidance

***External Background Noise Level***

The table below shows the typical background noise levels measured at the site (Location U1).

| | Day 07:00 to 23:00 ($L_{A90,T}$)* | Night 23:00 to 07:00 ($L_{A90,T}$)* |
|---|---|---|
| **Location U1 (West of Site, Facing Road):** | 52* | 33* |

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

Appendix A4 shows the unattended noise survey data presented in a graphical format.

**Cumulative Plant Rating Noise Emission Limits:**

Uttlesford District Council's requirements for plant noise emissions for this proposed scheme are as follows:

- ***"'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 ($L_{Aeq}$) below the typical background ($L_{A90}$) level at the nearest noise sensitive location'."***

Therefore, the cumulative rating noise level ($L_{Ar,Tr}$) from all future fixed plant must not exceed the existing typical measured background noise level. Therefore, the plant noise limits are shown in the table below:

| | Day 07:00 to 23:00 ($L_{Ar,Tr}$) | Night 23:00 to 07:00 ($L_{Ar,Tr}$) |
|---|---|---|
| **Maximum emission levels at 1 metre from nearest noise sensitive locations window, $L_{Aeq,1hour\ (Day)}$ and $L_{Aeq,15\text{-}min\ (Night)}$** | 47 | 28 |

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

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# Appendix A – Noise Measurement Graphs

## Appendix A1 – Attended Train Passby's Noise Measurements Location A1 to Location A3 (Section 3.2, Figure 2)

| Date | Position | Time [hh:mm] | Single Event Level, SEL $L_{AE}$,dB | Maximum Noise Level during Event $L_{AFmax}$, dB | Comments |
|---|---|---|---|---|---|
| 05/07/2021 | A1 | 13:06 | 82 | 75 | Northbound (3-carriage) |
| | A1 | 13:17 | 83 | 79 | Northbound (6-carriage) |
| | A2 | 13:53 | 81 | 75 | Southbound (5-carriage) |
| | A3 | 13:57 | 83 | 74 | Southbound (Freight Train) |
| | A3 | 14:04 | 81 | 73 | Northbound - Fast (6-carriage) |
| | A2 | 15:17 | 81 | 76 | Northbound - Fast (6-carriage) |
| | A2 | 15:18 | 83 | 77 | Southbound - Fast (3-carriage) |
| | A1 | 16:16 | 85 | 80 | Northbound - Slow (9-carriage) |
| | A1 | 16:18 | 85 | 81 | Southbound - Fast (6-carriage) |
| | A1 | 16:21 | 83 | 80 | Northbound - Slow (9-carriage) |
| | A3 | 16:24 | 78 | 72 | Southbound - Slow (6-carriage) |

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# Appendix A2 – Attended Baseline Noise Measurements at Location A1 to Location A3 (Section 3.2, Figure 2)

| Date | Position | Time [hh:mm] | Duration | $L_{Aeq,T}$, dB | $L_{AF,max}$, dB | $L_{A90,T}$, dB | Comments |
|---|---|---|---|---|---|---|---|
| 05/07/2021 | A1 | 13:18 | 7 mins, 13 secs | 48 | 67 | 42 | x1 No. Car Passing on Commercial Road<br>Road traffic noise from Pines Hill<br>Trees rustling |
| | | 13:25 | 17 mins 51 secs | 59 | 83 | 42 | x2 No. Trains Passing (Southbound)<br>Road traffic noise from Pines Hill<br>Trees rustling |
| | | 14:53 | 15 mins 8 secs | 58 | 79 | 43 | Helicoptor overhead ($L_{AF,max}$)<br>Sanding from Bay 2 and Bay 3 (dominant)<br>Road traffic noise from Pines Hill<br>Trees rustling |
| | A2 | 15:17 | 7 mins 57 secs | 51 | 78 | 44 | Road traffic noise on Stoney Common Road<br>Road traffic noise from Pines Hill<br>Trees rustling |
| | | 15:32 | 10 mins 6 secs | 58 | 81 | 44 | x1 No. Train Passing<br>Road traffic noise on Stoney Common Road<br>Road traffic noise from Pines Hill<br>Trees rustling |
| | A3 | 15:51 | 18 mins 12 secs | 56 | 75 | 43 | Cars passing on Stoney Common Road<br>x1 No. train passing (northbound – slow)<br>Road traffic noise from Pines Hill |
| | A1 | 16:11 | 5 mins 31 secs | 48 | 60 | 44 | Noise from commercial clearly audible<br>Distant road traffic noise from Pines Hill<br>Trees Rustling |
| | | 16:18 | 34 secs | 48 | 55 | 45 | Noise from commercial clearly audible<br>Distant road traffic noise from Pines Hill<br>Trees Rustling |
| | | 16:21 | 1 mins 47 secs | 47 | 55 | 44 | Noise from commercial clearly audible<br>Distant road traffic noise from Pines Hill<br>Trees Rustling |
| | A3 | 16:25 | 15 mins 3 secs | 53 | 69 | 45 | Cars passing on Stoney Common Road<br>x1 No. train passing (northbound – slow)<br>Road traffic noise from Pines Hill |
| | A2 | 16:41 | 15 mins 4 secs | 52 | 74 | 44 | x1 No. Train Passing (northbound - fast)<br>Road traffic noise on Stoney Common Road<br>Road traffic noise from Pines Hill<br>Trees rustling |

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# Appendix A3 – Attended Commercial Noise Measurements at Location A4 (Section 3.2, Figure 2)

| Date | Position | Time [hh:mm] | Duration | $L_{Aeq,T}$, dB | $L_{AF,max}$, dB | $L_{A90,T}$, dB | Comments |
|---|---|---|---|---|---|---|---|
| 05/07/2021 | A4 | 14:06 | 20 secs | 68 | 74 | 45 | Metal plate puncher (dominant, $L_{AF,max}$) – Bay 1<br>Sanding |
| | | 14:16 | 6 mins<br>3 secs | 64 | 77 | 47 | Nut runner audible<br>Hammering audible - metal on metal noise ($L_{AF,max}$)<br>Disc sander noise – Bay 2 audible |
| | | 14:19 | 3 mins<br>8 secs | 68 | 77 | 47 | Hammering only – Bay 2 (dominant, $L_{AF,max}$)<br>Disc sander noise – Bay 2 audible |
| | | 14:22 | 2 mins<br>3 secs | 60 | 68 | 48 | Train Passing ($L_{AF,max}$)<br>Hand-held disc cutter – Bay 2 (dominant) |
| | | 14:32 | 8 mins<br>48 secs | 56 | 71 | 44 | Hand-held disc cutter – Bay 2 (dominant)<br>Disc sander noise – Bay 3 audible and intermittent ($L_{A90}$)<br>Radio audible |
| | | 14:39 | 46 secs | 79 | 84 | 66 | Disc cutter – cutting metal girder (dominant, $L_{AF,max}$)<br>Note: occurs once every three weeks |
| | | 14:49 | 9 mins<br>32 secs | 71 | 89 | 45 | Disc cutter – cutting metal girder ($L_{AF,max}$)<br>Disc sander noise – Bay 2 audible and intermittent (dominant)<br>Radio audible ($L_{A90}$) |
| | | 14:52 | 3 mins<br>12 secs | 56 | 78 | 45 | Guillotine audible ($L_{AFmax}$)<br>Road traffic noise audible<br>Radio audible ($L_{A90}$) |
| | | 16:09 | 15 mins<br>31 secs | 53 | 75 | 45 | Hammering – metal on metal noise – Bay 2 (dominant, $L_{AF,max}$)<br>Radio audible ($L_{A90}$)<br>Aircraft overhead audible |

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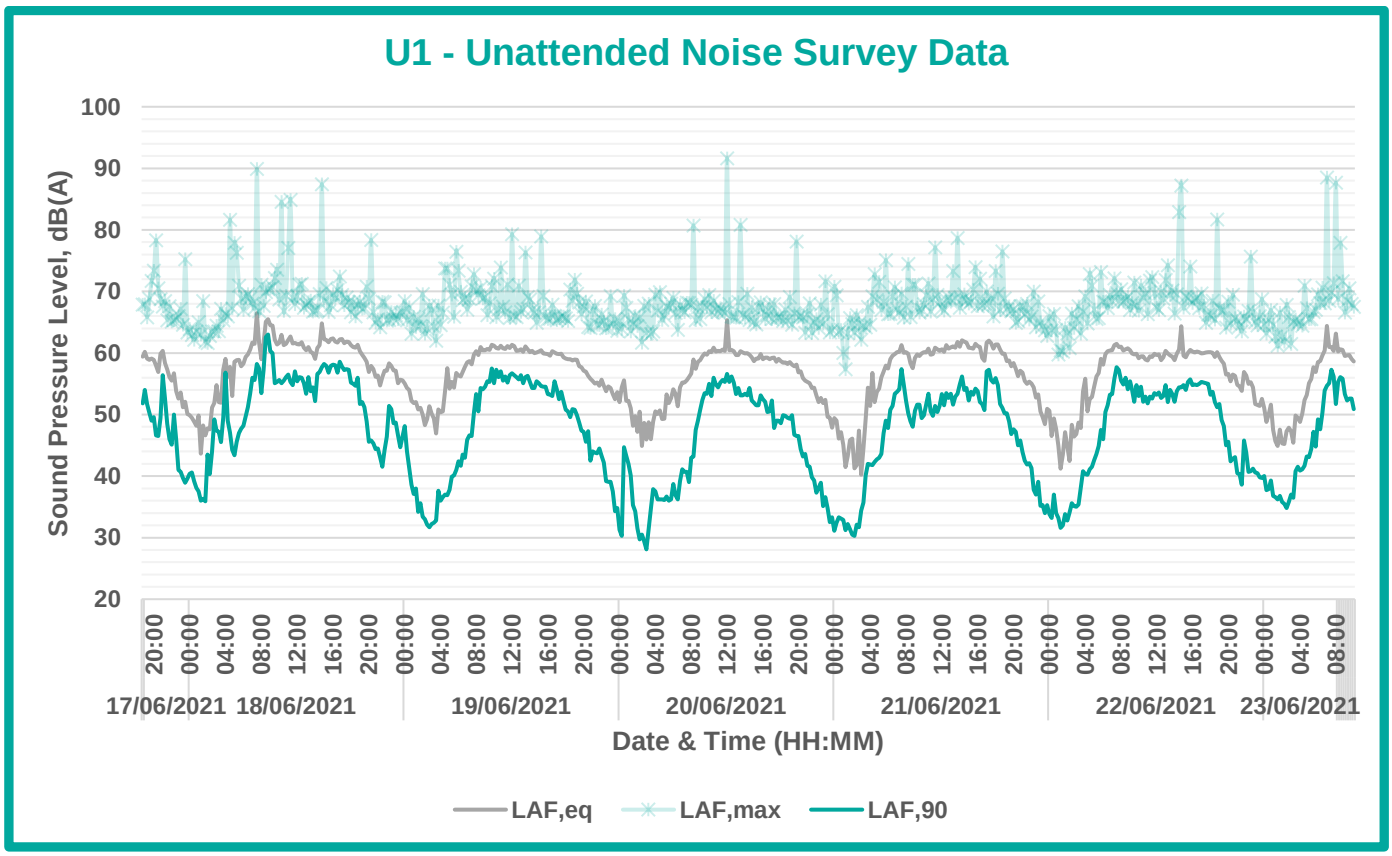
## Appendix A4 – Unattended Noise Survey Graph at Location U1 (Section 3.2, Figure 2)



# Appendix B – Drawings

## Appendix B1 – Site Boundary Plan (Source: Google Earth ™)

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## Appendix B2 – Site Block Plan Drawings (Source: Architects Drawings)

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# Appendix C – Noise Contours

## Appendix C1 – 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.***

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## Appendix C2 – 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.***

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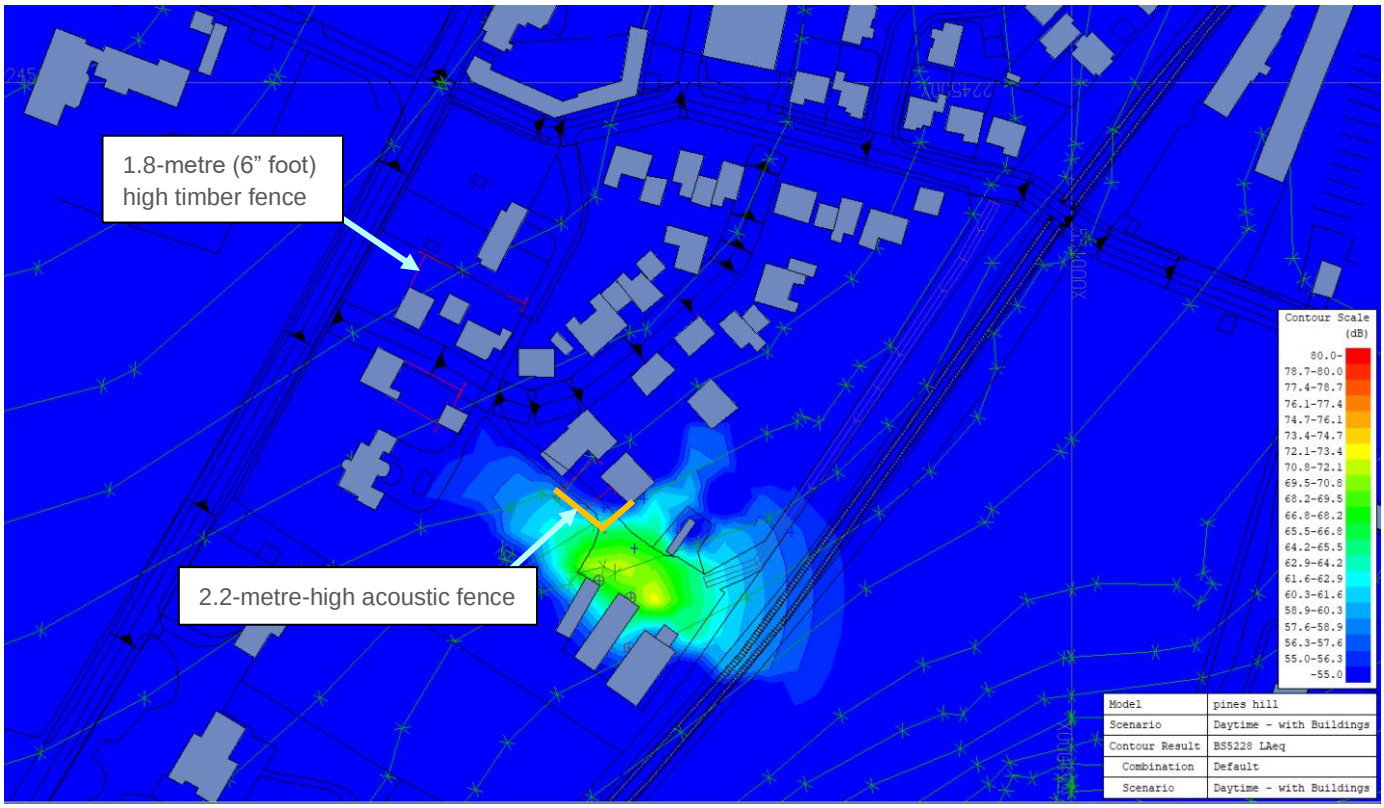
## Appendix C3 – Garden Amenity Assessment with Mitigation (Daytime)




***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 55 dB to >80 dB.***

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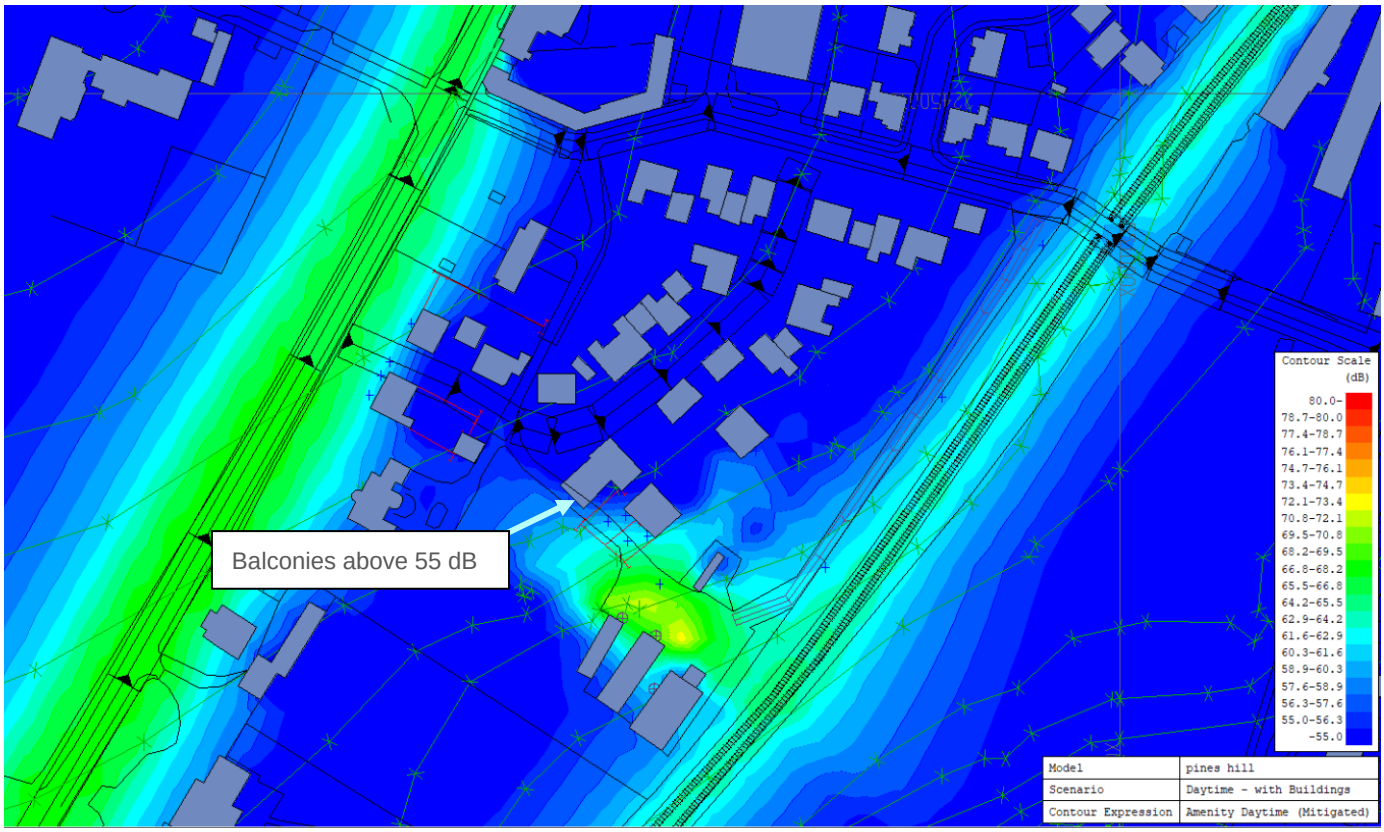
## Appendix C4 – Balcony Amenity Assessment with Mitigation (Daytime)




***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 55 dB to >80 dB.***

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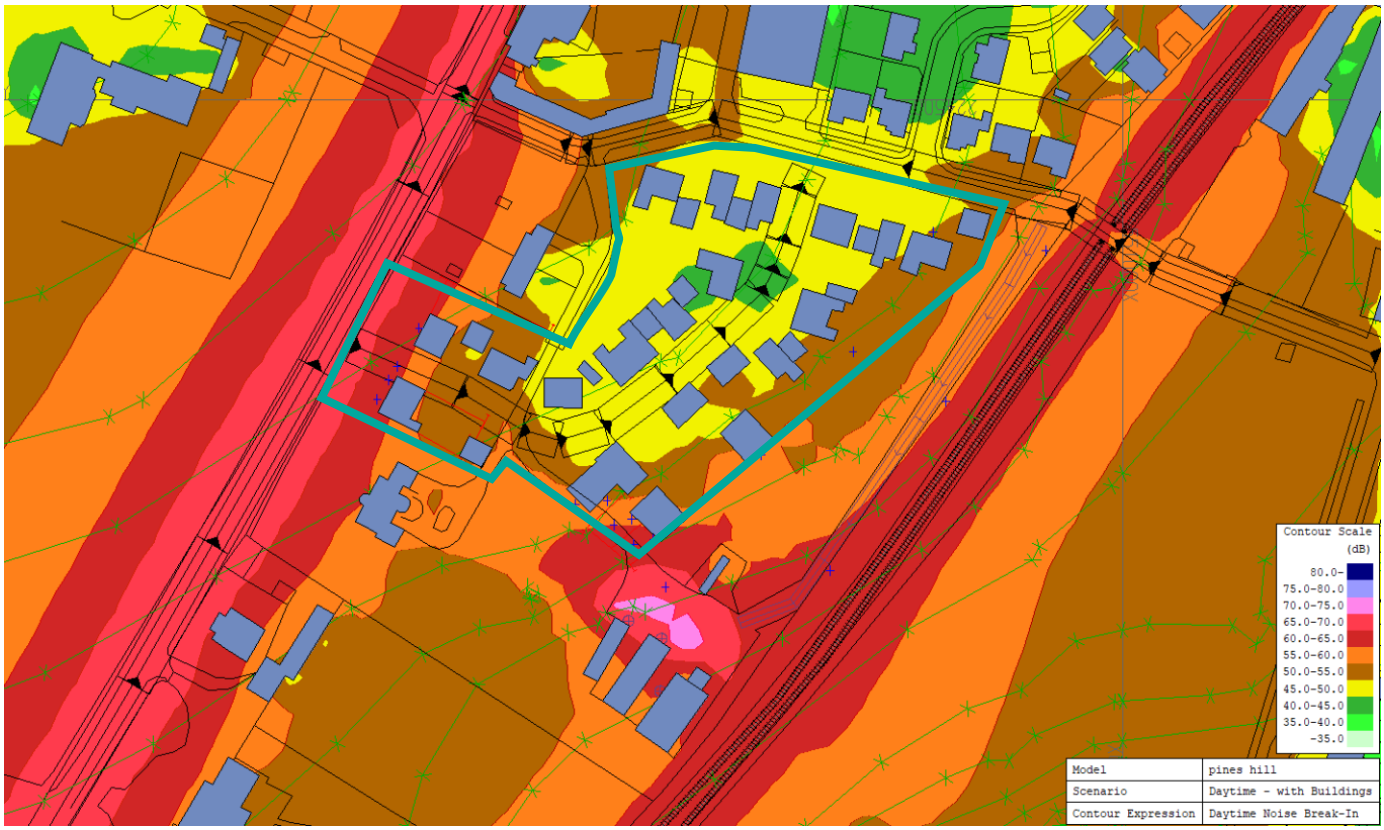
## Appendix C5 – Daytime Noise Break-In Assessment




***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 35 dB to >80 dB.***

CLIMATE ACOUSTICS

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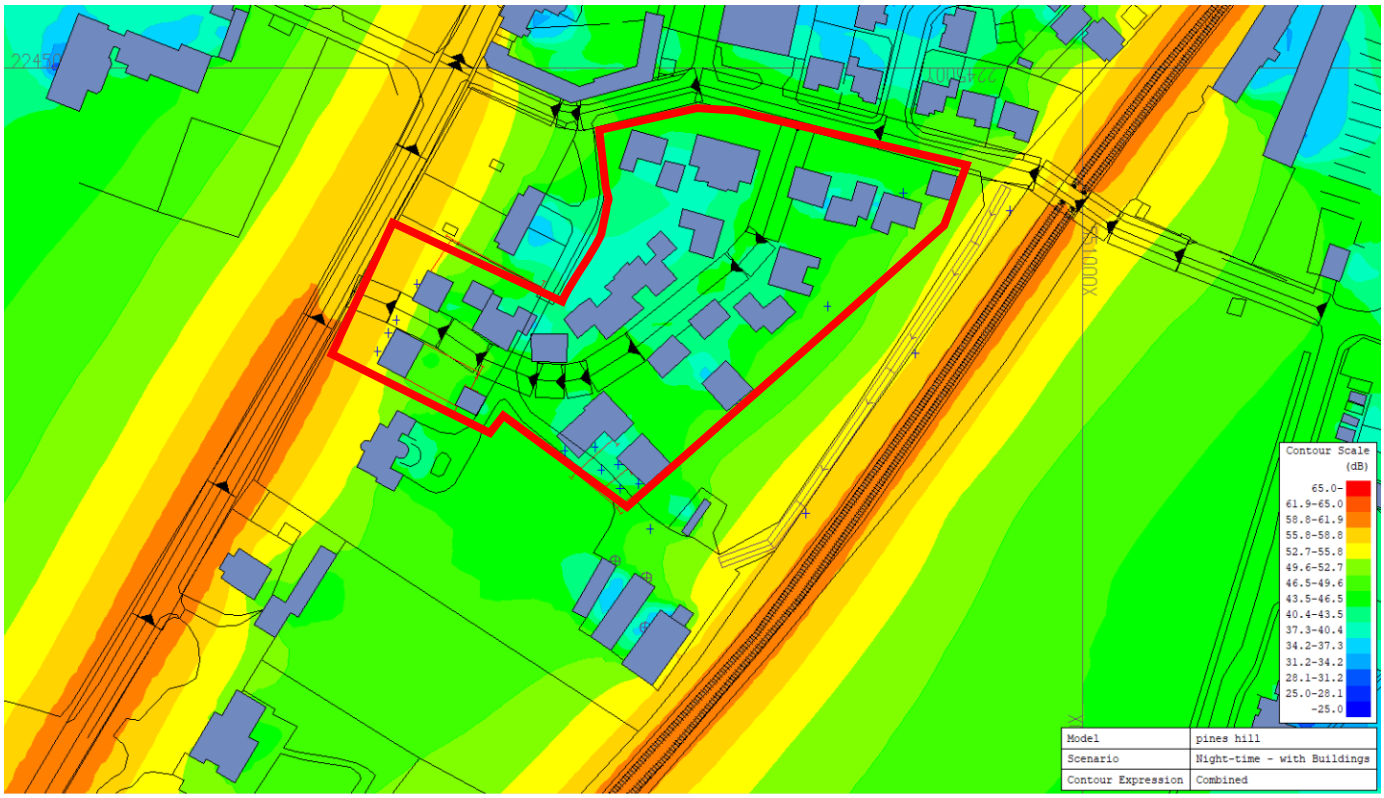
## Appendix C6 – Night-time Noise Break-In Assessment




***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 25 dB to > 65 dB.***