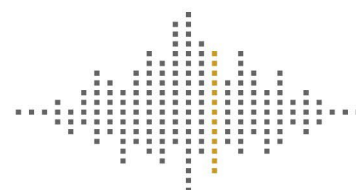


SHARPS REDMORE

ACOUSTIC CONSULTANTS ▪ Established 1990



Report

Royal Elm Park – Phase 5 (Block 6)

Environmental Noise
Assessment

Prepared by

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Date 24 October 2025

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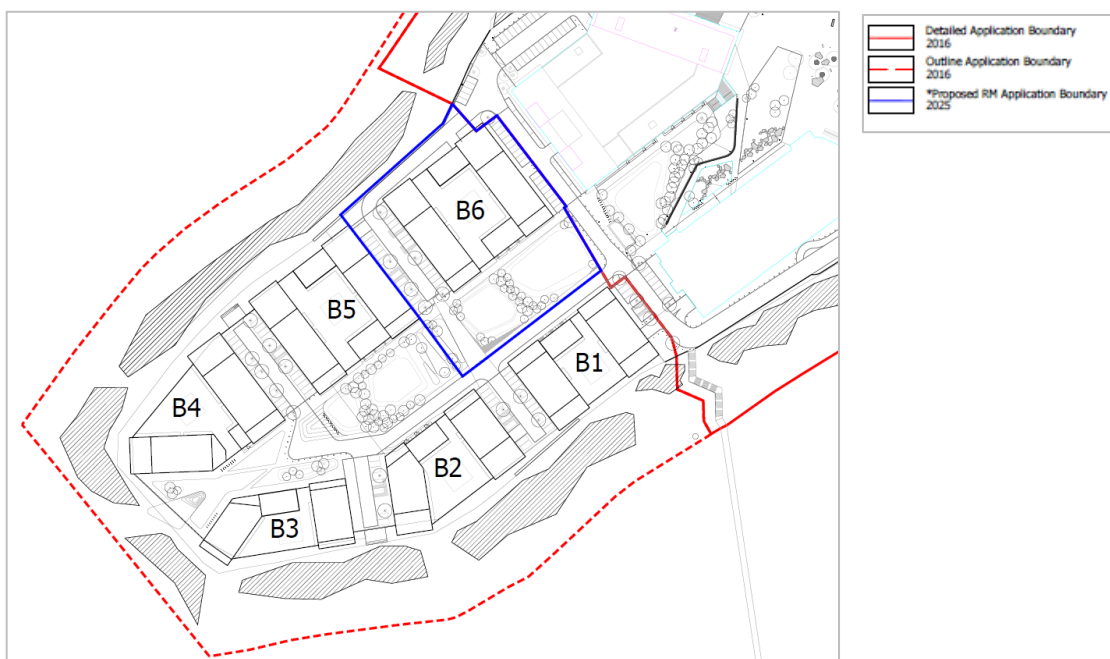
- A. Acoustic Terminology

This report has been prepared with all reasonable skill, care and diligence commensurate with an acoustic consultancy practice under the terms and brief agreed with our client at that time. Sharps Redmore provides no duty or responsibility whatsoever to any third party who relies upon its content, recommendations or conclusions.

1.0 Introduction

- 1.1 Sharps Redmore have been instructed to carry out an environmental noise assessment for a reserved matters application at Royal Elm Park, Reading.
- 1.2 The site is part of a wider development for which planning approval was granted¹ for a hybrid application including outline permission (all matters reserved apart from access to the site) for residential development (Blocks 1-6) to provide 422 residential units and detailed application for residential and mixed-use development.
- 1.3 The reserved matters application pursuant to the outline planning permission seeking approval for details relating to access, appearance, landscaping, layout and scale in respect of the development of Phase 5 (Block 6) incorporating 84 residential dwellings and all associated engineering works. The site location is shown in Figure 1 below.

FIGURE 1: Site Location



- 1.4 Planning approval for the outline scheme was approved subject to conditions including Condition 77 and 78 which relate to noise.

Condition 77: No development of any residential building shall take place until a detailed scheme, informed by an assessment of the current noise environment, for protecting the dwellings within that building from the external noise environment of the area has been submitted to and approved, in writing, by the Local Planning Authority. The scheme itself shall be designed, specified and constructed so that the sound insulation performance of the structure and the layout of the dwellings are such that the indoor ambient noise levels do not exceed the values detailed in Table 4 of BS 8233:2014. Where opening windows will lead to an internal noise level increase of 5 dBA or greater above BS 8233:2014 recommended internal levels, the scheme shall include provision of alternative mechanical ventilation with minimum performance equivalent to a mechanical heat recovery (MVHR) system with cool air bypass as an alternative means of cooling and ventilation. Noise from the system should not result in BS8233 internal levels being exceed.

¹ Planning reference PL/16/0199

Thereafter, the development shall not be carried out other than in accordance with the approved scheme which shall be completed before any part of the accommodation hereby approved is occupied, unless the Local Planning Authority otherwise agrees in writing.

Reason: to protect the amenity of future occupants of the proposed development in accordance with Policy CS34.

Condition 78: No mechanical plant shall be installed in the construction of any phase or part of a phase until a noise assessment of the proposed mechanical plant to be used for that phase has been submitted and approved by the Local Planning Authority. The assessment shall be carried out for in accordance with BS4141:2014 methodology. The predicted rating level, L_{Ar,Tr} (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to sensitive facades shall be at least 10dB below the existing background sound level, L_{A90,T} when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment.

Reason: To protect the amenities of the adjoining premises and the area generally in accordance with Policy CS34 and DM4.

- 1.5 In line with the requirements of the Conditions above the purpose of this report is to consider the impact of noise on the proposed development (Condition 77) and specify mitigation measures to protect amenity of future occupants. Reference is also made to the requirements of Condition 78.
- 1.6 A guide to the acoustic terminology used within the report is included in Appendix A.

2.0 Assessment Methodology and Criteria

Policy Requirements

- 2.1 The reason for the Condition 77 and 78 is to safeguard the amenities of future residents and in the case of Condition 78 the amenities of the adjoining areas in line with Policy CS34 of the RBC Core Strategy (2008 and amended 2015) which in relation to developments, such as residential developments, which are sensitive to effects of noise, advises that *“developments will only be permitted in areas where they will not be subject to high levels of such (noise) pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.”*

Design Guidance

Condition 77

- 2.2 Condition 77 refers to the design guidance in BS 8233:2014 ‘Guidance on sound insulation and noise reduction for buildings.’
- 2.3 The current nationally recommended internal noise levels for dwellings are given in BS 8233:2014 ‘Guidance on Sound Insulation & Noise Reduction for Buildings’. BS 8233 recommends the following internal noise standards:

TABLE 1: Guideline noise values

BS 8233:2014 Table 4 – Indoor ambient noise levels for dwellings			
Activity	Location	0700 to 2300	2300 to 0700
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 $L_{Aeq,8hour}$

- 2.4 The previous version (1999) of BS 8233 contained two guidelines for internal criteria; good and reasonable. The difference between the good and reasonable criteria was 5 dB. Whilst the 5 dB relaxation in noise criteria is not specifically referred to in the table above, Note 7 advises that *“where development is considered necessary or despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”* This ‘relaxation’ in the standard is reflected in Condition 77.

Condition 78

- 2.5 Condition 78 refers to BS 4142:2014 Methods for rating and assessing industrial and commercial sound. This standard enables the significance of sound impact to be determined in relation to industrial and commercial sources. The significance of sound impact is to be determined according to the following summary process:
- Determine the background sound levels, in terms of the index L_{A90} , at the receptor locations of interest.
 - Determine the specific sound level of the source being assessed, in terms of its L_{AeqT} level ($T = 1$ hour for day or 15 minutes for night), at the receptor location of interest.
 - Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.
 - Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.

- v) A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the context. 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 upon context.
- vi) The intent of the planning system is to ensure that a development does not result in “significant adverse impacts on health and quality of life.” BS 4142:2014 considers that the threshold of significant adverse impact is “a difference around +10 dB or more ... depending upon the context”. However, the NPPF and NPPG state that where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement *“...all reasonable steps should be taken to mitigate and minimise adverse effects in health and quality of life while together taking into account the guiding principles of sustainable development. This does not mean that adverse effects cannot occur, but that effort should be focused on minimising such effects.”*

2.6 The Council’s requirement in Condition 78 is that plant should be at least 10 dB below existing background noise levels is significantly more stringent than that required in the NPPF. It is SR’s view that standard would only apply to existing residential properties rather than the development itself.

3.0 Noise Assessment – Residential Development-Condition 77

- 3.1 To determine existing noise levels across the site SR has used computer modelling software package SoundPLAN to model noise levels in accordance with the recognised standards including ISO 9613-2 Acoustics Attenuation of sound during propagation outdoors and the Calculation of Road Traffic Noise (CRTN) 1988.
- 3.2 SoundPLAN calculates L_{AeqT} levels at defined receptors in accordance with the appropriate standards. The calculation is based on a number of input parameters including; source noise level data, barriers, receptor positions, topography and intervening ground conditions. In accordance with the guidance in CRTN the models are based on road traffic data for the M4 and the results compared to noise levels measured at the site as detailed below:

Noise Survey Details

- 3.3 A series of noise measurements were carried out at a location close to the M4 as shown below.

FIGURE 2: Monitoring location



- 3.4 Measurements were measured with a Norsonic type 1 sound level which was calibrated before and after each survey with no drift in accuracy noted. Weather conditions during the survey were dry with light winds and were suitable for taking sound level measurements.
- 3.5 At NL1 attended measurements were recorded during the daytime period in accordance with the shortened measurement procedure in the Calculation of Road Traffic Noise (CRTN). This method enables the daytime noise level ($L_{Aeq16hr}$) based on measurements carried out over a three-hour period between 1000 – 1700 hours by using the following formula.

$L_{A10(18\text{-hour})} = L_{A10(3\text{-hour})} - 1 \text{ dB}$, which is then corrected to provide a 16-hour L_{Aeq} as specified in BS 8233

$$L_{Aeq(16\text{hour})} = L_{A10(18\text{-hour})} - 2 \text{ dB}.$$

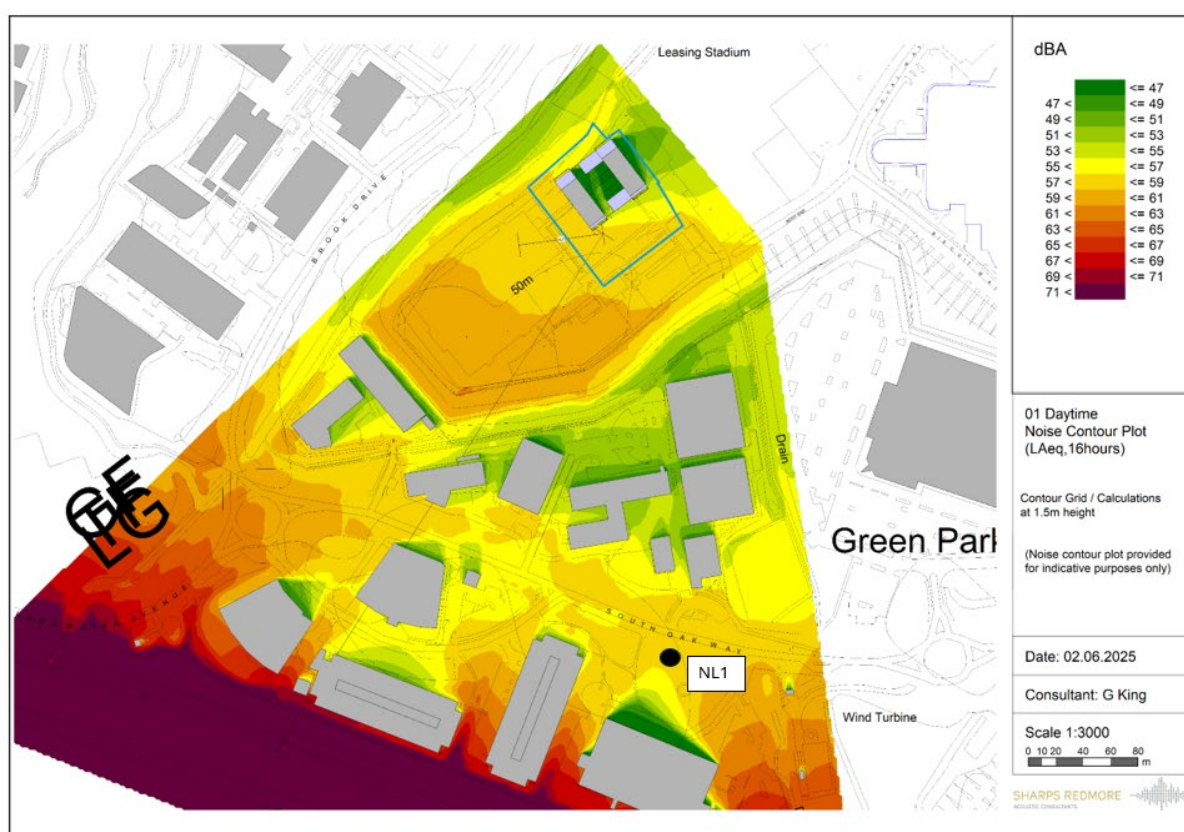
3.6 The results of the survey are shown in Table 2 below:

TABLE 2: Survey Results NL1 – 12 May 2025

	Noise Level Db	
	L _{Aeq1hr}	L _{A10,1-hour}
13:00 – 14:00	60	62.9
14:00 – 15:00	61	62.2
15:00 – 16:00	60	62.3

3.7 Based on the above survey results the predicted daytime noise levels at NL1 has been measured as 59 dB L_{Aeq16hr} (Calculated from shortened measurement procedure CRTN). Predicted noise levels as shown in Figure 3 below are within 1 dB of the measured noise levels.

FIGURE 3: SoundPLAN noise contours



3.8 The predicted noise levels as shown in Figure 3 above have been used to prepare an acoustic model of each façade of the proposed residential block. The results are shown in shown in Figures 4-7 below.

FIGURE 4: Daytime $L_{Aeq16hr}$ – View from West

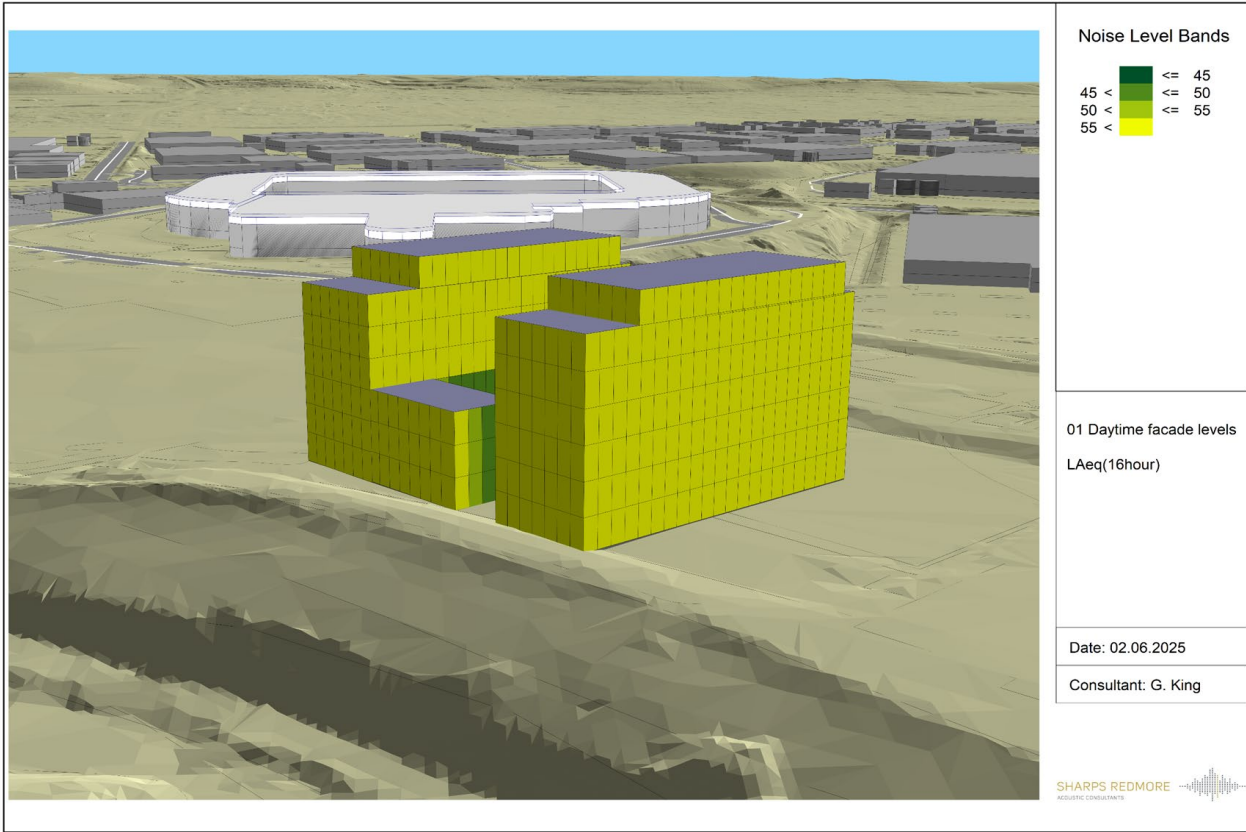


FIGURE 5: Daytime $L_{Aeq16hr}$ – View for East

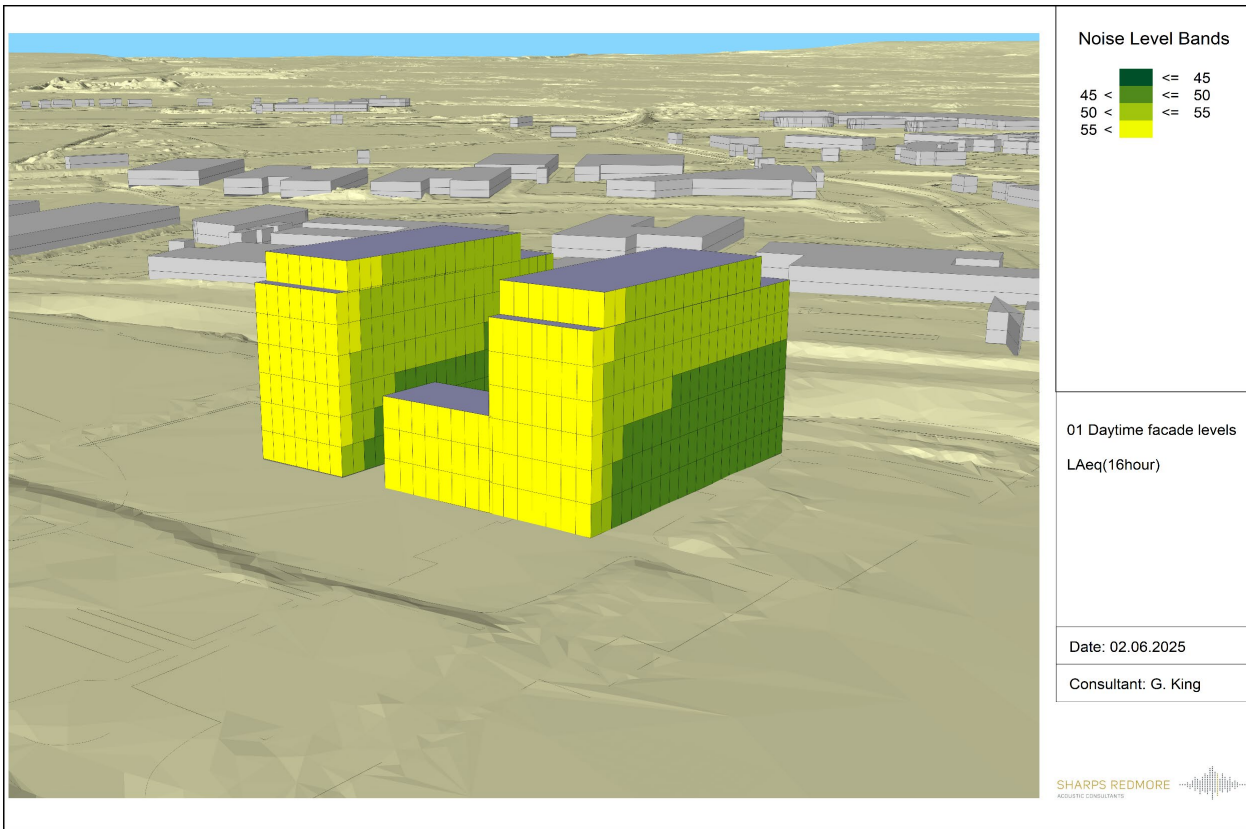


FIGURE 6: Night time L_{Aeq8hr} – View from West

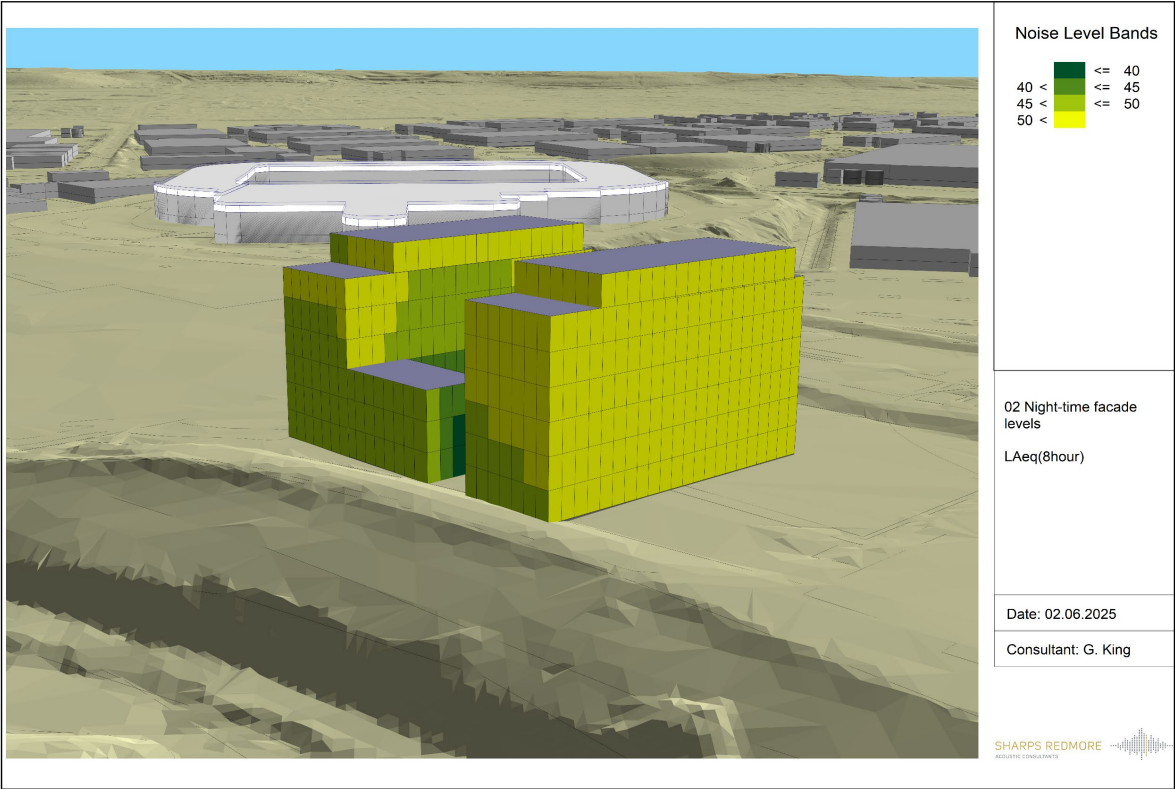
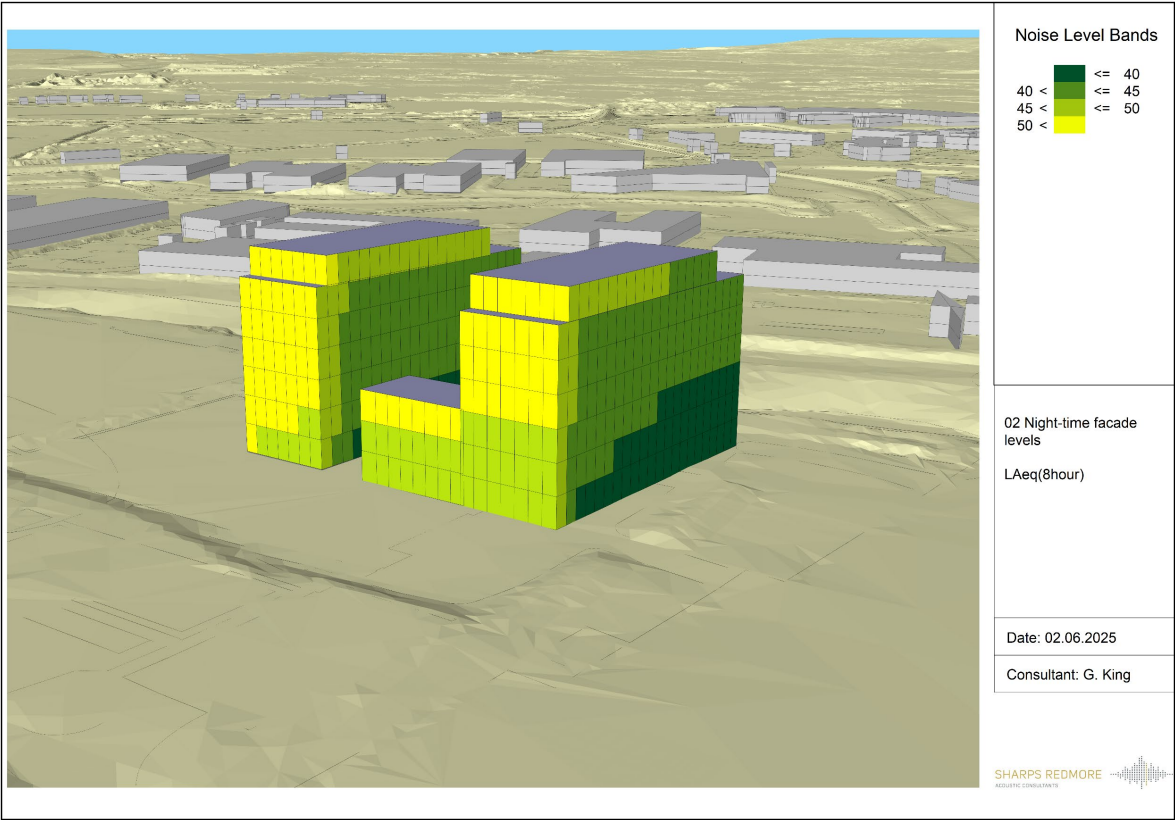


FIGURE 7: Night time L_{Aeq8hr} – View from East



- 3.9 The predicted internal noise levels have been determined based on the above models and the advice in table 3 below considers the requirements in BS 8233 as required by Condition 77 of the outline consent.

TABLE 3: Daytime Noise Levels

External Level (Free-field)	Internal Level	Conclusion	Condition 77
< 45 dB $L_{Aeq16hr}$	< 35 dB $L_{Aeq16hr}$	Predicted internal levels below the recommended 'good' daytime criteria in BS 8233:2014 as required by Condition 77	No further mitigation required
45 – 50 dB $L_{Aeq16hr}$	35 – 40 dB $L_{Aeq16hr}$	Predicted internal levels exceed the noise criteria in BS 8233 but exceedance no greater than 5 dB	No further mitigation required
50 – 55 dB $L_{Aeq16hr}$	40 – 45 dB $L_{Aeq16hr}$	Predicted internal levels will exceed the noise criteria in BS 8233 by more than 5 dB	alternative mechanical ventilation with minimum performance equivalent to a mechanical heat recovery (MVHR) system with cool air bypass as an alternative means of cooling and ventilation
> 55 dB $L_{Aeq16hr}$	> 45 dB $L_{Aeq16hr}$		

TABLE 4: Night time Noise Levels

External Level (Free-field)	Internal Level	Conclusion	Condition 77
< 40 dB L_{Aeq8hr}	< 30 dB L_{Aeq8hr}	Predicted internal levels below the recommended 'good' night time criteria in BS 8233:2014 as required by Condition 77	No further mitigation required
40 – 45 dB L_{Aeq8hr}	30 – 35 dB L_{Aeq8hr}	Predicted internal levels below the recommended 'reasonable' criteria in BS 8233 as specified by Condition 77	No further mitigation required
45 – 50 dB L_{Aeq8hr}	35 – 40 dB L_{Aeq8hr}	Predicted internal levels will exceed the noise criteria in BS 8233 by more than 5 dB	alternative mechanical ventilation with minimum performance equivalent to a mechanical heat recovery (MVHR) system with cool air bypass as an alternative means of cooling and ventilation
>50 dB L_{Aeq8hr}	> 40 dB L_{Aeq8hr}		

Internal noise levels

- 3.10 Where daytime external noise levels exceed 50 dB $L_{Aeq16hr}$ or night time noise levels exceed 45 dB L_{Aeq8hr} it will be necessary to have windows closed to achieve internal noise levels in accordance with the guidance in BS 8233:2014.
- 3.11 The sound reduction of the façade is determined from a number of factors, the individual sound reduction (R_w) and size (m^2) of the component elements i.e. wall, window (glass and frame) and vent, the size of room and reverberation time within the room. However, as a general rule of thumb where daytime noise levels are lower than 60 dB $L_{Aeq16hr}$ during the day and 55 dB L_{Aeq8hr} during the night time period then good quality standard thermal double glazing along with alternative means of ventilation will be sufficient to provide suitable internal noise levels. As shown in Figures 8 – 11 for the majority of the apartments noise levels will be below the suggested criteria.
- 3.12 Where noise levels exceed the suggested criteria further detailed calculations should be carried out to determine the acoustic performance of the façade elements.

FIGURE 8: Daytime $L_{Aeq16hr}$ – View from West

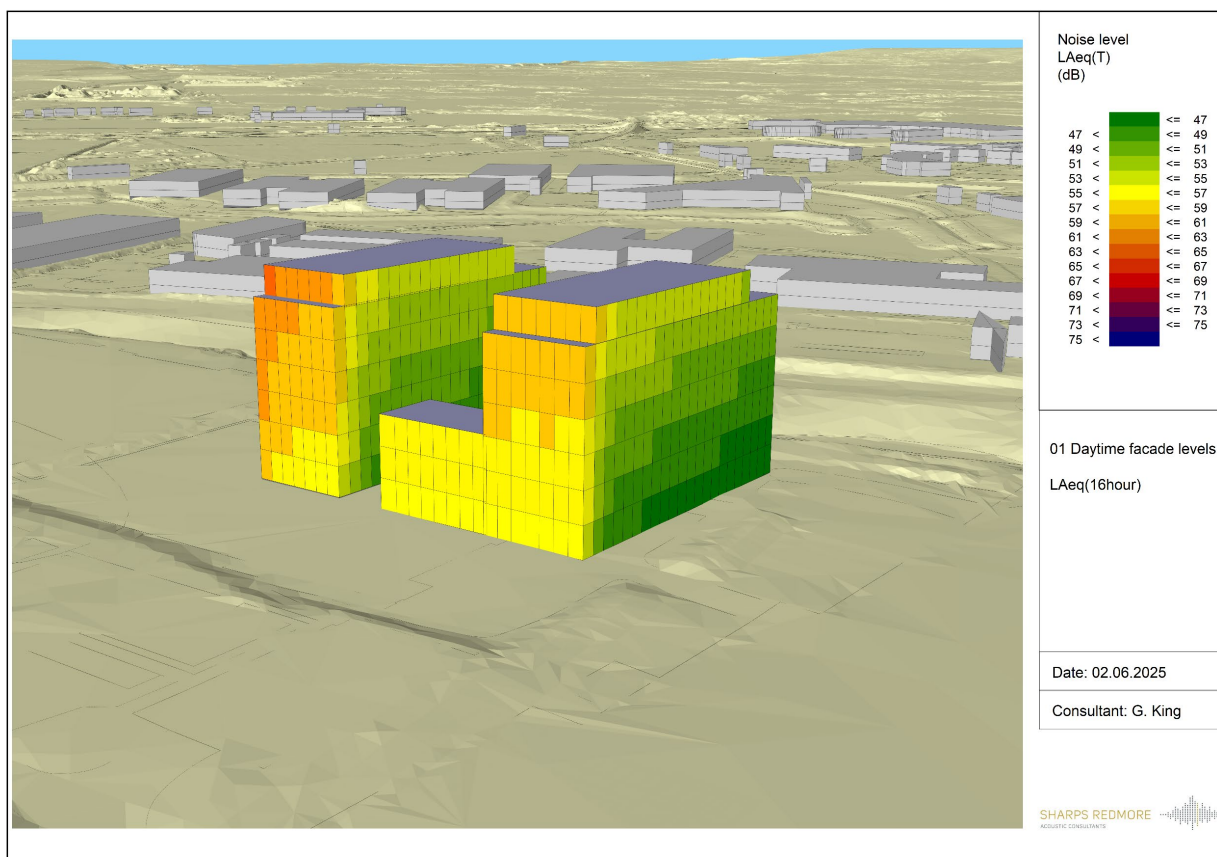


FIGURE 9: Daytime $L_{Aeq16hr}$ – View from East

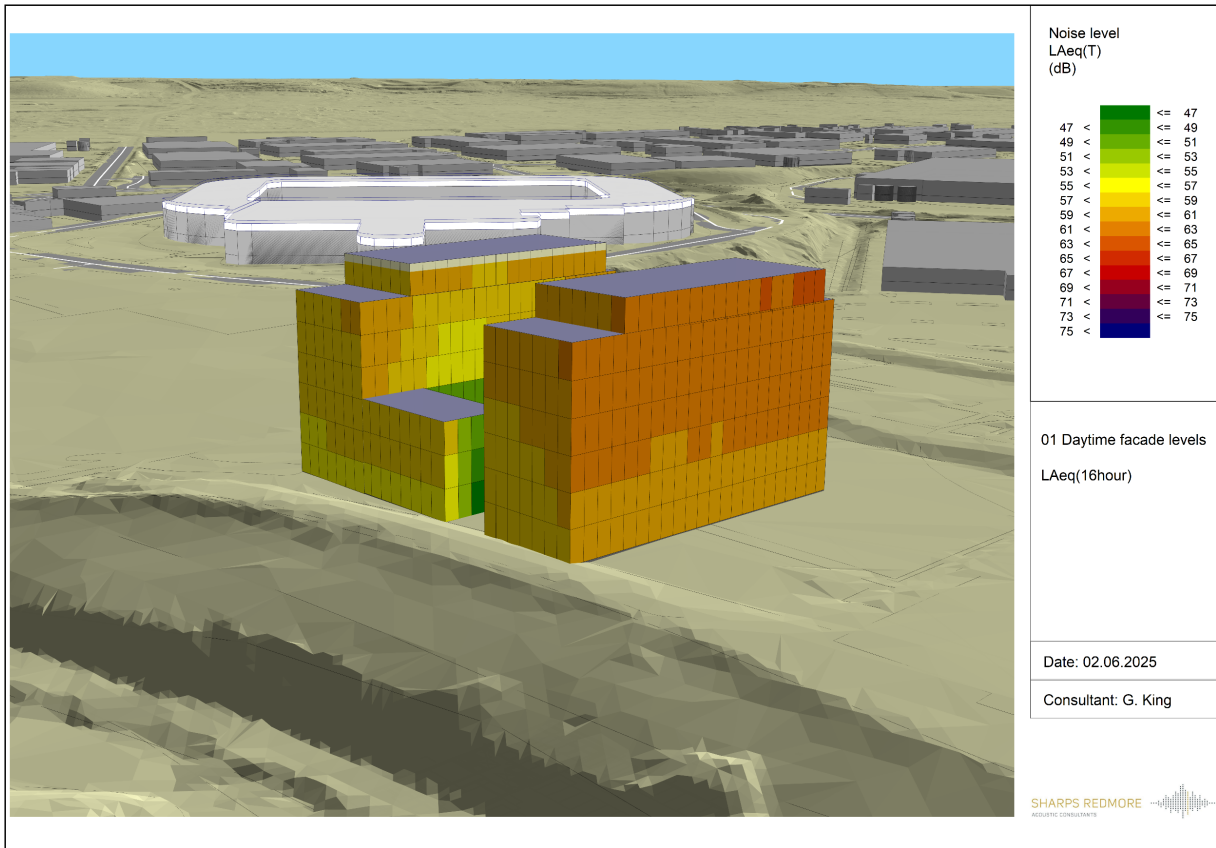


FIGURE 10: Night time $L_{Aeq16hr}$ – View from West

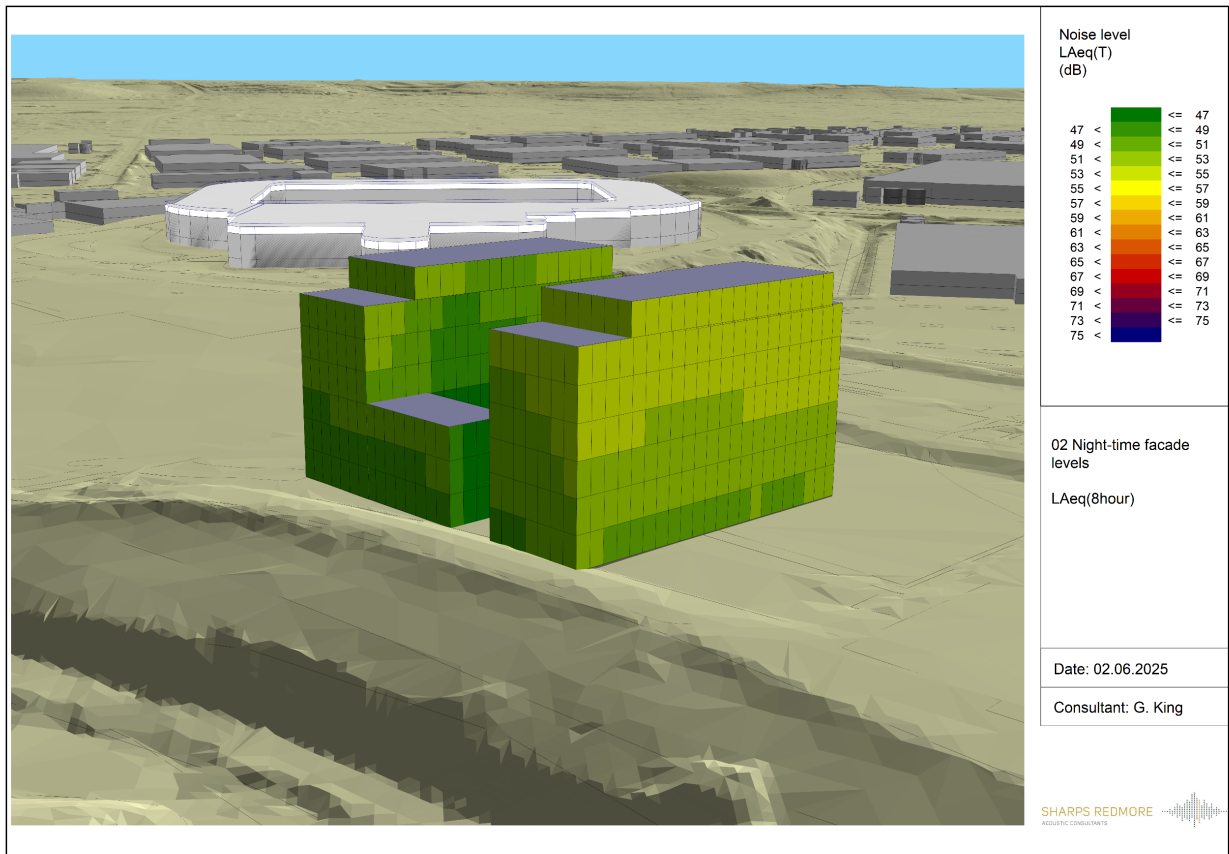
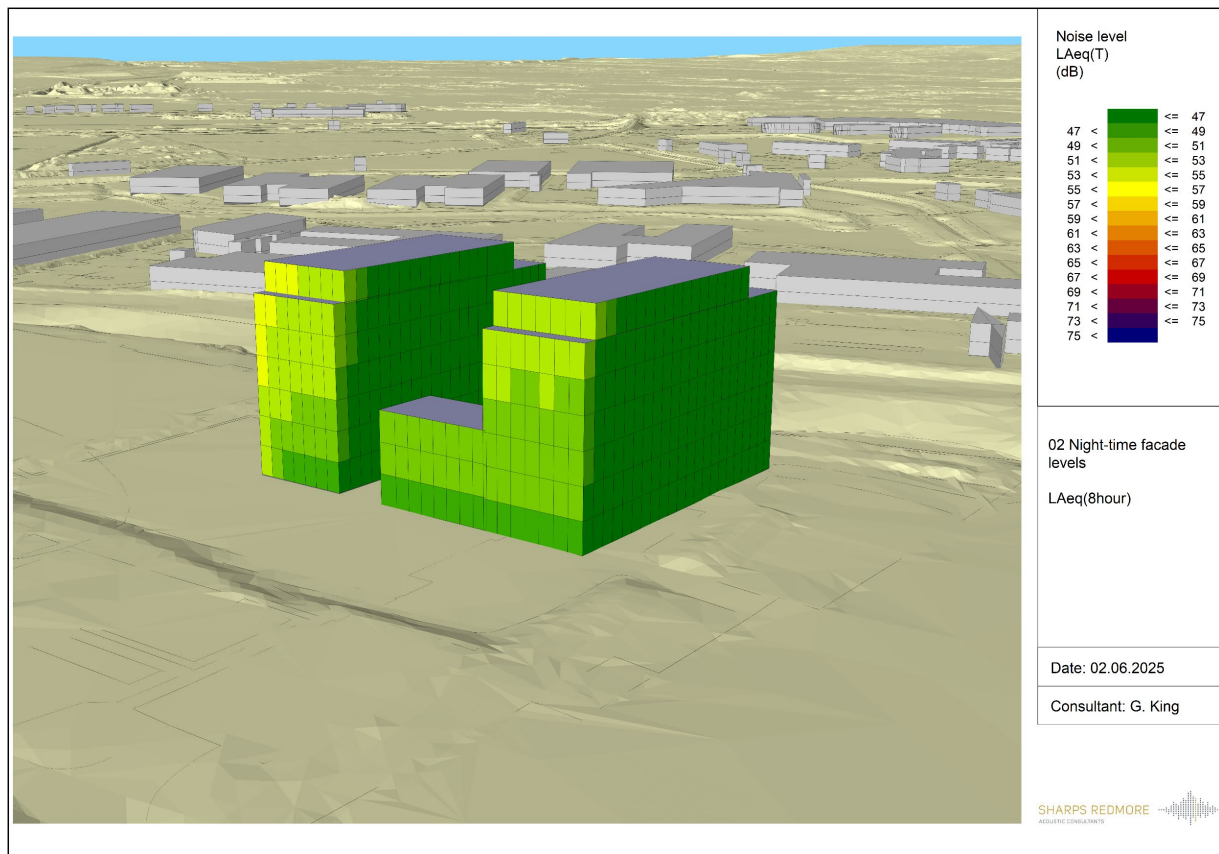


FIGURE 11: Night time L_{Aeq8hr} – View from East



External noise levels

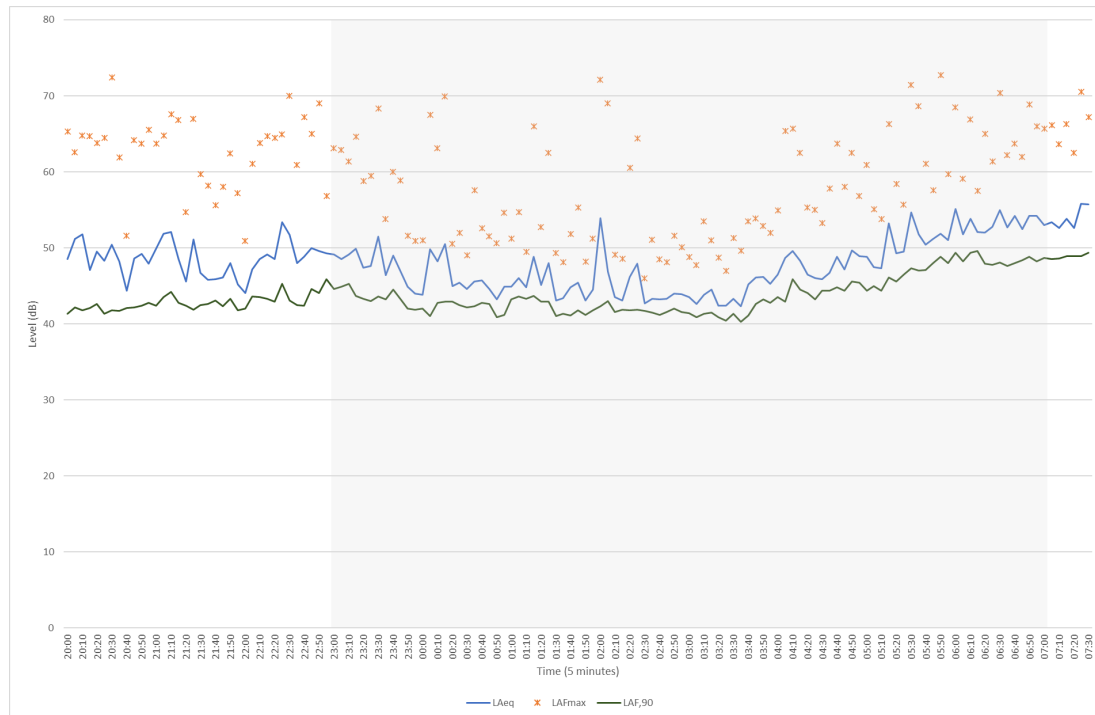
- 3.13 Condition 77 does not refer to external noise levels however BS 8233:2014 states *“it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$.”*
- 3.14 Private balconies will be provided to dwellings throughout the development. Predicted noise levels incident on these balconies will vary, however it is likely that on some balconies, will exceed the upper limit of 55 dB.
- 3.15 While these guideline limits should be targeted where possible, BS 8233:2014 also states that *“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.”* Furthermore, BS 8233:2014 clearly distinguishes between *“...traditional external areas that are used for amenity space, such as gardens and patios...”* and *“other locations, such as balconies, roof gardens and terraces,”* which *“...are also important in residential buildings where normal external amenity space might be limited or not available...”* and so *“...in these locations, specification of noise limits is not necessarily appropriate”*.

- 3.16 With all this in mind, our typical approach is to conclude that noise levels on balconies which exceed the guideline limits should not necessarily cast in doubt the overall acoustic feasibility of the development, particularly where those residents will have access to alternative, shared amenity space with much lower ambient noise levels (which will be the case here). Furthermore, it is our view that residents in this scenario (i.e. where they have access to quieter amenity space) would rather have access to a private balcony where noise levels are (for example) 5 dB in excess of the guideline limits than have no balcony at all. In addition, as discussed below, in line with the advice contained in the Planning Practice Guidance, alternative communal space has been provided to offset the impact of slightly higher levels on balconies. For these reasons, it is not considered appropriate to impose a restrictive planning condition seeking to avoid exceedance of particular noise thresholds for private balcony amenity areas.

4.0 Condition 78

- 4.1 Condition 78 requires that the rating level $L_{A,Tr}$ (specific sound level plus any adjustment for the characteristics features of the sound) of any plant shall be at least 10 dB below existing background sound levels.
- 4.2 To determine existing background noise levels SR has carried out a survey at a location representative of the proposed properties. Noise levels were measured from 12 to 13 May 2025 and covered both day and night time periods. The results of the survey are shown below:

FIGURE 12: Survey Results – 12-13 May 2025.



- 4.3 Background noise levels were dictated by road traffic noise on M4 and were around 42 dB during the evening and early part of the night before rising to 48 dB during the daytime period as traffic on the M4 increases. Based on evening sound levels, considering the requirements at Condition 78 the rating noise from plant should not exceed 32 dB.
- 4.4 It is not possible to carry out a detailed assessment at this stage as there is insufficient information available, however considering the distance to nearest residential receptors it is likely that the predicted noise levels from plant will be below the recommended criteria.

APPENDIX A

ACOUSTIC TERMINOLOGY

Acoustic Terminology

A1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. $50\text{ dB} + 50\text{ dB} = 53\text{ dB}$. Increases in continuous sound are perceived in the following manner:

1 dB increase - barely perceptible.

3 dB increase - just noticeable.

10 dB increase - perceived as twice as loud.

A2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.

A3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).

A4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p . Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p .

A5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.

A6 The main noise indices in use in the UK are:

L_{A90} : The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.

L_{Aeq} : The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

L_{A10} : The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given sample. It has been used over many years to measure and assess road traffic noise.

L_{AMAX} The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.

- A7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB.}$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

- A8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = $20 \log$ (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \log \frac{160}{10} = 60 - 24 = 36 \text{ dB}$$