

Noise Impact Assessment

Ty Cambria, 29 Newport Road, Cardiff



Prepared for:
Elite Cask Ltd.

Prepared by:
Paul Gurney BSc (Hons) MIOA

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Noise Impact Assessment

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Executive Summary

Stantec has prepared a Noise Impact Assessment for the proposed redevelopment of Ty Cambria, 29 Newport Road, Cardiff, which will provide a new 24-storey Purpose-Built Student Accommodation (PBSA) block providing 350no. residential units.

An environmental noise survey was carried out to establish existing sound levels at the site. The assessment found that the local acoustic environment is mainly influenced by road traffic on Newport Road and the surrounding road network. Noise levels were generally consistent throughout the survey period, reflecting the site's busy urban location.

The survey data was used to develop a noise model to predict sound levels at the proposed building façades due to road traffic noise. The results indicate that the façades facing Newport Road will experience moderate to high levels of road traffic noise, particularly at lower floors during the night-time period. As a result, appropriate acoustic mitigation will be required to ensure a suitable living environment for future occupants.

An assessment of the proposed building envelope has been undertaken and demonstrates that the internal noise standards recommended by national guidance can be achieved through the use of enhanced glazing, suitable external wall constructions and appropriately designed ventilation systems. Bedrooms overlooking Newport Road are likely to require a mechanical ventilation strategy to minimise the need for opening windows during periods of high traffic noise and to assist with overheating control.

Internal sound insulation has been considered for the proposed residential accommodation and associated ground floor uses, including a commercial space, a gym/wellness area, plant rooms and the bin store. Enhanced separating constructions and vibration control measures will be required in certain locations; however, the assessment indicates that appropriate acoustic standards can be achieved through detailed design and compliance with relevant building regulations and acoustic guidance.

The assessment also considered the proposed seventh-floor external amenity roof terrace area. Predicted noise levels within this area are expected to comply with recognised guidance for external residential amenity spaces, providing an acceptable environment for occupants. Management measures may be required to ensure activity within the roof terrace area does not adversely affect nearby noise sensitive receptors during night-time hours.

External plant noise limits have been established for any future building services equipment, such as ventilation or cooling plant. Compliance with these limits will help ensure that noise from the development does not give rise to adverse impacts at nearby residential properties and other noise sensitive receptors.

Overall, the assessment concludes that the proposed development is acoustically suitable for the proposed usage. Subject to the implementation of the recommended building fabric, ventilation and plant noise control measures, acceptable internal and external acoustic conditions can be achieved for future occupants while protecting the amenity of surrounding receptors.



1 Introduction

Stantec has been appointed to provide acoustic consultancy services in relation to the proposed new Purpose-Built Student Accommodation (PBSA) block at 29 Newport Road, Cardiff. The proposed development will involve the demolition of the existing building at the site (Ty Cambria House) and the construction of a new 24-storey PBSA block providing 350no. residential units.

A baseline noise survey has been undertaken to measure the existing average ambient & minimum consistent background sound levels at the proposed development site. The measured average ambient noise levels are used to model road traffic noise emissions impinging on the new development façades and inform the external building fabric assessment. The minimum consistent background sound levels are used to determine external plant rating noise limits that should be achieved at the nearest noise sensitive receptors.

A summary of relevant planning policy and acoustics guidance documents is provided, which are used to inform the noise impact assessment. This report is technical in nature; therefore, a glossary of acoustic terminology is provided in **Appendix A**.

1.1 Outline Description of the Site

The proposed development site is bounded by Newport Road to the southeast, East Grove to the northeast, mixed-used houses to the northwest and Cardiff Sixth Form College to the southwest.

The site is generally characterised as a mixed-use urban environment. The surrounding area comprises a mix of land uses, mostly commercial premises and residential dwellings. The nearest noise sensitive receptors to the proposed development site are identified as being the mixed-use houses along The Parade to the north, however consideration is also given to the residential apartments and hotel rooms to the south which overlook the proposed development site at Admiral House and Holland House Hotel Cardiff respectively. The site boundary and nearest noise sensitive receptors are shown in **Figure 1** overleaf.

The prevailing acoustic environment at the site is predominately controlled by road traffic noise from Newport Road and the surrounding road network, with some noise contributions from plant and mechanical services at the rear of the site. The noise survey positions used for the baseline noise survey have been selected to provide a representative indication of the existing sound climate at the site and at locations representative of the nearby noise sensitive receptors.





Figure 1: Site Boundary and Nearest Noise Sensitive Receptors (Image Source: Google Maps)

1.2 Noise Policy Guidance

The assessment methodology is based on the following policy and guidance documents:

- Technical Advice Note 11 Wales (hereafter referred to as TAN 11)
- ProPG Supplementary Document 2 (hereafter referred to as ProPG)
- World Health Organisation “Guidelines for Community Noise”, Berglund et. al., 1999 (hereafter referred to as WHO Guidelines)
- British Standard 8233:2014 – “Guidance on sound insulation and noise reduction for buildings” (hereafter referred to as BS8233)
- British Standard 4142:2014 + A1 2019 – “Methods for rating and assessing commercial and industrial sound” (hereafter referred to as BS4142)
- Approved Document Part O: Wales 2022 (hereafter referred to as ADO)
- Acoustics Ventilation & Overheating Guide: 2020 (hereafter referred to as AVO Guide)

A summary of relevant planning policy and acoustics guidance documents is provided in **Appendix B**.

2 Baseline Noise Survey

2.1 Methodology

Environmental noise measurements were undertaken at the site at 2no. monitoring positions between 12:00 on Friday 19th June 2026 and 08:00 on Friday 26th June 2026 by unattended noise monitoring equipment. The noise monitoring positions are shown in Figure 2 below and Figure 3 overleaf. The noise monitoring positions are described in Table 1.

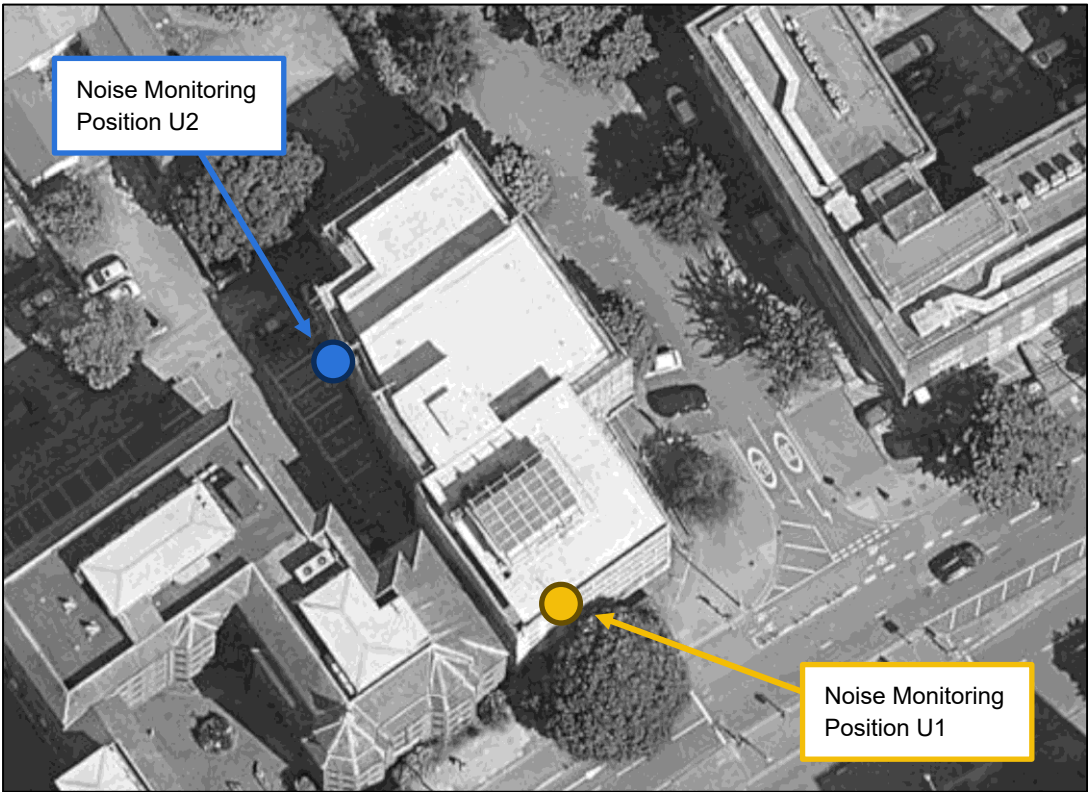


Figure 2: Noise Monitoring Positions (Image Source: Google Maps)

Table 1: Description of Noise Monitoring Positions

Monitoring Location ID	Time Period	Description of Noise Monitoring Location
U1	Start: 12:00 19/06/26 End: 13:00 23/06/26	The microphone was attached to a tripod and installed on the 7 th floor balcony terrace at the southeastern façade of Ty Cambria House. The microphone was directly overlooking Newport Road.
U2	Start: 14:00 23/06/26 End: 08:00 26/06/26	The microphone was attached to a tripod and installed on railing at the perimeter of the ground floor car park area at Ty Cambria House. The microphone was overlooking the Cardiff Sixth Form College car park.



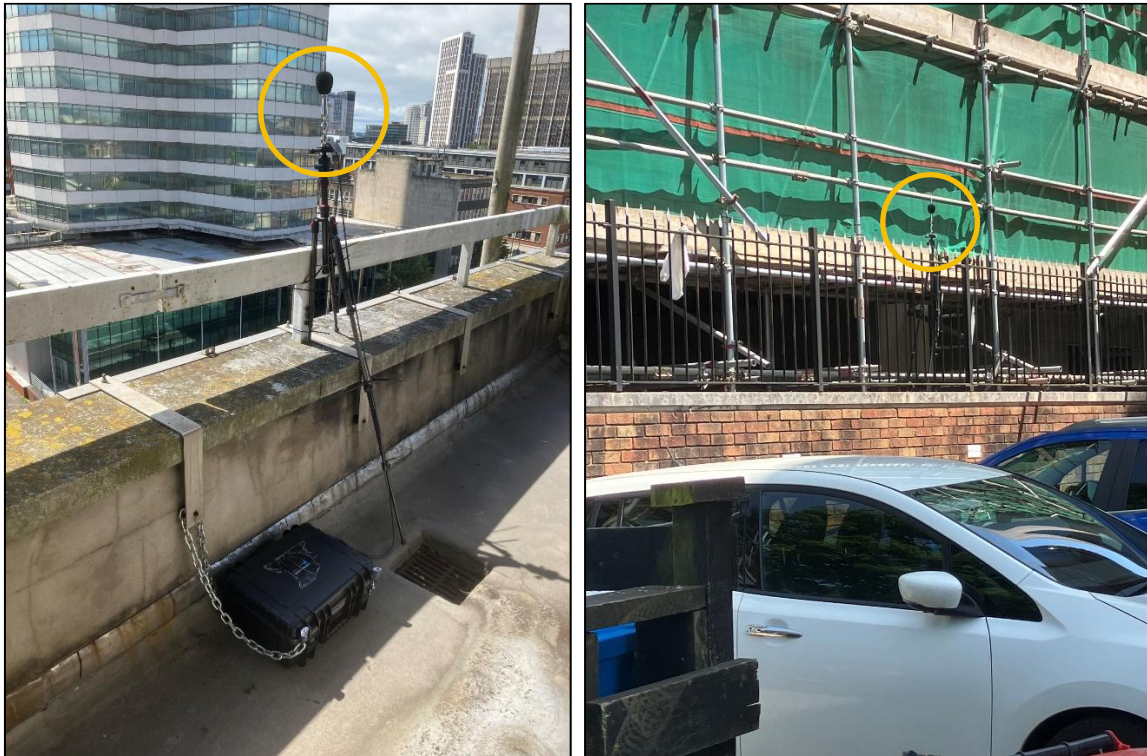


Figure 3: Noise Survey Photos, Position U1 (Left) and Position U2 (Right)

The measurement microphone was located at a height of ~1.5m above local ground at both monitoring positions. Measurements were undertaken in accordance with the guidance outlined in the relevant British Standards, BS 4142:2014 and BS 7445-1:2003. The monitoring procedure followed the guidance outlined in BS 7445:2003 Part 1, Section 5.2.3 and section 5.2.2.

Measurements were considered to be 'free field'. A suitable wind shield was fitted to the monitoring equipment throughout the monitoring period.

Observation and subjective evaluation of noise sources was carried out during the setup and collection of the survey equipment.

2.2 Personnel

The baseline noise survey was carried out by Paul Gurney (Senior Acoustic Consultant at Stantec). Paul is a corporate member of the Institute of Acoustics (MIOA) and holds the IOA Diploma in Acoustics and Noise Control.

2.3 Equipment

The noise monitoring equipment used for the survey is summarised in Table 2.

Table 2: Equipment List

Equipment	Manufacturer	Instrument	Serial No.	Date of Last Laboratory Calibration
Sound Level Meter	01dB	FUSION	14526	24/04/2026
Microphone	GRAS	40CD	470800	24/04/2026
Calibrator	Cirrus	CR:515	96051	02/07/2025

The sound level meter used for the noise survey has been verified as conforming to BS EN 61672-1. The acoustic calibrator used conforms to BS EN IEC 60942. Equipment calibration certificates can be provided on request. The sound level meter was calibrated to a reference level of 94 dB at 1kHz both prior to, and on completion of, the noise survey period. No significant drift in calibration was noted during the survey (≤ 0.5 dB).

2.4 Weather Conditions

Approximate weather history for Cardiff can be viewed in **Appendix C**. To summarise conditions, the weather was generally dry and average recorded wind speeds during the environmental noise measurement process did not exceed 5m/s. BS 4142:2014 provides the following guidance with regards to the acquisition of environmental noise measurements and weather conditions:

‘An effective windshield should be used to minimize turbulence at the microphone.

‘NOTE Windshields are generally effective up to wind speeds of 5 m/s’ and ‘exercise caution when making measurements in poor weather conditions such as wind speeds greater than 5 m/s.’

Weather conditions during the noise survey were suitable for the acquisition of noise data. Measurements are therefore considered to adhere to the guidance of the relevant British Standard and no corrections to the measured noise dataset has been applied.

2.5 Noise Survey Results

The following noise level indices are relevant to this assessment:

- $L_{Aeq,T}$ dB (‘A’ weighted equivalent continuous sound pressure level) - defined as the level of a continuous noise with the same total energy as the actual fluctuating sound over the measurement time periods. It is sometimes referred to as the ‘ambient noise level’ and can be considered an average.
- $L_{A90,T}$ dB - The A-weighted sound pressure level exceeded for 90% of the measurement period, typically used to describe the prevailing background sound level.



- $L_{Amax,F}$ dB, defined as the 'A' weighted maximum sound pressure level that occurred during the time period 'T' acquired using a 'fast' time weighting (i.e. a sample every 125ms). It is commonly used to describe the highest noise level that occurred during an event such as a vehicle pass-by.

A summary of the measured average ambient noise level measurements at the unattended noise monitoring positions is presented in Table 3. The ambient noise levels (L_{Aeq}) are logarithmically averaged over each period. The full results are provided graphically in Appendix D.

Table 3: Measured Average Ambient Noise Levels

Position	Period	Average Ambient Noise Level, dB $L_{Aeq,T}$							
		19 th	20 th	21 st	22 nd	23 rd	24 th	25 th	26 th
U1	Daytime (07:00 – 23:00)	65	62	62	63	63	-	-	-
	Night-time (23:00 – 07:00)	58	61*	56	57	-	-	-	-
U2	Daytime (07:00 – 23:00)	-	-	-	-	49	50	50	50
	Night-time (23:00 – 07:00)	-	-	-	-	48	48	53*	-

***Note:** Elevated noise levels were recorded during the following periods, which significantly increased the overall average ambient noise levels during the overall night-time period:

- **Position U1:** Between 23:00-23:30 (19th June), 00:00-00:30 and 02:00-02:30 (20th June), seemingly caused by seagulls congregating very close to the microphone during these periods
- **Position U2:** Between 04:00-05:30 (26th June), seemingly caused by a combination of seagulls congregating very close to the microphone and a car alarm sounding off nearby

The minimum consistent daytime & night-time background sound levels are presented in Table 4, and are based on the background sound level distribution graphs shown in Appendix E.

Table 4: Minimum Consistent Background Sound Levels

Position	Period	Minimum Consistent Background Sound Level
U1	Daytime (07:00 – 23:00)	55dB $L_{A90,1hr}$
	Night-time (23:00 – 07:00)	48dB $L_{A90,15mins}$
U2	Daytime (07:00 – 23:00)	43dB $L_{A90,1hr}$
	Night-time (23:00 – 07:00)	41dB $L_{A90,15mins}$

Table 5 presents the 10th highest noise level measured during the night-time period (23:00 to 07:00) on each night of the survey period. This assessment has been carried out interrogating 2-minute $L_{Amax,F}$ data, in line with AVO guidance.



Table 5: 10th Highest Measured Noise Level during Night-time (23:00 – 07:00)

Position	10 th Highest Measured Noise Level during Night-time (23:00 – 07:00), dB L _A F _{max,2mins}						
	19 th	20 th	21 st	22 nd	23 rd	24 th	25 th
U1	77	75	76	80	-	-	-
U2	-	-	-	-	68	67	75*

***Note:** this elevated noise level (relative to the other night-time periods at this monitoring position) was controlled by seagull noise in close proximity to the microphone

2.6 Observations

The overall noise climate at the site is largely dominated by road traffic noise on Newport Road, which acts as a continuous noise source throughout the daytime and night-time periods. As a result, the measured daytime and night-time average ambient noise levels were relatively consistent throughout the overall survey period:

- **Position U1:** 62-63dB L_{Aeq,16hr} (Daytime) / 56-58dB L_{Aeq,8hr} (Night-time)
- **Position U2:** 49-50dB L_{Aeq,16hr} (Daytime) / 48dB L_{Aeq,8hr} (Night-time)

Noise from seagulls caused the average ambient noise level to spike at specific periods, most notably during the night-time period between June 20th and June 21st at Position U1, and during the early morning period on June 26th at Position U2.

The maximum noise events measured at the site were largely controlled by seagull noise and road traffic noise, therefore the building envelope strategy will need to be designed to sufficiently control these maximum noise events, particularly during the night-time period (23:00 – 07:00). The WHO Guidelines for Community Noise (1999) states the following with regard to maximum noise events during the night-time period:

“For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10–15 times per night.”

2.7 Limitations

The survey represents noise conditions at the time of measurement only and may not capture all potential variations in sound levels. Variations in weather, atypical events, or seasonal changes may influence the sound environment.



3 Noise Modelling

3.1 Significance Criteria

A description of the impact of predicted facade noise levels is provided in **Table 6** with reference to the following guidance:

- British Standard 8233:2014
- World Health Organisation (WHO) Guidelines for Community Noise, 1999
- Professional Practice Guidance – Planning and Noise (ProPG), ANC, IOA and CIEH, May 2017
- Acoustics, Ventilation and Overheating – Residential Design Guide ANC, IOA, Jan 2020.

Table 6: Significance Criteria for Road Traffic and other Anonymous Noise affecting Dwellings

Magnitude of Impact	Daytime External Noise Level, dB LAeq,16hour (07:00 - 23:00)	Night-time External Noise Level, dB LAeq,8hour (23:00 - 07:00)	Description of Effect Without Design Mitigation
High	> 70	> 60	Unacceptable Impact based on advice from ProPG. Significant impact on sleep quality is likely when windows are open and changes in behaviour due to noise are common. High performance acoustic laminated windows may be required (depending on the type of noise sources). Trickle vents may not be an option resulting in a requirement to use Mechanical Ventilation with Heat Recovery (MVHR). The need to open windows to cool overheating rooms should be minimised or avoided at night. This may result in a requirement for mechanical cooling.
Medium	56 – 70	51 – 60	Sleeping with windows open may impact sleep quality and daytime noise in external areas and inside with windows open will impact amenity. Particularly at the upper end of the range, windows and vents with an enhanced acoustic performance may be required. The ventilation system and building design should aim to minimise the need to open windows to control internal temperatures.

Magnitude of Impact	Daytime External Noise Level, dB L _{Aeq,16hour} (07:00 - 23:00)	Night-time External Noise Level, dB L _{Aeq,8hour} (23:00 - 07:00)	Description of Effect Without Design Mitigation
Low	< 56	< 51	Good internal acoustic conditions will be achieved with windows closed and ventilation provided by a trickle vent. When windows are open slightly, conditions will normally still be reasonable, as defined in BS8233:2014. Windows can normally be opened to cool an overheating room without exceeding reasonable noise limits internally.

3.2 Noise Model and Results

To determine the external noise levels at the proposed building façades overlooking Newport Road at all floors, a noise model has been created using SoundPLAN v.9.1 environmental noise prediction and mapping software. The noise model has been generated based on the noise survey measurement results at the top floor roof terrace balcony of the existing building (i.e noise monitoring position U1) which are outlined in Section 2.5.

Noise modelling graphics for the developed site are shown in Appendix F. A noise model has been generated to display predicted daytime (07:00 – 23:00) and night-time (23:00 – 07:00) average ambient external noise levels at the proposed building façades overlooking Newport Road.

During daytime hours, external façade noise levels on the south façade range from 68dB L_{Aeq,16hour} at ground floor level to 61dB L_{Aeq,16hour} at top floor level. The noise modelling results align with a **‘Medium’** magnitude of impact at all floors.

During night-time hours, external façade noise levels on the south façade range from 61dB L_{Aeq,16hour} at ground floor level to 54dB L_{Aeq,16hour} at top floor level. The noise modelling results align with a **‘High’** magnitude of impact at the lower floors (GF – 3F) and a **‘Medium’** magnitude of impact at the higher floors.

The external building fabric should be designed to ensure external noise intrusion is adequately controlled at all building façades during daytime and night-time hours; this is discussed in detail within Section 4.1.



4 Noise Impact Assessment

4.1 External Building Fabric Assessment

Based on the results of the baseline noise survey and the results of the noise modelling, sound insulation calculations for habitable rooms within the PBSA block have been prepared to determine façade constructions sufficient to control noise intrusion in-line with the internal noise limits recommended in BS8233.

Predicted internal noise levels have been calculated on the basis of the following assumptions to provide a robust assessment of external noise intrusion to critical habitable rooms:

- Calculations are prepared to assess noise intrusion to a typical small-sized bedroom with 30m³ room volume (4m width, 3m length, 2.5m height)
- External façade area is 10m² (4m width, 2.5m height)
- Glazed area is 30% of the external façade area (3m²)

Note: Minimum sound insulation performance values for external building fabric elements in this report are indicative and represent likely sufficient mitigation to achieve the internal noise limits. Further assessment may be undertaken by a suitably qualified acoustician, responsible for the full acoustic design strategy, to confirm the minimum performance requirements for each habitable space based on room dimensions and façade area.

4.1.1 External Wall Construction

Calculations have been undertaken on the basis of the external wall comprising a steel frame system with brickslip cladding, which is typically capable of achieving the minimum insertion loss figures shown in **Table 7**.

Table 7: External Non-Glazed Wall Specification

Example Construction	Minimum Sound Reduction Index dB 'R' (BS EN ISO 10140-2:2010) @ Octave Band Centre Frequency (Hz)							R _w (+C _{tr})
	63	125	250	500	1k	2k	4k	
Metframe with 2no. 15mm Wallboard and 50mm Rockwool	20	33	41	46	50	48	48	48 (-4)

A steel frame system is deemed capable of achieving the minimum sound insulation requirements for the external wall, however careful attention should be given to the low frequency performance of the proposed system to check that it is able to sufficiently control low frequency noise intrusion from road traffic noise. At this stage, allowance should be made for two layers of plasterboard to form the internal lining (combined minimum 25kg/m² mass per unit area).



4.1.2 Roof Construction

The roof construction is not yet confirmed. It is expected that a suspended ceiling will be included below the lightweight or masonry roof construction within top-floor apartments. Therefore, noise intrusion via the roof to top-floor apartments is expected to be negligible compared to noise intrusion via other building elements (i.e. glazing). A roof construction inclusive of suspended ceiling system capable of achieving a minimum 40dB R_w+C_{tr} is expected to be sufficient.

4.1.3 Preliminary External Glazing Specifications

Based on the results of the external building fabric calculations, the preliminary façade glazing specifications provided within Table 8 are indicated necessary to achieve the internal ambient noise level design criteria within habitable rooms. The glazing specifications shown are subject to further development as the external building fabric design progresses and should not be used for tender purposes at this stage.

Table 8: Preliminary Façade Glazing Specifications

Glazing Type	Example Glazing Configuration	Minimum Sound Reduction Index dB 'R' (BS EN ISO 10140-2:2010) @ Octave Band Centre Frequency (Hz)							$R_w (+C_{tr})$
		63	125	250	500	1k	2k	4k	
Type 1* 	10mm/12as/6.4mm Laminated Double Glazing	22	27	29	36	41	42	52	39 (-4)
Type 2 	10mm/12as/6mm Double Glazing	21	26	27	34	40	38	46	37 (-4)
Type 3 	6mm/12as/4mm Double Glazing	16	22	21	30	40	41	42	34 (-5)

***Note:** **Glazing Type 1** is only required to residential habitable rooms at first floor, second floor, third floor and fourth floor levels. All habitable rooms on remaining floors may use **Glazing Type 2** instead. The glazing types referenced in **Table 8** are shown in **Figure 4**.



Figure 4: Glazing Types (Drawing Source: Fletcher Joseph)

As the design progresses, qualified comment should be sought on acoustic suitability and evidence of lab performance values should be made available by manufacturers.

4.1.4 Background Ventilation Strategy

It is understood that background ventilation is likely to be provided by mechanical means, however this is not yet confirmed. Therefore, 1no. passive trickle ventilator in the façade (typically located within the window frame) has been included within the calculations to assess the feasibility of passive background ventilation.

Based on the results of the external building fabric calculations, the preliminary passive trickle ventilator specification shown in Table 9 is indicated to be sufficient to achieve the internal ambient noise level design criteria within habitable rooms.

Table 9: Preliminary Passive Trickle Ventilator Specification

Example Passive Trickle Ventilator Specification	Minimum Element-Normalised Level Difference dB 'D _{n,e} ' (BS EN ISO 10140-2:2010) @ Octave Band Centre Frequency (Hz)							D _{n,e,w}
	63	125	250	500	1k	2k	4k	
Sonovent Medium 10mm (ZEN210/10AR)	33	33	35	44	51	57	54	48

Note: The passive trickle ventilator specification is calculated on the basis of 1no. passive trickle ventilator in the façade. For each additional passive trickle ventilator in the façade, the minimum sound reduction index figure would increase by $10 \cdot \log(N)$ dB at each octave band centre frequency, where N is the number of passive trickle ventilators in the façade.

The passive trickle ventilator specified above is a high-performance unit. A lower-performing ventilator may be feasible, although this would likely require higher glazing performance than the specifications set out in **Table 8**. Conversely, if a mechanical ventilation strategy is adopted and passive trickle ventilators are not required, the minimum glazing performance may be reduced. Any reduction is expected to be marginal and should be confirmed during the design stage.

The use of opening windows for rapid purge ventilation (i.e. to expel paint fumes or burnt toast odours as per Approved Document F) is acceptable at all facades. This is on the basis that windows will be opened for short periods and may be closed at occupant discretion once odours are purged.

4.2 Noise Intrusion During Overheating Condition – Preliminary Assessment

It is recommended that the proportion of the year that windows need to be opened to cool overheating rooms is reduced to a minimum through careful consideration of the thermal design, particularly at high noise exposure facades. Options for this include:

- Alternative high-rate ventilation options such as boost fans and/or large acoustically attenuated passive vent louvres
- Smaller windows, particularly on higher noise exposure facades (to reduce thermal gain and noise ingress via windows)
- Solar shading or solar reflective windows
- Exposed thermal mass and enhanced building fabric thermal performance
- Mechanical cooling, although this should be considered a 'last resort' for mitigating overheating condition

The following preliminary assessment has been undertaken to establish the likely measures required to control overheating, noise & ventilation in habitable rooms of the most critical dwellings to satisfy requirements of Building Regulations Part O (Wales).

There are no specific criteria or guidance on internal noise levels within Building Regulations Part O in Wales and therefore guidance is sought from the Acoustics, Ventilation and Overheating Residential Design Guide (AVO Guide): 2020 prepared by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA). The AVO Guide and the relevant criteria are summarised in **Appendix B**.

A 'Level 1 Site Risk Assessment' shows free-field bedroom façades overlooking Newport Road on the south façade may experience external noise levels of up to 61dB $L_{Aeq,8hr}$ and 80dB $L_{Amax,F}$ during night-time hours (23:00 – 07:00). This indicates that bedrooms on the south façade are at a 'High Risk' of adverse effect in periods of overheating at night. Overheating mitigation via openable windows is deemed unlikely to be sufficient.

A 'Level 1 Site Risk Assessment' shows free-field bedroom façades at the rear of the building on the north façade may experience external noise levels of up to 50dB $L_{Aeq,8hr}$ and 75dB $L_{Amax,F}$. This indicates that bedrooms on the north façade are at a 'Medium-Low Risk' of adverse effect in periods of overheating at night. Preliminary calculations indicate that an open window area $\leq 4\%$ of the floor area may be permissible. For example, a typical small sized bedroom with a floor area of 12m² would require a maximum openable window area of 0.5m² to achieve the AVO guide values of 42dB $L_{Aeq,8hr}$ and 65dB $L_{Amax,F}$ internally.



For design guidance, it is advised that overheating mitigation during night-time periods should not rely on openable windows for façades overlooking Newport Road, therefore a mechanical ventilation means of control (with or without active cooling) is likely to be necessary. This strategy would assist in meeting the upper internal night-time AVO Guide values of 42dB $L_{Aeq,8hr}$ and 65dB $L_{Amax,F}$ internally during overheating conditions.

The necessity for an active cooling element as part of the ventilation strategy should be confirmed by the thermal modelling engineer as part of a detailed overheating assessment.

4.3 Internal Sound Insulation Assessment

Current proposals for the development allow for a commercial space, a gym/wellness area and various back of house areas (incl. a plant room, substation room and bin store) at ground floor level, as shown in Figure 5. Noise transmission from the ground floor areas to habitable rooms above ground floor is to be assessed at detailed design stage.

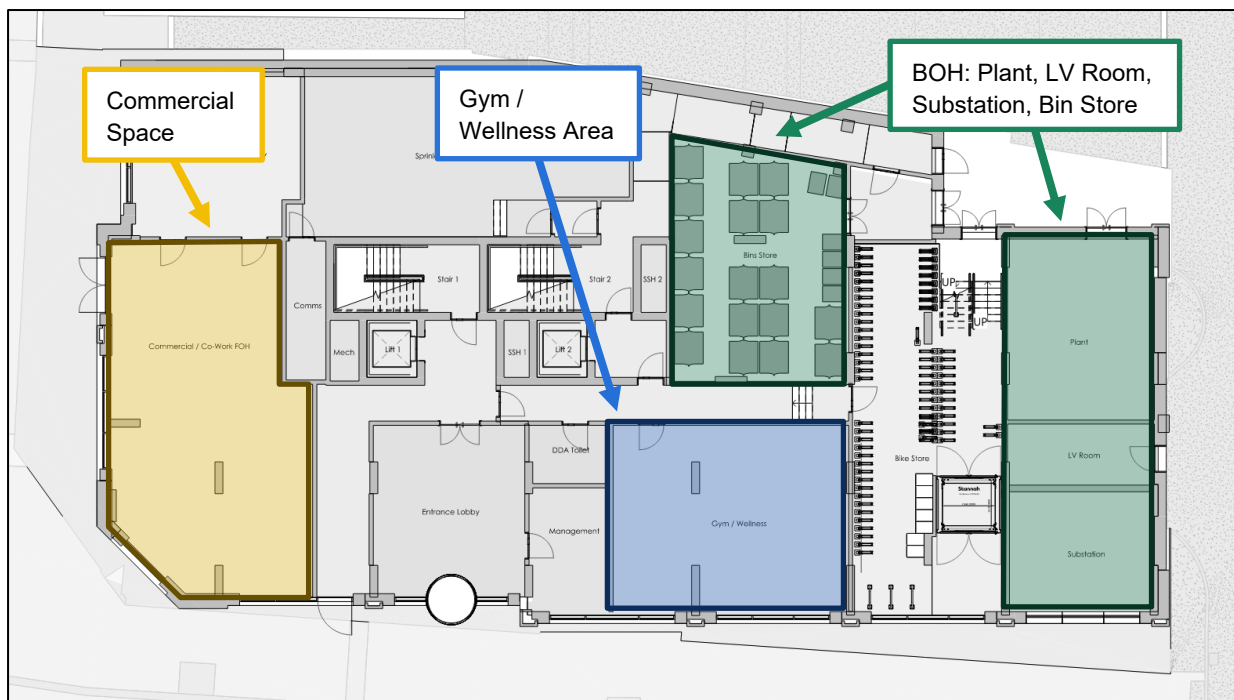


Figure 5: Ground Floor Proposals (Drawing Source: Fletcher Joseph)

The separating construction between ground floor and first floor will need to be sufficiently uprated to mitigate excessive noise transfer from the noise-generating areas shown in the figure above. Internal sound insulation between these ground floor areas and residential areas above are discussed in the following sections.

4.3.1 Internal Sound Insulation between Commercial and Residential Areas

A +5dB minimum sound insulation performance above Building Regulations criteria is typically suggested on schemes with commercial and residential adjacencies; however, this would need consideration of how significant noise from the commercial space is likely to be within the building.

For suspended ceilings within a commercial unit, the overall construction will be guided by the minimum level of sound insulation performance necessary to limit noise breakout from the commercial unit to residential apartments above. This will depend upon the expected ambient noise levels within the commercial unit.

For a commercial unit leased as 'shell & core' (i.e. provided to the commercial tenant without fixtures such as suspended ceilings), it is often the tenant's responsibility to fit-out the unit and provide a suitable level of sound insulation measures to limit noise breakout. Noise ingress from commercial spaces to residential habitable rooms and amenity areas can normally be controlled through an appropriately worded planning condition, requiring the commercial tenant(s) to commission an acoustic assessment by a suitably qualified acoustician before operation.

4.3.2 Internal Sound Insulation between Bin Store and Residential Areas

Careful attention is required for the separating floor construction between the bin store area and residential apartments located directly above. Depending on the thickness of the proposed masonry floor slab, a suspended ceiling system to the bin store area may be necessary to increase overall sound insulation performance and limit noise breakout. The proposed separating floor construction between the bin store area and residential apartments above is to be assessed at detailed design stage.

4.3.3 Internal Sound Insulation between BOH Plant Areas and Residential Areas

Controlling noise breakout from the BOH plant areas (including the substation room) is critical. Noise emissions from plant areas should not exceed NR20 noise levels in habitable rooms. Vibration through the common floor slab is also critical and should be adequately controlled with anti-vibration floor mounts fitted to services units.

At this stage, it is unclear what services plant will be included within each of the plant rooms. It is essential that this information is provided at detailed stage. Possible mitigation measures to limit plant room noise breakout include:

- Reselection of building services plant for quieter units
- Up-rated ceiling construction to BOH plant areas
- Up-rated floor construction (i.e. increased thickness to concrete floor slab)
- Up-rated anti-vibration floor mounts
- Addition of sound absorptive materials (i.e. wall panels) to reduce internal reverberant noise levels



For apartments above the substation room, habitable rooms should avoid dimensions of 3.4m or multiples of 3.4m, which relates to the wavelength of the sound emitted by substations and can exacerbate noise levels in the room. The sound insulation requirements for perimeter walls and ceilings will be reviewed during detailed design stage once plant selections are known.

4.3.4 Internal Sound Insulation between Gym Areas and Residential Areas

Noise and vibration should be suitably controlled to ensure that activities within the gym/wellness area do not cause an adverse impact to residential dwellings at first floor level and above. The 'ProPG: Gym Acoustics Guidance' (GAG:2023), provides acoustic design criteria for critical areas potentially exposed to gym noise & vibration, based on NR-curve type targets called 'G-curves'. The relevant G-curve criteria that should be achieved in residential areas are shown in Table 10.

Table 10: GAG:2023 'G-Curve' Acoustic Design Criteria

Receptor Type	'G-Curve' Guide Criteria	
	Airborne Sound (e.g., music) $L_{eq,T}$ (31.5Hz to 8kHz)	Heavy Impact Sound $L_{max,F}$ (31.5Hz to 8kHz)
Residential Areas	G15-G25 (day)	G20-G25 (day)
	G10-G20 (night)	G15-G20 (night)

Noise and vibration mitigation measures would likely be required to achieve the 'G-curve' criteria shown above when the gym/wellness area is in use, however the scope/scale of the noise and vibration mitigation measures can vary considerably depending on the proposed usage of the space. A few examples of the proposed usage of a space and the corresponding mitigation measures are provided below:

- A dedicated yoga area may require a suspended ceiling construction, however may not require any vibration control measures
- A basic gym area with running machines, cross-trainers and bikes (i.e. no free weights) would likely require a suspended ceiling construction and may require some basic vibration control measures (e.g. rubber matting beneath the machines, or proprietary anti-vibration measures provided by the machine manufacturer)
- A dedicated gym area with free weights would require a robust suspended ceiling construction and specialist vibration control measures (e.g. thick rubber matting provided by a gym flooring specialist)

Note that the examples listed above are provided for guidance only, and a detailed assessment of gym noise/vibration on residential areas for compliance with the target G-curve criteria is typically assessed at detailed design stage. A suitably worded condition requiring compliance with ProPG:GAG (2023) guidance is typically sufficient to protect residential areas from excessive noise & vibration noise ingress.



4.3.5 Internal Sound Insulation between Residential Dwellings

The proposed residential dwellings are to be designed and constructed in accordance with the requirements of the Building Regulations Approved Document Part E (2010). The following aspects are considered:

- Sound insulation of separating walls (airborne)
- Sound insulation of separating floors (airborne and impact)
- Sound insulation of internal walls within a unit
- Sound insulation of entrance doors to each unit
- Sound insulation of enclosures to waste pipes or other penetrating services pipework
- Reverberation time control in common areas
- Flanking sound control across external walls and any internal structure (horizontally and vertically)

Early consultation with the applicable Building Control Authority or Approved Inspector is advised to clearly determine the approach to achieving the requirements of Approved Document E (2010).



4.4 External Amenity Area Assessment

It is understood that a shared external amenity area is proposed in the form of a roof terrace area at seventh floor level, which is shown in Figure 6.



Figure 6: External Amenity Area at 7th Floor (Drawing Source: Fletcher Joseph)

Based on the measured average ambient noise levels at Position U2 (see Table 3) and the noise modelling results of the proposed building structure, it is predicted that the average ambient noise level within the roof terrace external amenity area should fall comfortably below the BS8233 upper guideline limit value of 55dB(A) for external amenity areas and should also achieve the desirable guideline limit value of 50dB(A).

The roof terrace area should be appropriately managed to ensure that social activity within the roof terrace area does not cause a noise impact on the nearby noise sensitive receptors (see Figure 1), particularly during night-time hours (23:00 – 07:00). It may be required to restrict the opening hours of the roof terrace area to daytime hours only (07:00 – 23:00) if noise complaints were to occur from nearby noise sensitive receptors due to night-time usage of the roof terrace area.

5 External Plant Rating Noise Limits

It is proposed to control external plant noise emissions to the rating noise limits set out in Table 11 at the nearest noise sensitive receptors, which are noted as being the mixed-use houses along The Parade, the Holland House Hotel Cardiff on Newport Road and Admiral House on Newport Road (see Figure 1).

Noise levels measured at monitoring position U1 are deemed representative of typical background noise levels at Holland House Hotel Cardiff and Admiral House, and noise levels measured at monitoring position U2 are deemed representative of typical background noise levels at the mixed-use houses along The Parade.

Table 11: Proposed External Plant Rating Noise Limits

Noise Sensitive Receptor	Period	Minimum Consistent Background Sound Level	Proposed External Plant Rating Noise Limit
Mixed-Use Houses along The Parade	Daytime (07:00-23:00)	43dB LA90,1hour	≤ 38dB LA _r ,1hr
	Night-time (23:00-07:00)	41dB LA90,15mins	≤ 36dB LA _r ,15mins
Holland House Hotel Cardiff and Admiral House on Newport Road	Daytime (07:00-23:00)	55dB LA90,1hour	≤ 50dB LA _r ,1hr
	Night-time (23:00-07:00)	48dB LA90,15mins	≤ 43dB LA _r ,15mins

The proposed external plant rating noise limits are set 5dB below the minimum consistent background sound level at the nearest noise sensitive receptors. This would constitute a low impact at the nearest noise sensitive receptors as per BS4142, and would align with the requirement to achieve Pol 05 of BREEAM 2026 (if targeted).



Appendices



Appendix A Glossary of Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{AFmax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{AFmax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
$D_{nT,w}$	$D_{nT,w}$ is the weighted standardised level difference single number value used to characterise the on-site airborne sound insulation performance of a partition.
R_w	R_w is the weighted sound reduction index single number value used to characterise the airborne sound insulation of a material or building element over a range of frequencies. This is typically measured in a laboratory in accordance with BS EN ISO 717-1.
$L_{nT,w}$	$L_{nT,w}$ is the weighted standardised impact sound pressure level single number value used to characterise the on-site impact sound insulation performance of a floor.
C_{tr}	C_{tr} is a correction term applied to single-number sound insulation values (R_w , $D_{n,e,w}$ etc.) to afford additional weighting against low frequency performance.
$D_{n,e,w}$	$D_{n,e,w}$ is the single number quantity which characterizes the airborne sound insulation performance across a given 'element' and is typically used to describe the acoustic performance of trickle ventilators etc.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and at least 3m from buildings.



Appendix B Guidance Documents

Planning Policy Wales

Welsh Government Planning Policy Wales (Edition 11) dated February 2021 (last updated October 2023), states;

“6.7.20 Where sensitive developments need to be located close to existing transportation infrastructure for sustainable movement and access they should be designed, as far as practicable, to limit harmful substances and noise levels within and around those developments both now and in the future. This may include employing the principles of good acoustic design and the inclusion of active travel or travel management measures as part of development proposals. Such development, however, should preferably be located away from existing sources of significant noise, which may include aircraft noise or roads, particularly new roads or those with programmed route improvements.”

The policy document goes on to refer to the ‘Professional Planning Guidance (ProPG) Supplementary Document 2’ produced by the Association of Noise Consultants, the Institute of Acoustics and the Chartered Institute of Environmental Health.

ProPG: Planning & Noise - Professional Guidance on Planning & Noise - New Residential Development

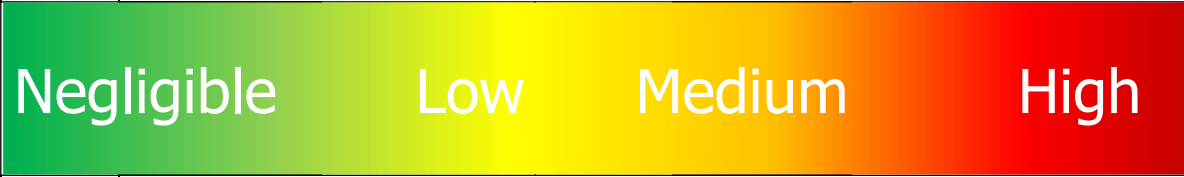
The Professional Practice Guidance on Planning and Noise (May 2017) provides guidance on transportation noise affecting new residential developments. The guidance was prepared by a working group formed from members of the Institute of Acoustics (IoA), the Association of Noise Consultants (ANC) and the Chartered Institute of Environmental Health (CIEH). It is specifically for assessing noise from predominantly transportation sources. The guidance promotes a two stage assessment approach:

- Stage 1 – Initial Site Noise Risk Assessment; and,
- Stage 2 – Full assessment and systematic appraisal of four key elements.

The Stage 1 initial risk assessment provides an indication of the likely risk of adverse effects from noise assuming in the first instance that no mitigation were included within the proposals. The risk assessment is based on measured or predicted noise levels during a “typical worst case” 24-hour period. Figure 1 of the document presents the Stage 1 assessment and indicates that higher noise levels result in increased noise risk without mitigation. This is summarised in Figure A1 below. Figure A1 (Figure 1 of ProPG) does not directly relate noise levels to specific risk categories although a negligible noise risk broadly correlates to noise levels not exceeding 50dB $L_{Aeq,16hr}$ (daytime) and 40dB $L_{Aeq,8hr}$ (night).



Noise Impact Assessment

Day L _{Aeq} , 16 Hr	50 dB	55 dB	60 dB	65 dB	70 dB
 Negligible Low Medium High					
Night L _{Aeq} , 8 Hr	40 dB	45 dB	50 dB	55 dB	60 dB

ProPG Stage 1 Noise Risk Assessment (adapted from ProPG Figure 1)

Where the initial noise assessment indicates a higher risk of adverse noise effects, a Stage 2 assessment is required. The Stage 2 assessment is more involved than the Stage 1 and requires systematic consideration of four elements:

Element 1 – Good Acoustic Design Process

The acoustic design of a building and any mitigation should be considered at an early stage of the design process. Following a good acoustic design process is considered a part of achieving a good design as required by the NPSE and NPPF. Guidance on the requirements for providing an Acoustic Design Statement (ADS) is given in Figure 3 of ProPG.

Element 2 – Internal Noise Level Guidelines

The guideline criteria for internal ambient noise levels are consistent with BS8233:2014:

- 35dB L_{Aeq,16hr} in living rooms during daytime
- 30dB L_{Aeq,8hr} in bedrooms during night-time
- 45dB L_{AFmax} should not normally be exceeded 10-15 times a night in bedrooms

Element 3 – External Amenity Area Noise Assessment

The guidance of the ProPG reflects and extends on the advice of BS8233 and PPG Noise. The guidance in the ProPG presents five points for consideration, the first being “If the external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended”.

Element 4 – Assessment of Other Relevant Issues

“Other relevant issues” within the context of the ProPG include relevant national and local policy which may have a bearing on the development.



Technical Advice Note (Wales) 11

Noise bands defining categories A-D of TAN 11 are set in terms of $L_{Aeq,16hr}$ daytime and $L_{Aeq,8hr}$ night time levels for road traffic noise and mixed sources, free field 1.2-1.5m above ground level as follows;

TAN11 Noise Exposure Categories

Recommended noise exposure categories for new dwellings near existing noise sources (ref Table 2 of TAN 11 (Wales) October 1997)					
Noise Source	Time	Noise Exposure Categories			
		A	B	C	D
Road Traffic	07:00-23:00	<55	55-63	63-72	>72
	23:00-07:00	<45	45-57	57-66	>66
Rail Traffic	07:00-23:00	<55	55-66	66-74	>74
	23:00-07:00	<45	45-59	59-66	>66
Air Traffic	07:00-23:00	<57	57-66	66-72	>72
	23:00-07:00	<48	48-57	57-66	>66
Mixed Sources ⁽⁴⁾	07:00-23:00	<55	55-63	63-72	>72
	23:00-07:00	<45	45-57	57-66	>66

Note: In addition, sites where individual noise events regularly exceed 82dB(A) $L_{max(slow)}$, several times in any night-time hour should be treated as being in NEC C, unless the $L_{eq(8\text{ hour})}$ already puts the site in NEC D.

⁽⁴⁾ Mixed sources: this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant.



British Standard 4142:2014+A1:2019

The standard method for assessing noise from commercial and industrial premises is British Standard BS 4142:2014+A1 2019 “Method for rating and assessing industrial and commercial sound”. The standard is applicable for assessing noise affecting “dwellings or premises used for residential purposes”.

A BS 4142 assessment is made by determining the difference between the specific noise under consideration and the background sound level, as represented by the L_{A90} parameter, determined in the absence of the commercial sound. The L_{A90} parameter is defined as the level exceeded for 90% of the measurement time. This parameter therefore excludes short duration noise events, such as individual vehicle movements, and represents the underlying continuous noise.

The commercial or industrial sound is assessed in terms of the equivalent continuous noise level, L_{Aeq} . The equivalent continuous noise level (L_{Aeq}) of the commercial or industrial sound, over the applicable assessment period, is known as the specific sound level.

A character correction penalty can be applied to the specific sound level where the commercial noise exhibits distinguishable tones, impulsiveness, intermittency or other characteristics which “are otherwise readily distinctive against the residual acoustic environment”.

The specific noise level with the character correction (if necessary) is known as rating level (L_{Ar}) and the difference between the background noise and the rating level is determined to make the BS 4142 assessment. The following is then considered:

- Typically, the greater this difference, the greater the magnitude of the impact.
- 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.

The standard highlights the importance of considering the context in which a sound occurs. Factors including the absolute sound level, the character of the sound, the sensitivity of the receptor and the existing acoustic character of the area should be considered when assessing the noise impact. The use of the proposed premises for short term holiday rentals is also pertinent to the consideration of context.

The standard notes the need to consider absolute sound levels where background sound levels are low:

"For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low. Where the background sound levels and rating level are low, absolute levels might be as, or more, relevant than margin by which the rating level exceeds the background. This is especially true at night."



British Standard 8233:2014

Appropriate noise limits for internal noise levels within residential premises are recommended in BS 8233:2014. Limits are in terms of the equivalent continuous level (L_{Aeq}).

The table below provides the BS 8233:2014 guidance criteria for indoor ambient noise levels in habitable rooms when they are unoccupied.

BS 8233 Internal Noise Limits - Residential

Activity	Location	Daytime (07:00-23:00) $L_{Aeq(16hour)}$ dB	Night-time (23:00-07:00) $L_{Aeq(8hour)}$ dB
Resting	Living room	35	-
Dining	Dining room / area	40	-
Sleeping (daytime resting)	Bedroom	35	30

The indoor ambient noise level guidance of BS 8233:2014 is qualified by various notes, of which applicable ones are given in the table below.

BS 8233 Qualifying Notes

Qualifying Note	Description
Note 2	The levels shown in the table above are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in the table above.
Note 3	These levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.
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.
Note 5	If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.
Note 7	Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable conditions still achieved.

BS 8233:2014 also provides guidance on external noise levels for protection of private amenity spaces for residential demises. A level of 50dB $L_{Aeq,T}$, is said to be desirable but 55dB $L_{Aeq,T}$ should be regarded as the upper guideline value.



Approved Document O: Wales 2022

Approved Document O: Wales 2022 provides the following text with regard to noise during night-time hours (23:00 – 07:00):

High levels of external noise could limit the use of cross-ventilation to mitigate the risk of summer overheating. External noise is a material consideration considered when applying for Planning permission and mitigating measures may be required in the design in order to obtain Planning permission and controlled through a condition imposed on the consent. In exceptional cases, this could include non-openable windows. More commonly, windows will be openable in order to enable natural ventilation to occur at less sensitive times of day, when there is lower noise, when people are not present in the room, or when they are present but not engaged in noise-sensitive activities. But those windows may need to be kept closed at times to maintain acceptable indoor acoustic conditions, for example when people are using the rooms for sleep or office work. A noise issue may be identified at the Planning stage but rely on occupants to close windows at noise-sensitive times rather than prevent them from ever opening them, and in those cases overheating strategies should assume windows will be closed during noise-sensitive periods even if they are not fixed closed.

When the removing excess heat as part of the overheating strategy, noise levels in bedrooms should be kept to a minimum during the sleeping hours of 23:00 – 07:00. Building control bodies may accept as evidence that this requirement is satisfied:

- a. documentation to demonstrate that the local planning authority did not consider external noise to be an issue at the site at the planning stage or;*
- b. if the local planning authority did consider external noise to be an issue that should be controlled through a condition at planning stage, then documentation to demonstrate that the proposals for heat removal (during the sleeping hours of 23.00 – 07.00) are accommodated within or do not conflict with documentation provided to the local planning authority to satisfy any related planning permission condition(s). (For example any expectation that windows on one or more façade, or in certain rooms, will need to be kept closed during noise-sensitive periods.)*

Where active measures (e.g. mechanical system) are used for removing excess heat within the overheating strategy, the noise generated by these measures, particularly within bedrooms and living rooms should be considered. Noise generated by ventilation/cooling systems (which may travel through ducts) and noise from the fan unit may disturb the occupants of the building and so discourage their use. Therefore, the designer should consider minimising noise by careful design and the specification of quieter products. Further guidance on mechanical ventilation systems can be found in Approved Document F.

Acoustics, Ventilation and Overheating – Residential Design Guide 2020

The Acoustics, Ventilation and Overheating – Residential Design Guide (AVO Guide) 2020 aims to assist designers to adopt an integrated approach to the acoustic design of residential dwellings within the context of ventilation and thermal comfort requirements.

The guidance outlines a two-level risk assessment procedure for estimating the potential adverse impact on occupants in overheating conditions.



Noise Impact Assessment

The Level 1 site risk assessment is based on external free-field noise levels and the assumed scenario where a partially open window is used to mitigate overheating. The Level 1 assessment is sufficient for developments on 'Negligible' risk sites. The relevant table outlining guidance for level 1 site risk assessment of noise from transport noise sources (relating to overheating condition) is shown overleaf.

The Level 2 assessment is recommended for 'High' risk sites. For 'Low' and 'Medium' risk sites, a Level 2 assessment can optionally be undertaken to give more confidence regarding the suitability of internal noise conditions. This may be particularly appropriate for sites in the 'Medium' risk category.

Table 3-2 Guidance for Level 1 site risk assessment of noise from transport noise sources ^[Note 1] relating to overheating condition

Risk category for Level 1 assessment ^[Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
LAeq,T ^[Note 3] during 07:00 - 23:00 LAeq,8hr during 23:00 - 07:00 65 dB 60 dB 55 dB 50 dB High Medium Low Negligible	Increasing risk of adverse effect	Recommended Optional
	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

Note 1 The noise levels suggested assume a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.

Note 2 The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships, [15, 17].

Note 3 A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines ^[23].

Note 4 Refer also to references ^[1, 17, 18, 22] for further guidance regarding individual noise events. Where 78dB LAFmax is normally exceeded during the night-time period (23:00–07:00), a Level 2 assessment is recommended.

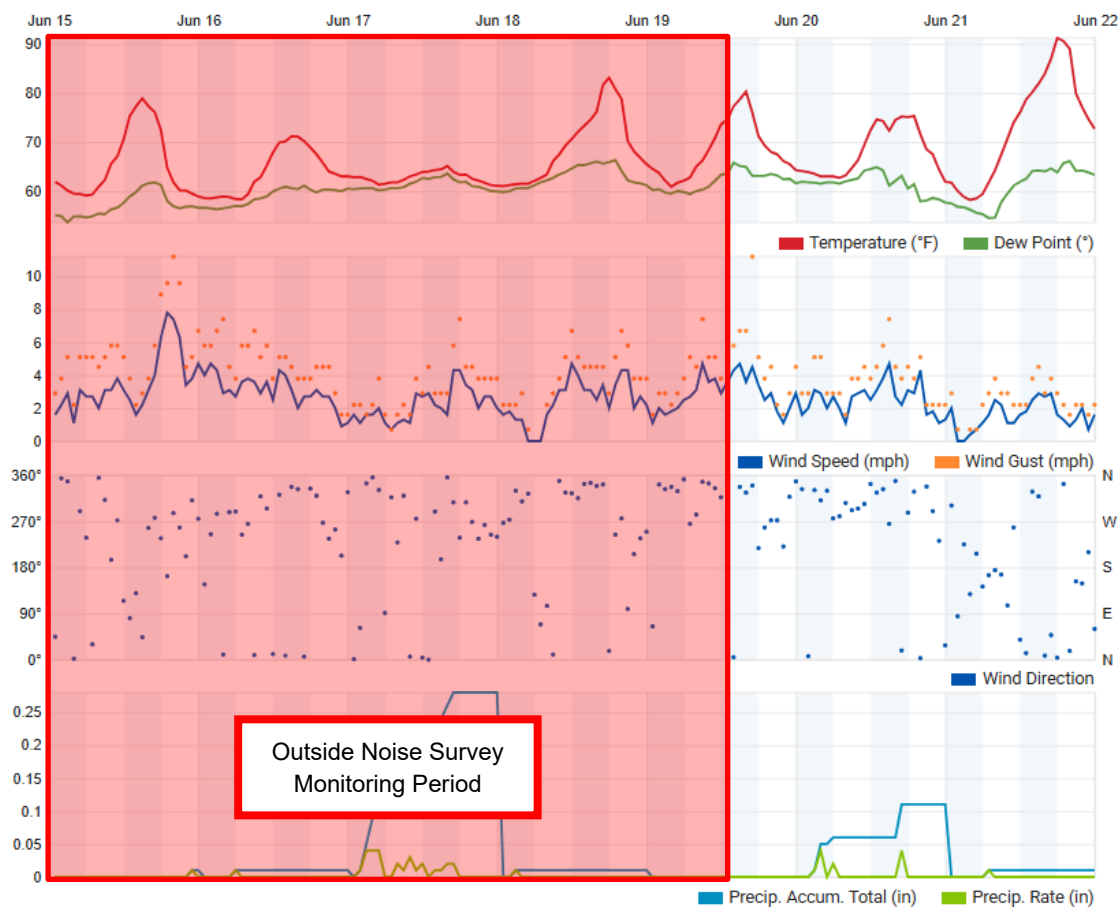
Note 5 The risk of an adverse effect occurring will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.

Note 6 To evaluate the risk category for a dwelling, all three aspects of external noise exposure (i.e. daytime, night-time and individual noise events) should be evaluated. The highest risk category for any of the three aspects applies.

Appendix C Weather Time History Graphs

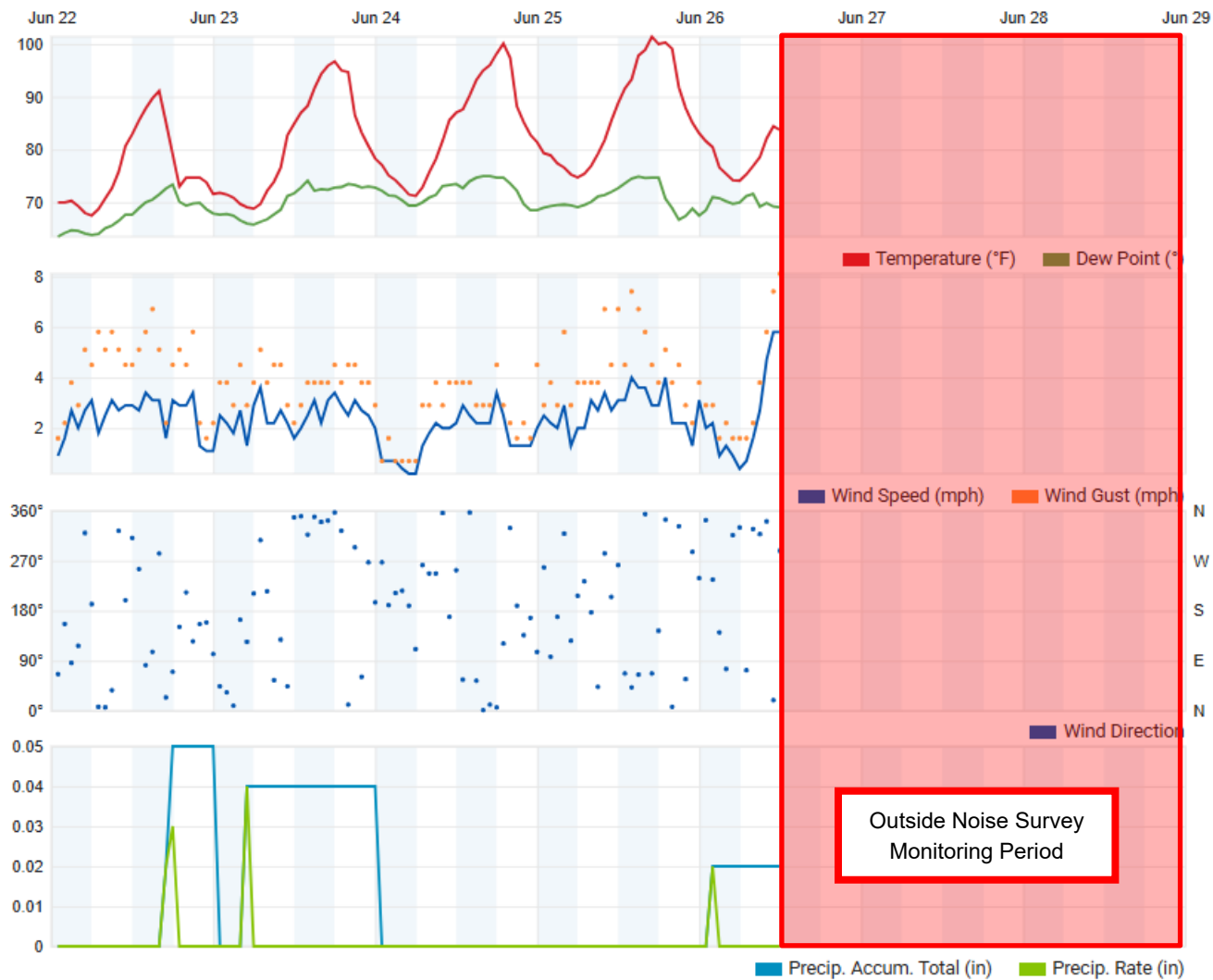
Weather time history graphs from www.wunderground.com (ID: ICARDI130)

June 15, 2026 - June 21, 2026

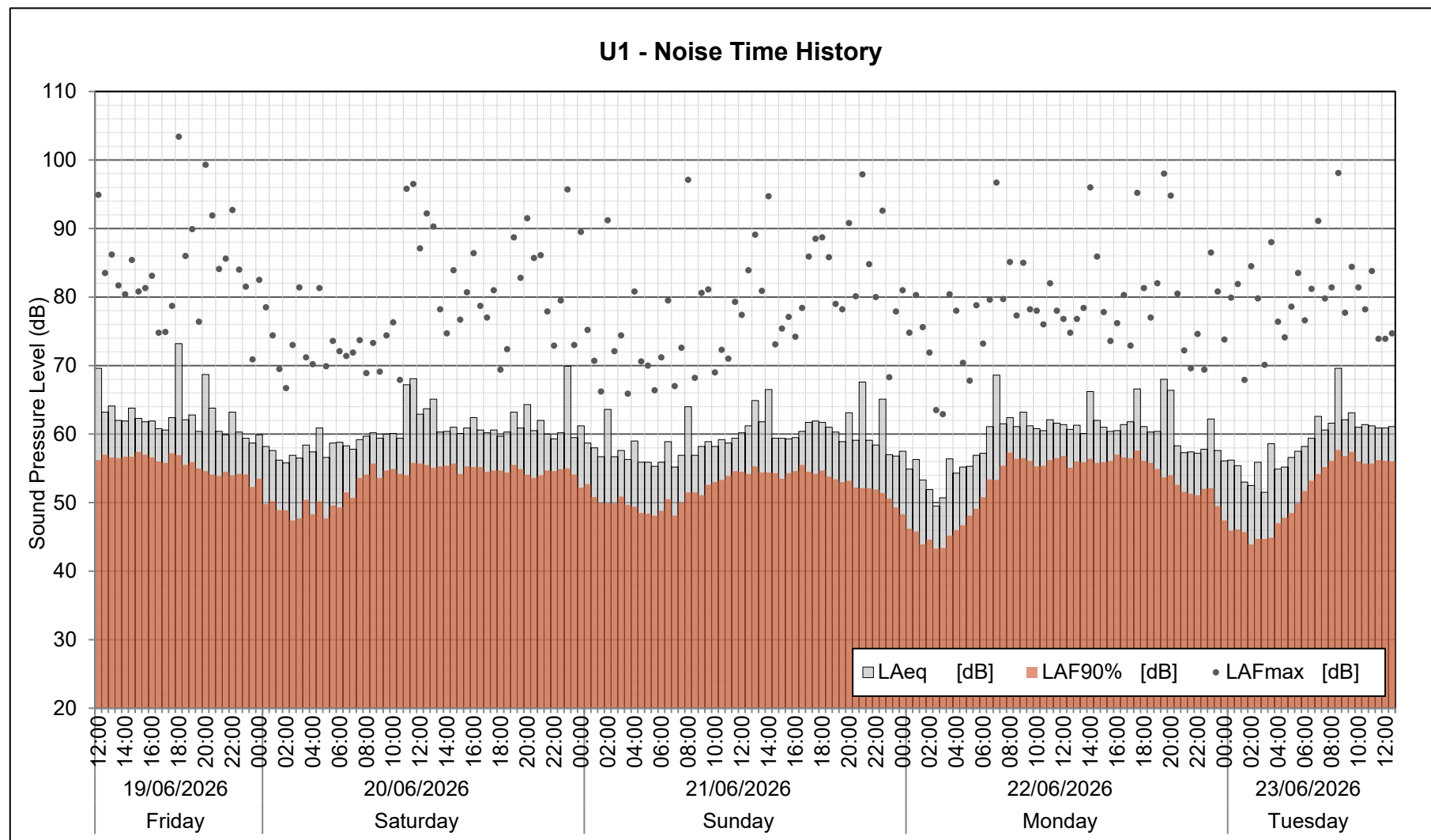


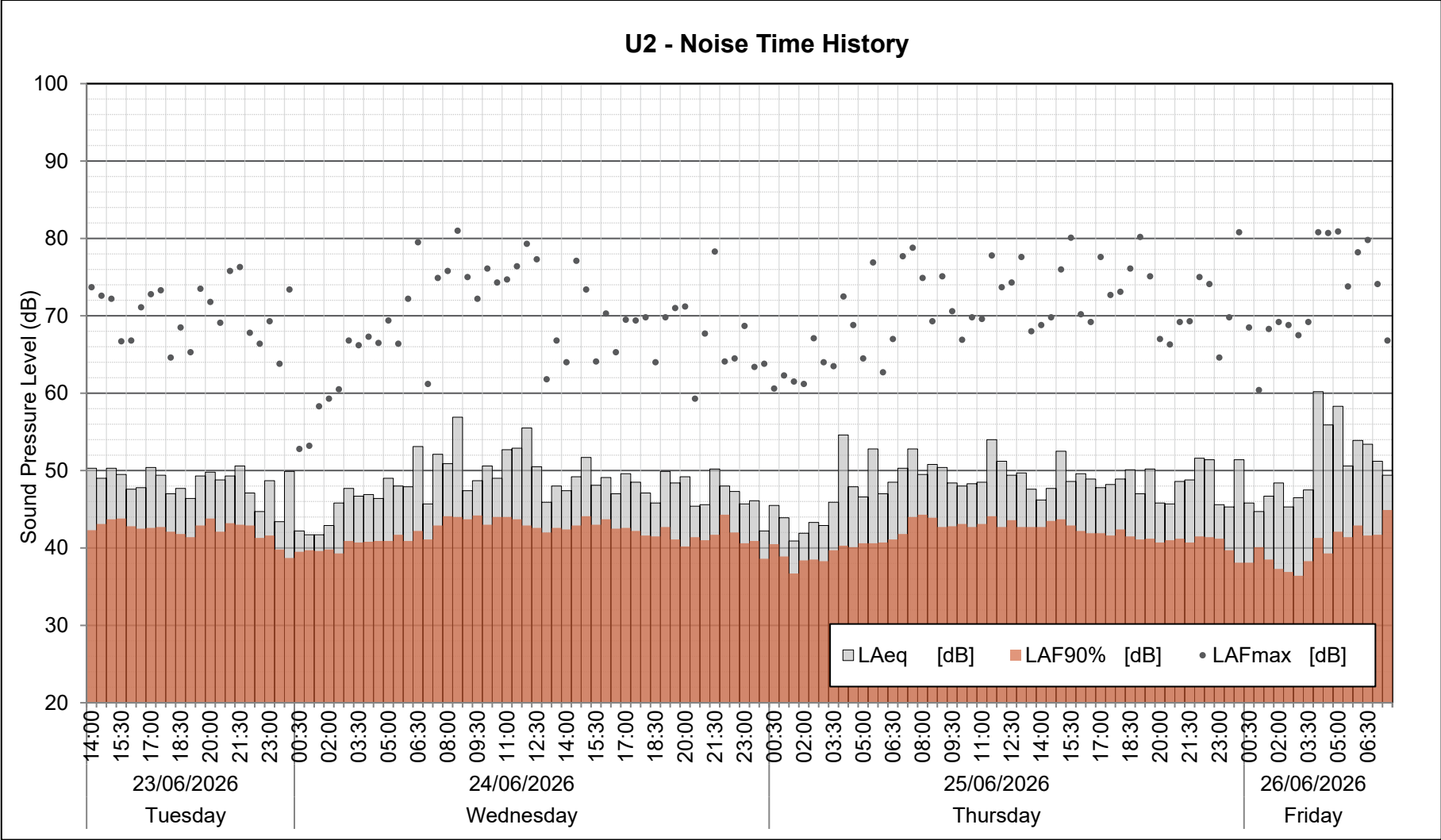
Noise Impact Assessment

June 22, 2026 - June 28, 2026

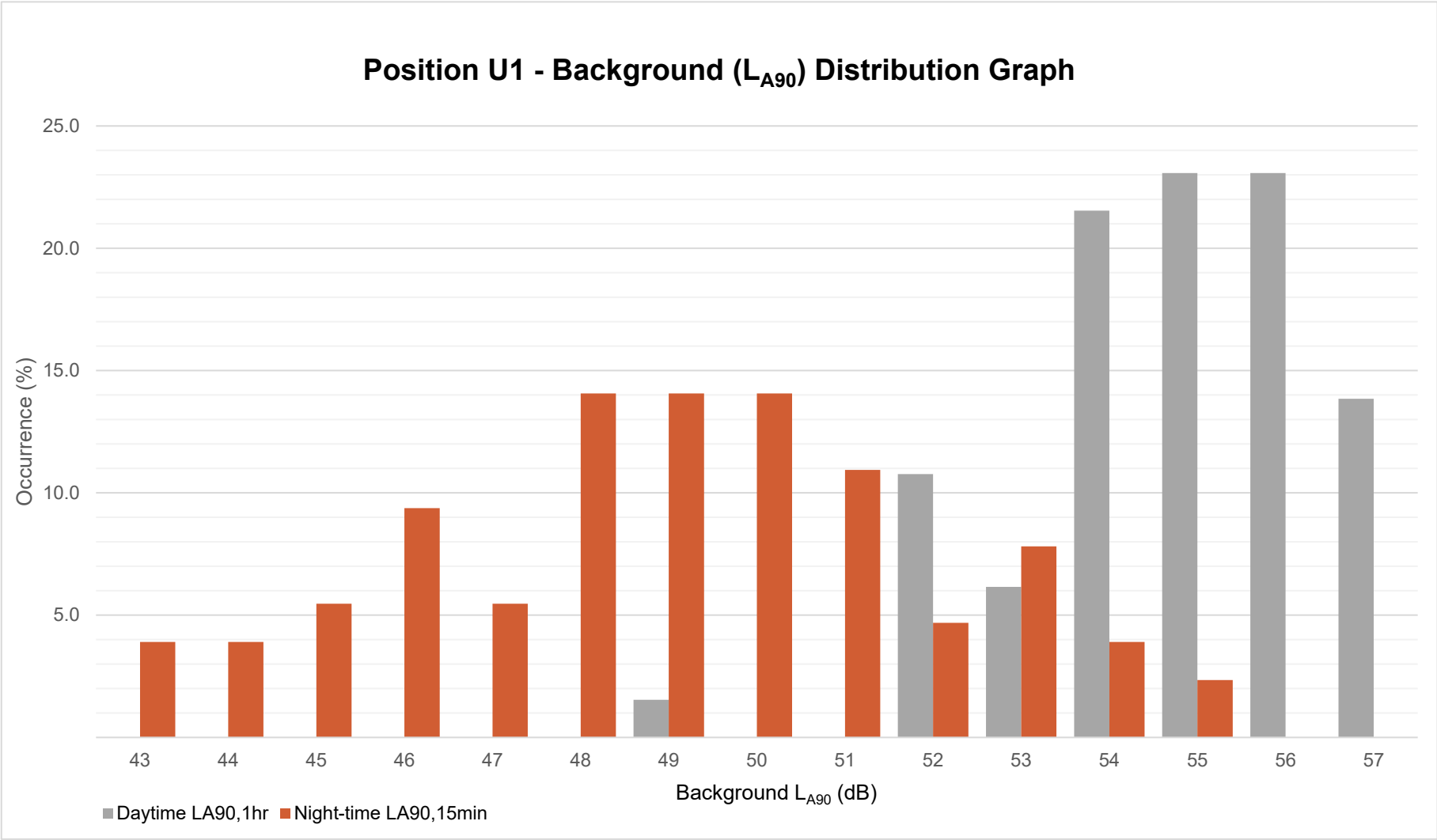


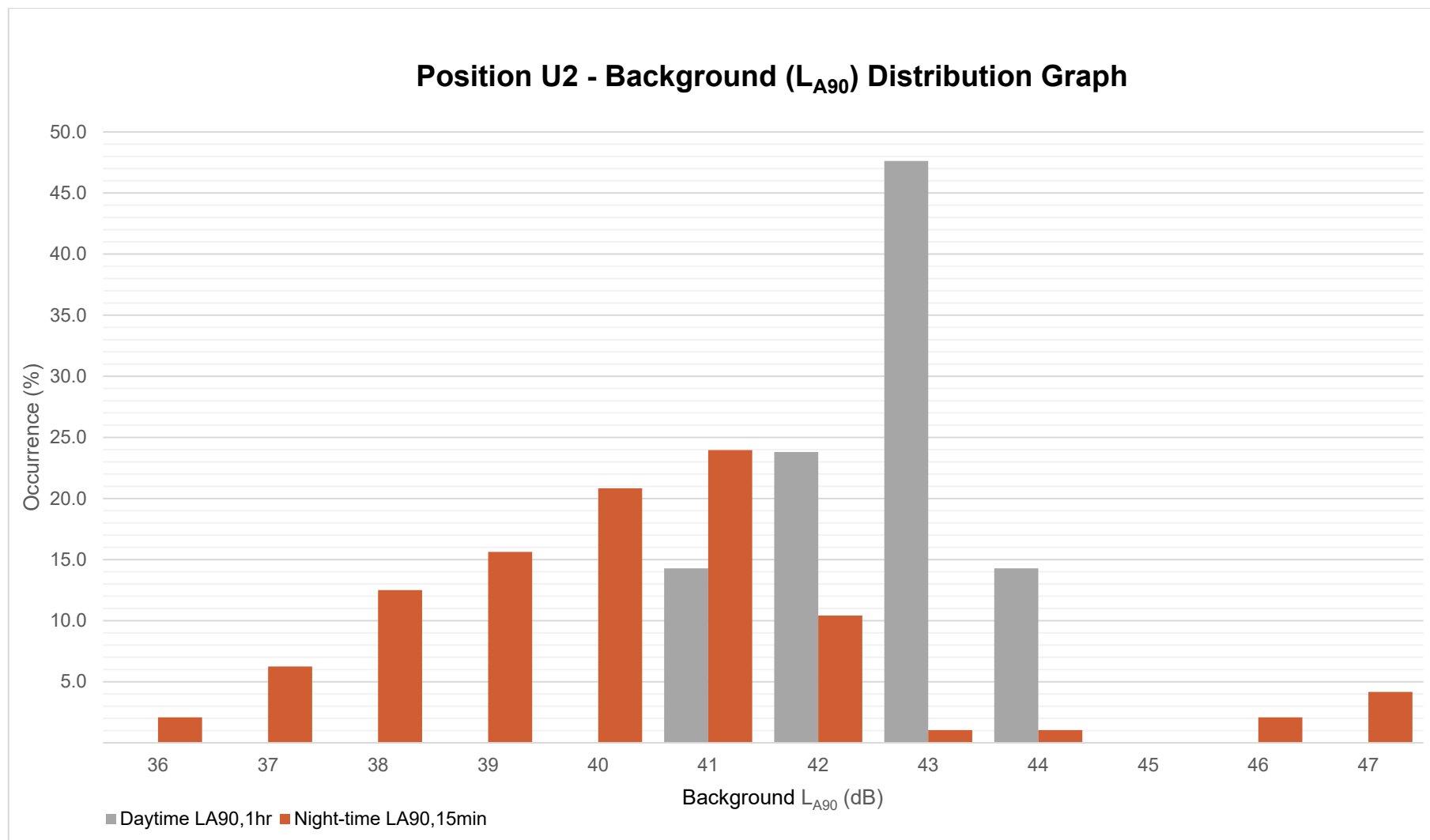
Appendix D Noise Survey Time History Graphs





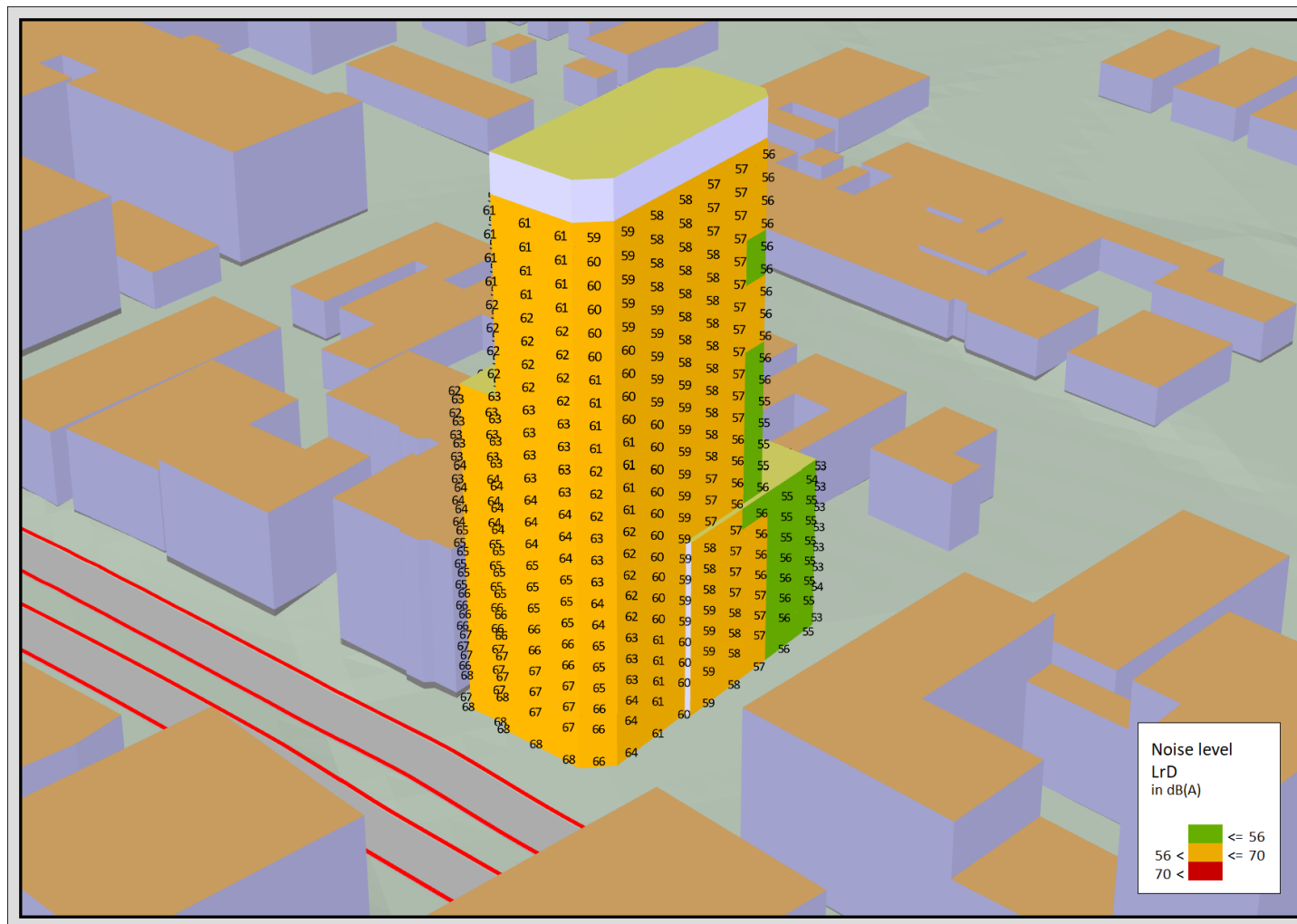
Appendix E Background Sound Level Distribution Graphs





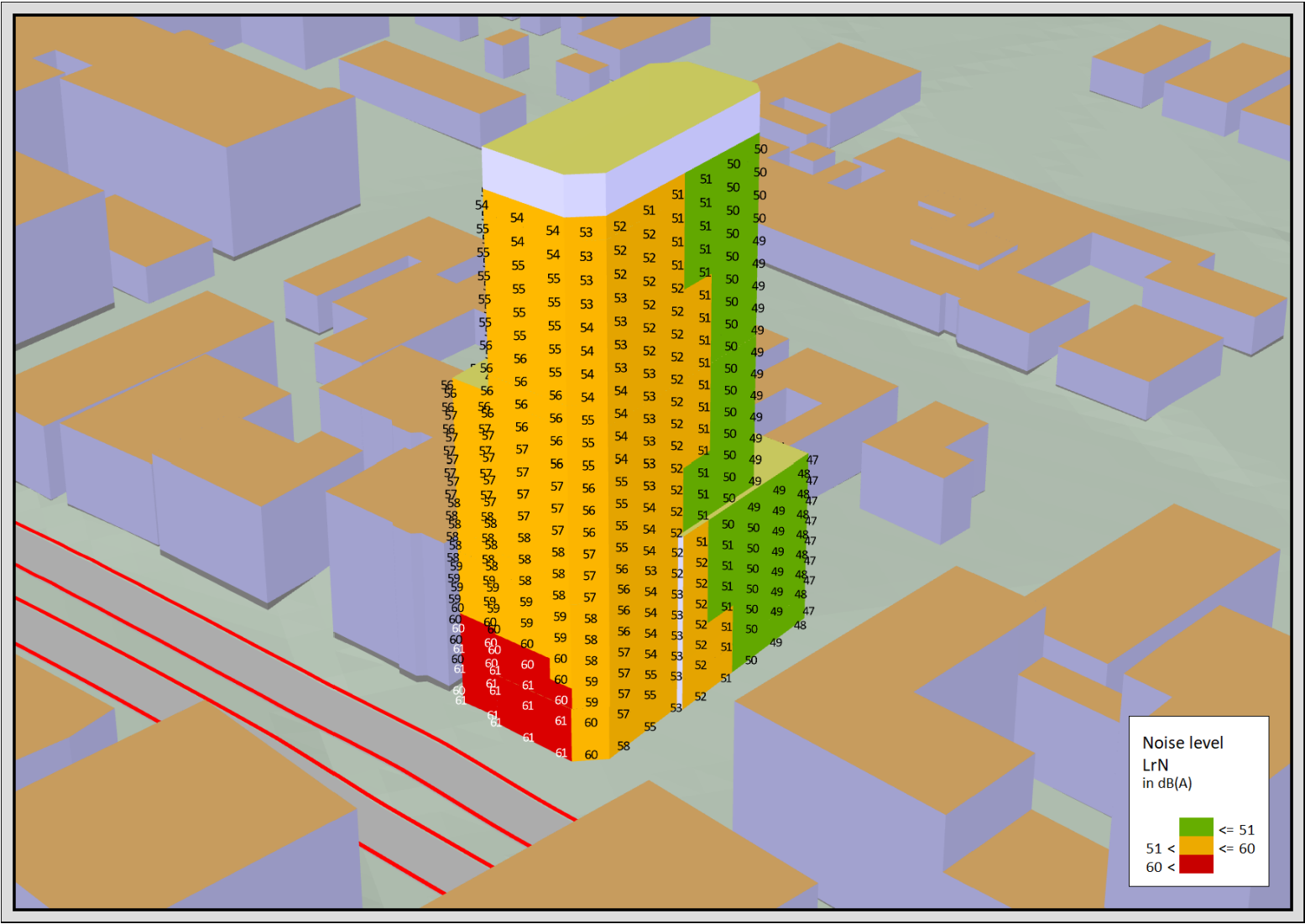
Appendix F SoundPlan 9.1 Noise Modelling Graphics

Average Ambient Noise Levels at Proposed Building Facades overlooking Newport Road during Daytime Hours (07:00 – 23:00, $L_{Aeq,16hr}$)



Noise Impact Assessment

Average Ambient Noise Levels at Existing Building Facades overlooking Newport Road during Night-time Hours (23:00 – 07:00, $L_{Aeq,16hr}$)



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Stantec UK Limited
Wharton Place, 13 Wharton Street
Cardiff
CF10 1GS
UNITED KINGDOM
stantec.com