
MR MUZAFFER CELIK

NOISE IMPACT ASSESSMENT REPORT

38 WINDMILL STREET, GRAVESEND DA12 1BA

Client: Mr Muzaffer Celik

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1 INTRODUCTION

1.1 Overview

1.1.1 By instruction from Mr Muzaffer Celik ('the client'), NoiseAir was commissioned to undertake a Noise Impact Assessment (NIA) for a proposed residential development at the location: 38 Windmill Street, Gravesend DA12 1BA, herein referred to as the 'development site'.

1.1.2 General limitations with respect to this NIA are outlined in **Appendix A**.

1.2 Site Description

1.2.1 The development site consists of a three-storey building plus basement situated on the eastern side of Windmill Street at the junction with Lord Street. The building is Class E (offices) on ground floor with a maisonette at upper ground, first and second floor levels with storage at basement level.

1.2.2 The development site is bound to the west by Windmill Street and the A226 to the north. Each of these roads are single carriageway access roads providing routes through the central business district of Gravesend. Both roads were observed to be heavily trafficked, with traffic moving intermittently at low speeds and up to speeds of 20 miles per hour.

1.2.3 Immediately to the east of the development site is Parrock Street Car Park, a 625 no. space surface car park that is operational 24 hours a day.

1.2.4 **Figure 1** presents location block plan of the development site boundary with respect to the local area and its context.

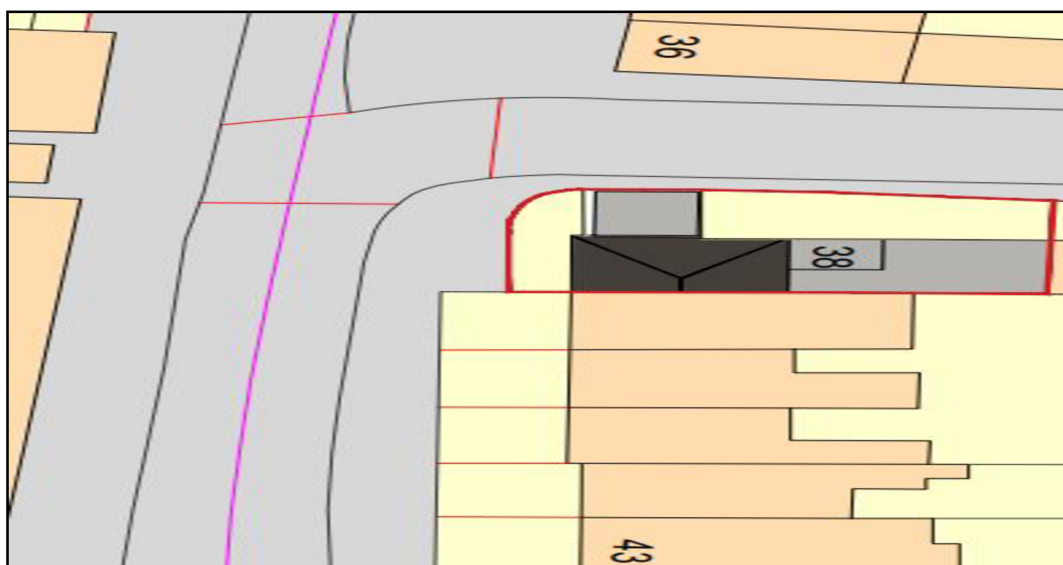


Figure 1: Development site block plan.

1.3 Development Proposals

1.3.1 Proposals for the development site outline an application for Listed Building Consent for the conversion of the property into 2 x 1-bed and 1 x 2-bed residential flats.

1.3.2 This assessment is based on the proposed site layout as presented in **Figure 2**.

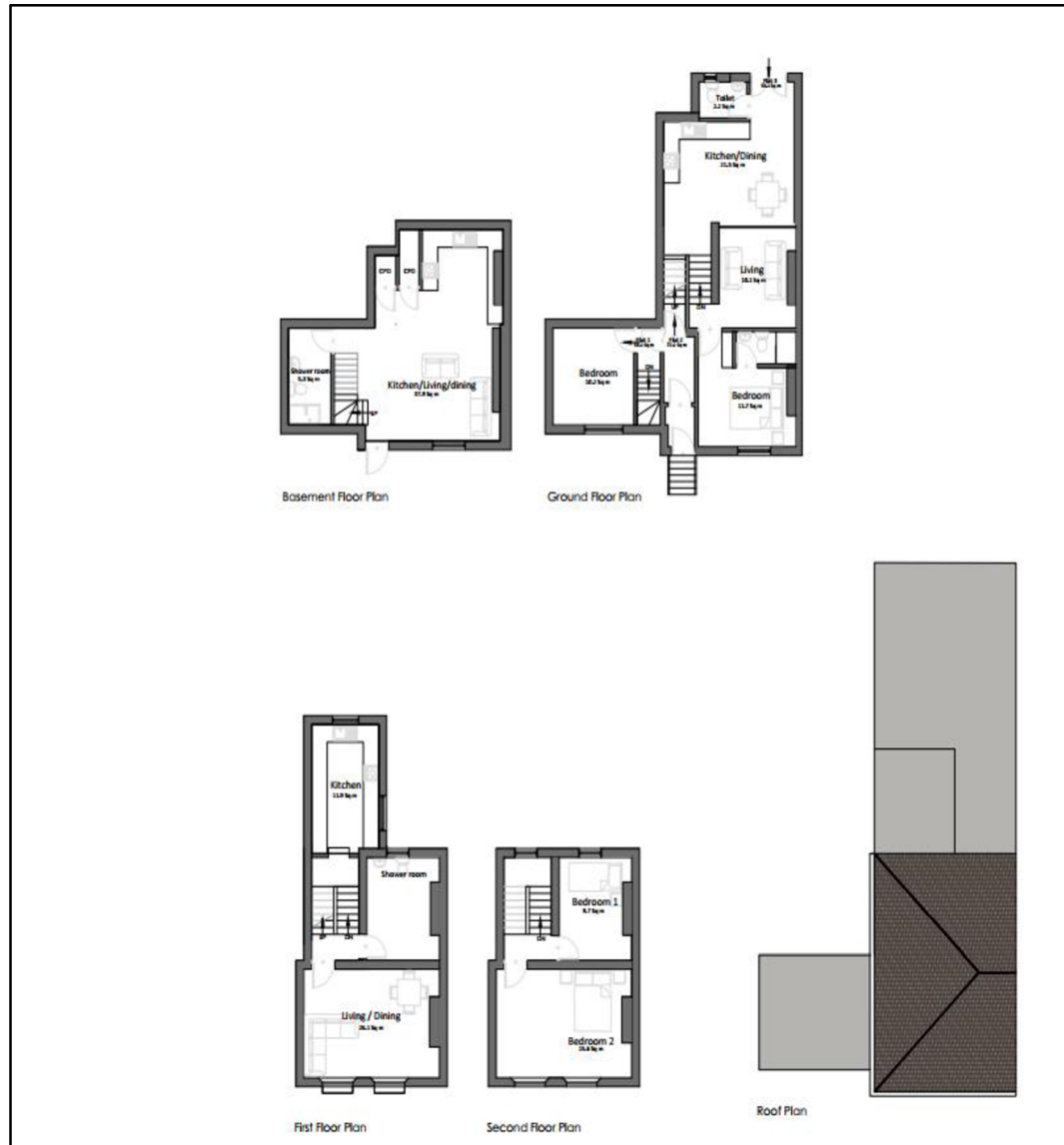


Figure 2: Proposed development site layout.

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 National Planning Policy Framework [NPPF 2021]

- 2.1.1 The NPPF sets out the government's planning policies for England and how they are expected to be applied. It aims to achieve sustainable development; stating that planning policies and decisions should prevent unacceptable levels of noise pollution from new and existing development while affirming that National Policy Statements form part of the national planning policy framework and should be considered in planning decisions.

2.2 Noise Policy Statement for England (NPSE)

- 2.2.1 The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to "promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".
- 2.2.2 The NPSE sets out the government's overall policy on noise within the context of sustainable development. It introduces three concepts for noise management: avoid significant adverse effects; mitigate and minimise adverse effects; and where possible, contribute to improvements in health and quality of life.
- 2.2.3 It also establishes a hierarchy of noise management actions: avoid; reduce; remedy; mitigate; compensate.
- 2.2.4 The NPSE also introduces the below categories with respect to 'adverse impacts'.

'NOEL – No Observed Effect Level'

- This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

- This is 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'.

- 2.2.5 The NPSE states that significant adverse effects on health and quality of life should be avoided. Where the impact lies somewhere between LOAEL and SOAEL, it requires that all

reasonable steps are taken to mitigate and minimise the adverse effects of noise. In this regard, a certain degree of impact between LOAEL and SOAEL would be acceptable in terms of planning policy, provided that the impact has been mitigated and minimised by design.

2.3 Planning Practice Guidance - Noise [PPG 2019]

2.3.1 PPG 2019 provides guidance on how noise should be considered in planning decisions. It was published in 2014 and updated in 2019. The document advises on how to avoid, mitigate or minimise adverse effects of noise through good acoustic design and appropriate conditions or obligations.

2.3.2 **Table 1** summarises the noise exposure hierarchy outlined within the PPG.

Table 1: National Planning Practice Guidance Noise Exposure Hierarchy		
Perception	Increasing Effect Level	Action
Not noticeable	No Observed Effect	No specific measures required
Noticeable and not intrusive	No Observed Adverse Effect	No specific measures required
Lowest Observed Effect Level		
Noticeable and intrusive	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Effect Level		
Noticeable and disruptive	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Unacceptable Adverse Effect	Prevent

2.4 Gravesham Local Plan Core Strategy (September 2014)

2.4.1 The Local Plan Core Strategy is a strategic planning document which sets out the Council's vision, strategic objectives, and policies shaping development and the environment in Gravesham covering the period 2011-28. This report has specifically made reference to the following policies:

- Policy CS01: Sustainable development – Policy seeks to ensure that proposals which secure development that improves the economic, social and environmental conditions in the Borough are progressed;
- Policy CS19: Development and Design Principles requires that new development will protect and enhance biodiversity and the Borough's Green Infrastructure network; and,

2.5 Consultation and Scope of Works

- 2.5.1 The location of the development site is an urban setting with traffic noise forming the predominant noise climate in the area.
- 2.5.2 The scope of this assessment includes consideration of noise at each facade of the proposed residential dwellings where noise sensitive areas might be located in terms of the potential impact of local noise sources.

Consultation with Local Planning Authority

- 2.5.3 NoiseAir attempted to contact Gravesham Borough Council on the 8th August 2023 via telephone, however, at the time of writing, no response has been received.

2.6 Assessment Criteria

- 2.6.1 In order to achieve noise levels which are considered to be in alignment with the planning approaches and policies discussed in Section 2.1, it is considered that all efforts are made to ensure that future occupants are unlikely to be exposed to noise levels which might breach the LOEL criteria.
- 2.6.2 It should be noted however that planning guidance does not preclude development where the LOEL is likely to be breached in certain circumstances as long as reasonable efforts are made to mitigate and reduce such an effect.
- 2.6.3 It is therefore considered that the noise assessment and subsequent criteria should be undertaken in accordance with British Standard 8233:2014 – Guidance on sound insulation and noise reduction for buildings, a summary of which is provided below.

British Standard 8233:2014 (BS 8233:2014)

- 2.6.4 British Standard 8233:2014 – *Guidance on sound insulation and noise reduction for buildings* (BS 8233:2014) provides guidance on internal ambient noise levels, resulting from break-in of external environmental noise that should not be exceeded in various locations within dwellings.
- 2.6.5 Guidelines for buildings in terms of internal noise level are reported in **Table 9** overleaf.

2.6.6

Table 2: Summary of internal noise guidelines.			
Activity	Location	0700 – 2300 hours	2300 – 0700 hours
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 $L_{Aeq,8hour}$

- 2.6.7 The standard clarifies that these values are based on the existing guidelines issued by the World Health Organisation (WHO). In addition, it states that the internal noise levels may be relaxed by up to 5 dB whilst maintaining a reasonable living condition. Conversely, in terms of internal maximum levels to be achieved during the night, the standard does not recommend any limits for individual noise events. However, a guideline value may be set in terms of SEL or L_{AFmax} , depending on the type and the number of events per night.
- 2.6.8 Furthermore, BS 8233:2014 provides guidance on desirable noise levels in areas that are intended to be used for external amenity space, such as gardens, balconies and roof gardens which are intended to be used for relaxation. For these spaces it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ up to a level of 55 dB $L_{Aeq,T}$ for noisier environments.

3 ACOUSTIC SURVEY

3.1 Acoustic Survey Details

- 3.1.1 NoiseAir conducted unattended noise monitoring between 25th July 2023 and 3rd August 2023 at the development site. Noise monitoring was undertaken at two monitoring locations (ML1 and ML2), the positions of which are shown in **Figure 3** below.

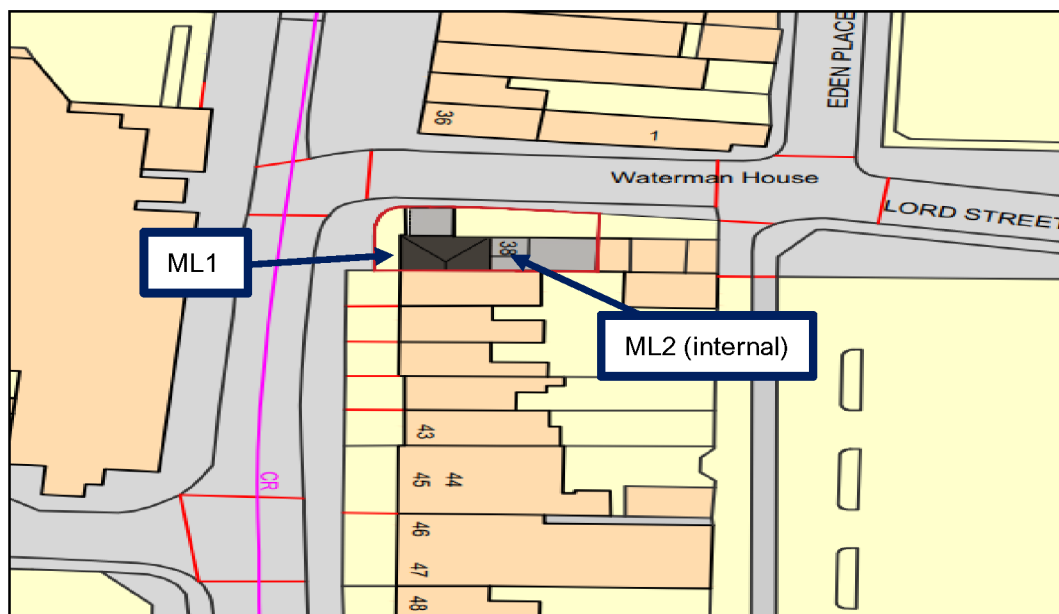


Figure 3: Approximate noise monitoring location.

- 3.1.2 The noise measurement was made using a Class 1, integrating sound level meter (SLM). The acoustic equipment was calibrated to comply with Section 4.2 of BS 7445-1:2003¹, before and after the noise monitoring periods. Details of the SLM and associated field calibrations can be found in **Table 3**.

SLM (Serial No.)	Preamp (Serial No.)	Microphone (Serial No.)	Calibrator (Serial No.)	Start Calibration	End Calibration	Drift
NOR140 (1402826)	NOR1209 (15455)	NOR1225 (16829)	SVAN SV30A (10818)	-26.1	-26.3	0.2 dB
NOR140 (1405015)	NOR1209 (14517)	NOR1225 (42327)	SVAN SV30A (10818)	-25.6	-25.6	0.0 dB

- 3.1.3 The weather conditions were noted to be as outlined in **Table 4** during each site visit.

¹ BS 7445-2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.

Table 4: Summary of Weather Conditions Noted During Each Site Visit

	29/06/23	03/07/23
Roads (Wet / Dry)	Dry	Dry
Temperature (°C)	22	20
Wind speed (m/s ⁻¹)	< 0.5	< 5
Cloud Cover (Approx. %)	20	60
Humidity (%)	69	74

3.2 Measured Sound Levels

3.2.1 Data is shown in **Figure 4** detailing a level vs time graph of the recorded L_{Amax} , L_{Aeq} and L_{A90} sound level over 15-minute time periods for ML1 for the entire measurement duration.

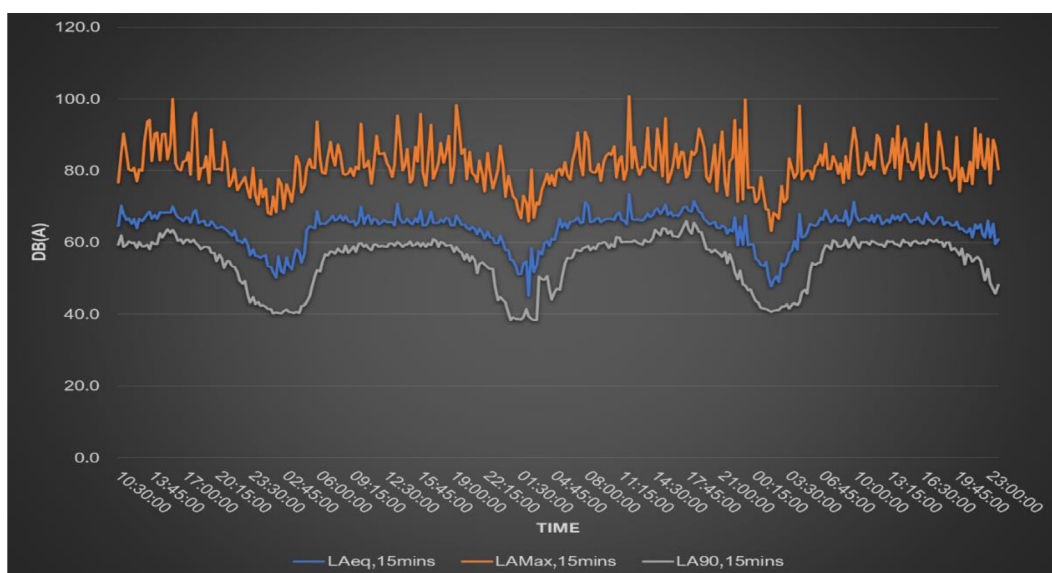


Figure 4: Level vs. time graph showing L_{Amax} , L_{Aeq} and L_{A90} sound levels – ML1

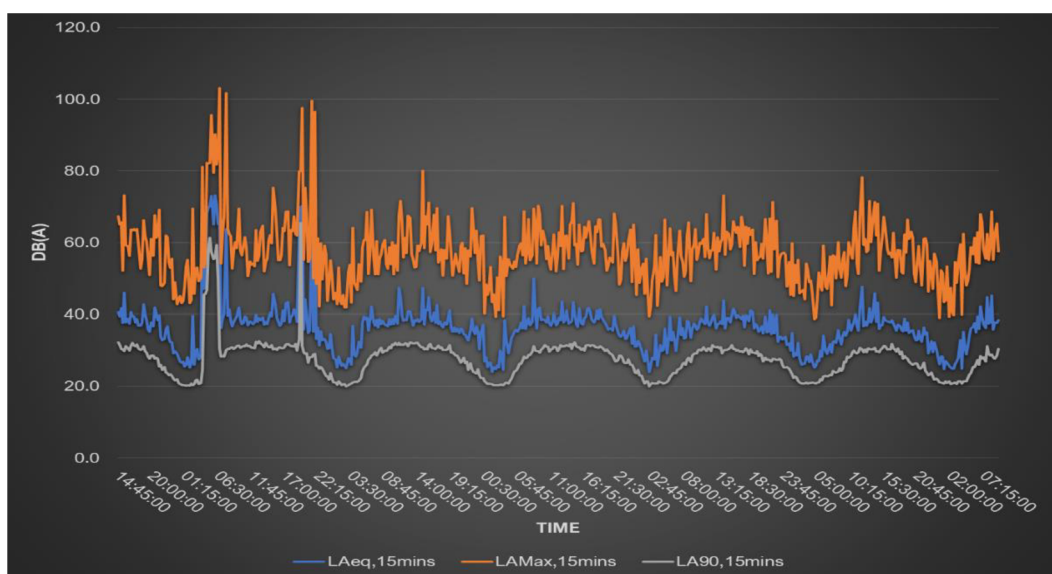


Figure 5: Level vs. time graph showing L_{Amax} , L_{Aeq} and L_{A90} sound levels – ML2

- 3.2.2 The results for the monitoring locations during the daytime and night-time periods are presented in **Table 5** below.

Table 5: Average Measured Daytime and Night-time Noise Levels		
Monitoring Location	Time	dB $L_{Aeq, 16hour}$ / dB $L_{Aeq, 8hour}$
ML1	07:00-23:00	66.0 – 67.6
	23:00-07:00	60.9 – 62.3
ML2	07:00-23:00	37.8 – 40.2
	23:00-07:00	30.5 – 34.2

- 3.2.3 The maximum night-time noise level exceeded more than 10 times in a single night-time period at ML1 are presented in **Table 6** overleaf.

Table 6: Summary of the Maximum Night-Time Noise Levels Exceeded More Than Ten Times in a Single Night-time Period at ML1 (Figures in dB L_{AFmax})	
Monitoring Location	Measured Maximum Noise Level During the Night-Time Period (dB(A))
ML1	80
ML2	57

- 3.2.4 An analysis of the recorded noise data at ML2 – situated internally – indicates that the current glazing configuration is insufficient to mitigate noise in line with current standards as presented in Section 2 of this report.
- 3.2.5 Therefore, an acoustic design statement and sound insulation scheme is presented in the following sections.

4 3D SOUND MODEL

4.1 Overview

- 4.1.1 A 3D sound model has been constructed in SoundPLAN™ to calculate the predicted sound pressure levels at selected potential receiver facades. The model uses the calculation method from ISO 9613-2:1996² to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings. The model is based on and calibrated against data collected during the survey presented in Section 3 of this report.

4.2 3D Sound Model

- 4.2.1 The 3D sound model specifically includes the following noise sources:
- **Noise breakout from surrounding road network** – Line sources set to 0.5 m above local ground level and each calibrated to site measurements and spectrum corresponding to that acquired at ML1 of daytime 67.6 dB $L_{Aeq,16hour}$, night-time 62.3 dB $L_{Aeq,8hours}$, and night-time 80.0 dB L_{Amax} .
 - **Noise breakout from Parrock Street Car Park** – 1 no. horizontal area source set to 0.5 m above local ground level. Car park was set to a total of 500 no. spaces with 50% being used in a 1 hour period during the daytime and 25% being used during the night-time.
- 4.2.2 Noise contour plots illustrating the daytime ($L_{Aeq,16hour}$), night time ($L_{Aeq,8hour}$) and night time (L_{AFmax}) condition are given in **Figure 6**, **Figure 7** and **Figure 8** respectively.

² ISO9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

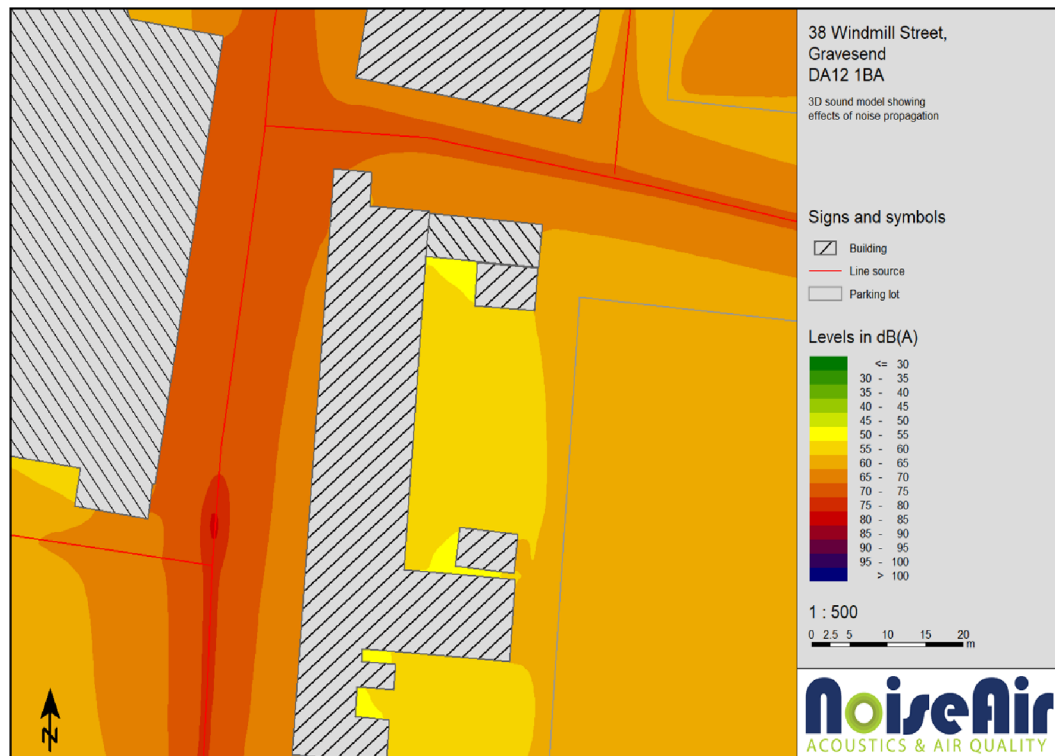


Figure 6: Noise contour for the proposed development during the daytime – $L_{Aeq,16hour}$.

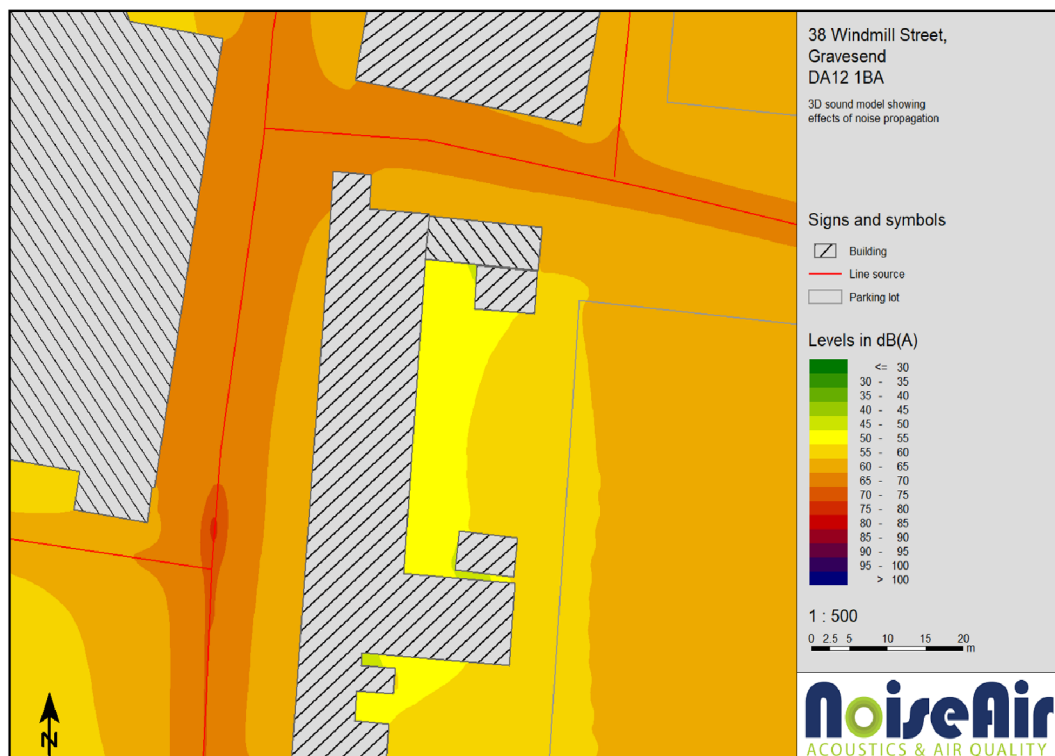


Figure 7: Noise contour for the proposed development during the night-time – $L_{Aeq,8hour}$.

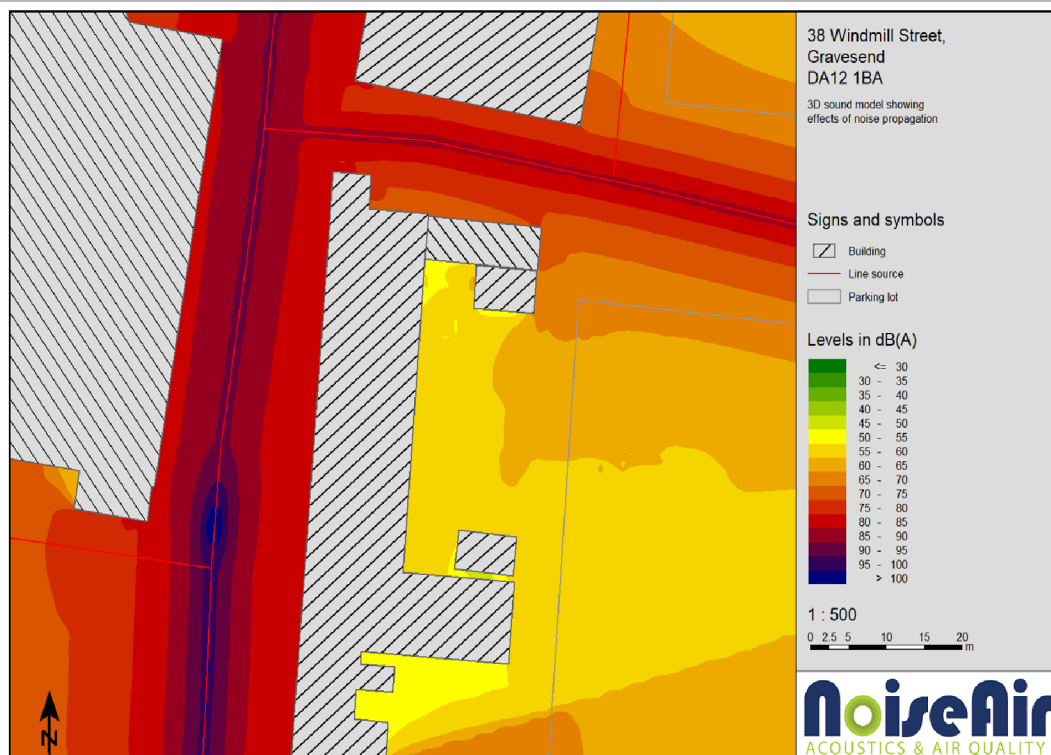


Figure 8 Noise contour for the proposed development during the night-time – $L_{AF,max}$.

- 4.2.3 Receptor locations used in the noise model with calculated façade levels are presented in **Figure 9** below.

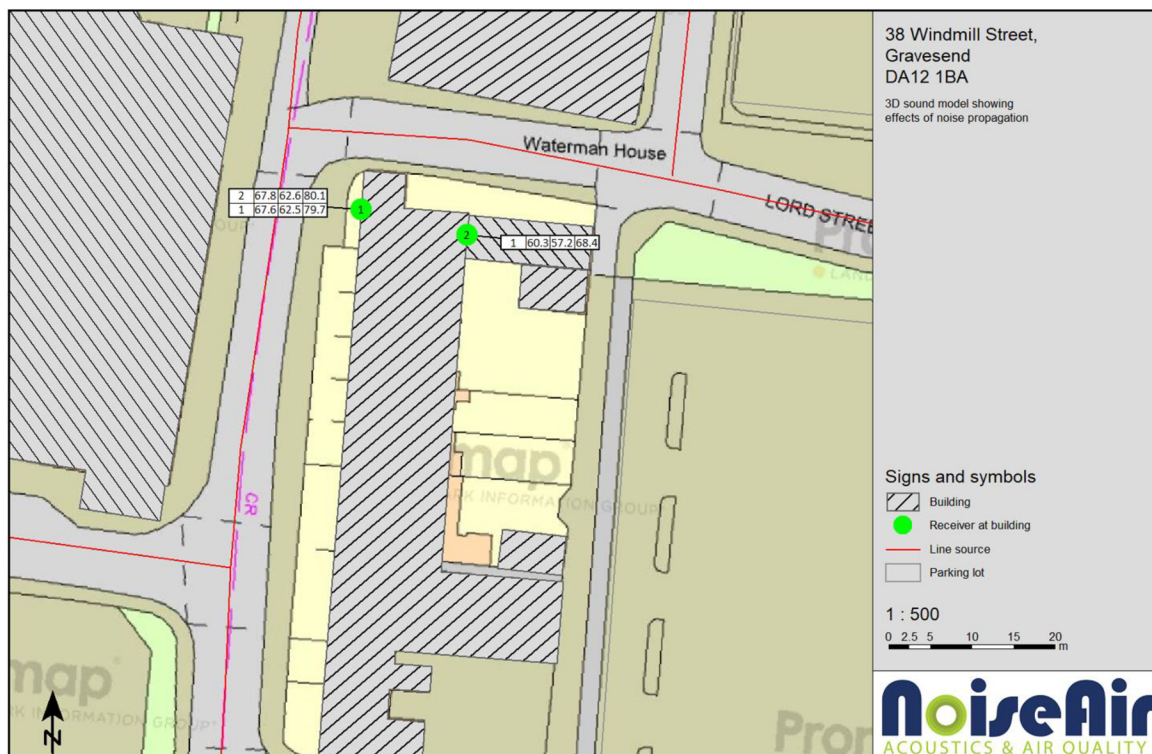


Figure 9: Illustration of the 3D sound model receptor locations.

4.2.4 **Table 7** below details the predicted noise levels at each façade receptor location.

Table 7: Predicted Receptor Noise Levels					
Receptor Number	Facade	Floor	dB $L_{Aeq,16hours}$ Daytime	dB $L_{Aeq,8hours}$ Night-Time	dB $L_{Amax, Night}$
1	West	GF	67.6	62.5	79.7
		1.FI	67.8	62.6	80.1
2	East	1.FL	60.3	57.2	68.4

5 BS 8233:2014 ASSESSMENT

5.1 BS 8233:2014 Assessment of Daytime Noise Levels in Outdoor Living Areas

5.1.1 At the time of writing, there are no proposals for external amenity space, therefore, no further discussion is required on this matter.

5.2 BS 8233:2014 Assessment of Daytime / Night-time Noise Levels in Living Rooms and Bedrooms

5.2.1 Due to differing levels across the site, the development has been split into two façade zones: the western façade and the eastern façade.

5.2.2 The predicted noise levels at the façades of the proposed building structures, as detailed in **Figure 9** and **Table 7** for the daytime period, together with the level of attenuation required to achieve 35 dB $L_{Aeq,16hour}$ in living rooms and 30 dB $L_{Aeq,8hour}$ / 45 dB L_{Amax} in bedroom areas in accordance with BS 8233: 2014, are presented in **Table 8**.

Table 8: Level of Attenuation Required to Achieve the Internal Noise Guideline Levels.			
Façade	Scenario	Worst Case Noise Level at the Façade of the Property	Worst Case Level of Attenuation Required
West	Daytime $L_{Aeq,16hours}$	68	33
	Night-Time $L_{Aeq,8hours}$	63	33
	Night-Time L_{Amax}	80	35
East	Daytime $L_{Aeq,16hours}$	60	25
	Night-Time $L_{Aeq,8hours}$	57	27
	Night-Time L_{Amax}	68	23

5.3 Building Envelope Performance – Windows Open

5.3.1 The sound performance requirements for bedrooms, living and dining rooms at the development during the daytime and night-time in rooms with windows closed are summarised in Section 6.1.

5.3.2 However, with windows open, the attenuation provided by the façade will be approximately 10-15 dB(A). This would potentially allow the recommended internal noise limit to be exceeded in most rooms at the development during certain parts of a typical day / night.

5.3.3 **Table 9** shows the level of exceedance for partially open windows at the front, rear and side facades.

Table 9: Summary of Internal Noise Levels with Windows Partially Open (based on a Partially Open Window Providing up to 15 dB(A) Attenuation).

Façade	Room Type	Day / Night	Windows Openable	Excess (dB)
West	Living Room	Day	No	+18
	Bedroom	Night	No	+20
West	Living Room	Day	No	+10
	Bedroom	Night	No	+12

5.3.4 It is considered that in many circumstances, such as urban/ sub-urban developments, an exceedance of up to 5 dB(A) in accordance with BS 8233:2014 is likely to be acceptable to future residents and therefore is unlikely to breach the LOEL criteria discussed in Section 2 of this report.

5.3.5 Where exceedances are likely to be greater than +5 dB, on occasions, this may be acceptable to a resident, but when quiet conditions are required, the resident should be able to close the windows whilst maintaining adequate ventilation.

6 SOUND INSULATION SCHEME

6.1 Building Envelope Requirements – Windows Closed

- 6.1.1 Proposals for the development site at the time of writing outline residential use. Noise sensitive rooms are proposed to all facades of the property. Therefore, internal noise levels are required to not exceed 35 dB L_{Aeq} during the daytime hours in all rooms and 30 dB L_{Aeq} and 45 dB L_{Amax} during the night-time hours in bedrooms.
- 6.1.2 When assessing sound levels in habitable areas of the proposed development, the sound attenuation provided by the overall building facade should be considered. To mitigate sound levels, the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates noise the least, so the proportion of glazing in a building facade is an important consideration when assessing overall sound attenuation. Additionally, any façade penetrations should also be considered such as for ventilation, e.g., trickle ventilation.
- 6.1.3 Based on the design details forwarded, worst case façade attenuation calculations have been undertaken in accordance with BS EN ISO 12354-3:2017.
- 6.1.4 Calculations assuming a passive and an active ventilation strategy have been undertaken and presented in this section. **Table 10** and **Table 11** below present a summary of the different elements for living rooms and bedrooms using a passive and an active ventilation strategy, respectively.

Table 10: Summary of Building Envelope Performance Requirements - Passive Ventilation				
Façade	Room Type	Wall R_w+C_{tr} (dB)	Glazing R_w+C_{tr} (dB)	Ventilation $D_{n,ew}+C_{tr}$ (dB) (1250EA)
West	Living Room	50	35	40
	Bedroom		40	45
East	Living Room	50	31	31
	Bedroom		36	36

Table 11: Summary of Building Envelope Performance Requirements - Active Ventilation			
Block	Room Type	Wall R_w+C_{tr} (dB)	Glazing R_w+C_{tr} (dB)
West	Living Room	50	28
	Bedroom		
East	Living Room	50	29
	Bedroom		33

6.1.5 It should be noted that the acoustic performance values stated are for guidance and based on information provided at the time of writing. Changes to location, size and orientation of rooms/ facades can have impacts on the calculated internal noise levels and subsequently the required acoustic performance criteria.

6.1.6 **Table 12** below provides a typical example summary for each element type outlined in **Table 10** and **Table 11** above.

Table 12: Summary of Building Element Type Typical Examples		
Element Type	Acoustic Performance	Typical Example
Wall	50 dB R_w+C_{tr}	Concrete / Brick exterior wall with min. 100 mm insulated (60 kg / m ³ rockwool) cavity constructed with timber studwork and resilient bars with min. 10 mm plasterboard lining
Window	Up to 30 dB R_w+C_{tr}	10 mm pane, 6-16 mm air filled cavity, 4 mm pane.
Window	Up to 32 dB R_w+C_{tr}	10 mm pane, 6-16 mm air filled cavity, 6 mm pane.
Window	Up to 35 dB R_w+C_{tr}	6 mm pane, 16 mm argon filled cavity, 8.8 mm Pilkington Optiphon pane.
Window	Up to 38 dB R_w+C_{tr}	10 mm pane, 16 mm argon filled cavity, 8.8 mm Pilkington Optiphon pane.
Window	Up to 40 dB R_w+C_{tr}	10 mm pane, 20 mm argon filled cavity, 8.8 mm Pilkington Optiphon pane.
Acoustic Slot Vent (Window)	Up to 36 dB $D_{n,e,w}+C_{tr}$ (2 no. per room)	Titon TA5223 (V50) + TA5202 (C25) 2500EA.
Acoustic Slot Vent (Window)	Up to 40 dB $D_{n,e,w}+C_{tr}$ (2 no. per room)	Titon TA5225 (V75) + TA5206 (C75) 2500EA.
Acoustic Vent (Wall)	Up to 57 dB R_w+C_{tr} (2 no. per room)	DbA Products DB-61AWV.

6.1.7 It should be noted that the examples provided in **Table 12** are for guidance only, however any adopted solution must achieve the acoustic performance values presented in **Table 10** and **Table 11**.

6.1.8 Secondary glazing may be a consideration due to the historical nature of the building, an example construction is presented below in

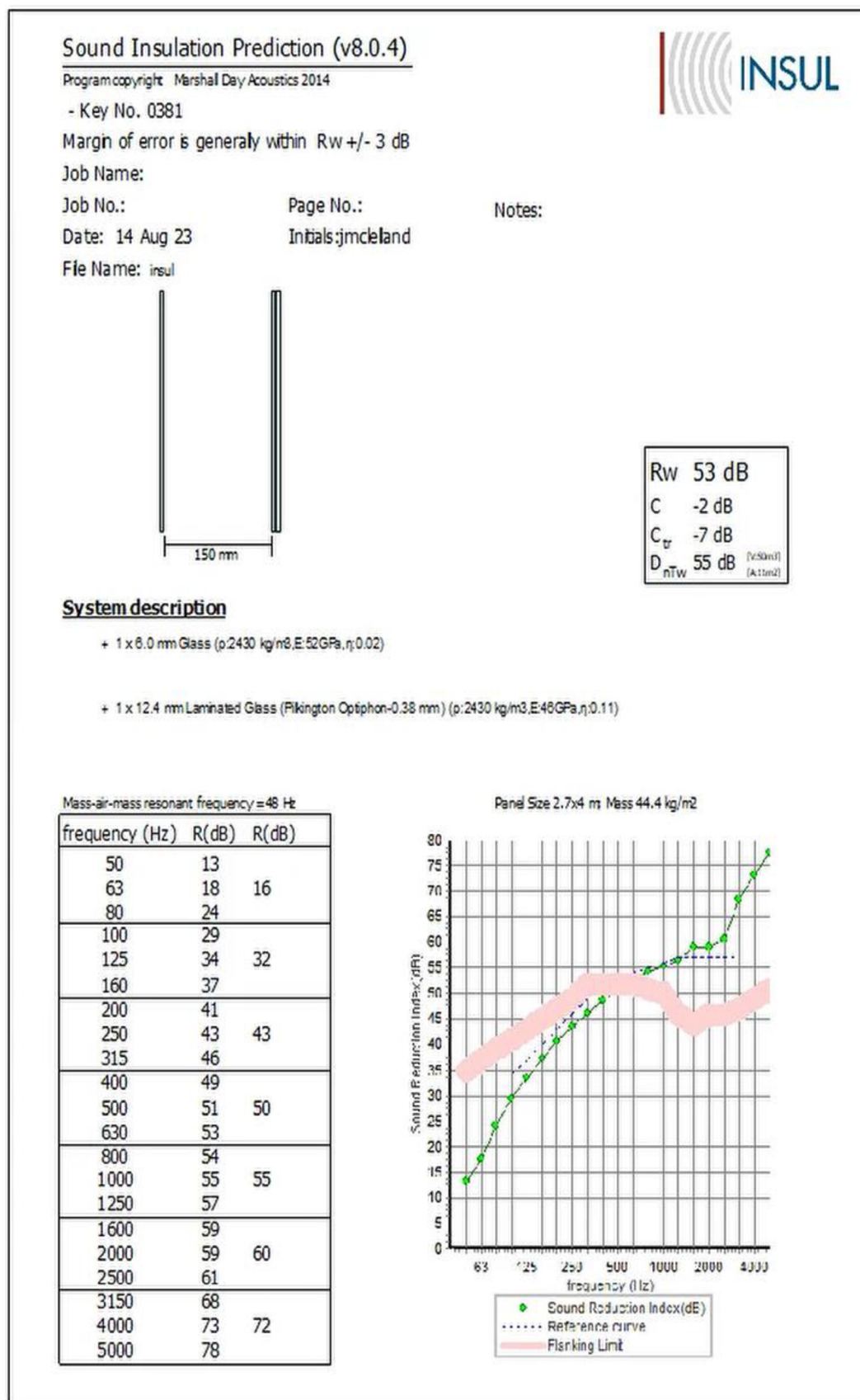


Figure 10: Example secondary glazing.

6.2 Ventilation Requirements

- 6.2.1 It is recommended that the acoustic ventilation proposed at the site should, as a minimum, comply with Building Regulations 2022 Approved Document F1 2021 Means of Ventilation and British Standard BS5925 1991: “Code of Practice for Ventilation Principles and Designing for Natural Ventilation”. Acoustic ventilation is only recommended for noise sensitive rooms, which are bedrooms and living/dining rooms.
- 6.2.2 The implementation of the recommended glazing would ensure that the required internal daytime and night-time noise limits are achieved. It should be further noted that the glazing configurations within this report are for guidance only. Similar products to those used in NoiseAir calculations may achieve a similar level of sound reduction, however this should be verified by the manufacturer.
- 6.2.3 Given that measured noise levels to facades that front onto the surrounding road network may be considered to be marginally elevated, consideration should be given to the inclusion of an active ventilation system to habitable rooms as part of the development site. Such a system would allow future residents to enjoy acceptable internal noise levels while maintaining appropriate ventilation requirements. However, as **Table 10** and **Table 11** demonstrates, adequate ventilation can be achieved with passive ventilation.
- 6.2.4 Any mechanical ventilation adopted for the noise sensitive rooms should have a noise output which complies with NR25 noise rating curve.

7 CONCLUSIONS

- 7.1.1 By instruction from Mr Muzaffer Celik, NoiseAir was commissioned to undertake a Noise Impact Assessment for a proposed residential development at the location: 38 Windmill Street, Gravesend DA12 1BA.
- 7.1.2 Calculations show that to achieve a reasonable internal acoustic environment in habitable rooms as specified within BS 8233:2014, the building envelope constructions should be selected to meet the sound reduction index (SRI) values presented in **Table 10** and **Table 11**.
- 7.1.3 Given that measured noise levels to facades that front onto the surrounding road network may be considered to be marginally elevated, consideration should be given to the inclusion of an active ventilation system to habitable rooms as part of the development site. Such a system would allow future residents to enjoy acceptable internal noise levels while maintaining appropriate ventilation requirements. However, as **Table 10** demonstrates, adequate ventilation can be achieved with passive ventilation.

APPENDIX A - REPORT LIMITATIONS

This Report is presented to Mr Muzaffer Celik and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, NoiseAir Limited is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Mr Muzaffer Celik and NoiseAir shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

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APPENDIX B - GLOSSARY

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. <i>NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.</i>
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. <i>NOTE: The ambient sound comprises the residual sound and the specific sound when present.</i>
Ambient sound level, $L_a = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T <i>NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.</i>
Background sound	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS 4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
C_{tr}	Correction term applied against the sound insulation single-number values (R_w , D_{w1} and $D_{nT,w}$) to provide a weighting against low frequency performance. <i>NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.</i>
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS 4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m ²), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. <i>NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.</i>
Free-field level	Sound pressure level away from reflecting surfaces. <i>NOTE: Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e., not 3.5 m from the reflecting surface in the direction of the source). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.</i>

Impact sound pressure level, L_i	Average sound pressure level in a specific frequency band in a room below a floor when it is excited by a standard tapping machine or equivalent.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants. <i>NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.</i>
Measurement time interval, T_m (BS 4142:2014)	Total time over which measurements are taken. <i>NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.</i>
Noise criteria	Numerical indices used to define design goals in a given space.
Noise rating, NR	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
Normalised impact sound pressure level, L_n	Impact sound pressure level normalized for a standard absorption area in the receiving room. <i>NOTE: Normalised impact sound pressure level is usually used to characterize the insulation of a floor in a laboratory against impact sound in a stated frequency band.</i>
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for $N\%$ of a specified time interval.
Reference time interval, T_r (BS 4142:2014)	Specified interval over which the specific sound level is determined. <i>NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.</i>
Residual sound (BS 4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T .
Rating level, L_{Ar,T_r}	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. <i>NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.</i>
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.
Sound exposure level, L_{AE}	Level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.
Sound level difference, D	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Sound pressure, p	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.
Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).
Sound reduction index, R	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,T_r}$ (BS 4142:2014)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
Specific sound source (BS 4142:2014)	Sound source being assessed.
Standardised impact sound pressure level, L'_{nT}	Impact sound pressure level normalized to a reverberation time in the receiving room of 0.5 s.
Standardised level difference, D_{nT}	Difference in sound level between a pair of rooms, in a stated frequency band, normalized to a reference reverberation time of 0.5 s for dwellings.
Groundborne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground. <i>NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.</i>
Structure-borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements. <i>NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.</i>
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. <i>NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).</i>
Weighted normalised impact sound pressure level, $L'_{n,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or
Weighted standardised impact sound pressure level $L'_{nT,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted standardised level difference, $D_{nT,w}$	Single-number quantity that characterizes the airborne sound insulation between rooms.

Symbols

D_w	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
L_{Ar,T_r}	Rating level (dB)
L_n	Normalised impact sound pressure level (dB)
L'_{nT}	Standardised impact sound pressure level (dB)
$L'_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L'_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_p	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

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