

BEAUMONT & PARTNERS 008 LTD

Conversion to Residential at Buzzers Bar, North Shields

Noise Assessment

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SUMMARY

This report presents the assessment of noise affecting a proposed residential development at Buzzers Bar, North Shields. The premises are predominantly affected by road traffic noise on the A1018 to the east and localised roads surrounding the site.

The main purpose of the report is to:

- present all measured noise levels (**Section 3**)
- use measured noise data combined with published traffic flow data to determine noise exposure of proposed residential units (**Section 4**)
- detail appropriate noise amelioration schemes (enhanced building envelope sound insulation) where necessary (**Section 5, in particular Table 5-2**). Table 5-2 defines options for the configuration of the appropriate sound insulation performance of the building envelope. All these options, by full calculation (BS8233 detailed method, Annex G.2) show that the appropriate target noise levels within the proposed apartments will be met.
- The final choice of noise amelioration inclusions (to be determined by developer) should ultimately be submitted to the Local Planning Authority for approval.

Subject to final definition and the subsequent provision of noise amelioration measures, the residents of the proposed apartments will be provided with acceptable internal noise environments, in line with all current guidance.

Specifications for glazing and ventilation in this report have been designed to ensure that the flats requiring more than 15dB(A) façade attenuation meet the internal noise criteria with the assumption of closed windows and alternative ventilation. This is in accordance with National Planning Policy.

Residents would be able to open windows at their own discretion and will be provided with an alternative means of ventilation to allow windows to be closed for acoustic comfort whilst maintaining adequate levels of ventilation in accordance with the Building Regulations Approved Document F.

Sound insulation treatments for each façade which are proposed habitable rooms are presented overleaf.

Figure 1: Proposed Glazing and Ventilation Strategy

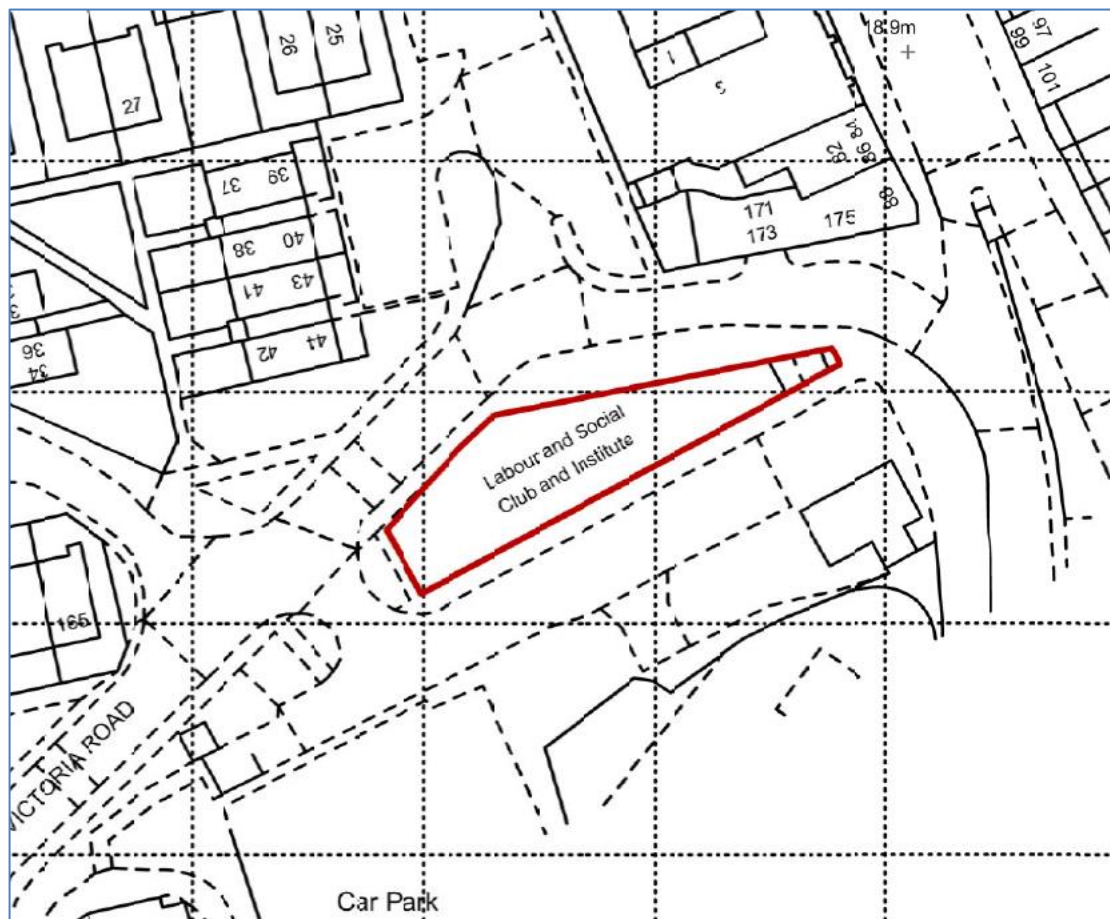


1 INTRODUCTION

1.1 Context

- 1.1.1 Hedley Planning Services Ltd. commissioned L A Environmental Ltd on behalf of Beaumont & Partners to undertake a noise assessment at a proposed residential conversion of Buzzers Bar, in North Shields. The location is shown in Figure 1-1, below.
- 1.1.2 The purpose of the survey was to assess noise levels and compare the results with guidance, as would generally be required by the Planning Authorities. Noise monitoring was carried out over a 24-hour period during a weekday in July 2022 and the results are reproduced in this report.
- 1.1.3 The assessment also considers all relevant noise amelioration measures and sound insulation measures likely to be relevant to the site and building envelope such that the appropriate noise levels due to the various sources may ultimately be achieved.

Figure 1-1: Site Location



2 GUIDANCE AND CRITERIA

2.1 National Planning Policy Framework 2021

2.1.1 The revised National Planning Policy Framework (NPPF) was updated in July 2021 and sets out the government's planning policies for England and how these are expected to be applied. The NPPF does not provide specific policies or define noise limits, but rather is intended to enable the planning system to support the Government's aims and objectives with respect to sustainable development provides a framework within which locally-prepared plans for housing and other development can be produced.

2.1.1 The NPPF represents the Government's commitment in favour of sustainable development, through its intention to make the planning system more streamlined, localised and less restrictive.

2.1.2 Paragraph 185 of the NPPF states that:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

2.1.3 Additional national planning guidance is provided in the Government's Noise Policy Statement for England (NPSE – "the Noise Policy"), to which the framework makes specific reference as the main source of national guidance on planning and noise.

2.2 Noise Policy Statement for England (NPSE) 2010

2.2.1 The Noise Policy has a long term vision 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*”. The vision is supported by three key aims intended to promote sustainable development with respect to noise so that “*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development*”:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life”.*

2.2.2 The Noise Policy recognises that it is not currently possible to define a single objective noise level having specific effects on people, hence the emphasis on “*promoting*” improvements to health and quality of life through effective management of noise, considered in the context of the wider environment and factors other than noise.

2.2.3 No specific criteria are provided by the NPPF or the Noise Policy to enable planning decisions to be made. In the absence of such guidance, the assessment of external noise levels for acceptable amenity criteria has been undertaken in consideration of the guidance provided in British Standard BS 8233: 2014 *Guidance on Sound Insulation and Noise reduction in buildings*.

2.2.4 This Standard provides, not only advice on acceptable external noise levels, reflecting those given in the World Health Organisation’s 1999 *Guidelines for Community Noise*, but also advises on suitable design specifications for building envelopes to achieve suitable internal noise levels.

2.3 BS8233:2014 and WHO 1999 Guidance Levels

2.3.1 BS8233:2014 ‘*Guidance on sound insulation and noise reduction for buildings*’ defines a range of ambient noise levels for design criteria, such that suitable conditions are achieved in certain internal and external environments.

2.3.2 BS8233 refers to the World Health Organisation research and recommendations when defining acceptable and upper guidance noise levels within gardens during the day, and within habitable rooms in dwellings during the day and night time periods. The noise levels that normally satisfy these criteria for most people are defined in Table 2-1.

Table 2-1: Summary of BS8233 guidance noise levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living rooms	35 dB $L_{Aeq,16hour}$	--
Relaxing	Gardens	55 dB $L_{Aeq,16hour}$	--
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	--
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$ 45dB L_{Amax}

- 2.3.3 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting internal noise level.
- 2.3.4 The advice provided states that where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved.
- 2.3.5 BS8233 indicates that regular individual noise events can cause sleep disturbance and suggests that guideline values should be considered in terms of SEL or L_{Amax} , but does not provide recommended values. The WHO recommends that within bedrooms L_{Amax} figures in excess of 45dBA associated with individual noise events should be minimised to 10 to 15 occurrences per night to minimise sleep disturbance.
- 2.3.6 Where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.

3 SURVEY DETAILS

3.1 Instrumentation & Weather Conditions

- 3.1.1 The equipment used during the surveys is detailed in Appendix C and is fully compliant with that specified as Type 1 in British Standard BS EN61672 - 1: 2003: *"Electroacoustics. Sound level meters Specifications."*
- 3.1.2 The equipment used during the survey were two CK:247 Invictus Portable Noise Monitors with communication for remote download and alerts. Statistical values, Equivalent Continuous Noise Levels (L_{eq}), Percentile Noise Levels ($L_1, L_{10}, L_{50}, L_{90}, L_{99}$), maximum/minimum ($MAXL, MINL$) and third octave frequency band data, together with time history logging and audio recordings were gathered throughout the survey period.
- 3.1.3 The instrument was set to trigger audio recordings once noise levels exceeded 70dB(A) for more than 5 seconds, to establish the cause of peak noise levels.

- 3.1.4 Automatic calibration occurred at 00:00 and no variation in calibration level was observed. Equipment is also within a valid period of laboratory calibration. A windshield was fitted over the microphone at all times during the survey periods to reduce the effects of any wind induced noise.
- 3.1.5 Sound level meters were mounted on tripods with the microphone projected from two 1st floor opening windows to the sides of the building most exposed to road traffic noise, to determine façade noise levels.
- 3.1.6 During the afternoon on Monday 18 July 22 temperatures reached 33°C. There was a light south – south westerly breeze throughout. The survey period remained dry with a light breeze and high temperature of 37°C on Tuesday 19 July 2022. (See Appendix D)

3.2 Monitoring Locations

- 3.2.1 Continuous noise monitoring was undertaken externally from the closest opening windows to the A1018 on the north and south elevations of the building as shown in Photographs 3 & 4 and Figure 3-1.

Photograph 3: Microphone position - 1st floor on northern elevation



Photograph 4: Microphone position - 1st floor on southern elevation



Figure 3-1: Microphone Positions



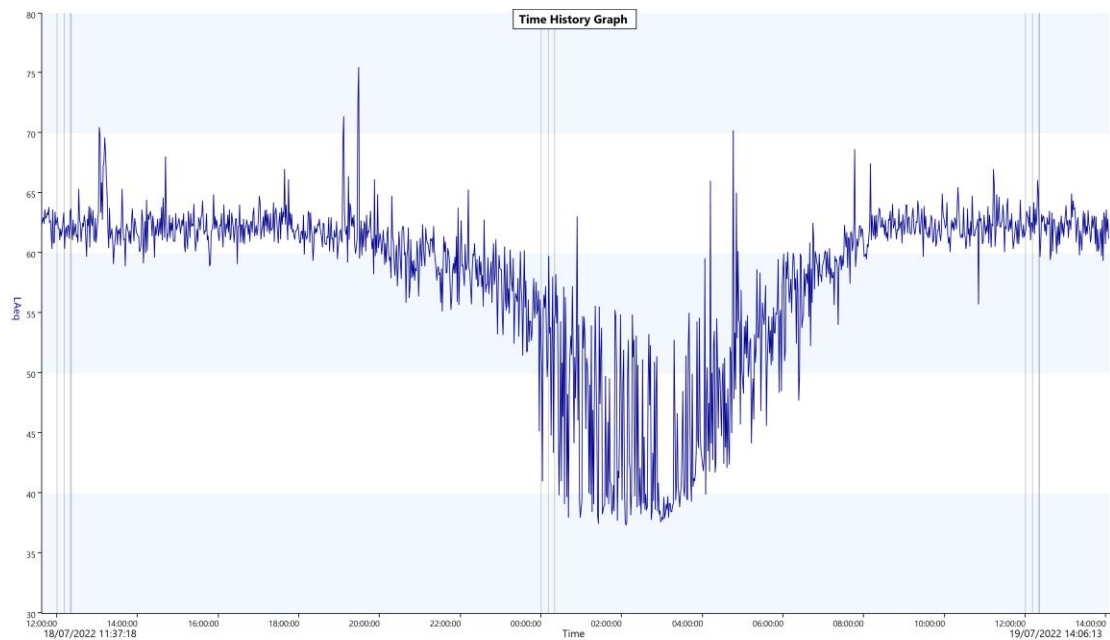
3.3 Results

Northern Facade

3.3.1 The results are shown in Graphs 1 and 2 below. Graph 1 shows the time history chart over the entire monitoring period between approximately 12:00 on Monday 18 and 14:00 on Tuesday 19 July 2022.

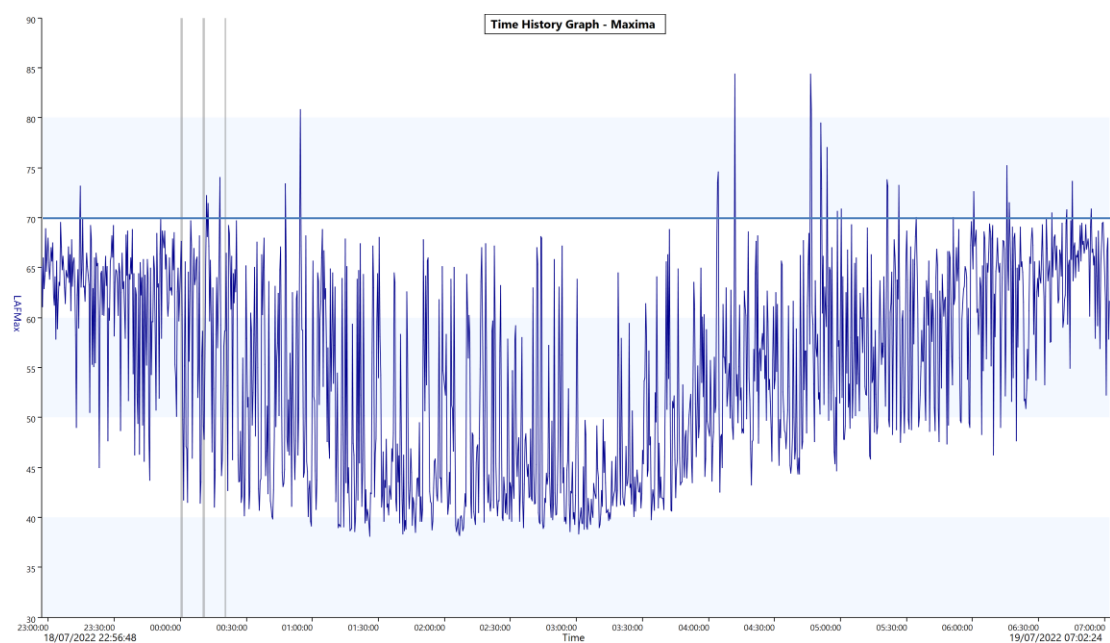
3.3.2 Full hourly results are shown in Appendix D.

Graph 1: Façade Noise Levels (LAeq)



3.3.3 Graph 2 depicts the night time maximum noise levels between 23:00 and 07:00 on Monday night – Tuesday morning.

Graph 2: Night time Maximum Façade Noise Levels (LAmax) – Monday 18 July 2022



3.3.4 Noise from road traffic on the A1018 to the east and the wider road network was the dominant noise throughout the survey period.

3.3.5 The results from each time period are summarised in Table 3-1.

Table 3-1: Northern Façade - Measured Noise Levels dB(A) 18 – 19 July 2022				
Measurement Time Period	Period	L _{Aeq}	L _{A10}	Hourly L _{Amax}
07:00 – 23:00	Daytime	62	65	--
23:00 – 07:00	Night time	53	54	68 – 84

3.3.6 Daytime Equivalent Continuous Façade Noise Levels are typically of the order of 62dBLAeq,16hr.

3.3.7 The Equivalent Continuous Noise Level during the night time period (23:00 – 07:00) was 53 dBLAeq,8hr.

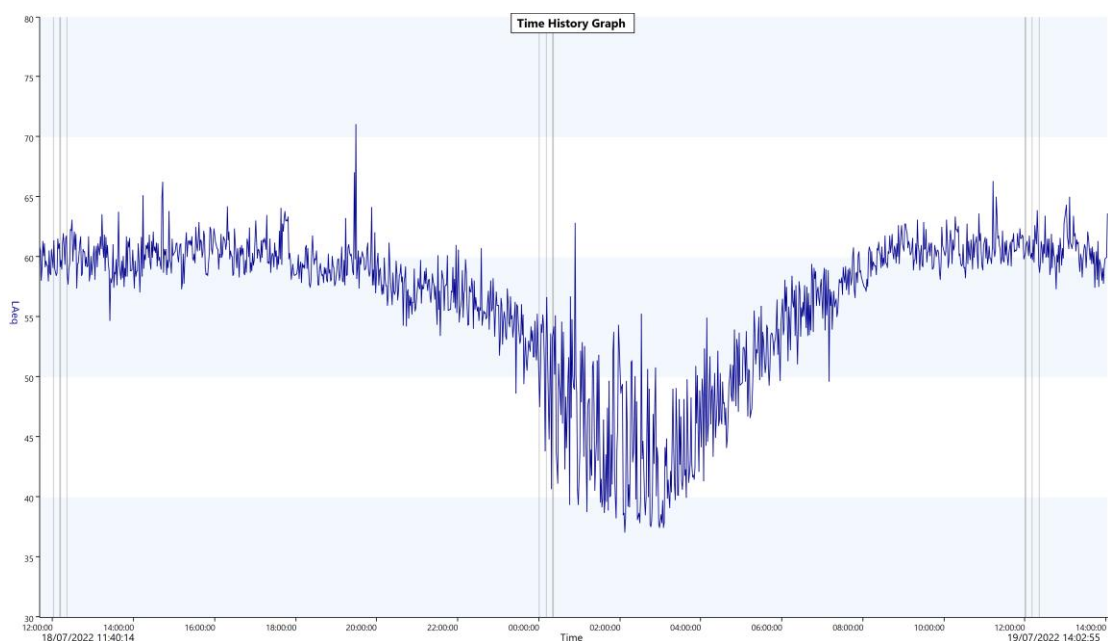
3.3.8 Typical maxima did not exceed 70 - 75dB(A) during the majority of the night time period. However, maximum noise levels up to 84dB(A) were recorded.

Southern Façade

3.3.9 Noise survey results are shown in Graphs 3 - 4 below. Graph 3 shows the time history chart over the entire monitoring period between 12:00 on Monday 18 and 14:00 on Tuesday 19 July 2022.

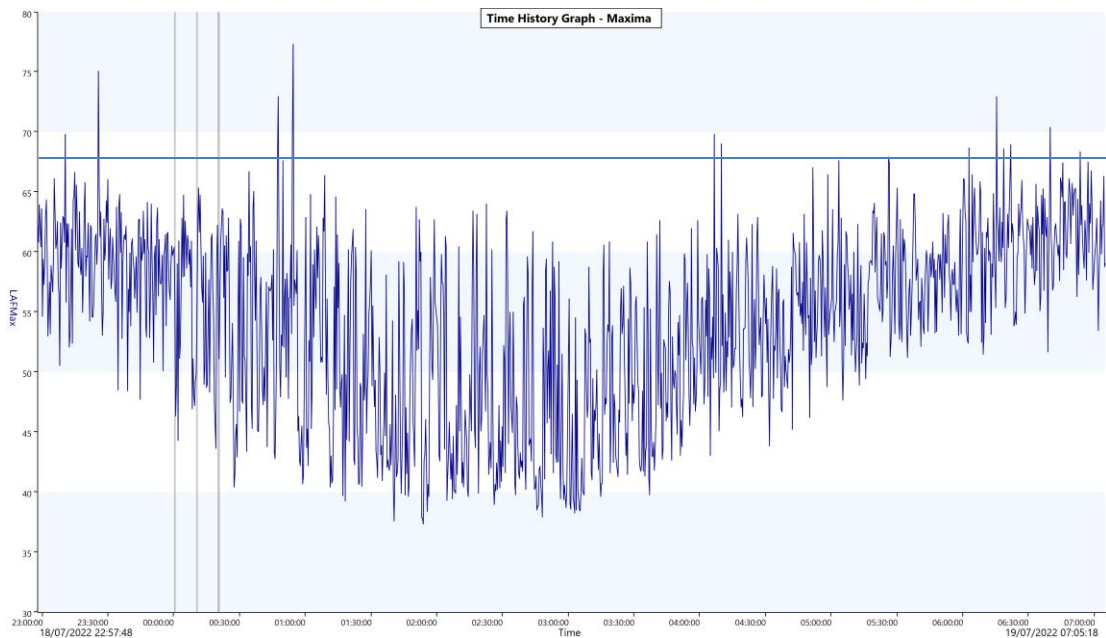
3.3.10 Full hourly results are shown in Appendix D.

Graph 3: Façade Noise Levels (L_{Aeq})



3.3.11 Graph 4 depicts the night time maximum noise levels between 23:00 and 07:00 on Monday night – Tuesday morning.

Graph 4: Night time Maximum Façade Noise Levels (LAmax) – Monday 18 July 2022



3.3.12 Noise from road traffic on the wider road network was the dominant noise throughout the survey period. Vehicles passing caused maximum noise levels to exceed 70dB LAmax on occasions.

3.3.13 The results from each time period are summarised in Table 3-2.

Table 3-2: Southern Façade - Measured Noise Levels dB(A) 18 – 19 July 2022				
Measurement Time Period	Period	L _{Aeq}	L _{A10}	Hourly LAmax
07:00 – 23:00	Daytime	60	62	--
23:00 – 07:00	Night time	50	44	65 – 77

3.3.14 Daytime Equivalent Continuous Façade Noise Levels are typically of the order of 60dB LAeq,16hr.

3.3.15 The Equivalent Continuous Noise Level during the night time period (23:00 – 07:00) was 50dB LAeq,8hr.

3.3.16 Typical maxima did not exceed 65 - 70dB(A) during the majority of the night time period.

3.3.17 The above results enable reliable assessment of the noise levels affecting the proposed development.

4 NOISE LEVELS AT PROPOSED DEVELOPMENT

4.1 Summary of Expected Noise Exposure of Proposed Development

- 4.1.1 Noise predictions have been carried out using CadnaA computer software that enables accurate modelling of noise based on a 3-dimensional model of the site and surrounding area. Noise sources are plotted on the proposed site layout using traffic flow data to provide a worst-case scenario (See Appendix E).
- 4.1.2 The contribution of noise from the surrounding road network, allowing for distance attenuation and any screening from existing buildings or topography, is then calculated.
- 4.1.3 Baseline flows for 2020 are based on the daytime (07:00 to 23:00) first floor noise levels as this determines the worst-case situation in relation to road traffic. Receiver and grid calculation height is set to 4m.

Figure 4-1: Daytime Façade Noise Levels (dBLAeq,16hr)

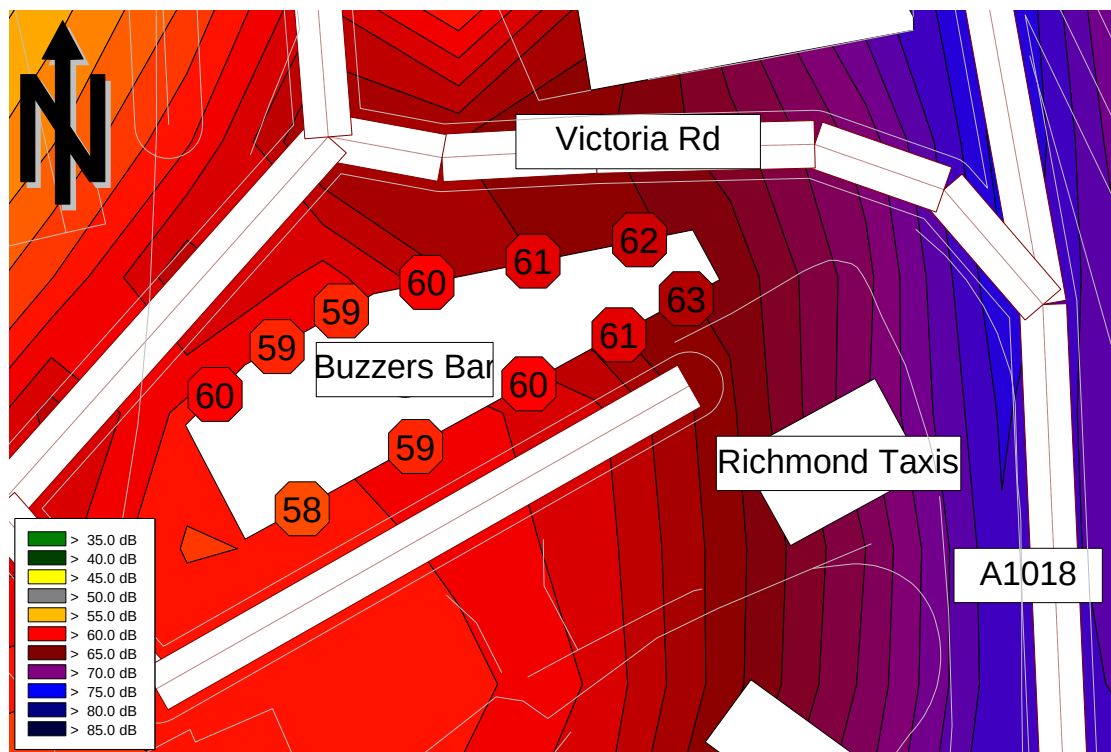
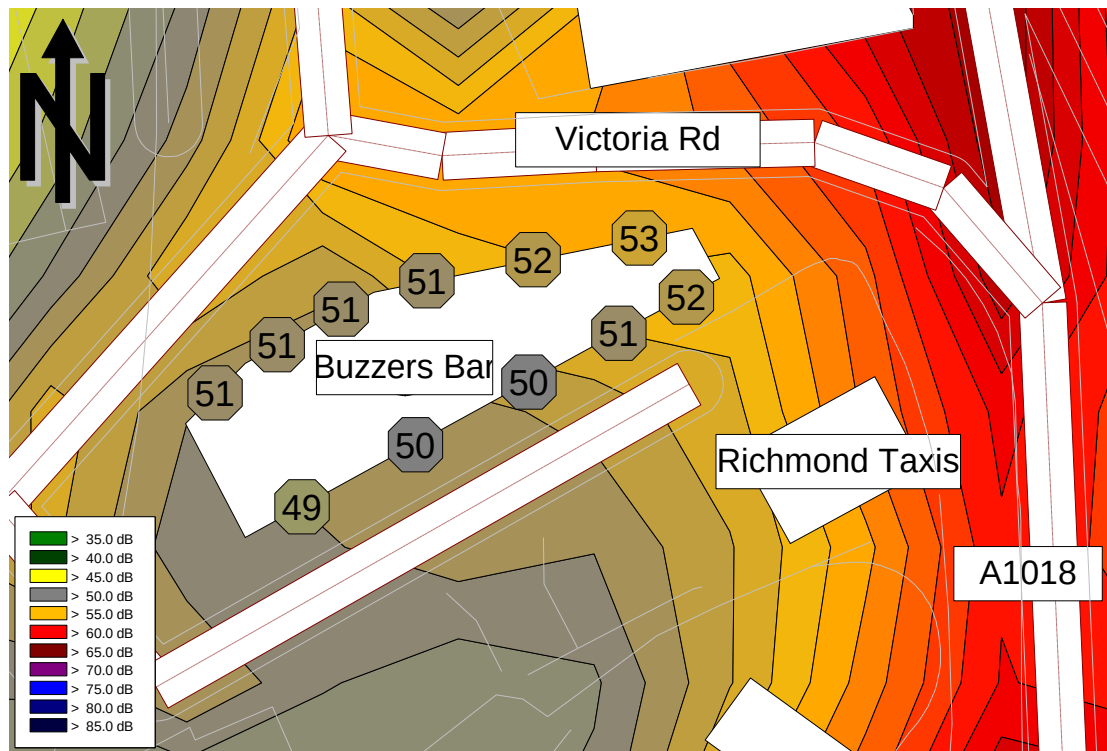


Figure 4-2: Night time Façade Noise Levels (dBLAeq,8hr)



4.1.4 A summary of the above for the effects of road traffic at the façades are as follows:

Table 4-1: Measured/Predicted Noise Levels dB(A)		
	Level at façade dBLAeq,T	Level of attenuation required dB(A)
Northern façade		
LAeq(16 hour Daytime)	62	27
LAeq(8 hour Night Time)	53	23
LAFmax (Night Time)	73	28
Southern façade		
LAeq(16 hour Daytime)	60	25
LAeq(8 hour Night Time)	50	20
LAFmax (Night Time)	70	25

4.1.5 The summary of results above demonstrates that the level of attenuation required by the building façade will be determined by achieving acceptable internal noise levels at night within bedrooms facing north with a reduction up to 28dB(A) necessary.

4.1.6 Maximum noise levels are considered the appropriate determining factor in the mitigation of external noise to achieve acceptable internal noise criteria.

4.2 Summary of Design Criteria

- 4.2.1 The following are working design criteria for residential parts of this proposed development:

Resting Rooms	$LA_{eq}(16hr \text{ Daytime}) < 35dB(A)$,
	$LA_{eq}(8hr \text{ Night Time}) < 30dB(A)$
Living Rooms	$LA_{eq}(16hr \text{ Daytime})$ less than 35dB(A)
Maxima	$LA_{Max}(\text{Night Time})$ not generally exceeding 45dB(A)

- 4.2.2 Noting the results of the survey, ensuring the above criteria are met will require attention to noise amelioration measures of the building envelope and windows exposed to noise levels detailed in Table 4-1. Subsequent discussions of relevant noise amelioration measures refer to these noise levels.
- 4.2.3 There are no proposed amenity areas for this development and therefore no further attenuation is required to meet external noise criteria.

4.3 Living Rooms and Bedrooms During the Daytime

- 4.3.1 During the daytime period, BS8233 recommends a guideline value of 35dB $LA_{eq,16h}$ inside living rooms and bedroom areas. WHO 1999 indicates that with a window partially open for ventilation, approximately 15dB of attenuation from external noise sources should be achieved. On this basis, living rooms and bedrooms facing North and South will not achieve internal guidance levels without the provision of alternative acoustic ventilation.

4.4 Bedrooms During the Night-time

- 4.4.1 During the night-time period, BS8233 recommends a guidance level of 30dB $LA_{eq,8h}$ and 45dB L_{Amax} inside bedroom areas. As per the daytime requirements, bedrooms facing north and south will not achieve the guidance levels with windows open.
- 4.4.2 Appropriate mitigation measures are discussed in Section 5.

5 NOISE AMELIORATION MEASURES

5.1 Building Envelope Sound Insulation

- 5.1.1 The recommendations of this report for relevant noise amelioration define various possible combinations for wall, glazing, ventilation (acoustic parameters) and roof/ceiling construction, all of which should enable the guidance criteria defined above to be met.
- 5.1.2 Options given in this section (see Table 5-2) are based on calculations of resultant noise levels in habitable rooms as dependent upon measured/estimated external façade noise levels and the insulation properties of the wall, glazing, roof/ceiling and ventilation. These calculations are based on typical habitable rooms with 2.5M² glazed area and a room volume of 50M³ and “reverberation time” of 0.7 seconds.
- 5.1.3 The calculations are all carried out according to the full calculation method of BS8233:2014 (Annex G.2). Each insulation option identified within Table 5-2 (i.e. every row of the table defining glazing performance, ventilator acoustic performance and roof/ceiling type) should, according to the calculation procedure, enable the appropriate guidance criteria to be met.
- 5.1.4 Ultimately, the chosen configurations of sound insulation enhancements involve considerations of design and, therefore, must be finally defined by the developers/architects. Only relevant recommendations for relevant combinations which may be expected to meet the acoustic requirements can be provided. The finalised inclusions should be forwarded to the Local Planning Authority for approval.

Glazing

- 5.1.5 The weakest part of a building façade in terms of sound insulation is generally the glazed areas and windows are the main point of entry for external noise into a dwelling. The insulation of various glazing configurations has been assessed by reference to the Sound Insulation Index dB(R_w) and its inclusion within the BS8233:2014 full calculation method, which takes into account an increased low frequency content usually associated with road traffic.

Ventilation

- 5.1.6 Enhanced glazing must be closed to provide the required benefit and it is consequently necessary to provide the required ventilation by suitably sound attenuated means.
- 5.1.7 The acoustic rating of such ventilators, when assessed as a façade element, is specified in terms of dB(D_{ne,w}).

Roof Construction

5.1.8 In high noise level situations it is also necessary to ensure that roof/ceiling constructions also provide sufficient sound insulation in way of top floor habitable rooms.

5.1.9 Typical pitch roof constructions are categorised in guide calculations as 4 alternatives:

- 1 single ceiling boarding no mineral wool
- 2 single ceiling boarding with 100mm mineral wool
- 3 double ceiling boarding with 100mm mineral wool
- 4 double ceiling boarding with 100mm mineral wool solid layer (19mm ply) under tiles/felt.

5.1.10 Other roof constructions (e.g. flat roof) may be included in guide calculations according to their estimated or specified performance levels **dB(R_w)**.

Walls

5.1.11 Walls, usually masonry, provide good sound insulation such that they need not be considered in relation to the above.

5.1.12 However, for lightweight walling construction methods (e.g. curtain walling) due attention must be given to design for appropriate sound insulation.

5.1.13 These may be included in guide calculations according to their estimated or specified performance levels **dB(R_w)**.

5.2 Building Envelope Recommended for this Development

5.2.1 A summary of the measured noise levels at the north and south façades are shown in Table 5-1 below together with an example of effective sound insulation enhancements for both the glazing and ventilation.

Table 5-1: Enhanced Insulation Options				
	North façade		South façade	
Measured façade level dB(A)	62 dBLAeq,16hr	73 dBLAmax	60 dBLAeq,16hr	70 dBLAmax
Required internal noise level dB(A)	35 dBLAeq,16hr	45 dBLAmax	35 dBLAeq,16hr	45 dBLAmax
Minimum façade insulation	31 dB Rw glazing / 37 dB Dne,w vent		29 dB Rw glazing / 35 dB Dne,w vent	
Example	6mm / 6 - 16mm / 4mm Acoustic Window Vents (See Appendix G)		4mm / 6 - 16mm / 4mm Acoustic Window Vents (See Appendix G)	

5.2.2 Detailed calculations are shown in Appendix B and have been carried out according to the full calculation method of BS8233:2014 (Annex G.2).

5.2.3 Further insulation options are identified below, according to the calculation procedure and enable the appropriate guidance criteria to be met. Building envelope sound

insulation enhancements that are recommended for those facades of this development subject to significant noise levels are given in Table 5-2.

5.2.4 It is important to note that Table 5-2 details effective sound insulation enhancements:

- Glazing (configuration and acoustic performance, **dB(R_w)**)
- Ventilator (acoustic performance, **dB(D_{ne,w})**)
- Roof/Ceiling (as Type 1, 2, 3 or 4) – if top floor and pitch roof

As dependent upon

- External Façade Noise Level (left hand column) – dB(A)

5.2.5 The resultant internal noise level (reverberant within receive room) is given in the right hand column of Table 5-2. In all cases these will be below the relevant guidance target level.

5.2.6 The guideline values are for habitable rooms only which are defined as “Living Rooms” and “Bedrooms”. The criteria for “dining room/area” is more relaxed at 40dBA_{Leq,16hr} and maximum internal criteria of 45dB(A) only relates to bedrooms.

5.2.7 The architect/developer may choose the options (or equivalent) that best suit their development. Ultimately, the chosen configurations of sound insulation enhancements involve considerations of design and, therefore, must be finally defined by the developers/architects. Relevant recommendations can only be provided for relevant combinations which may be expected to meet the acoustic requirements.

Table 5-2: Building Envelope Enhanced Insulation Options						
External Noise Level dB(A)	Glazing Config Glass/Cavity/Glass	Glazing dB(R _w)	Ventilator dB(D _{new})	Ceiling Roof (*)	External Internal Reduction dB(A)	Internal Noise Level dB(A)
L_{Amax}						
73	6 mm / (6 - 16 mm) / 6 mm	31	37	2	27.9	45
70	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	43
L_{Aeq,16hr}						
63	6 mm / (6 - 16 mm) / 6 mm	31	37	2	27.9	35
62	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	35
61	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	34
60	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	33
59	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	32
58	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	31
L_{Aeq,8hr}						
53	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	26
52	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	25
51	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	24
50	4 mm / (6 - 16 mm) / 4 mm	29	35	2	26.8	23

5.2.8 Different glazing options may be used to achieve the same insulation performance (dB(R_w)). In general, for small cavity glazing (~12mm) reduction to 10mm cavity, to accommodate frame rebate sizes, would not be significant in terms of noise reduction.

5.2.9 Other glazing configurations giving equivalent performance would be acceptable. In all cases windows may be openable but should be well sealed when closed. Ventilation systems should allow the appropriate air change capability (other than “purge ventilation” which may be achieved by opening windows) without resort to open (or partially open) windows.

- 5.2.10 Worst case night time noise levels are at least 5dB(A) lower than daytime levels. Acceptable night time conditions will be met as all internal Night Time Noise Levels are determined to below 30dBLAeq and worst case Maxima will be below 45dB(A).

Table 5-2 - Important Note:

The right hand column is the resultant internal noise levels due to the external Façade Noise Level (left hand column).

For a façade with External Level:

Select required amelioration package for External Level - Column 1
(May be any of the options or equivalents)

Possible amelioration configurations are detailed on row - Columns 2, 3, 4, 5

Overall estimated noise reduction External to Internal - Column 6

Resultant Noise Level within room is given - Column 7

(These are at or below the required (Guidance) noise limit)

(The most suitable, or otherwise equivalent, maybe selected)

(Different configurations will require calculation to show acceptable performance)

Glazing/Walls – Explanatory Notes

- 5.2.11 The above calculations are based upon a glazed area of 2.5m² in standard masonry walls. If the design departs significantly from this, such as curtain walling or significantly larger glazed areas then this should be taken into account in determination of the final scheme. "Curtain Wall" makeup should be designed to provide for at least 50dB(R_w) Sound Insulation.

Roof/Ceiling – Explanatory Notes

- 5.2.12 The development building has both a pitched roof and flat roof, screened from road traffic noise by parapets (see Photographs 3 & 4) and noise transmission through the roof is not likely to present any issues.

Ventilation – Explanatory Notes

- 5.2.13 For habitable rooms with windows in facades subject to the noise levels identified in Table 5-2, ventilation systems enabling adequate ventilation without recourse to open windows should be incorporated. Suppliers should be informed of the overall reduction required (Table 5-2, Column 6).
- 5.2.14 The proposed development will be required to meet Building Regulations Approved Document F1 Means of Ventilation for domestic properties with regard to ventilation provision.

- 5.2.15 The reductions will typically require ventilation units or schemes to provide a sound reduction of at least 35 - 37 dB(Dne,W) or better (as identified in Column 4) (See Appendix F for supplier list).
- 5.2.16 Table 5-2 is recommended for guidance and suppliers may offer alternative solutions based on the noise data provided within this report.
- 5.2.17 Building Regulations Approved Document F1 Means of Ventilation for domestic properties makes provision for three ventilation strategies, (1) Background Ventilation, (2) Extract Ventilation and (3) Purge Ventilation
- Background ventilation can be achieved via Trickle vents, Wall vents or continuous ventilation.
 - Extract ventilation can be achieved via mechanical extract fan units located in the 'wet rooms' which can be intermittent or continuous.
 - Purge ventilation can be achieved by opening windows or mechanical ventilation. Mechanical ventilation must provide 4 air changes per hour (ach).
- 5.2.18 Purge ventilation is a Building Regulations requirement to provide rapid ventilation to combat high concentrates of pollutants such as water vapor released from occasional activities such as painting and decorating, or accidental release such as smoke from burnt food etc.
- 5.2.19 It should be noted that the internal noise level guidelines are generally not applicable under "purge ventilation" conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).
- 5.2.20 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting internal noise level and should be assessed in the "open" position.
- 5.2.21 Should a purge ventilation requirement arise then windows may be opened in the normal manner and in accordance with the Building Regulation suggestion, a simple extract fan can provide the required purge ventilation without the need to always open windows. Windows should still be openable as a means of escape during fire etc. and at the occupant's choice.
- 5.2.22 All recommendations in this report are limited to the acoustic performance only and do not address the suitability of any vent for ventilation purposes. It is assumed that any changes required to the façade design as a result of non-acoustic considerations should not adversely influence the acoustic performance of the façade outlined in this report.

6 CONCLUSIONS

- 6.1.1 A noise assessment has been carried out for a proposed conversion of Buzzers Bar, North Shields.
- 6.1.2 Prevailing noise levels (predominantly road traffic noise) have been measured and assessed accordingly. Relevant detailed noise measurement has been carried out over a 24-hour weekday period with road traffic noise from A1018 and the wider surrounding road network being dominant. All potential issues with regard to noise and the resulting noise exposure may be ameliorated. The measured data presented allows the full and appropriate assessments.
- 6.1.3 Noise amelioration measures for appropriate enhancement of the sound insulation of the building envelope of noise affected facades have been recommended. These have been assessed according to typical maximum measured façade noise levels and predicted LAeq levels based on published traffic flow data.
- 6.1.4 It is therefore considered that the outcome of this noise assessment and the conclusions drawn should be considered technically robust in light of the current climate, to enable decision-makers to come to well-informed judgements.

Figure 6-1: Proposed Glazing – All Habitable Rooms



- 6.1.5 Acceptable internal noise levels can be achieved in the main living areas of Flats 3, 5 and 7 with glazing configuration 6mm / (6 – 16mm) / 6mm or similar.
- 6.1.6 Glazing configuration 4mm / (6 – 16mm) / 4mm or similar would be required for all remaining habitable rooms (including bedrooms).
- 6.1.7 Different glazing options may be used to achieve the same insulation performance which would provide up to 31 and 29dB(RW) respectively.

- 6.1.8 Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed. Any façade openings used to provide whole dwelling ventilation (e.g. acoustic trickle ventilators) should be assessed in the “open” position and, in this scenario, the internal LAeq and LAm_{ax} target levels have been demonstrated not to be exceeded. Acoustic trickle ventilation should be provided for all habitable rooms as shown in Figure 6-1.
- 6.1.9 Recommendations for appropriate noise amelioration measures are given in Section 5 (in particular Table 5-2 cross-referenced to Figures 4-1 and 4-2). These relate to the inclusion of sound insulation measures in the building envelope at those facades affected by road traffic noise.
- 6.1.10 It has been fully demonstrated that relevant national and local policies on planning and noise can be met with appropriate glazing and ventilation systems and therefore the recommendation would be for planning consent to be granted.
- 6.1.11 There is no policy requirement to include specific mitigation for purge situations given that occupants would experience any increased levels of noise for only short periods. Once the “purge” situation is overcome then windows would be closed and acceptable acoustic conditions would then prevail.
- 6.1.12 Other glazing and ventilation configurations giving equivalent performance would be acceptable and it is recommended that the manufacturer of the chosen glazing and ventilation system provide evidence that the installed solution will provide the requisite sound insulation as detailed in this report.
- 6.1.13 All recommendations in this report are limited to the acoustic performance only and do not address the suitability of any vent for ventilation purposes.
- 6.1.14 Ultimately, the chosen configurations of sound insulation enhancements involve considerations of design and cost and, therefore, must be finally defined by the developers/architects. Relevant recommendations can only be provided for relevant combinations which may be expected to meet the acoustic requirements. The finalised inclusions should be forwarded to the Local Planning Authority for approval.
- 6.1.15 This report has been compiled from the results of noise measurements undertaken over a typical weekday in July 2022.

Appendix A: Glossary of Acoustic Terminology

Decibel (dB): a unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 Pa, the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dB(A): decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

$L_{Aeq,T}$: the equivalent continuous sound level -the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter. It is written as L_{eq} in connection with aircraft noise.

Maximum and Minimum (L_{Amax} and L_{Amin})

The simplest statistical parameters are the maximum level (L_{Amax}) and the minimum level (L_{Amin}) during the measurement period. The L_{Amax} is often used as a measure of the most obtrusive facet of the noise, even though it may only occur for a very short time and is the level of the maximum Root Mean Square reading. L_{Amin} is rarely used, but can be a useful way of identifying a constant noise amongst other intermittent noises.

Fast Time-weighting: An averaging time used in sound level meters, equivalent to 1/8 second.

Slow Time-weighting: An averaging time used in sound level meters, equivalent to 1 second.

Percentile Parameters ($L_{n,T}$)

Percentile parameters, L_n values, are useful descriptors of noise. The L_n value is the noise level exceeded for n per cent of the measurement period, which must be stated. The L_n value can be anywhere between 0 and 100. The two common ones are discussed below, but sometimes other values will be encountered.

Background Noise ($L_{A90,T}$)

The most commonly used percentile level is the $L_{A90,T}$, which is the 90th percentile level and is the level exceeded for 90 per cent of the time, T. It will be above the L_{min} and has been adopted as a good indicator of the "background" noise level. It is specified in BS 4142:1997 as the parameter to assess background noise levels. Whilst it is not the absolute lowest level measured in any of the short samples, it gives a clear indication of the underlying noise level, or the level that is almost always there in between intermittent noisy events. BS4142:1997 advises that the measurement period should be long enough to obtain a representative sample of the background level.

Level exceeded for 10% of the Time ($L_{A10,T}$)

$L_{A10,t}$ is the 10th percentile, or the level exceeded for 10 per cent of the time, and was used for road traffic noise assessments since it had been shown to give a good indication of people's subjective response to noise. Although the L_{Aeq} has largely superseded its use for traffic, $L_{A10,T}$ may still be found in acoustic reports discussing road traffic. It is still used to assess traffic noise to determine eligibility for noise-insulation grants where a road is altered or a new one proposed. The $L_{A10,T}$ can be useful in assessing the overall noise climate, for example, if the $L_{A90,T}$, $L_{A10,T}$ and $L_{Aeq,T}$ are all within a few dB, then this indicates that the noise source is fairly constant.

Appendix B: Building Envelope Sound Insulation Calculations

Enhancements to Building Envelope Sound Insulation

Glazing

The weakest part of a building façade in terms of sound insulation is often the glazed areas. The insulation of various glazing configurations may be assessed by reference to the full calculation methods of BS8233:1999 & 2014 (which take account of spectral content of external façade noise level) (Ref 1, Sect 6,7).

Glazing configurations and the acoustic insulation rating of such are specified in terms of $dB(R_w)$.

Ventilation

Enhanced glazing must be closed to provide the required benefit and it is consequently necessary to provide the required ventilation by suitably sound attenuated means.

The acoustic rating of such ventilators, when assessed as a façade element, is specified in terms of $dB(D_{ne,w})$.

Roof Construction

In high noise level situations it is also necessary to ensure that roof/ceiling constructions also provide sufficient sound insulation in way of top floor habitable rooms.

Typical pitch roof constructions are categorised in guide calculations as 4 alternatives:

- 1 single ceiling boarding no mineral wool
- 2 single ceiling boarding with 100mm mineral wool
- 3 double ceiling boarding with 100mm mineral wool
- 4 double ceiling boarding with 100mm mineral wool solid layer (19mm ply) under tiles/felt.

Other roof constructions (e.g. flat roof) may be included in guide calculations according to their estimated or specified performance levels **$dB(R_w)$** .

Walls

Walls, usually masonry, provide good sound insulation such that they need not be considered in relation to the above.

However, for lightweight walling construction methods (e.g. curtain walling) due attention must be given to design for appropriate sound insulation. These may be included in guide calculations according to their estimated or specified performance levels **$dB(R_w)$** .

Calculation procedures are “calibrated” by inputting the example from BS8233, Annex G.2. The results are summarised below to show exact equivalence

Data for all enhanced building envelope combinations are then pasted into identical spreadsheets to yield the basic Sound Insulation Summary Table within the report (Table 5-2).

Calibration of Calculation Procedures

Room/Window Dimensions		Room Acoustics								
		T60	63	125	250	500	1000	2000	4000	
			0.7	0.7	0.7	0.7	0.7	0.7	0.7	
Length	4									
Width	4	External Spectra @ Façade								
Height	3	dB(A)	63	125	250	500	1000	2000	4000	
Volume	48	66	76.9	69.9	63.9	62.9	61.9	57.9	50.9	Road
		66	51.1	52.1	48.1	52.1	62.1	62.1	52.1	Rail
		66	69.4	68.4	64.4	60.4	59.4	60.4	57.4	Aircraft
		66	100	100	100	100	100	100	100	Manual
Window Sizes		Roof Sound Insulation dB Dnt								
Width	3	63	125	250	500	1000	2000	4000		
Height	1	18	21	26	32	32	35	38	1	
		20	24	33	39	45	48	51	2	
Window Area	3	28	32	39	47	52	58	61	3	
		34	38	45	53	58	64	67	4	
Ceiling Area	16	100	100	100	100	100	100	100	N/A	
		Ventilator								
		dBnew	63	125	250	500	1000	2000	4000	
		52	33	36	45	52	55	56	59	
Glazing:		10 mm / (6 - 16 mm) / 4 mm 24 21 32 37 42 43 35 (-2; -5) 35 33 30								
External Spectra:	Road									
Roof/Ceiling:	Type:	3								
Ventilator:	52	dB(Dnew)								
		dB(Rw)	63	125	250	500	1000	2000	4000	
Glazing Insulation:		35	21	24	21	32	37	42	43	
		dB(A)	63	125	250	500	1000	2000	4000	
Calculated Internal Noise:		32.0	27.8	27.3	28.6	23.0	20.1	12.2	3.9	
Noise Reduction		34.0	23.1	26.5	26.3	36.9	41.8	46.6	48.0	

Appendix C: Noise Monitoring Equipment

Instrumentation	Certificate no.	Calibration due
Cirrus Research plc Instrument type: CR:247 Noise Monitoring terminal Serial number V069903	144970	14/08/2022
Cirrus Research plc Instrument type: CR:247 Noise Monitoring terminal Serial number V071016	149546	27/11/2022

Appendix D: Weather Data and Hourly Noise Survey Results

Past Weather in South Shields — Graph

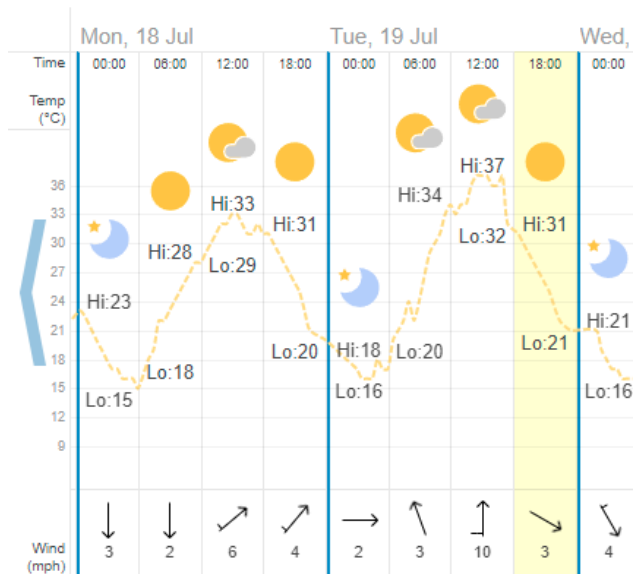


Table 6-1: Noise monitoring results – Northern facade

Start Time	End Time	Instrument	LAFMax	LAFMin	LAF10	LAF90	LAEq
19/07/2022 07:00	19/07/2022 08:00	V069903	75.0	43.1	64.4	48.6	60.5
19/07/2022 08:00	19/07/2022 09:00	V069903	82.8	46.7	65.1	54.7	62.3
19/07/2022 09:00	19/07/2022 10:00	V069903	75.2	46.0	65.0	55.4	62.4
19/07/2022 10:00	19/07/2022 11:00	V069903	80.3	45.3	65.0	55.1	62.3
19/07/2022 11:00	19/07/2022 12:00	V069903	82.3	47.6	65.0	55.6	62.6
18/07/2022 12:00	18/07/2022 13:00	V069903	79.1	44.9	64.9	55.5	62.2
18/07/2022 13:00	18/07/2022 14:00	V069903	79.4	43.5	65.8	54.6	63.9
18/07/2022 14:00	18/07/2022 15:00	V069903	85.2	45.2	64.8	55.2	62.4
18/07/2022 15:00	18/07/2022 16:00	V069903	79.9	46.3	64.8	55.4	62.2
18/07/2022 16:00	18/07/2022 17:00	V069903	75.1	46.3	65.0	55.0	62.2
18/07/2022 17:00	18/07/2022 18:00	V069903	80.7	48.7	65.3	56.4	62.8
18/07/2022 18:00	18/07/2022 19:00	V069903	77.1	46.9	64.5	54.1	61.6
18/07/2022 19:00	18/07/2022 20:00	V069903	93.9	46.7	65.0	54.0	64.7
18/07/2022 20:00	18/07/2022 21:00	V069903	78.9	43.5	63.6	50.5	60.2
18/07/2022 21:00	18/07/2022 22:00	V069903	80.4	41.4	63.5	49.4	59.8
18/07/2022 22:00	18/07/2022 23:00	V069903	83.9	38.8	62.7	47.5	59.1
			93.9	38.8	64.7	53.6	62.0
18/07/2022 23:00	19/07/2022 00:00	V069903	73.2	37.0	60.9	42.7	56.5
19/07/2022 00:00	19/07/2022 01:00	V069903	80.8	35.5	56.5	38.0	53.9
19/07/2022 01:00	19/07/2022 02:00	V069903	68.8	34.9	51.4	37.0	49.7
19/07/2022 02:00	19/07/2022 03:00	V069903	68.1	35.4	47.7	37.2	47.5
19/07/2022 03:00	19/07/2022 04:00	V069903	68.8	36.2	46.2	37.8	46.5
19/07/2022 04:00	19/07/2022 05:00	V069903	84.4	37.1	52.6	40.2	56.7
19/07/2022 05:00	19/07/2022 06:00	V069903	73.8	41.9	56.6	44.3	53.8
19/07/2022 06:00	19/07/2022 07:00	V069903	75.2	42.6	62.5	46.5	58.1
			84.4	34.9	54.3	40.5	52.8
			68.1				

Table 6-2: Noise monitoring results – southern facade

Start Time	End Time	Instrument	LAFMax	LAFMin	LAF10	LAF90	LAeq
19/07/2022 07:00	19/07/2022 08:00	V071016	73.8	46.0	60.8	51.6	57.8
19/07/2022 08:00	19/07/2022 09:00	V071016	72.5	49.6	62.4	55.6	60.1
19/07/2022 09:00	19/07/2022 10:00	V071016	73.5	51.9	62.9	57.0	60.7
19/07/2022 10:00	19/07/2022 11:00	V071016	75.5	51.1	63.3	56.4	60.9
19/07/2022 11:00	19/07/2022 12:00	V071016	79.8	52.5	63.3	57.0	61.2
18/07/2022 12:00	18/07/2022 13:00	V071016	79.5	49.4	62.6	55.4	60.3
18/07/2022 13:00	18/07/2022 14:00	V071016	77.6	48.4	62.4	54.5	60.0
18/07/2022 14:00	18/07/2022 15:00	V071016	82.5	47.3	62.5	55.5	60.7
18/07/2022 15:00	18/07/2022 16:00	V071016	71.6	50.4	63.0	56.4	60.7
18/07/2022 16:00	18/07/2022 17:00	V071016	87.4	51.7	62.7	56.2	60.5
18/07/2022 17:00	18/07/2022 18:00	V071016	77.2	53.1	63.3	57.0	61.0
18/07/2022 18:00	18/07/2022 19:00	V071016	72.3	48.1	61.3	54.8	59.2
18/07/2022 19:00	18/07/2022 20:00	V071016	85.9	49.0	61.8	54.9	61.0
18/07/2022 20:00	18/07/2022 21:00	V071016	72.7	45.3	60.5	52.0	57.8
18/07/2022 21:00	18/07/2022 22:00	V071016	75.2	46.2	60.4	51.1	57.6
18/07/2022 22:00	18/07/2022 23:00	V071016	73.7	43.0	59.5	49.4	56.6
			87.4	43.0	62.0	54.7	59.8
18/07/2022 23:00	19/07/2022 00:00	V071016	75.1	38.8	58.0	44.9	54.1
19/07/2022 00:00	19/07/2022 01:00	V071016	77.3	35.7	55.4	39.2	52.3
19/07/2022 01:00	19/07/2022 02:00	V071016	66.4	34.5	51.2	36.9	47.7
19/07/2022 02:00	19/07/2022 03:00	V071016	64.0	34.2	48.8	36.6	46.2
19/07/2022 03:00	19/07/2022 04:00	V071016	62.6	35.3	46.7	37.6	44.7
19/07/2022 04:00	19/07/2022 05:00	V071016	69.8	37.0	52.2	41.2	49.3
19/07/2022 05:00	19/07/2022 06:00	V071016	67.9	42.8	55.6	45.8	52.4
19/07/2022 06:00	19/07/2022 07:00	V071016	72.9	44.8	59.8	49.3	56.3
			77.3	34.2	53.5	41.4	50.4
			62.6				

Appendix E: Department for Transport Road Traffic Statistics

Manual count points

Site number: 18612

Site details

Region	North East
Local authority	South Tyneside
Road name	A1018
Road classification	'A' road
Managed by	Local authority
Road type	Major
Start junction	A1018 Imeary St
End junction	A194
Link length	0.40km (0.25 miles)
Easting, northing	436666, 566595
Latitude, longitude	54.99259700, -1.42846380

Location



Annual Average daily flow

Year	Count method	Pedal cycles	Two wheeled motor vehicles	Cars and taxis	Buses and coaches	Light goods vehicles	Heavy goods vehicles	All motor vehicles
2020	Estimated using previous year's AADF on this link	102	24	10297	566	1109	68	12064
2019	Estimated using previous year's AADF on this link	89	32	13557	896	1257	78	15820
2018	Manual count	81	35	13389	886	1268	78	15655

Manual count points

Site number: 58318

Site details

Region	North East
Local authority	South Tyneside
Road name	A1018
Road classification	'A' road
Managed by	Local authority
Road type	Major
Start junction	Sunderland Rd
End junction	Imeary St
Link length	0.70km (0.43 miles)
Easting, northing	436929, 566181
Latitude, longitude	54.98885800, -1.42440670

Location



Annual Average daily flow

Year	Count method	Pedal cycles	Two wheeled motor vehicles	Cars and taxis	Buses and coaches	Light goods vehicles	Heavy goods vehicles	All motor vehicles
2020	Estimated using previous year's AADF on this link	69	22	6140	198	781	29	7169
2019	Estimated using previous year's AADF on this link	61	29	8083	313	885	33	9344
2018	Estimated using previous year's AADF on this link	55	31	7983	310	893	33	9250
2017	Estimated using previous year's AADF on this link	50	32	8072	341	876	33	9354
2016	Manual count	52	31	8132	365	833	33	9394

Appendix F: Suppliers of Acoustic Ventilation Systems

Titon Head Office, Sales & Marketing - Colchester 894 The Crescent, Colchester Business Park, Colchester Essex CO4 9YQ	07967 348 061 01206 713 800	Paul Croughan Key Account Manager Vent Systems
Ryttons Building Products Ltd Design House Kettering Business Park Kettering Northants NN15 6NL	01536 511874	Mr Anthony Irwin
Airflow Developments Limited Aidelle House Lancaster Road Cressex Business Park High Wycombe Bucks HP12 3QP	01494 525252	Mr Ian Thompson (07825 668782)
Passivent Brooklands Road Sale Cheshire M33 3SS	0161 962 7113	
Air Domestique Installations Ltd 31, Berkely Road London N15 6HH	0181-880-2426	''
Greenwood Air Management Brookside Industrial Estate Rustington West Sussex BN16 3LH	01903-771021	

Appendix G: Example of Acoustic Vents

Greenwood Acoustic Products: Terms that are frequency dependent											
											
Product Code	Description	Equivalent Area mm ²	Dn,e,w Average Weight Performance	Octave Band Centre (1/1 Oct) Frequency (Hz)							Dn,e,w Ctr A- Weighted Level
				63	125	250	500	1000	2000	4000	
2500EAW.AC1	Vent 2500EA + 1 Acoustic Set	2749	42	31.5	40.7	38.8	35.8	42.3	43.9	45.1	40
2500EAW.AC2	Vent 2500EA + 2 Acoustic Set	2736	45	32.0	41.7	39.6	37.2	45.3	52.6	54.9	42
5000EAW.AC1	Vent 5000EA + 1 Acoustic Set	5713	39	32.0	38.9	38.4	30.6	43.7	43.0	40.2	37
5000EAW.AC2	Vent 5000EA + 2 Acoustic Set	5497	42	31.6	39.9	37.9	31.8	46.7	53.3	48.1	38
MA3051	Acoustic Wall Ventilator	2500	55	na	46.7	46.3	49.0	55.7	66.3	69.3	52
EAR 42W	Acoustic Window Ventilator	3912	42	na	40.8	41.9	37.4	44.0	45.9	40.9	42
AAB4000	Acoustic Wall Ventilator	2500	44	na	34.7	42.4	41.3	47.5	50.5	na	44
1600DN	Acoustic Window Ventilator	1250	37	na	39.8	38.9	36.5	33.6	38.7	39.9	36
AWV39	Acoustic Wall Ventilator	2500	39	na	38.3	32.4	34.9	38.5	47.3	56.9	37
2500EA	Vent 2500EA	2723	36	na	45.0	43.5	39.6	35.4	34.3	37.7	36
5000EA	Vent 5000EA	5230	33	na	39.5	37.3	35.5	32.0	31.0	33.5	33
1250F	Window Ventilator	1362 / 1362	35	na	39.1	40.8	39.4	31.7	36.5	35.4	34
2500F	Window Ventilator	2583 / 2634	33	na	38.3	38.7	36.1	32.5	32.6	32.0	34
4000HD	Window Ventilator	3200	33	na	36.8	35.3	33.0	31.4	32.8	36.5	33
8000HD	Window Ventilator	6400	30	na	32.6	31.6	29.1	28.4	30.1	33.5	29
2000L	Window Ventilator	1600	37	na	41.4	38.5	37.3	34.1	37.5	41.0	36
4000L	Window Ventilator	3200	34	na	38.5	35.7	34.4	31.3	34.4	37.5	33
3000S	Window Ventilator	1800 / 2500	35	na	39.9	37.0	34.9	32.5	36.2	39.2	34
4000S	Window Ventilator	2700 / 3200	33	na	38.4	36.8	33.8	29.7	33.8	36.6	32
6000S	Window Ventilator	3400 / 4200	32	na	36.7	33.6	31.6	29.2	33.4	36.9	31