Beach Road, South Shields

Noise impact assessment

9915.1

17th June 2022

Revision A

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Revision	Description	Issued by	Date
A	First issue	IS	17th June 2022

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1 Summary

1.1 This report has been prepared in response to planning condition no. 6 of planning application ST/1082/21/FUL, and planning condition 6 of listed building consent ST/0948/21/LBC, for 1, 3, and 3a, Beach Road, South Shields.

1.2 These conditions regard the provision of a satisfactory internal noise environment.

1.3 The existing noise risk at the site is assessed in accordance with relevant standards and noise practice guidance.

1.4 Noise levels affecting the proposed development from local road traffic and the Town Hall bells have been measured during the day and night, and the façade noise impact calculated.

1.5 Internal noise levels were measured simultaneously with the existing glazing in place, and exceed the recommended maximum number of occurrences and maximum noise level value in terms of $L_{AF,max.}$

1.6 The measured noise level, character of the sound, periodicity and number of occurrences would be likely to significantly affect the quality of sleep of future occupants.

1.7 The sound reduction performance of the envelope is recommended to be upgraded by means of new glazing units.

1.8 The façade sound insulation design is considered with windows closed to reduce the calculated noise impact to below the lowest adverse effect level. Alternative provision should be made for whole dwelling ventilation according to the Building Regulations, Approved Document F (AD-F).

1.9 The acoustic performance requirements for glazing and ventilators are summarised in Table 1. Based on these ventilator acoustic constraints, potential AD-F ventilation strategies are suggested.

1.10 Based on the details outlined in this report, the noise risks identified are able to be mitigated and minimised, and the site is considered suitable for residential development.

Elevation	Glazing performance	Trickle ventilator performance	Potential AD-F ventilation strategy
Bedrooms on Beach Road and north elevation	36 dB $R_w + C_{tr}$ e.g. Saint-Gobain 8(6)8.8 mm *or* 10.8A(55.2) mm (single glazing)	[Trickle vent not required]	AD-F System 3, MEV with a design air permeability of > 5 $m^3/h/m^2$ *or* AD-F System 4, MVHR
		40 dB $D_{ne,w} + C_{tr}$	AD-F System 3, MEV
Living and kitchens all elevations	27 dB $R_w + C_{tr}$ e.g. Saint-Gobain 4(12)4 mm	[Trickle vent not required]	AD-F System 3, MEV with a design air permeability of > 5 $m^3/h/m^2$ *or* AD-F System 4, MVHR
		29 dB $D_{ne,w} + C_{tr}$	AD-F System 3, MEV

Table 1: Summary of minimum façade sound insulation treatment

2 Introduction

2.1 A residential development consisting of alterations to form flats has been proposed at 1, 3 and 3a Beach Road, South Shields.

2.2 Apex Acoustics has been commissioned to undertake a noise survey and assessment of the potential noise impact on the proposed development site to address the requirements of planning condition 6 of planning application ST/1082/21/FUL, and planning condition 6 of listed building consent ST/0948/21/LBC.

2.3 The primary noise sources considered in this assessment are:

- Bells ringing at the town hall
- Road traffic on Beach Road and Fowler St.

2.4 The site location is shown in Figure 1.

2.5 The purpose of this report is to identify appropriate acoustic design parameters and the manner in which these may be achieved in practice.

2.6 The scope of our appointment includes:

- Measure the existing noise environment over a 24-hour period at positions on the façade and internally.
- Calculate the highest noise impact on the worst affected façade
- Calculate the typical noise levels arising internally
- Determine potential noise impact under whole dwelling ventilation condition according to Approved Document F strategies.
- Provide a detailed scheme for the mitigation of noise to reduce the risk of adverse effect, in accordance with local and national policy requirements.

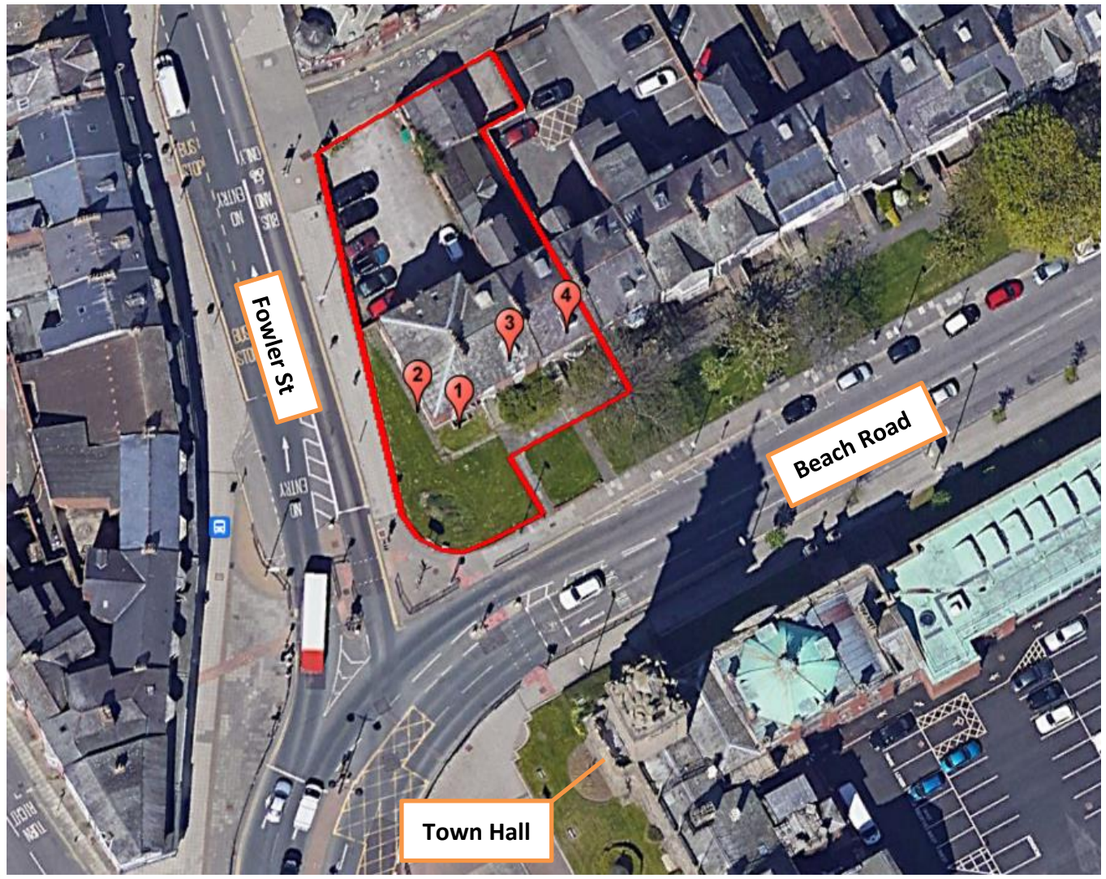


Figure 1: Site location outlined in red and measurement positions indicated by markers

3 Planning conditions

3.1 Condition 6 of application ref. ST/1082/21/FUL is shown in Figure 2.

> 6 No dwelling hereby permitted shall be occupied unless and until acoustic mitigation measures in respect of that dwelling have been implemented in full in respect of windows to the Beach Road elevation and, where applicable, windows to the Fowler Street elevation in accordance with the recommendations of a Noise Assessment and/or the details approved under condition 6 of listed building consent ST/0948/21/LBC. Thereafter those acoustic mitigation measures shall remain in place at all times.
>
> In the interests of residential amenity in accordance with Policies EA5 and DM1 of the South Tyneside Local Development Framework and the NPPF.

Figure 2: Requirements of Condition 6 of ST/1082/21/FUL

3.2 Condition 6 of listed building consent ref. ST/0948/21/LBC for is shown in Figure 3.

> 6 All replacement/refurbishment works in respect of external windows and associated internal window shutters shall be undertaken in full accordance with details to be submitted to and approved in writing by the Local Planning Authority. Such details shall include a schedule outlining those windows to be refurbished and those to be replaced together with specification and materials details for all refurbishment works and replacement windows. All replacement windows shall be of a timber framed construction and where existing windows have internal shutters these shall be retained and refurbished. Replacement double glazed windows shall only be permitted to the front and side elevations at No.1 Beach Road and only if it has been demonstrated to the satisfaction of the Local Planning Authority through submission of a Noise Assessment that such windows are required in order to achieve a satisfactory internal residential noise environment.
>
> To ensure that features of special architectural and historic interest are preserved and that any new windows/shutters respect the special architectural and historic interest of these listed buildings in accordance with Policies SS12 and DM6 of the South Tyneside Local Development Framework and the NPPF.

Figure 3: Requirements of Condition 6 of ST/0948/21/LBC

3.3 Figure 2 shows that South Tyneside Local Development Framework – Core Strategy Policy EA5 is referenced. The policy is shown in Figure 4.

> **Policy EA5 Environmental Protection**
>
> **To complement the regeneration of the Borough, the Council will control new development so that it:**
>
> **A** acts to reduce levels of pollution, environmental risk and nuisance throughout the Borough;
>
> **B** minimises adverse impacts on the Magnesian Limestone Aquifer and its associated groundwater protection zones;
>
> **C** focuses the treatment of contaminated and derelict land so as to achieve a balance between:
>
> i) the management of risk approach in its Contaminated Land Strategy; and
>
> ii) the regeneration of the riverside corridor;
>
> **D** ensures that the individual and cumulative effects of development do not breach noise, hazardous substances or pollution limits; and
>
> **E** does not permit unsustainable schemes to be located in those areas of the coast, Tyne corridor and Don Valley where flood risk is unacceptably high.

Figure 4: South Tyneside LDF – Core Strategy Policy EA5

3.4 Figure 3 shows that South Tyneside Local Development Framework Development Management Policy DM1 is referenced. The excerpt of the policy relevant to noise is shown in Figure 5.

> **B the development is acceptable in relation to any impact on residential amenity;**

Figure 5: South Tyneside LDF – Development Management Policy DM1 (excerpt)

3.5 **Professional Practice Guidance on Planning & Noise**

3.6 Professional Practice Guidance on Planning & Noise: New Residential Development (ProPG), Reference 1, is a guidance document on the management of noise within the planning system in England for new build housing developments.

3.7 The document draws together guideline limits for internal noise levels from external transport sources from other sources of guidance, including BS 8233, Reference 2, and the World Health Organisation (WHO) Guidelines for Community Noise, Reference 3.

3.8 These criteria are consistent with those usually adopted by the Local Environmental Health Department, including for developments comprising refurbishment and change of use, and are presented in Table 2.

Activity	Location	Guideline upper limit, dB		
		$L_{Aeq,\ daytime}$	$L_{Aeq,\ night\text{-}time}$	L_{AFmax}
Resting	Living room	35	-	-
Dining	Dining room	40	-	-
Sleeping (daytime resting)	Bedroom	35	30	45

Table 2: Internal noise level requirements

3.9 The daytime period is defined as the 16 hours between 07:00 to 23:00 hours and the night-time period is defined as the 8 hours between 23:00 to 07:00 hours.

3.10 With regards to the night-time L_{AFmax} criterion, ProPG states:

"In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax,F}$ more than 10 times a night."

3.11 Regarding noise from individual events, Appendix A of ProPG states:

"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.

3.12 It is considered that the adopted internal ambient noise level targets align with the LOAEL following the terminology of the NPSE, such that meeting these targets adequately achieves the aims of the NPPF and NPSE.

3.13 ProPG states:

"Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally."

3.14 Internal ambient noise levels 10 dB above the daytime and night-time values in Table 2 are therefore identified as the SOAEL.

4 Noise sources and measurements

4.1 **Measurements**

4.2 Measurements of the existing noise environment were made over approx. a 24-hour period from 13:05 on 17th May 2022 using the guidance of BS 7445, Reference 4.

4.3 The measurement locations are shown in Figure 1.

4.4 At positions 1 and 2 the microphone was located directly outside of a first-floor window, facing Beach Road and Fowler St., respectively. Measurements are considered to be of façade noise levels.

4.5 At positions 3 and 4 the microphone was located within a front elevation first floor room of 1 Beach Road and ground floor room of 3 Beach Road, respectively, in order to measure simultaneous internal noise levels arising.

4.6 The equipment used is listed in Table 3.

Equipment	Model	Serial no.
Sound Level Meter	NTi XL2	A2A-04045-D2
Calibrator	Larson Davis CAL 200	11705
Sound Level Meter	NTi XL2	A2A-05832-E0
Calibrator	Larson Davis CAL 200	9462
Sound Level Meter	NTi XL2	A2A-12479-E0
Calibrator	Larson Davis CAL 200	13405
Sound Level Meter	NTi XL2	A2A-14205-E0
Calibrator	Larson Davis CAL 200	15308

Table 3: Equipment used

4.7 All sound level meters and calibrators used meet the technical specifications of BS 7445 and have current calibration certificates traceable to national standards. The equipment was field-calibrated before and after the measurement with no significant drift in sensitivity noted.

4.8 Weather conditions were dry with wind speeds below 5 m/s.

4.9 **Noise sources**

4.10 The most significant noise source affecting the proposed development during the daytime was local road traffic, and the bells of the Town Hall chiming every 15 minutes.

4.11 Other noise sources included general urban hum, and some gull noise.

4.12 Position 1 was therefore selected as that most exposed to noise from the combination of these sources.

4.13 The most significant noise source affecting the proposed development during the night time was the bells of the Town Hall, with periodic road traffic.

4.14 **Results**

4.15 The time histories of the $L_{Aeq,1sec}$ recorded are shown in Figure 6 to Figure 9.

4.16 The relative loudness and periodicity of the town hall bells is able to be distinguished in each time history.

4.17 The measured daytime and night-time noise levels are shown in Table 4.

Position	Parameter	dBA	Octave band centre frequency, Hz A-weighted façade noise level, dB					
			125	250	500	1k	2k	4k
1	Daytime, $L_{Aeq,16hr}$	**68**	54	59	61	65	58	50
	Night time, $L_{Aeq,8hr}$	**62**	45	51	54	59	55	47
	Night time, $L_{AF,max}$	**86**	-					
2	Daytime, $L_{Aeq,16hr}$	**66**	52	58	60	61	57	55
	Night time, $L_{Aeq,8hr}$	**59**	44	49	52	54	51	49
	Night time, $L_{AF,max}$	**78**	-					

Table 4: Measured façade noise levels

Position	Parameter	dBA	Octave band centre frequency, Hz A-weighted internal noise level, dB					
			125	250	500	1k	2k	4k
3 (internal)	Daytime, $L_{Aeq,16hr}$	**41**	30	33	35	37	33	26
	Night time, $L_{Aeq,8hr}$	**35**	20	24	27	31	29	22
	Night time, $L_{AF,max}$	**59**	-					
4 (internal)	Daytime, $L_{Aeq,16hr}$	**39**	30	32	31	34	28	23
	Night time, $L_{Aeq,8hr}$	**33**	22	25	25	30	24	21
	Night time, $L_{AF,max}$	**60**	-					

Table 5: Measured internal noise levels

4.18 The highest maximum night-time noise levels are shown in Table 6. The 11th highest noise levels are shown in bold.

Position		Measured 11 highest maximum noise events during the night-time										
1	L_{AFmax}, dB	90	88	87	87	87	87	87	87	87	87	**86**
	Source	Traffic	Bells	Bells	Bells	Bells	Bells	Bells	Bells	Bells	Bells	Bells
2	L_{AFmax}, dB	87	86	83	83	81	80	80	79	79	78	**78**
	Source	Sweeper	Traffic	Traffic	Traffic	Traffic	Bells	Traffic	Bells	Bells	Bells	Bells
3 (internal)	L_{AFmax}, dB	65	60	59	59	59	59	59	59	59	59	**59**
	Source	Traffic	Bells	Bells	Bells	Bells	Bells	Bells	Bird	Bells	Bells	Bells
4 (internal)	L_{AFmax}, dB	65	63	62	62	62	61	60	60	60	60	**60**
	Source	Traffic	Bells	Bells	Bells	Bells	Bells	Bells	Bells	Bells	Bells	Bells

Table 6: Measured L_{AFmax} events during the night time period

4.19 86 dB is not exceeded more than 10 times and therefore is used as the design case to determine compliance against ProPG Note 4 of Figure 2 for the purpose of break-in calculations.

4.20 Data for positions 3 and 4 show that internal L_{AFmax} noise levels were measured to exceed the recommended maximum value of 45 dB L_{AFmax} by up to 20 dB.

4.21 The recommended maximum was measured to be exceeded 62 times at position 3 and 50 times at position 4.

4.22 The 20 highest noise levels were noted as being from the town hall bells alone, except for the loudest event, noted to be a revving motorcycle.

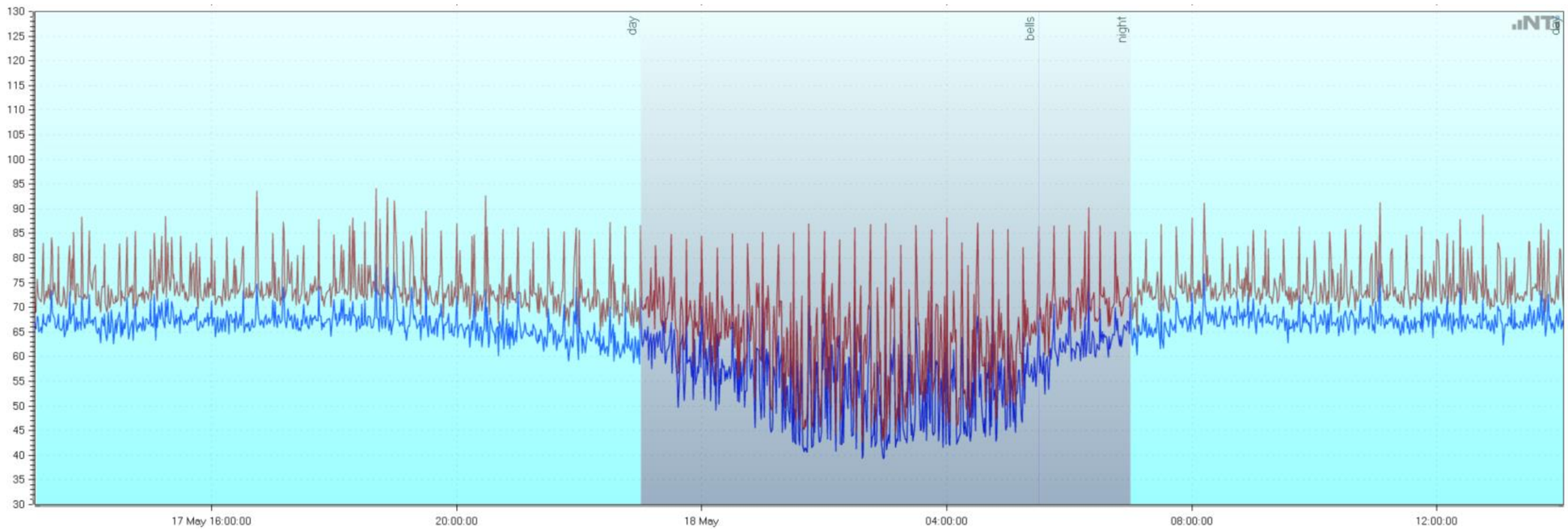


Figure 6: Position 1 time history of the recorded $L_{Aeq,1sec}$ and $L_{AF,max}$

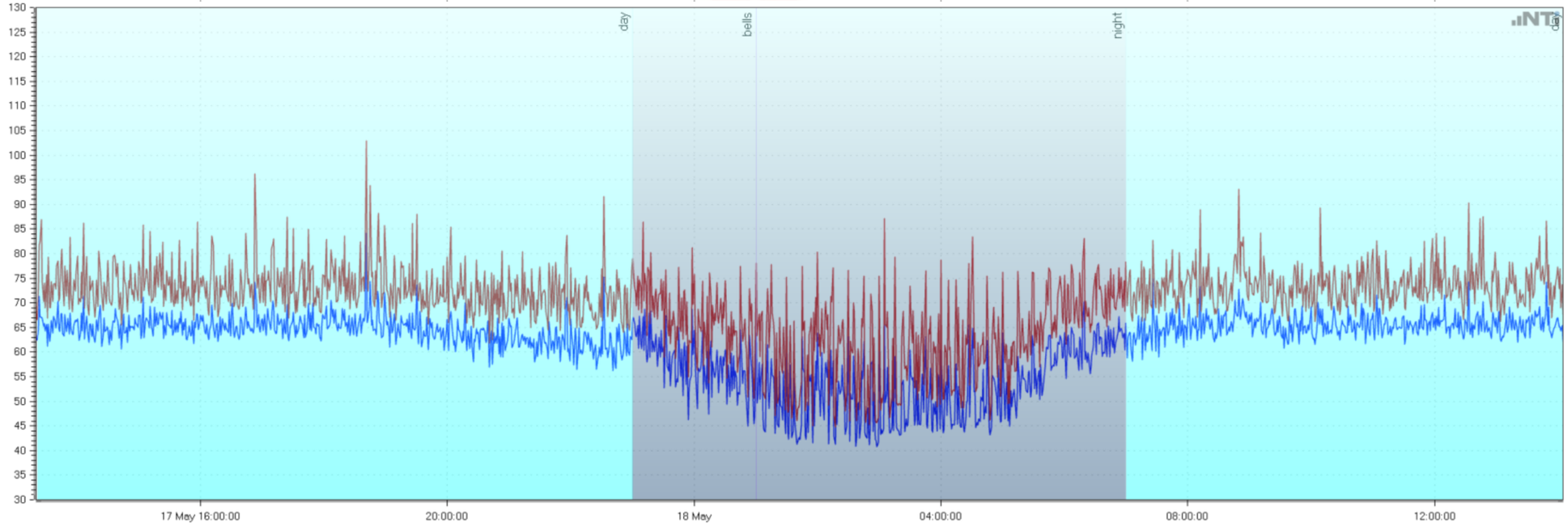


Figure 7: Position 2 time history of the recorded $L_{Aeq,1sec}$ and $L_{AF,max}$

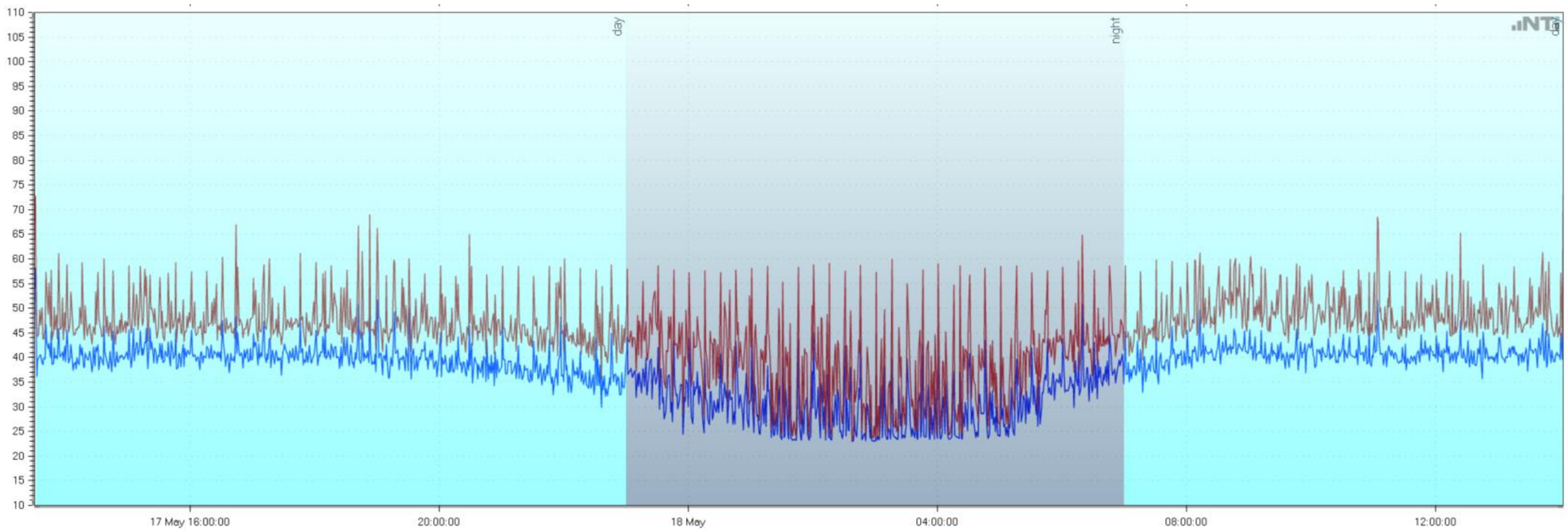


Figure 8: Position 3 time history of the recorded $L_{Aeq,1sec}$ and $L_{AF,max}$

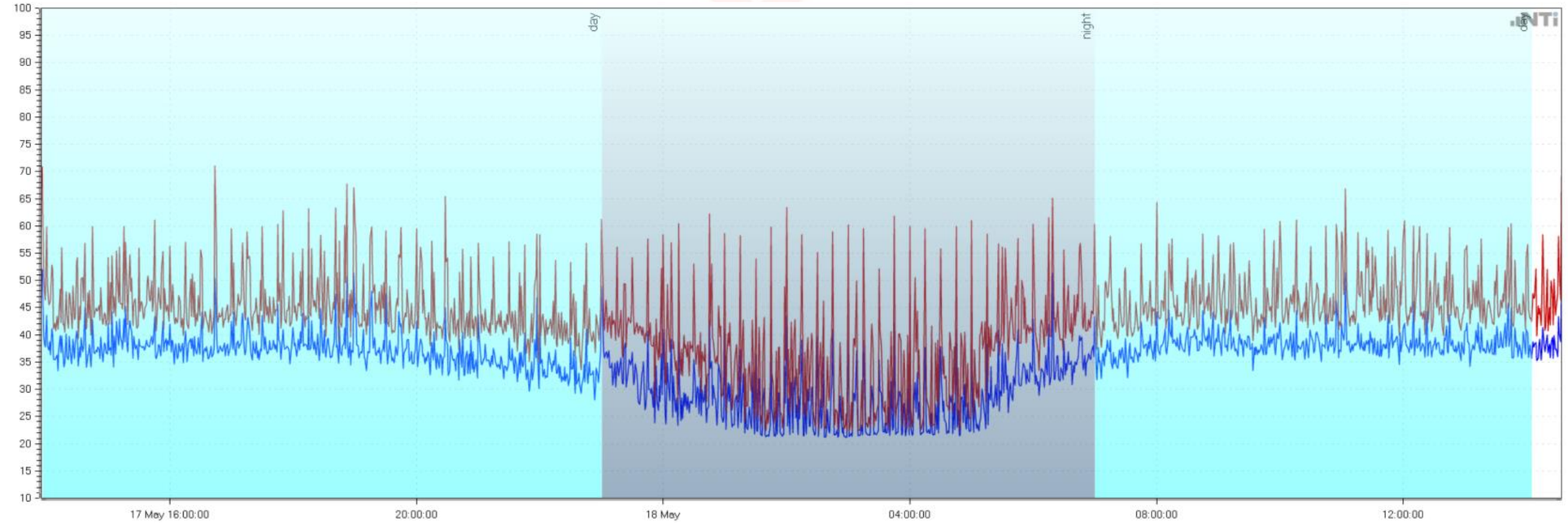


Figure 9: Position 4 time history of the recorded $L_{Aeq,1sec}$ and $L_{AF,max}$

5 Internal noise levels and how to achieve the limits

5.1 As outlined in paragraphs 4.20 to 4.22 the measured internal noise levels due to individual events exceed the recommended maximum number of occurrences and maximum noise level value.

5.2 The measured noise level, character of the sound, periodicity and number of occurrences would be likely to significantly affect the quality of sleep of future occupants.

5.3 The sound reduction performance of the envelope is recommended to be upgraded by means of new glazing units.

5.4 **Façade sound insulation calculations**

5.5 Free-field noise levels at the windows of the most exposed rooms which are used in the façade sound insulation calculations are shown in Table 7.

5.6 Octave band $L_{Aeq,T}$ noise levels in the 125 Hz to 2 kHz calculation range indicated in BS 8233 have been adjusted to match the single figure measured A-weighted noise level.

Elevation	Parameter	dBA	Octave band centre frequency, Hz A-weighted free-field noise level, dB				
			125	250	500	1k	2k
Beach Road	$L_{Aeq,16hr}$	**62**	48	53	55	59	52
	$L_{Aeq,8hr}$	**56**	39	45	48	53	49
	L_{AFmax}	**80**	40	58	70	78	76
Fowler Street	$L_{Aeq,16hr}$	**60**	47	52	54	56	51
	$L_{Aeq,8hr}$	**53**	39	43	46	49	46
	L_{AFmax}	**72**	46	53	66	69	66

Table 7: A-weighted external free-field noise levels used to calculate façade sound insulation

5.7 The calculation method for façade sound insulation is in accordance with BS 8233 and the principles of BS EN 12354-3, Reference 7.

5.8 From ISO 16283, Reference 8, the reverberation time is typically 0.5 seconds across the relevant frequency range for a furnished living room. This value is used for both living rooms and bedrooms.

5.9 Details of the methodology used to calculate internal noise levels are provided on our website: https://www.apexacoustics.co.uk/calculation-facade-sound-insulation/.

5.10 The minimum glazing and ventilator performances presented in the summary table are calculated to be required to reduce noise levels to below the LOAEL for internal noise levels in those rooms most exposed to external noise ingress.

5.11 Noise levels in less exposed but similarly protected rooms will be lower and therefore also comply with the internal noise level targets.

5.12 The most exposed rooms are those with the largest ratio of window area to room volume, as well as those closest and most exposed to the noise sources.

5.13 The room and window dimensions used in the calculations are taken from the architects' plans and elevations, Reference 5.

5.14 The sound reduction of the masonry portion of the facade is much higher than that of the glazing and ventilation provision. Therefore, noise penetration through the masonry is disregarded as relatively insignificant.

5.15 Calculated internal noise levels on the basis of the identified minimum performance requirements are presented in Table 8.

Elevation	Room affected	Calculated internal level		
		Daytime dB $L_{Aeq,16hr}$	Night-time dB $L_{Aeq,8hr}$	Night-time dB $L_{AF,max}$
Beach Road	Bedroom	27	20	43
	Living room	33	-	-
Fowler Street	Living room	35	-	-

Table 8: Summary of calculated worst-case internal noise levels

5.16 Based on the proposed façade sound insulation provision and the level and frequency of the measured maximum noise event, 45 dB $L_{AF,max}$ is unlikely to be exceeded more than 10 times per night, and is therefore below the LOAEL described in paragraph 3.10.

5.17 **Noise and Approved Document F ventilation conditions**

5.18 The proposed development will be required to meet Part F of the Building Regulations with regard to the whole dwelling ventilation condition, as described in Approved Document F (AD-F), Reference 6.

5.19 It is calculated that a maximum of 1 trickle ventilator achieving the minimum acoustic performance requirements in Table 1 is acoustically feasible in each room.

5.20 Based on these acoustic constraints, AD-F System 1 (background ventilators and intermittent extract fans) would not typically be feasible.

5.21 A suitable ventilation strategy may be AD-F System 3 (continuous mechanical extract (MEV)).

5.22 Per Table 5.2c of AD-F, where the designed air permeability of the scheme is greater than 5 $m^3/h/m^2$ at 50 Pa, background ventilators are not necessary.

5.23 Para 5.10 of AD-F goes on to recommend that

"*this option is selected only if designing to an air permeability leakier than 5 $m^3/h/m^2$ and if the person carrying out the building work has previous experience of closely matching design with as-built air permeability levels*."

5.24 It should be emphasised that the above is not intended to constitute a ventilation strategy design, which is the responsibility of the mechanical engineers.

5.25 Ventilation system design should be carefully considered. Research has shown that annoyance caused by noise from poorly designed systems frequently results in occupants curtailing the operation of the ventilation system. Such action leads to inadequate ventilation resulting in poor air quality, which is well correlated with a range of adverse health effects.

5.26 Purge ventilation conditions as described by AD-F is manually controlled ventilation of rooms or spaces at a relatively high rate to rapidly dilute pollutants and / or water vapour as released from occasional activities, such as painting and decorating or accidental releases such as smoke from burnt food or spillage of water. This type of ventilation is typically provided by opening windows.

5.27 For purge ventilation conditions, ProPG states:

"It should also be noted that the internal 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)."

5.28 Considering this guidance, opening windows is acceptable for these occasional events without giving risk to potential adverse effect on occupants.

5.29 It should be emphasised that the above is not intended to constitute a ventilation strategy design, which is the responsibility of others. Once the ventilation strategy is established, if the details vary from those described above, the proposed details should be reassessed for acoustic performance.

6 Conclusion

6.1 This report has been prepared in response to planning condition no. 6 of planning application ST/1082/21/FUL, and planning condition 6 of listed building consent ST/0948/21/LBC, for 1, 3, and 3a, Beach Road, South Shields.

6.2 These conditions regard the provision of a satisfactory internal noise environment.

6.3 The existing noise risk at the site is assessed in accordance with relevant standards and noise practice guidance.

6.4 Noise levels affecting the proposed development from local road traffic and the Town Hall bells have been measured during the day and night, and the façade noise impact calculated.

6.5 Internal noise levels were measured simultaneously with the existing glazing in place, and exceed the recommended maximum number of occurrences and maximum noise level value in terms of $L_{AF,max}$.

6.6 The measured noise level, character of the sound, periodicity and number of occurrences would be likely to significantly affect the quality of sleep of future occupants.

6.7 The sound reduction performance of the envelope is recommended to be upgraded by means of new glazing units.

6.8 The acoustic performance requirements for glazing and ventilators are summarised in Table 1. Based on these ventilator acoustic constraints, potential AD-F ventilation strategies are suggested.

6.9 Based on the details outlined in this report, the noise risks identified are able to be mitigated and minimised, and the site is considered suitable for residential development.

7 References

1 Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH), "ProPG: Planning & Noise - New Residential Development," May 2017.

2 BS 8233: 2014, Guidance on sound insulation and noise reduction for buildings.

3 Guidelines for Community Noise, Edited by Birgitta Bergland, Thomas Lindvall, Dietrich H Schwela, World Health Organisation, 1999.

4 BS 7445:2003, Description and measurement of environmental noise. Guide to quantities and procedures.

5 Architect's Drawings; Edwards Architecture Ltd. 2022; 20063-EArch-FE-AP-DR-A-0151-P02, 20063-EArch-Beach Road Design and Access Statement 26.10.21, 20063-EArch-PL-FF-DR-A-0011-P09, 20063-EArch-PL-FF-DR-A-0135-P06.

6 Approved Document F 2021 Edition, The Building Regulations 2000.

7 BS EN 12354-3:2000, Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound.

8 BS EN ISO 16283-1:2014 Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation.