ACOUSTIC CONSULTANTS LTD

Noise Impact Assessment

Proposed Residential Development
Longbrook St, Exeter

Reference: 11193A/GK

Client & Architect

Pulse Consult

Document Control					
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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

Table of Contents

1. Introduction

Pulse Consult Limited appointed Acoustic Consultants Limited to provide noise advice for the proposed 8 storey student accommodation to be located at Longbrook St in Exeter.

The development currently has planning permission (application Ref. no: 23/1331/NMA and 20/1769/FUL, Exeter City Council).

This report provides the results of a noise survey conducted on the existing site and assesses the impact of environmental noise upon the sensitive elements of the proposed development.

The site is subject to Planning Condition 14 (Application Ref. No. 20/1769/FUL), which establishes plant rating noise limits ($L_{Ar,T}$) at the nearest residential receptors, including those of the proposed scheme. However, this will be addressed in a separate report focused specifically on plant noise impact and Planning Condition 14.

In addition, a separate report providing comments on the Stage 4 design in relation to sound insulation, in accordance with Approved Document E, has been produced and was issued to the client on 17th of February 2025.

This report has been undertaken in accordance with British Standard 8233:2014 Approved Document O (ADO).

2. Site and Location

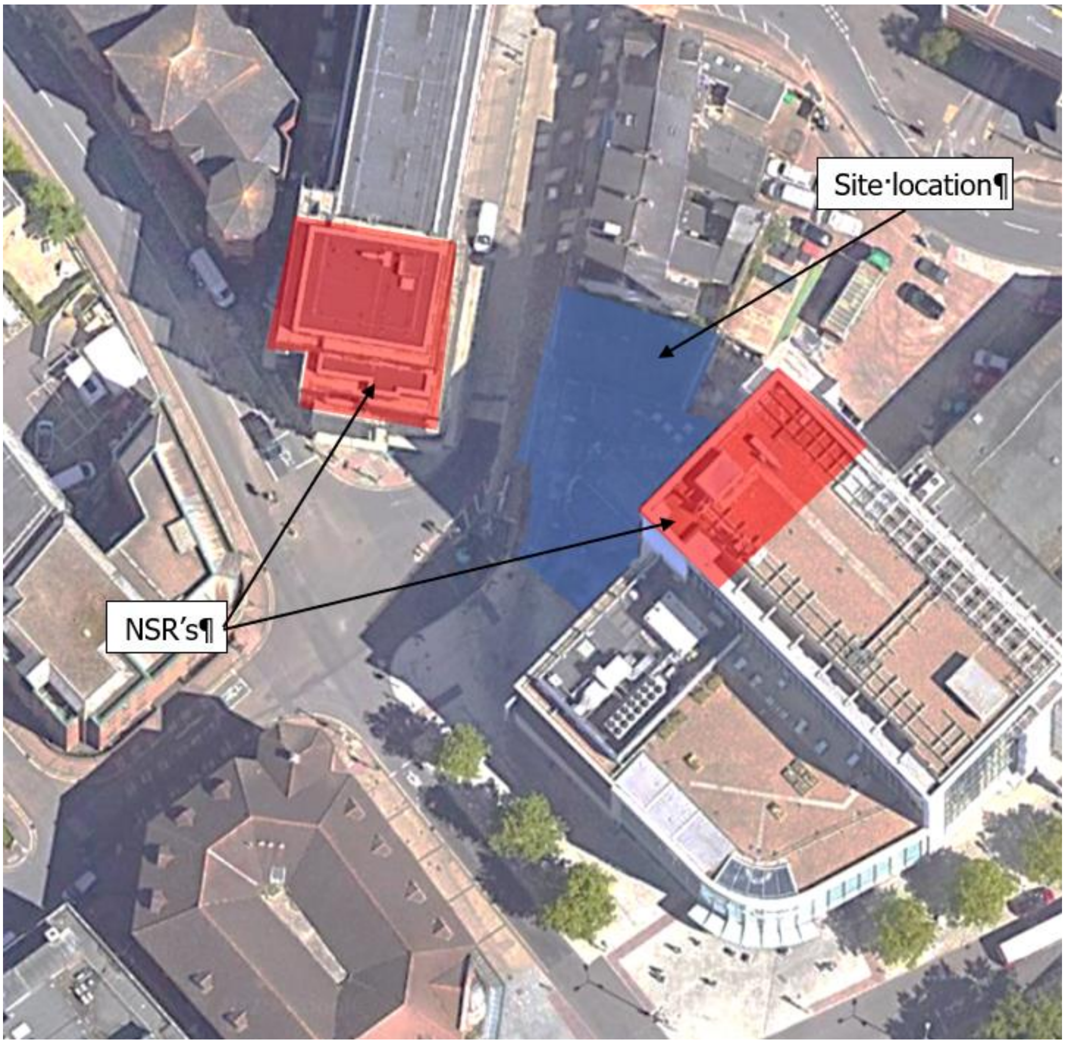
The site is located at 26-28 Longbrook Street, Exeter EX4 6AE where the proposals are to build an 8-story student accommodation building.

The site is in a mixed commercial and residential area with a John Lewis department store on the southern boundary and various commercial units to the north. It is understood that the nearest existing residential receivers are situated above the John Lewis store and in the multi-storey building opposite the site on Longbrook Street.

The main source of noise affecting the proposal site is road traffic noise from Longbrook Street on the western site boundary and New N Road and Bailey Street to the south.

The site location and main noise sources are highlighted in the figure below:

Figure 1: Site location in blue and main noise sources



3. Baseline Noise Survey

A partially attended noise monitoring exercise was completed at the site between the 10th of January and the 13th January 2025 to determine the environmental noise levels affecting the site.

3.1. Monitoring Equipment

Sound Pressure Levels were measured using a Class 1 sound level meter with a half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

This equipment was checked and calibrated as noted below and the certificates are available for inspection.

Table 1: Monitoring equipment

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
LT1			
SLM, Cirrus Research, CR:171C	G071684	07/12/2023	204425
Microphone, Cirrus Research, MK224	211710D	07/12/2023	204425
Calibrator, Cirrus Research, CR:515	73217	07/01/2025	1510516-1
ST1			
SLM, NTI, XL2	A2A-20250-E0	10/04/2024	1508377-1
Pre-Amp, NTI, MA220	10592	10/04/2024	1508377-1
Microphone, NTI, MC230A	A22596	10/04/2024	1508377-1
Calibrator, Larson Davis, CAL200	19741	10/04/2024	1508377-2
ST2			
SLM, NTI, XL2	A2A-09705-E0	10/10/2023	UK-23-113
Pre-Amp, NTI, MA220	5332	10/10/2023	UK-23-113
Microphone, NTI, MC230A	A14374	10/10/2023	UK-23-113
Calibrator, NOR-1251	35230	24/10/2024	1510319-1

3.2. Weather Conditions

On the set-up of the long-term survey measurement there was light rain and gentle winds of 4m/s. Throughout the survey and on collection, it was calm and dry with wind speeds of 3m/s and an average temperature of 10 degrees Celsius. During the short-term measurements, conditions were calm and dry.

The weather conditions are not expected to have adversely affected the measured data.

3.3. Monitoring Procedure

To assess the existing background noise climate at the site, as well as the specific noise levels impacting the site from roads, measurements were taken at three locations. The primary noise climate at all these locations consisted of road traffic and pedestrian noise. The details for each monitoring location are as follows:

3.3.1. Long Term Noise Monitoring

The microphone at LT1 was in a free-field position, approximately 1.5m above the ground.

3.3.2. Short Term Measurements

Two short-term, 30 minute attended monitoring surveys were undertaken at positions ST1 and ST2. At both locations, the microphone was in a free-field position, approximately 1.5m above the ground

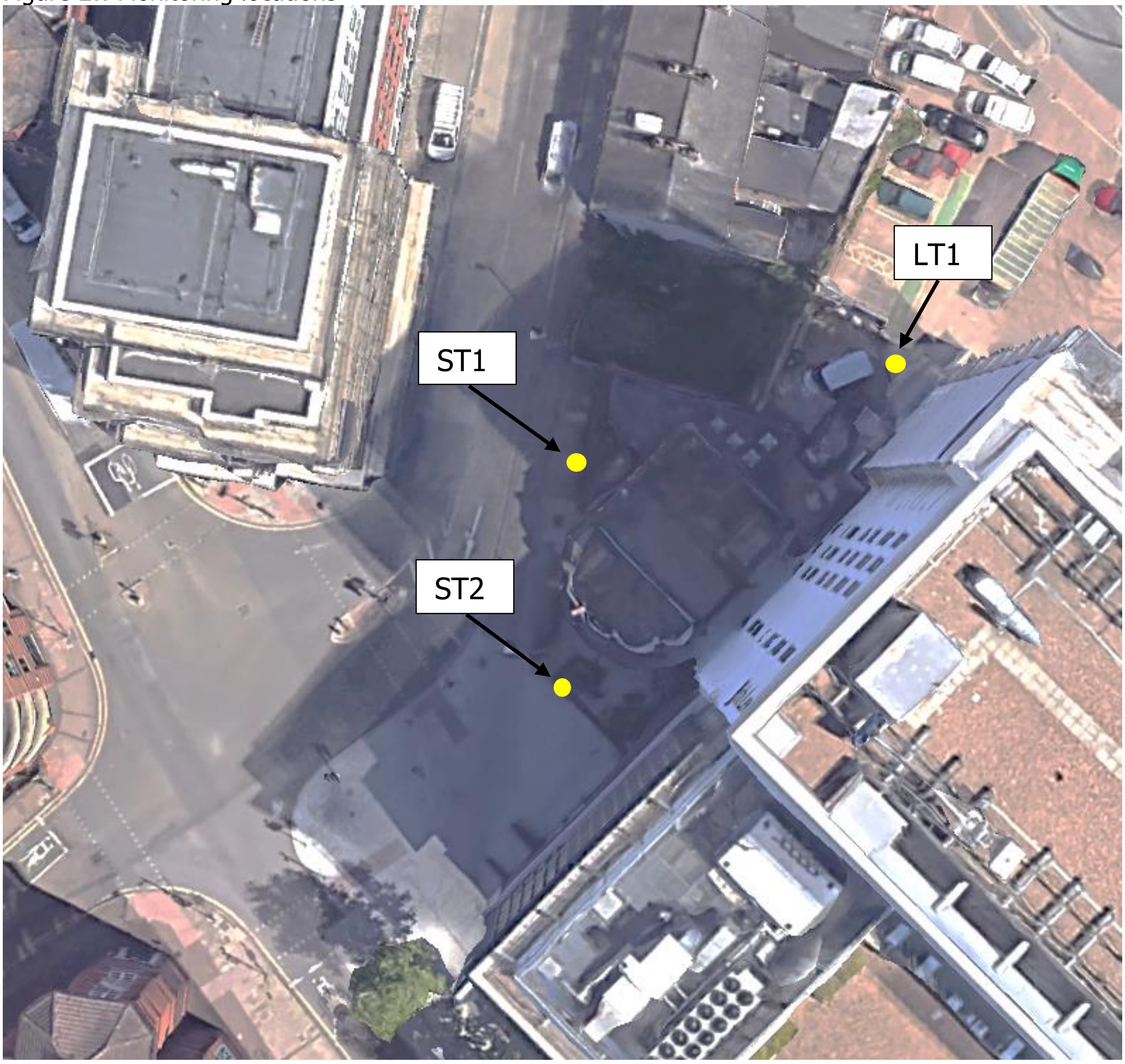
ST1 was located at the western boundary of the site to the side of Longbrook Street which is representative of the western façade of the proposed development. ST2 was located to the south of site, representative of the development's south façade.

Noise monitoring at these two locations was undertaken simultaneously during monitoring at LT1. We have calculated the level difference during the measurement period between these two locations and LT1. The difference has then been applied to the long term measured data at LT1 to determine and calibrate representative long-term sound levels at both short-term locations.

3.4. Monitoring Locations

The following figure shows the respective monitoring locations highlighted above:

Figure 2:: Monitoring locations

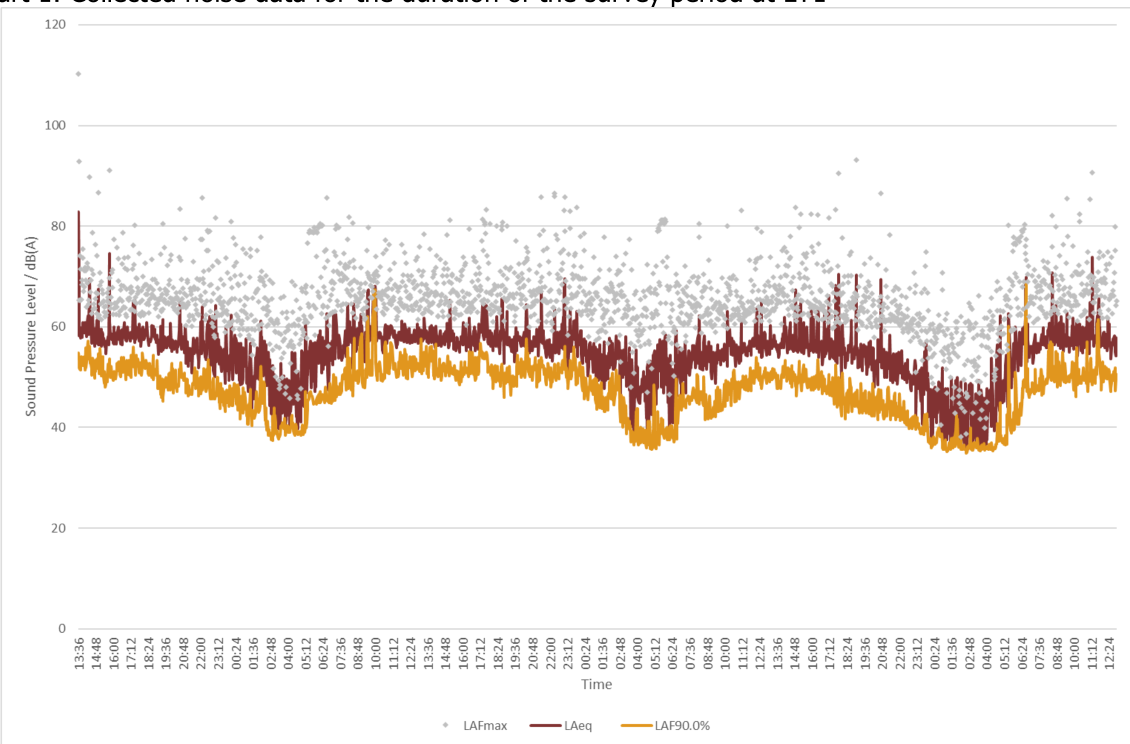


3.5. Monitoring Results

3.5.1. Monitoring Location LT1

The measured equivalent ($L_{Aeq, T}$), maximum (L_{AFmax}), and background ($L_{A90, T}$) noise levels during the survey are shown in the chart below, with data displayed in 2-minute intervals.

Chart 1: Collected noise data for the duration of the survey period at LT1



The measured daytime and night time equivalent ($L_{eq,T}$) noise levels and night-time maximum (L_{Fmax}) noise levels during the survey are provided in the table below.

Table 2: Equivalent noise level and maximum noise levels at LT1 (free-field levels)

Parameter	Sound pressure level (dB) per Octave Band (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
$L_{Aeq, 16 hours}$	67	61	56	54	55	52	49	46	59
$L_{Aeq, 8 hours}$	60	56	52	50	50	47	41	31	54
L_{AFmax}	76	77	75	75	76	75	70	59	81

The measured range and model/typical for background ($L_{A90, 15 min}$) and equivalent ($L_{Aeq, 15 min}$) noise levels at LT1 are provided in the following table.

Table 3: Measured equivalent and background noise levels at LT1 (free-field levels)

Period	$L_{A90,15min}$ dB		$L_{Aeq,15min}$ dB	
	Range	Mode	Range	Typical
Day (07:00 - 23:00)	41 - 55	50	49 - 66	58
Night (23:00 - 07:00)	35 - 53	36	43 - 65	53

3.5.2. Monitoring Location ST1

The measured noise levels from the short-term attended survey at ST1 are as follows:

Chart 2: Collected noise data for the duration of the survey period at ST1

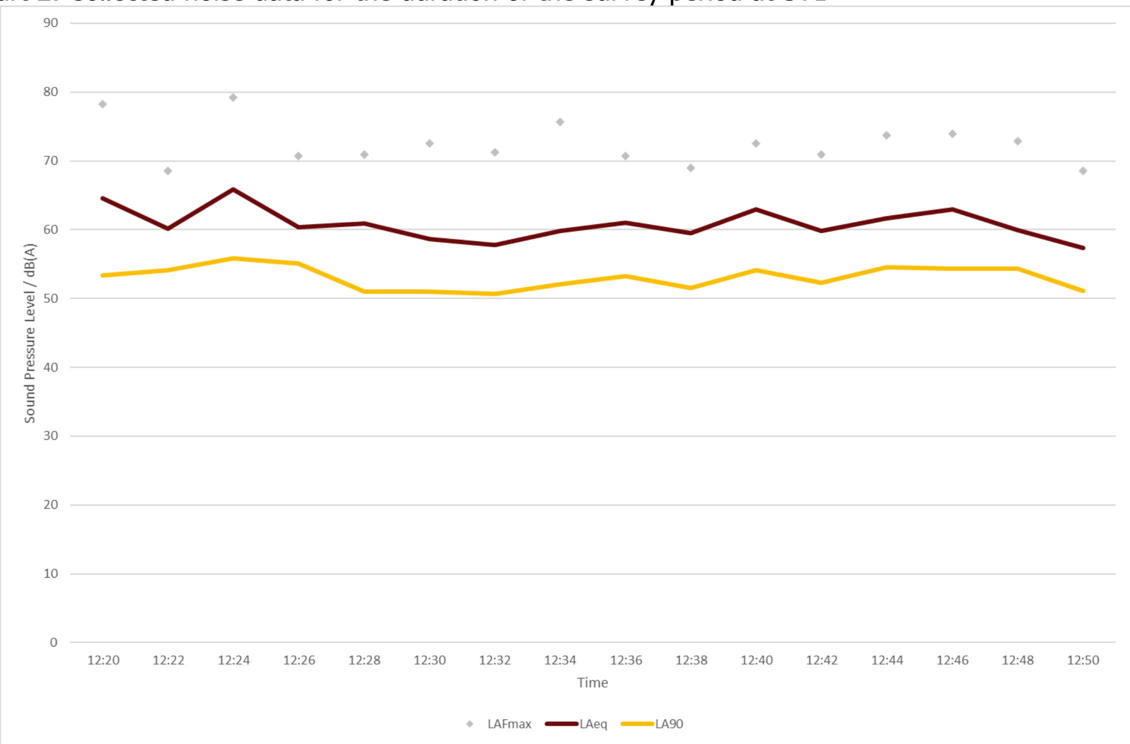


Table 4: Equivalent noise levels and maximum noise levels at ST1

Parameter	Sound pressure level (dB) per Octave Band (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
$L_{Aeq, 30 min}$	71	66	62	59	57	53	45	44	62
L_{AFmax}	87	86	77	68	62	60	56	52	74

3.5.3. Monitoring Location ST2

The measured noise levels from the short-term attended survey at ST2 are as follows:

Chart 3: Collected noise data for the duration of the survey period at ST2

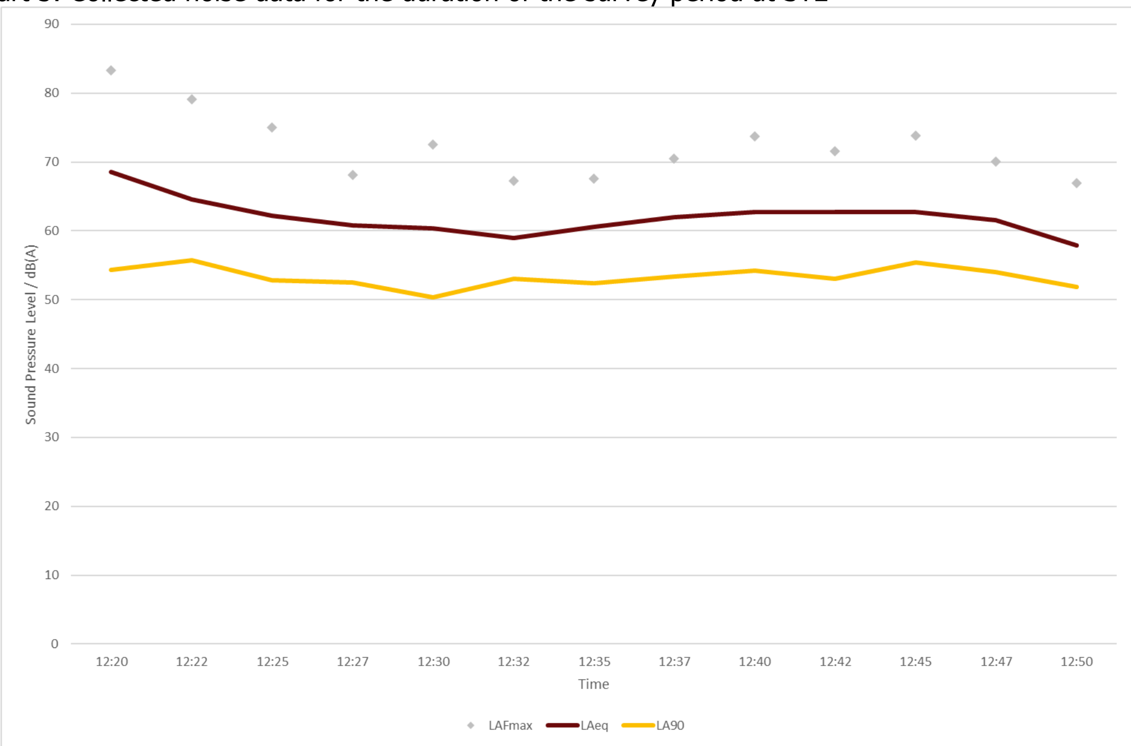


Table 5: Equivalent noise level and maximum noise levels at LT2 (free-field levels)

Parameter	Sound pressure level (dB) per Octave Band (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
$L_{Aeq, 30\ min}$	69	66	64	60	58	54	47	42	63
L_{AFmax}	77	84	86	78	71	66	59	54	80

3.6. Long Term Noise Monitoring Predictions at ST1 and ST2

Both measurements at ST1 and ST2 were captured simultaneously with measurements at location LT1. The following table shows a comparison of both 30-minute measured equivalent noise levels from the short-term locations and LT1.

This gives the level difference between these locations which can be used to determine the façade design levels.

Table 6: Noise Level differences between ST1 and ST2 with LT1

Period (hh:mm)	Location	Sound pressure level (dB) per Octave Band (Hz)								dBA
		63	125	250	500	1000	2000	4000	8000	
12:18 to 12:55	ST1	71	66	62	59	57	53	45	44	62
	LT1	67	61	57	54	53	49	43	35	58
	Difference	**4**	**5**	**5**	**5**	**4**	**4**	**2**	**9**	**4**
	ST2	69	66	64	60	58	54	47	42	63
	LT1	67	61	57	54	53	49	43	35	58
	Difference	**2**	**5**	**7**	**6**	**5**	**5**	**4**	**7**	**5**

The above sound level differences have been applied to the measured long term noise data from LT1 to determine the following long term noise levels at locations ST1 and ST2.

Table 7: Equivalent noise level and maximum noise levels at ST1 (free-field levels)

Parameter	Sound pressure level (dB) per Octave Band (Hz)								dBA
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
$L_{Aeq, 16 hours}$	71	66	61	59	59	56	51	55	63
$L_{Aeq, 8 hours}$	64	61	57	55	54	51	43	40	58
L_{AFmax}*	77	84	86	78	71	66	59	54	80

*Highest max in this instance was a motorbike passing

Table 8: Equivalent noise level and maximum noise levels at ST2 (free-field levels)

Parameter	Sound pressure level (dB) per Octave Band (Hz)								dBA
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
$L_{Aeq, 16 hours}$	69	66	63	60	60	57	53	53	64
$L_{Aeq, 8 hours}$	66	66	64	61	59	56	47	47	63
L_{AFmax}*	77	84	86	78	71	66	59	54	80

*Highest max in this instance was a motorbike passing

4. Indoor Ambient Noise Levels

4.1. Noise Mitigation Zones

Façades across the developments are subject to different external noise levels due to variations in exposure to and distances from environmental noise sources.

Based on the predicted noise levels, it will be necessary to design the building fabric of the proposed dwellings to control the levels of environmental noise internally.

The following mark-up shows the colour coded mitigation zones that are referred to within the following sections. Facades to non-habitable spaces as shown in the existing drawings will require no mitigation.

Figure 3: Mitigation zones – 1st floor

Figure 4: Mitigation zones – 2nd to 5th floor

Figure 5: Mitigation zones – 6th to 7th floor

Figure 6: Mitigation zones – 8th floor

4.2. **Calculation Method**

Calculations for indoor ambient noise levels due to road traffic noise have been undertaken using the calculation method provided in Annex G Section G.2 of British Standard 8233:2014, the building facade construction specified below, and the octave band free-field design equivalent noise levels and maximum noise levels taken from the measured noise spectra noted above.

The room and window dimensions are based off the architectural drawings for the proposed development.

We advise that building elements, having the sound insulation performances noted below, be incorporated into the design of the façades including the windows, doors, floor and ventilation system.

Alternative constructions to those noted below could be used, however they would need to be assessed to ensure they control external noise to within the BS 8233:2014 and recommended internal ambient noise level criteria.

The calculations are based on the dimensions within architectural drawings, as well as the following assumptions:

- Habitable rooms have a height of 2.4m.
- Reverberation time of 0.5 seconds within all habitable rooms.
- The development is ventilated via natural ventilation, with no continuous mechanical extract ventilation (MEV). As such, in accordance with Approved Document F, trickle vents have a total minimum area of 8000mm^2 per habitable room. Please note that if continuous MEV is installed, then the acoustic performance will need reassessing.
- Should the drawings be updated, new mitigation measures may be required.

4.3. Building Façade Construction

Alternative constructions to those noted below could be used, however they would need to be assessed to ensure they control external noise to within the recommended internal ambient noise level criteria.

4.3.1. External Wall Construction

Within all zones, external wall type specifications detailed in the architectural drawings. The walls are expected to be of lightweight construction and will comprise of the following:

Wall Type 1 to 4

- Red Brick (102.5mm) (assumed min. 164 kg/m^2)
- Cavity (50mm)
- Rockslik – Rainscreen Slab (130mm) (assumed min. 48 kg/m^3)
- Sheathing (12mm) (assumed min. 8.7 kg/m^2)
- Glass Mineral Wool (100mm) (assumed min. 33 kg/m^3)
- 2 layers of 12.5mm Gypsum Wallboard (assumed min. 16 kg/m^2)

Wall Type 5 to 6

- Zinc standing beam 5mm (assumed min. 5.7 kg/m^2)
- Ventilated Void (38mm)
- Rockslik – Rainscreen Slab (100mm) (assumed min. 48 kg/m^3)
- Sheathing (12mm) (assumed min. 17.3 kg/m^2)
- Glass Mineral Wool (100mm) (assumed min. 33 kg/m^3)
- 2 layers of 12.5mm Gypsum Wallboard (assumed min. 16 kg/m^2)

Wall Type 7 - 10

- Fibre Cement Cladding Panels (assumed min. 32.6 kg/m^2)
- Ventilated Void (50mm)
- Rockslik – Rainscreen Slab (100mm) (assumed min. 48 kg/m^3)
- Sheathing (12mm) (assumed min 17.3 kg/m^2)
- Glass Mineral Wool (100mm) (assumed min. 33 kg/m^3)
- 2 layers of 12.5mm Gypsum Wallboard (assumed min. 16 kg/m^2)

The above wall constructions have been modelled with a proprietary sound insulation software and are expected to achieve the following sound reduction indices:

Table 9: Required sound reduction of external facades

Type	Sound Reduction Index / dB per Octave Band (Hz)								R_w (dB)
	63	125	250	500	1k	2k	4k	8k	
Wall Type 1 to 4	41	49	52	61	66	69	71	71	64
Wall Type 5 to 6	27	43	48	53	58	58	58	58	56
Wall Type 7 to 10	26	40	45	49	51	57	60	60	53

Any alternative wall constructions should achieve the above at a minimum or be provided to us for review.

4.3.2. Window Construction

The following table shows the minimum sound reduction performance of the windows to all habitable rooms on all floors:

Table 10: Required sound reduction of windows

Zone	Required Element Normalised Level Difference (dB) per Octave Band (Hz)							R_w (dB)	Typical Construction
	63	125	250	500	1k	2k	4k		
	20	24	20	25	35	38	35	31	Double Glazing: e.g. 4/12/4
Facades using Wall Type 5 to 10 (Fibre cement or Zinc Standing Seam)	31	35	41	47	50	52	65	49	Enhanced Glazing: e.g. 16.8/15/16.8
Facades using Wall Type 1 to 4 (Brick)	24	29	38	44	52	49	64	47	Enhanced Glazing: e.g. 12.8/15/12.8

Any alternative windows build-ups should achieve the above at a minimum or be provided to us for review.

4.3.3. Roof Construction

The proposed roof construction is understood to be flat, comprising a 200mm thick reinforced concrete slab (minimum mass 465kg/m²), with 210mm thick 'Tissue Faced Insulation' above and a plasterboard suspended ceiling below. This construction is deemed acceptable and is expected to achieve the following sound insulation performance, as estimated using proprietary sound insulation software:

Type	Sound Reduction Index / dB per Octave Band (Hz)								R_w (dB)
	63	125	250	500	1k	2k	4k	8k	
Roof, 200mm thick Concrete Slab	44	44	47	54	61	66	71	71	59

4.4. Ventilation Provisions

4.4.1. Background Ventilation

The habitable rooms will need to be ventilated via attenuated means. The ventilation should include the necessary sound attenuation in order that the ingress of external noise is controlled to be compatible with the building fabric.

The vents are required to achieve the following element normalised level difference ($D_{n,e}$) in the open position. The supplier of any chosen ventilation product should provide test data confirming that the ventilation system meets the following performance data. There should be no unattended vents or openings in the façade.

The following table shows the required sound reduction of ventilation for all habitable rooms on all floors. The minimum number of vents is also provided, to achieve the minimum equivalent area criteria of Approved Document F ($\geq$ 8000mm^2 per habitable room). Please note that if the dwelling only has one exposed façade, then expert advice is required, and the above noted minimum ventilation performance is subject to change.

Table 11: Required sound reduction of ventilation

Zone	Required Ventilator Sound Insulation Performance, $D_{n,e}$ per Octave Band (Hz)								$D_{n,e,w}$ (dB)	Typical Construction	Minimum No. of Vents
	63	125	250	500	1k	2k	4k	8k			
	30	35	35	36	34	29	33	34	32	*Standard Trickle - XS13 4400 EA+XC13 412 Canopy* (4000 mm^2)	2
	45	47	46	50	55	65	68	60	54	*Wall Vent - Greenwood MA3051* (2500mm^2)	2

The ventilation supplier should confirm the above performance is achievable when tested to the current British Standards.

Since a significant amount of wall vents will need to be considered to meet Approved Document F requirements and internal noise levels, a more appropriate choice could comprise mechanical ventilation such as MVHR system. Where mechanically ventilation is considered, then it might be possible to reduce slightly the window performances since there is no need to provide trickle vents/ wall vents on the façade as stated above.

Where mechanically ventilation is considered, the minimum required atmosphere-to-room sound level difference along the proposed elevations is as outlined below in Table 13: Minimum required atmosphere-to-room sound level difference for MVHR.

4.4.2. **Overheating Ventilation**

It should be noted that under overheating conditions the windows may need to be opened. Where this is the case, the requirements of Approved Document O (ADO) will need to be met.

ADO classifies this development as a 'Moderate Risk Location'. The ADO Noise Guide published November 2024 suggests that an open window under overheating conditions should provide approximately 10dB of outside-to-inside level difference in moderate risk locations.

With open windows, the night-time overheating noise criteria (40 dB $L_{Aeq,8hour}$ and 55 dB L_{AFmax} no more than 10 times) is expected to be exceeded in all locations at the development without specifying a maximum equivalent area.

The following table gives the maximum equivalent area of an open window or vent permittable for each volume range in each mitigation zone. This is calculated following the method outlined in section 5.2 of the ADO Noise Guide Version 1.1, issued November 2024. It should be noted that any stated areas should be communicated to a dynamic thermal modelling consultant.

Table 12: Maximum required equivalent area per room volume

Mitigation Zone	Max total Equivalent Area (m²) per Room Volume (m³)					
	≤ 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50
(yellow)	0.06	0.07	0.08	0.09	0.10	0.11
(green)	0.02	0.02	0.02	0.03	0.03	0.03

Where these open window equivalent areas are exceeded, an alternative attenuated form of ventilation/cooling will be required. This could be achieved with a suitably designed domestic MVHR system.

If mechanical ventilation is required to mitigate overheating within bedrooms on these façades (dependent on the overheating assessment), the sound level difference between the level of external noise at the atmospheric terminal and the level within the room, 1.5 metres from the grille should be as follows:

Table 13: Minimum required atmosphere-to-room sound level difference for MVHR

Mitigation Zone	Required Sound Level Difference
(yellow)	≥ 36 dBA
(green)	≥ 45 dBA

The sound level difference above is what would be required of the full mechanical cooling system and the final performance would be dependent on the chosen cooling system and on numerous factors such as atmospheric terminal location, duct layout, number of bends etc.

4.5. Effect of Mitigation Measures

With the noted building fabric construction, and suitable ventilation provisions, the predicted internal noise levels within the proposed dwellings are within the criteria of British Standard 8233:2014 of 35dB $L_{Aeq,16hour}$ in the daytime rooms, and 30 dB $L_{Aeq,8hour}$ and 45 dB $L_{Amax,F}$ in the night-time rooms.

Calculations for the worst-case studio room in the green zone is provided below:

Figure 7: Studio room in green zone calculations

Free Field Level at Façade

Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Day, $L_{eq,16hour}$	69	66	63	60	60	57	53	53	65
Night $L_{eq,8hour}$	66	66	64	61	59	56	47	47	64
Night-time $L_{max(fast)}$	77	84	86	78	71	66	59	54	80

Building Façade Construction

External Element		63	125	250	500	1000	2000	4000	8000
Wall Vent - Greenwood MA3051 – 54 Dnew (EA 2500 mm2)	D_{ne}	45	47	46	50	55	65	68	60
10000	Number of	4							
TRUE		0	0	0	0	0	0	0	0
102.5mm Brick, 15mm void, 100mm Mineral Wool, 12mm Sheathing, 100mm Wool, x2 12.5mm Gypsum 64 Rw		39	49	52	61	66	69	71	71
	Area	3							
		0	0	0	0	0	0	0	0
Enhanced glazing: 12.8/15/12.8 - 47 Rw		24	29	38	44	52	49	64	60
	Area	9							
		0	0	0	0	0	0	0	0

Calculations to BS EN 12354

	63	125	250	500	1000	2000	4000	8000
Sum	0.00315	0.001026612	0.000203278	6.29276E-05	1.53996E-05	1.0477E-05	8.3794E-07	4.04234E-06
10log sum	-25.01396301	-29.88593797	-36.91909292	-42.01158726	-48.12489676	-49.79762949	-60.76787251	-53.93366662
10log S/A	-0.614524791	-0.614524791	-0.614524791	-0.614524791	-0.614524791	-0.614524791	-0.614524791	-0.614524791
correction factor +3	3	3	3	3	3	3	3	3

Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Day, $L_{eq,16hour}$	46	38	28	20	14	10	-5	1	**27**
Night $L_{eq,8hour}$	43	38	29	21	13	9	-11	-5	**26**
Night-time $L_{max(fast)}$	54	56	51	38	25	19	1	2	**45**
NR Calc:									
Day, $L_{eq,16hour}$	14	19	18	17	14	13	1	9	**NR19**
Night $L_{eq,8hour}$	10	19	19	18	13	12	-5	3	**NR19**
Night-time $L_{max(fast)}$	24	40	42	35	25	22	7	10	**NR42**

5. Summary and Conclusions

Pulse Consult Limited appointed Acoustic Consultants Limited to provide a noise impact assessment for the proposed student accommodation development to be located at Longbrook Street in Exeter.

This report provides the results of a noise survey conducted on the existing site and assesses the impact of environmental noise upon the sensitive elements of the proposed development.

A noise survey has been undertaken on-site, the results of which are summarised in this report. The survey data and site plans have been used to predict the noise impact to the proposed accommodation across the site.

This report has been undertaken in accordance with British Standard 8233:2014 Approved Document O (ADO).

With the recommended fabric construction and suitable ventilation provisions, the predicted internal equivalent noise levels due to external noise sources impacting upon the site currently are within the recommended BS8233:2014 noise criteria.

As such, we would consider external noise can be suitably controlled within the habitable rooms of the proposed development and good internal conditions can be achieved based on the recommended noise mitigation measures set out in this report.

6. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure pA – 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.

A-weighted sound pressure level, L_{pA} - quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$L_{pA} = 10 \log_{10} (p_A/p_0)^2$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
p_0 is the reference sound pressure (20 μPa)

Background sound level, $L_{A90,T}$ – A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{Aeq,T} = 10\lg_{10}\left\{(1/T)\int_{t_1}^{t_2} [p_A(t)^2/p_0^2]dt\right\} \quad (1)$$

where:

p_0 is the reference sound pressure (20 μPa); and

$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. 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).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

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, $L_s = L_{Aeq,Tr}$ – 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.

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.

Rating level, $L_{Ar,Tr}$ – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, eVDV – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

Weighted sound reduction index, R_w – Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).

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