BS8233 Assessment For

2 Chester Road,

Wrexham,

LL12 7AD



September 4th 2025

Prepared by:

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1.0 Introduction

1.01 E2 Consultants have been commissioned to undertake a noise impact survey and assessment for the construction of an apartment block at 2 Chester Road, Wrexham, LL12 7AD

1.02 The methodology used for this assessment will be BS8233:2014 as this is a new development within the designated area. BS4142:2014+A1:2019 will also be considered with the possibility of industrial noise should external plant be used.

1.03 The report will also issue recommendations of acoustic performance of glazing and, if required, ventilation proposals in order for the future dwelling to meet all necessary criteria.

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2.0 Development Description

2.0.1 The proposed set of dwellings are located off Chester Road, opposite the Wrexham Theatre. The south façade will back onto a car park area, with the village hall and county court buildings to the East. The rest of the nearby buildings are residential.

2.0.2 The development consists of a three-storey apartment block in the current vacant land to the East of Chester Road. There are no buildings of an industrial nature and therefore a BS4142:2014 survey has not been deemed required at this point. Should AC units or ASHPs become part of the scheme in future a BS4142:2014 report will be required to be completed by a suitably competent person.

2.0.3 The main noise sources likely to disrupt the proposed building is traffic from Chester Road.

2.0.4 With the above sources in mind the monitoring took place in the currently vacant plot in order to obtain background noise levels that were not affected by the security hoarding around the site perimeter.

2.1 Locations of Monitors

2.1.1 One Type 1 sound level meter was installed on site, setup on a tripod in a secure location. This was run for a period of 24hrs to cover representative façade impact levels both during the daytime and night-time periods.

2.1.2 Figure 1 & 2 shows the area where the monitor was installed. All locations are displayed on site map in figure 3.

Figure 1 – front assessment location



Figure 2 – rear assessment location



2.1.4 Measurements were made in 15 minute periods, on 1 second averaging, to allow for the removal of anomalies and increased accuracy. The data was averaged into L_{Aeq_16hr} daytime and L_{Aeq_8hr} night-time with data also recorded for L_{AMax} in both day and night periods for the BS8233:2014 assessment. L_{A90} was also measured for the BS4142:2014 aspect.

2.1.5 The monitoring was conducted using 1 x Type 1 NTI XL2 sound level meter, outdoor case with batteries and outdoor microphone protection.

2.1.6 The measurements were taken by a fully qualified engineer with AMIOA status with the institute of Acoustics.

2.1.7 All measurements were taken after a field calibration was undertaken to ensure accuracy and repeatability of measurements. Drift was also checked post measurement to validate the data collected.

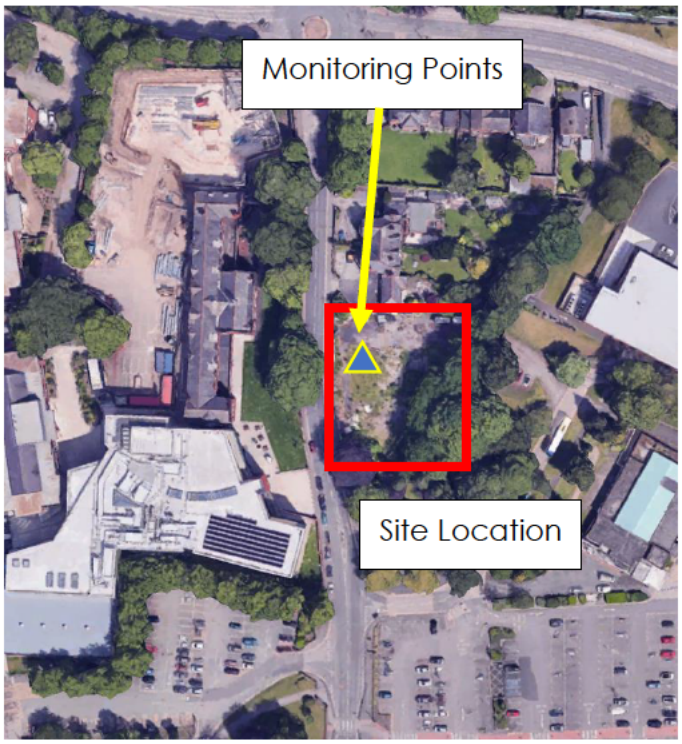
2.1.8 Further data such as wind speed, wind direction, rainfall intensity, temperature and cloud cover were all recorded at the beginning and end of the assessment at the monitoring location.

2.1.9 Any anomalies (such as noise by the engineer during setup and collection of the kit) were removed from the survey for a true reflection of the ambient levels in the vicinity. This was done by recording audio throughout the survey at each location and listening back through the files during the analysis process to confirm what was recorded manually during the survey.

2.1.10 Care was taken to inform any residents in the area that audio recording was taking place.

2.0 Plan Views of Site with Designated Work Areas

Figure 3

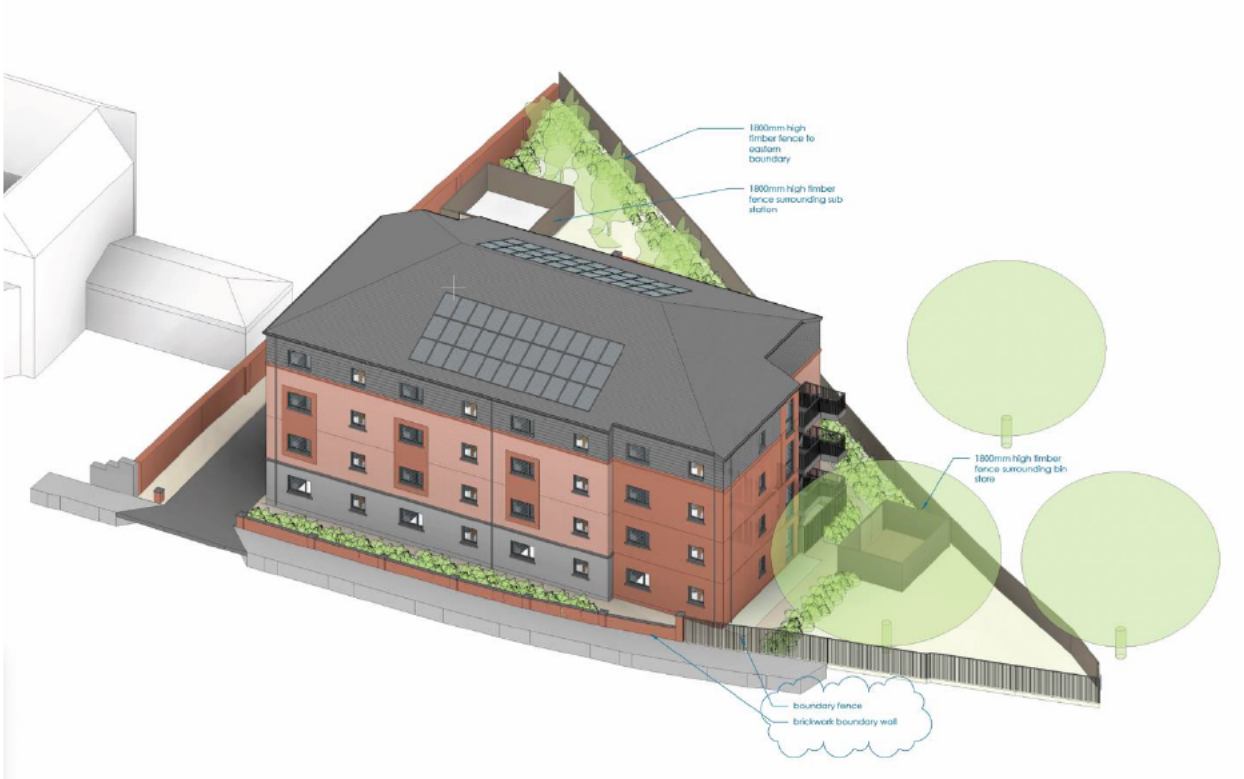


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2.3 Proposed Layout

Figure 4





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3.0 Noise Assessment Criteria - National Planning Practice Framework

3.0.1 The Planning Policy Wales sets out the Government's economic, environmental and social planning policies. Section 3.22 states;

"*Planning authorities should develop and maintain places that support healthy, active lifestyles across all age and socio-economic groups, recognising that investment in walking and cycling infrastructure can be an effective preventative measure which reduces financial pressures on public services in the longer term. The way a development is laid out and arranged can influence people's behaviours and decisions and can provide effective mitigation against air and noise pollution."*

3.0.2 The guidance also sees traffic consideration and management as key when it comes to noise impact assessments. Section 4.1.45 states

"Local authorities must adopt an integrated approach to traffic management. They should consider how different measures can complement one another and contribute to the achievement of wider planning and transport objectives, implementing the Active Travel Act and reducing exposure to air and noise pollution, taking into account the needs of the disabled and less mobile sections of the community."

3.0.3 Section 6 of the document also tackles the likely social and well-being impacts of the preservation of 'distinctive and natural places'. Section 6.7.1 refers to the need to protect the soundscape of areas;

"Clean air and an appropriate soundscape, contribute to a positive experience of place as well as being necessary for public health, amenity and well-being. They are indicators of local environmental quality and integral qualities of place which should be protected through preventative or proactive action through the planning system. Conversely, air, noise and light pollution can have negative effects on people, biodiversity and the resilience of ecosystems and should be reduced as far as possible."

This is then continued in reference to noise in section 6.7.4;

"The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so."

3.0.4. It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

- The effect may be determined by reference to guideline noise values. British Standard (BS) 8233:2014 and World Health Organisation (WHO) "Guidelines for Community Noise" contain such guidelines.

Another method is to compare the resultant noise level against the background noise level (L_{A90}) of the area. This is the method employed by BS 4142:2014 to determine the likelihood of complaint from noise of an industrial nature. It is best suited to the assessment of steady or pseudo-steady noise.

3.1 BS4142:2014 +A1 (2019)

3.1.1 Noise effects on residential properties have been assessed according to the guidance in BS 4142:2014. This standard primarily provides a numerical method by which to determine the significance of sound of an industrial nature (i.e. the 'specific sound' from the proposed development) at residential sensitive receptors.

3.1.2 The specific sound level may then be corrected for the character of the sound (e.g. perceptibility of tones and/or impulses), if appropriate, and it is then termed the 'rating level', whether or not a rating penalty is applied. The 'residual sound' is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

3.1.3 According to BS 4142:2014, the background sound levels adopted for the assessment should be representative of the periods being assessed. The standard recommends that the background sound level should be collected from continuous measurements of normally not less than 15-minute intervals. However, the Standard states that there is no 'single' background sound level that can be derived from such measurements. It is particularly difficult to determine what is 'representative' of the night-time period because it can be subject to a wide variation in background sound levels between the shoulder night periods.

3.1.4 The method chosen for this section of the report is to use the data collected at the nearest NSR for the day and night periods to provide the ambient and background noise levels. The mode ($L_{Aeq_1hr(Day)}$ and $L_{Aeq_15min(Night}$) value will then be used for each time period over the course of the measurement as the most appropriate way of creating a representative value.

3.1.5 The specific sound levels have been determined separately in terms of the L_{Aeq1hr} during the daytime $L_{Aeq15min}$ during the night-time. Daytime is typically between 07:00 and 23:00 hours and night-time is typically between 23:00 and 07:00 hours, so these periods have been adopted for this assessment.

3.1.6 At each of the most likely sensitive receptor locations, the rating level has been determined from the predicted specific sound level. Where it has considered it to be appropriate, a rating penalty has been applied for tonality, impulsivity and/or intermittent specific sounds as described in the commentary to paragraph 9.2 of

BS4142:2014. This has been applied with consideration for the main sound sources from site that contribute to the level of specific sound at the receptor location.

3.1.7 As per the requirements of the standard, an initial estimate of the impact of the specific sound has been obtained by subtracting the measured background sound level from the rating level of the specific sound. Table 2 provides the initial evaluation of impact following this method.

Table 2

Magnitude	Difference Between rating Level and Background Level	Comments
High	**+10dB**	**Significant Adverse impact Likely**
Medium	**+5 to +10dB**	**Adverse impact Likely**
Low	**0 to +5 dB**	**Adverse impact unlikely**
Negligible	**Less than 0dB**	**Low chance of Adverse Impact**

3.1.8 Following the initial evaluation of impact, the context of the sound has also been considered, which is a key requirement of the Standard. In evaluation of the context, the following factors have been considered:

- the absolute level of the sound;
- the character and level of the residual sound compared to the character and level of the specific sound and
- the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

3.2 BS8233 Guidance on Sound Insulation and Noise Reduction for Buildings

3.2.1 The scope of this standard is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate. The standard suggests suitable internal noise levels within different types of buildings, including dwellings, as shown in Table 3 below.

Table 3: BS8223 recommended internal noise levels

Activity	Typical Situation	Design Target $L_{Aeq,T}$ (dB)	
		Daytime (07:00-23:00)	Night-Time (23:00-07:00)
Suitable resting/sleeping conditions	Living Room	35	-
	Bedroom	35	30
Dining	Dining room	40	-

3.2.2 BS8233 goes on to recommend noise levels for external amenity spaces (i.e., gardens, balconies etc). According to BS8233;

"It is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors might be warranted."

3.2.3 BS8233 goes on to say:

In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.

3.3 Building Regulations Approved Document O: Overheating

3.3.1 Approved Document O of the Building Regulations 2010 Overheating (ADO) concerns ventilation and overheating requirements in dwellings.

3.3.2 Requirement O1(2)(a) concerns the maximum acceptable noise levels in homes during overheating scenarios. These represent a 10 dB relaxation on the noise levels set out in BS8233 and WHO Guidelines that apply in non-overheating scenarios. Table 4 sets out these limits.

Table 4: Internal noise level limits in overheating scenarios

Location	Time	Noise limits in overheating conditions
Bedroom	Daytime (07:00-23:00)	$L_{Aeq,16h}$ 45 dB
	Night (23:00-07:00)	$L_{Aeq,8h}$ 40 dB L_{AFmax} 55 dB not exceeded more than 10 times per night

3.4 World Health Organisation's Guidelines for Community Noise

3.4.1 The WHO Guidelines for Community Noise offers advice with regard to setting noise criteria applicable to sleep disturbance. Section 4.2.3 specifies:

If the noise is not continuous, L_{Amax} or SEL are used to indicate the probability of noise-induced awakenings. Effects have been observed at individual L_{Amax} exposures of 45 dB or less. Consequently, it is important to limit the number of noise events with a L_{Amax} exceeding 45dB.

3.4.2 The guidelines go on to state:

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"At night, sound pressure levels at the outside façades of the living spaces should not exceed 45 dB LAeq and 60 dB LAmax, so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB."

3.4.3 The sound insulation performance value of 15 dB for a façade containing a partially open window accords with the guidance offered in BS8233. The guidelines reference a study by Vallet & Vernet, which concluded that:

"For a good sleep, it is believed than indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night."

3.4.4. Accordingly, this assessment has utilised the 10th highest measured maximum noise level from the night-time period and allows for an assessment of a typical maximum noise level in determining façade sound insulation performance.

3.5 TAN 11: October 1997

3.5.1 The Technical Advise Note (Wales) 11, Noise – October 1997 provides some further criteria in relation to noise criteria categories for Noise-sensitive developments. These categories have been derived to assist local planning authorities in their consideration of planning applications. These categories are part of Annex A of the guidance document and are displayed in the tables below.

"Local planning authorities should consider whether proposals for new noise-sensitive development would be incompatible with existing activities, taking into account the likely level of noise exposure at the time of the application and any increase that may reasonably be expected in the foreseeable future. Such development should not normally be permitted in areas which are, or are expected to become, subject to unacceptably high levels of noise and should not normally be permitted where high levels of noise will continue throughout the night."

Table 2: RECOMMENDED NOISE EXPOSURE CATEGORIES FOR NEW DWELLINGS NEAR EXISTING NOISE SOURCES

Noise Levels[1] corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$dB

Noise Source		Noise Exposure Category			
		A	B	C	D
road traffic	0700-2300	<55	55-63	63-72	>72
	2300-0700[2]	<45	45-57	57-66	>66
rail traffic	0700-2300	<55	55-66	66-74	>74
	2300-0700[2]	<45	45-59	59-66	>66

TABLE 1: NOISE EXPOSURE CATEGORIES

A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

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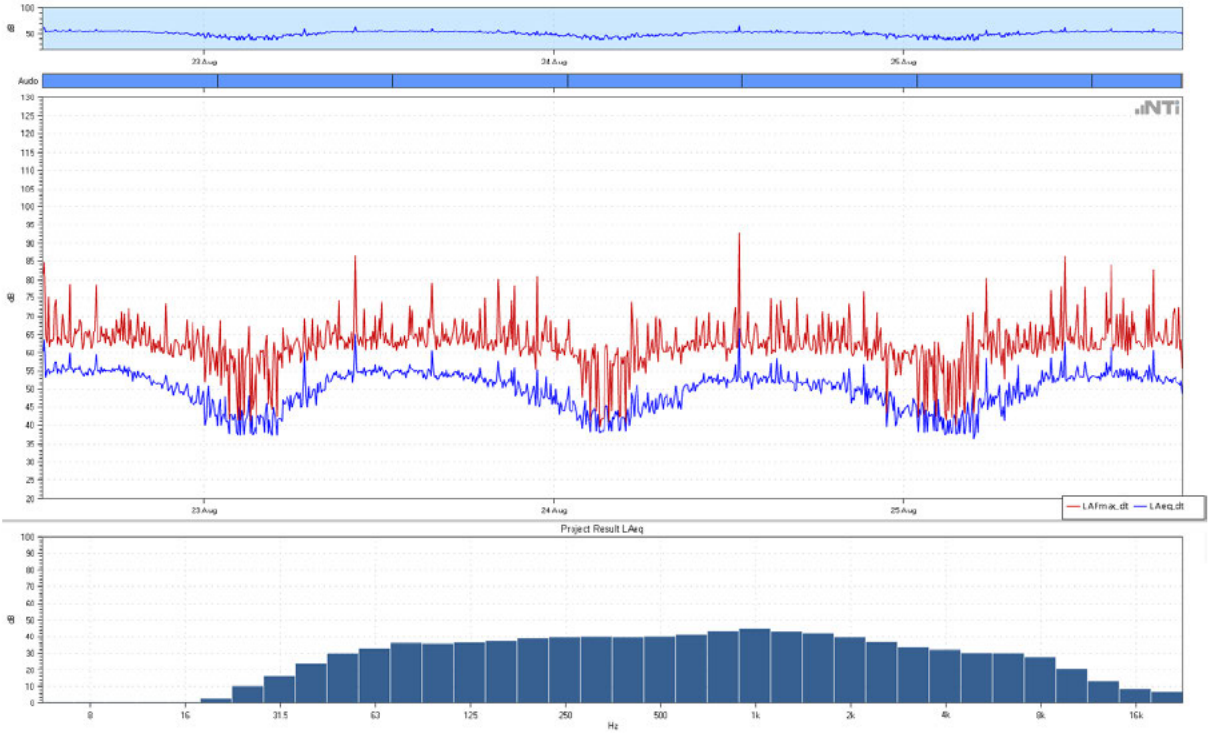
4.0 Results

4.1 Noise Assessment (Front) – 12.46pm 25/03/25 – 09.16am 26/03/25

Table 5

Location	L_{Aeq_16hr}	L_{Aeq_8hr}	L_{Amax} (10th highest)	L_{A90}
Day	**53.0dBA**			**43.5dBA**
Night		**44.4dBA**	**63.8dBA**	**37.7dBA**

Figure 4



4.1.1 Comments: Mainly traffic pass-by noise. No tonal features. Some Birdsong causing spikes.

Table 6

Day/Time	Cloud Cover	Temperature (Celcius)	Prescence of fog/snow/ice	Wind Speed (m/s)	Wind Direction
Installation	1	21	No	1.2	NW
Collection	3	18	No	1.7	SSW

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4.3 Comparison of Results to BS8233

Table 7

Location	L_{AeqT} (16hr Day & 8hr Night)	L_{AMax}	BS8233 & WHO Internal noise	BS8233 & WHO External Noise	Difference to L_{Aeq} (internal/external) limit	Difference to Max (internal/external)
(Front)						
Day (0700-2300)	53dBA		35dBA	55dBA	(+18dBA/ -2dBA)	-
Night (2300-0700)	44dBA	64dBA (10th Highest)	30dBA (45dBA L_{AMax})	(60dBA L_{AMax})	(+14dBA)	(+19dBA)

5.0 Observations and Further Discussions

5.0.1 The measured L_{Aeq} values for both the day and the night periods are shown in table 7. The day period is 18dBA above the limit for indoor noise levels to the front of the building.

5.0.2 The night value is also 14dBA above the recommended value for internal noise to prevent sleep disturbance to the front of the proposed dwelling.

5.0.3 BS8233 assumes that a standard double-glazed window will provide up to 15dB reduction when open (with some council guidelines leaning on the side of caution and assuming a 10dB reduction). Either option would mean that any modern double-glazed window in the building should not be the main source of ventilation, with a low chance of sleep disturbance being had by the inhabitants of the proposed dwellings. Trickle vents/acoustic vents will therefore for required throughout the proposed building to prevent overheating in accordance with document O of the building regs.

5.0.4 The L_{AMax} value to prevent the likelihood of sleep disturbance is set at 60dBA external and 45dBA internal. Based on the highest value from the tenth-highest daily value measured during the week the reading for L_{AMax} night was 64dBA at the front. This value is 19dBA above the required value externally for sleep disturbance. This therefore increases the required specification of windows to the front of the building and will be used as the figures for the BS8233 Annex G calculation procedure to provide specific product examples for the glazing and ventilation in the proposed dwelling. The night-time L_{AMax} comparison value will be used as the highest potential difference.

5.0.5 The glazing specification to the rear of the building does not take into account the screening that would be provided by the building itself. However, using the specified figures would mean that any further industrial noise increase to the rear of the proposed development would also be catered for. This is seen as the most robust method for this assessment.

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5.1 BS8233:2014 Annex G Calculations

Table 8

	Overall dBA	Octave Band Frequency (Hz)					
Time Period		**125**	**250**	**500**	**1000**	**2000**	**4000**
LAMax	63.8	52	55	56	59	57	54

Room Details	**(m)**	Bedroom Front
Height	2.2	
Width	3	
Length	3	
Sample Room Volume	19.8	
Sample Room Surface Area	26.4	

Element	**Area/No.of**	**Element Specification**
External Wall	6.6	Traditional brick and block with ties and insulation
Windows	1.5	4 mm / (6 - 16 mm) / 4 mm Pilkington
Ceiling	9	
Ventilation	1	Standard non-acoustic trickle ventilator typically ≥ Dn,e,w 30dB

Element SRI

		Octave Band Frequency (Hz)						Single Figure Rating
Element	**Area/No.of**	**125**	**250**	**500**	**1000**	**2000**	**4000**	
Walls	4	47	49	49	58	68	79	57
Windows	1	21	17	25	35	37	31	29
Ceiling	1	28	34	40	45	49	52	
Ventilation (Dn,e)	1	30	30	30	30	30	28	30

Overal Sound Reduction

Calculated Internal SPL

		Octave Band Frequency (Hz)					
	Overall	**125**	**250**	**500**	**1000**	**2000**	**4000**
Leq,2	36.0	15.8	26.6	27.8	30.8	29.5	28.9
Limit	45						
Value under limit	9.0						

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6.0 Glazing, Structural and Ventilation Recommendations

6.1 External Walls

6.1.1 External walls of the proposed building are understood to be traditional 9” brick:

Table 9

Description	Octave Band Centre Frequency (Hz) Sound Reduction Index *R* dB					
	125	**250**	**500**	**1k**	**2k**	**4k**
Traditional solid 9" brick & block	39	44	51	58	63	68

6.2 Glazing

6.2.1 Suitable sound insulation performance of all windows and patio doors of the development may be achieved by using the examples provided in table 10.

Table 10

Location	Description	Octave Band Centre Frequency (Hz) Sound Reduction Index *R* dB						Rw (C; Ctr)
		125	**250**	**500**	**1k**	**2k**	**4k**	
Chester Rd	4 mm / (6 - 16 mm) / 4 mm Pilkington	21	17	25	35	37	31	29 (-1;-4)

6.3 Ventilation

6.3.1 It is anticipated that a ventilation system will be needed to be incorporated into the scheme design, such that residents of the properties are able to have background ventilation without necessarily needing to open windows.

6.3.2 If ventilation is provided where windows are decided not to be openable the likely reductions can be seen in table 11.

Table 11

Location	Description	Octave Band Centre Frequency (Hz) Sound Reduction Index $D_{n,e}$ dB					
		125	**250**	**500**	**1k**	**2k**	**4k**
Chester Rd	Standard non-acoustic trickle ventilator typically ≥ Dn,e,w 30dB	30	30	30	30	30	28

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7.0 BS4142:2014+A1:2019 Consideration

7.0.1 With the introduction of a sub-station to the North-East corner of the site it is important to consider the possible impacts of such an industrial noise source on both the proposed development and the surrounding residential properties.

7.0.2 As the noise levels of the proposed unit are not currently know this report will set limits that should not be exceeded 1m from the residential property to the North and also the proposed development itself.

7.0.3 To make sure the station complies with BS4142:2014, and to provide enough of a contingency to avoid future issues, a value of 5dB below background has been set at each of the NSR facades.

7.0.4 Table 12 shows the distance from the proposed substation to both the proposed development and the nearest Noise Sensitive Receptor (NSR) façade. The limit value has then been calculated based on the simple decibel distance formula. Night-time background levels have been used as these are the lowest and represent the point at which adverse impact is most likely to occur.

Table 12

NSR	Distance to Substation (m)	L_{A90} Value (night)	Limit value 1m from Façade (dBA)	Limit Value at Source (dBA)
2 Chester Rd	14	38	33	56
Hampson Guest House	12	38	33	55

7.0.5 The limit values provided in table 12 are the limits 1m from the substation. This does not take into account the proposed fencing around the station itself. Depending on the height of the substation, height of the fencing and the composition/attenuation value of the fencing itself; the allowable value 1m from the substation is likely to be higher than this. As a free-field source the substation would be limited to an output value of 55dBA. The proposed fencing should make sure that the noise level does not exceed 55dbA at the boundary of the fence-line. It is recommended that the fencing is solid and of a density of at least 10kg/m2 to make sure that there is enough attenuation at the lower frequencies. The lower frequency 'hum' is likely to be the main cause of any complaints in the area if it becomes audible.

7.0.6 With the assumptions made related to the source itself and activity it is considered that there will be a low chance of adverse impact from industrial sources on the rear of the proposed development providing the mitigation measures are met.

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8.0 Conclusion

8.0.1 The use of the suggested configuration specification in section 6 will allow the proposed site to meet the regulations for acoustic performance in accordance with BS8233:2014.

8.0.2 The existing plant noise adjacent to the property, accompanied by the proposed glazing, ventilation and mitigation plan, will also mean that the site fully conforms to the specified standard BS4142:2014; with a low chance of adverse impact expected.

8.0.3 The outdoor amenity spaces to the rear of the proposed development are expected to be 50-53dBA L_{Aeq_16hr} post construction of the new apartment block. Therefore the outdoor amenity space to the rear, if used as such, would also be below the required values in accordance with BS8233:2014.

8.0.4 The TAN Guidelines provided would mean the following categorisation of the measured data, shown in table 13.

Table 13

Location	Daytime Noise Category	Night-time Noise Category
Front	A	A
Rear	A	A

8.0.5 This would mean that 'noise need not be the determining factor in granting planning permission'.

9.0 Credentials

Table 14

Name	Title	Credentials
James Flitton BSc AMIOA	**Acoustic Consultant**	**CSCS Professionally Qualified person**
		Associate Member Institute of Acoustics
		IOA Diploma in Acoustics and Noise Control
		Affiliate Member of IDE
Signed	[redacted]	

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Appendix A – Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near (LAeq,T).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. 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), L_{Ax}	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 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).
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. Generally used to describe background noise level.

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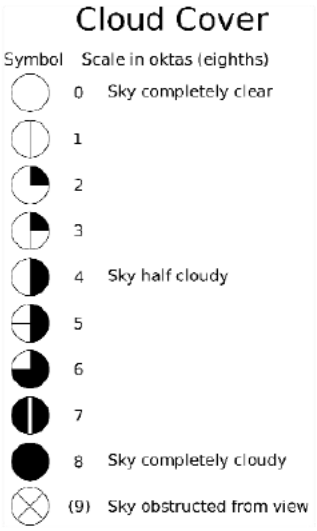
Appendix B - Noise Survey Instrumentation

Type	Manufacturer	Model	Serial Number	Last Cal	Cal Due
SLM	NTi	XL2-TA	A2A-18475-E0	12/11/2024	12/11/2026
Pre-amp	NTi	MA220	9378	12/11/2024	12/11/2026
Microphone	NTi	MC230A	A19093	12/11/2024	12/11/2026
Calibrator	NTi	CAL200	19829	12/11/2024	12/11/2025

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Appendix C – Weather Conditions Chart Used

(Blank version)

<table>
<tr><th colspan="5">Weather Conditions</th></tr>
<tr><th>Measurement Location</th><th>Date/Time</th><th>Description</th><th>Beginning of Survey</th><th>End of Survey</th></tr>
<tr><td></td><td></td><td>Temperature:</td><td></td><td></td></tr>
<tr><td colspan="2" rowspan="8">
</td><td>Precipitation:</td><td></td><td></td></tr>
<tr><td>Cloud cover (oktas - see guide)</td><td></td><td></td></tr>
<tr><td>Presence of fog/snow/ice</td><td></td><td></td></tr>
<tr><td>Presence of damp roads/wet ground</td><td></td><td></td></tr>
<tr><td>Wind Speed (m/s)</td><td></td><td></td></tr>
<tr><td>Wind Direction</td><td></td><td></td></tr>
<tr><td>Conditions that may cause temperature inversion (i.e. calm nights with no cloud)</td><td></td><td></td></tr>
</table>

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Appendix D – BS8233:2014 Annex G Calculations

			Octave Band Frequency (Hz)					
			125	250	500	1000	2000	4000
Leq,ff	A		52	55	56	59	57	54
Dn,e			30	30	30	30	30	28
$\frac{Ao}{S}10^{\frac{-Dn,e}{10}}$	B		0.00064	0.00064	0.00064	0.00064	0.00064	0.00102
Rwi			21	17	25	35	37	31
$\frac{Swi}{Sf}10^{\frac{-Rwi}{10}}$	C		0.00181	0.00453	0.00072	0.00007	0.00005	0.00018
Rew			47	49	49	58	68	79
$\frac{Sew}{Sf}10^{\frac{-Rev}{10}}$	D		0.00002	0.00001	0.00001	0.00000	0.00000	0.00000
Rrr			28	34	40	45	49	52
$\frac{Srr}{Sf}10^{\frac{-Rrr}{10}}$	E		0.00216	0.00054	0.00014	0.00004	0.00002	0.00001
10log10(B+C+D+E)	F		-23.4	-22.4	-28.2	-31.2	-31.5	-29.2
A (furnished)			11	14	16	16	15	14
$Log10\frac{S}{A}$			0.2	0.0	0.0	0.0	0.0	0.0
Leq,2	A+F+G+3		31.8	35.6	30.8	30.8	28.5	27.9
A-weighting			-16	-9	-3	0	1	1
LAeq,2			15.8	26.6	27.8	30.8	29.5	28.9
Total		36.0						