

TAN 11 Noise Assessment Report: Proposed dwelling house adjacent to number 1 Bramble Court, Llay Road, Wrexham.

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Site assessment for: Land adjacent to 1 Bramble Court, Llay Road,
Wrexham (Planning reference LLAP/20160827)

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Approved for issue on behalf of 101 Acoustics Ltd.



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Executive Summary:

This report assesses the noise impact on the proposed development of a detached dwelling house on the land adjacent to 1 Bramble Court, Llay, Wrexham. The noise climate at the site is comprised of road noise from the Llay Road, birdsong, and occasional vehicle movements/reverse beepers from the adjacent brick yard.

A TAN 11 and BS8233:2104 noise assessment was carried out to determine the TAN 11 Noise Exposure Category (NEC) at the site and the internal noise climate of the proposed dwelling.

The ambient external day time noise level was **44dB** $L_{Aeq, 16 \text{ hour}}$ and the night time level was **42dB** $L_{Aeq, 8 \text{ hour}}$, which puts the development into Noise Exposure Category (NEC) **A** when rated in accordance with TAN 11.

As such, no specific sound insulation scheme for the building envelope is required

The noise levels measured on site also indicated that no specific glazing or ventilation is required in order to comply with BS8233:2014 (and the WHO Guidelines for Community Noise 1999) for both day time or night time (assuming windows will be opened for ventilation purposes) to protect future residents from road noise or noise from the adjacent Huws Gray Brick Specialist Centre.

The daytime measured noise levels for external amenity areas such as gardens and patios were compliant with the BS8233:2014 criterion of 50dB $L_{Aeq, T}$.

Contents

1	Introduction	5
2	The nature, measurement and effect of noise.....	5
3	Noise criteria	6
3.1	Planning Policy Wales, Edition 7, July 2014.....	6
3.2	Planning Guidance (Wales), Technical Advice Note 11, Noise - October 1997 (TAN 11)	6
3.3	BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings'.....	7
3.4	World Health Organisation, Guidelines for Community Noise (WHO, 1999)	8
3.5	BS 7445-1: 2003 'Description and measurement of environmental noise Part 2: Guide to quantities and procedures'	9
4	TAN 11 noise impact assessment.....	9
4.1	Location of noise source and proposed development.....	9
4.2	Description of noise sources.....	10
4.3	Criteria to be applied	10
4.4	Measurement of ambient sound levels.....	11
4.4.1	Survey period and measurement durations	11
4.4.2	Weather conditions	11
4.4.3	Location of equipment.....	11
4.4.4	Results	11
4.4.5	Discussion of the results – NEC category.....	12
5	BS8233:2014 and WHO Guidelines	12
5.1	BS8233 Internal noise levels	12
5.1.1	Proposed property layout	12
5.1.2	Internal noise levels - windows closed.....	13
5.1.3	Internal noise levels with windows open	14
5.1.4	Amenity of external areas	15
6	Conclusion.....	15
Appendix A	Measurement Data	16
Appendix B	Measurement equipment	17
Appendix C	Acoustic terminology	18
Appendix D	References	19
Appendix E	Qualifications and experience of the author.....	19

Figures

Figure 1	Location of measurement equipment and proposed dwelling house	9
Figure 2	Site plan showing dwelling location in relation to brick yard.....	10
Figure 3	Floor plans of the proposed property	13

Tables

Table 1	Typical noise levels	5
Table 2	TAN 11 Noise Exposure Categories	6
Table 3	NEC ranges in dB ($L_{Aeq,T}$) for mixed sources.....	7
Table 4	Summary of Noise Criteria: BS8233:2014.....	7
Table 5	Noise measurements for day time	11
Table 6	Noise measurements for night time hours.....	11
Table 7	Pilkington glazing performance.....	14
Table 8	24 hour measurement data for Bramble Court	16
Table 9	Test equipment used for noise assessment.....	17

1 Introduction

101 Acoustics Ltd. were appointed by My J Homer to carry out a noise assessment in accordance with TAN 11 to determine the Noise Exposure Category (NEC) at the proposed dwelling site, and BS 8233:2014 to determine the projected internal noise climate within the proposed dwelling on the land adjacent to 1 Bramble Court. Plans for the proposed development have been submitted to Wrexham County Borough Council under planning reference LLAP/20160827.

Sound insulation requirements for the glazing and ventilation for the proposed property have been considered to ensure that the amenity of the future occupants will be protected.

2 The nature, measurement and effect of noise

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly it is possible to measure the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels and as the sound pressure level of the threshold of pain is over a million times that of the quietest audible sound, to reduce the relative magnitudes of the numbers involved a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies, therefore it is usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel (dBA), has been shown to correlate closely to the subjective human response. Table 1 shows typical noise levels in decibels.

Approximate Noise Level in dB(A)	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In car noise without radio
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

Table 1 Typical noise levels

When related to changes in noise level a change of ten decibels from 60 dB(A) to 70 dB(A) represents a doubling in perceived loudness. Similarly, a decrease in noise from 70 dB(A) to 60 dB(A) represents a halving in loudness. A change of 3 dB(A) is considered to be just perceptible in normal conditions.

3 Noise criteria

Several documents were referenced to determine the required level of sound insulation for the development based upon the external noise climate at the site. The pertinent documents are:

3.1 Planning Policy Wales, Edition 7, July 2014

Planning Policy Wales states in section 13.15.1 .."Noise can be a material planning consideration, for example in proposals to use or develop land near an existing source of noise or where a proposed new development is likely to generate noise. Local planning authorities should make a careful assessment of likely noise levels and have regard to any relevant Noise Action Plan before determining such planning applications and in some circumstances it will be necessary for a technical noise assessment to be provided by the developer"..

3.2 Planning Guidance (Wales), Technical Advice Note 11, Noise - October 1997 (TAN 11)

Planning Guidance (Wales), Technical Advice Note 11 – Noise. October 1997 (TAN 11). TAN 11 gives Noise Exposure Category (NEC) ratings and guidance for when noise mitigation measures should be provided, or planning refused on the grounds of possible noise nuisance.

The TAN 11 Noise Exposure Categories (NEC's) are shown in Table 2.

TAN 11 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.

Table 2 TAN 11 Noise Exposure Categories

TAN11 also specifies the range of acceptable noise levels for each NEC based upon the noise source. NECs for mixed sources (any combination of road, rail, air and industrial sources) are shown in Table 3.

Mixed sources	Time period	A	B	C	D
	0700-2300	<55	55 – 63	63 – 72	>72
	2300 – 0700	<45	45 - 57	57 - 66	>66

Table 3 NEC ranges in dB ($L_{Aeq,T}$) for mixed sources

3.3 BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings'

The 2014 edition of BS 8233 saw a change in the title of the Standard, moving from a 'Code of Practice' to 'Guidance', as the text 'largely comprises guidance that does not support claims of compliance'.

BS 8233:2014 indicates that to control external noise ingress into a proposed development, a number of planning stages should occur as follows:

- Assess the site, identify significant existing and potential noise sources, measure or estimate noise levels, and evaluate layout options
- Determine design noise levels for spaces in and around the building(s).
- Determine sound insulation of the building envelope, including the ventilation strategy

BS 8233:2014 suggests design noise levels for various types of building. The recommended internal noise levels for dwelling houses, flats and rooms in residential use when unoccupied can be seen in Table 4 below (from Table 4 of Section 7.7.2 of BS 8233:2014). The guidance states that in general and for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values. The noise levels in Table 4 do differ to those published in BS 8233:1999 'Sound insulation and noise reduction for buildings – Code of practice', but are based on the existing guidance from the current World Health Organisation (WHO) "Guidelines for Community Noise" 1999.

Activity	Location	07:00 to 23:00	23:00 to 0700
Resting	Living room	35dB $L_{Aeq, 16\text{hour}}$	-
Dining	Dining room/area	40dB $L_{Aeq, 16\text{hour}}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq, 16\text{hour}}$	30dB $L_{Aeq, 8\text{hour}}$

Table 4 Summary of Noise Criteria: BS8233:2014

When considering the noise level criteria considered in Table 4 the following points should be noted:

1. BS 8233: 2014 suggests that the above criteria should be adopted flexibly and that where a development is considered necessary or desirable that the internal target level may be relaxed by up to 5 dB and reasonable internal conditions still achieved.
2. The noise levels quoted above are annual averages and do not need to be achieved in all circumstances e.g. New Years Eve or fireworks night.
3. The noise levels Table 4 are for steady external noise sources such as traffic noise. Internal noise levels are irrespective of the external noise source and should not exceed 45 dB. Whilst this has been omitted from the 2014 version of BS 8233, it does state that regular individual noise events (for example, scheduled SEL or $L_{A_{f,max}}$) depend on the character and number of events per night.
4. BS 8233:2014 does not define the term 'normally' in relation to the number of exceedances per night, however, the World Health Organisation's 'Guidelines for Community Noise' references a study by Vallet & Vernet, 1991, which concluded that "for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB $L_{A_{f,max}}$ than 10-15 times per night." Therefore, levels of $L_{A_{f,max}}$ 45 dB should not be exceeded more than 10-15 times per night.
5. BS 8233:2014 notes that if the design of the building is relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the facade insulation or resulting noise level.
6. BS 8233:2014 provides guidance for noise in gardens and outdoor amenity space. It suggests that it is desirable that the external noise level does not exceed 50 dB $L_{A_{eq,T}}$, with an upper guideline value of 55 dB $L_{A_{eq,T}}$ which would be acceptable in noisier environments. In these circumstances developments should be designed to achieve the lowest practicable levels in external amenity spaces, but development should not be prohibited should target levels not be achievable.

3.4 World Health Organisation, Guidelines for Community Noise (WHO, 1999)

The WHO Guidelines for Community Noise were referenced in the development of the criteria for BS 8233:2014. In dwellings, the critical effects of noise are on sleep, annoyance and speech interference. To avoid night time sleep disturbance, indoor guideline values for bedrooms are 30 dB $L_{A_{eq}}$ (8hour) for continuous noise and 45 dB $L_{A_{f,max}}$ for single sound events, although the guidance does state that lower levels may be annoying depending on the nature of the noise source. Daytime internal noise levels should not exceed 35 dB $L_{A_{eq}}$ (16 hour) to avoid serious annoyance.

The guidelines also state that to protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB $L_{A_{eq}}$ for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB $L_{A_{eq}}$.

At night, sound pressure levels at the outside façades of living spaces should not exceed 45 dB $L_{A_{eq}}$ and 60 dB $L_{A_{f,max}}$, so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from a partly open window is 15 dB.

3.5 BS 7445-1: 2003 'Description and measurement of environmental noise Part 2: Guide to quantities and procedures'

BS7445 – 1 defines the quantities to be used for the description of noise in community environments and describes the procedures for the determination of these quantities, individually and in combination. The results are expressed as $L_{Aeq, T}$, the equivalent continuous A-weighted sound pressure level over time period T.

Section 4 of BS7445 defines internal and external measurement positions. For measurement outside buildings, free field measurements should be made 3.5 meters or further from a reflecting side of the ground, although façade corrections should be made in some circumstances.

The standard also provides some guidance on appropriate parameter selection for the measurement of different types of noise, as well as measurement time intervals with respect to meteorological conditions.

4 TAN 11 noise impact assessment

To determine the noise climate at the land adjacent to 1 Bramble Court, ambient noise levels were measured to provide data for the noise assessment in accordance with TAN 11 and BS8233:2014. and BS 8233:2014

4.1 Location of noise source and proposed development

Figure 1 shows the location of the proposed development and the location of the noise monitoring equipment, and Figure 2 shows the site layout relative to the adjacent brick yard.

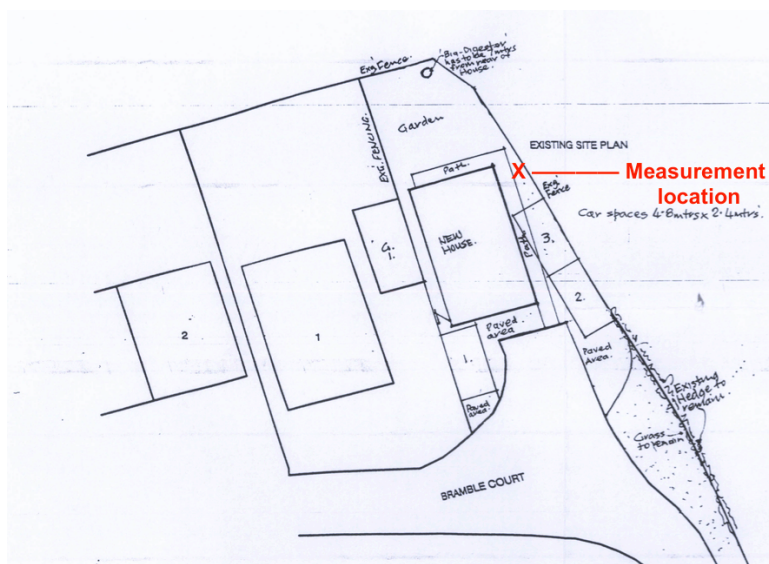


Figure 1 Location of measurement equipment and proposed dwelling house



Figure 2 Site plan showing dwelling location in relation to brick yard

4.2 Description of noise sources

The dominant noise source at Bramble Court is that of traffic noise from the B5102 Llay Road. As there were gentle breezes, the rustling of leaves was also noted along with birdsong.

Occasional distant sound from reverse beepers was noted from the Huw's Gray yard adjacent to the plot, the boundary of which was 25m from the measurement location. The yard covers a large area, thus vehicle movements close to Bramble Court will be infrequent, indeed none were noted throughout the manned survey period.

A disused quarry lies directly north of the proposed development, which is of no material concern from a noise perspective.

4.3 Criteria to be applied

Internal noise levels in the proposed dwelling should fall within the limits defined in BS8233:2014 (as previously defined in Table 4) and the WHO guidelines. As such the following internal noise levels should be attained:

- A daytime internal noise level of 35 dB L_{Aeq} (16hour) for bedrooms and living areas
- A night time internal noise of 30 dB L_{Aeq} (8hour) for bedrooms

4.4 Measurement of ambient sound levels

4.4.1 Survey period and measurement durations

Noise measurements were made over a 24-hour period from 18:00 on Monday the 11th of June until 18:00 on Tuesday the 12th June.

When the equipment was deployed on the Monday 11th June a 2-hour site survey was carried out to ascertain the noise climate at the location between 13:30 and 15:30.

4.4.2 Weather conditions

Noise measurements were made in calm conditions with 50 – 70 percent cloud cover. Temperatures varied between 13 and 19 °C and gentle breezes at 1-2.5 m/s from the north to north west on Monday and north east on Monday were noted which were spot-checked on site with an anemometer. No fog or precipitation was experienced.

4.4.3 Location of equipment

The measurement equipment was located as shown in Figure 1, with the meter being located 1.5 metres from the ground and positioned higher than a low boundary fence around the plot to be developed. A belt of trees some 25m deep separates the brick yard from the development plot, which is adjacent to another recently built residential dwelling house.

4.4.4 Results

Measurement data for day time hours is shown in Table 5 and data for night time is shown in Table 6. The highest $L_{Af,max}$ values for each measurement period are also indicated and the full measurement data set is shown in .

07:00 – 23:00 hrs.	$L_{Aeq,16hr}$ dB	L_{AFmax} dB
Daytime noise levels	44	86

Table 5 Noise measurements for day time

23:00 – 07:00	$L_{Aeq,8hr}$	L_{AFmax}
Night time noise levels	42	74

Table 6 Noise measurements for night time hours

4.4.5 Discussion of the results – NEC category

The day time ambient sound level at the assessment location was **44 dB $L_{Aeq}(16\text{hour})$** which puts the location in **NEC category A** (<55dB).

The night time ambient sound level at the assessment location was **42 dB $L_{Aeq}(8\text{hour})$** which puts the location in **NEC category A** (<45dB).

For developments in NEC category A, TAN 11 states that ..“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”..

As such noise levels measured on site indicate that noise is not a consideration for the granting of planning permission at this site.

5 BS8233:2014 and WHO Guidelines

As the 1999 WHO document informed the criteria set within BS8233:2014, it is determined that a BS8233:2014 assessment of a proposed development also complies with the guideline noise levels set out within the WHO document.

5.1 BS8233 Internal noise levels

The BS8233: 2014 ambient noise requirements are that the day time internal noise levels at the proposed development are 35 dB L_{Aeq} (16 hour) or less. There are no criteria to meet $L_{A_{fmax}}$ levels for daytime hours.

Night time internal noise levels at the proposed development should be 30 dB L_{Aeq} (8 hour) or less and indoor sound pressure levels should not exceed approximately 45 dB $L_{A_{f,max}}$ than 10-15 times per night.

5.1.1 Proposed property layout

Figure 3 shows the floor plan layout for the proposed property. It can be noted that the elevation facing the brick yard has no windows to habitable rooms directly facing it.

If there were to be any significant noise generation from the brick yard next door, the property is oriented so that noise from the yard does not directly impinge on the windows of the habitable areas. The yard is not open out of normal working hours, so will have no effect on night time noise levels.

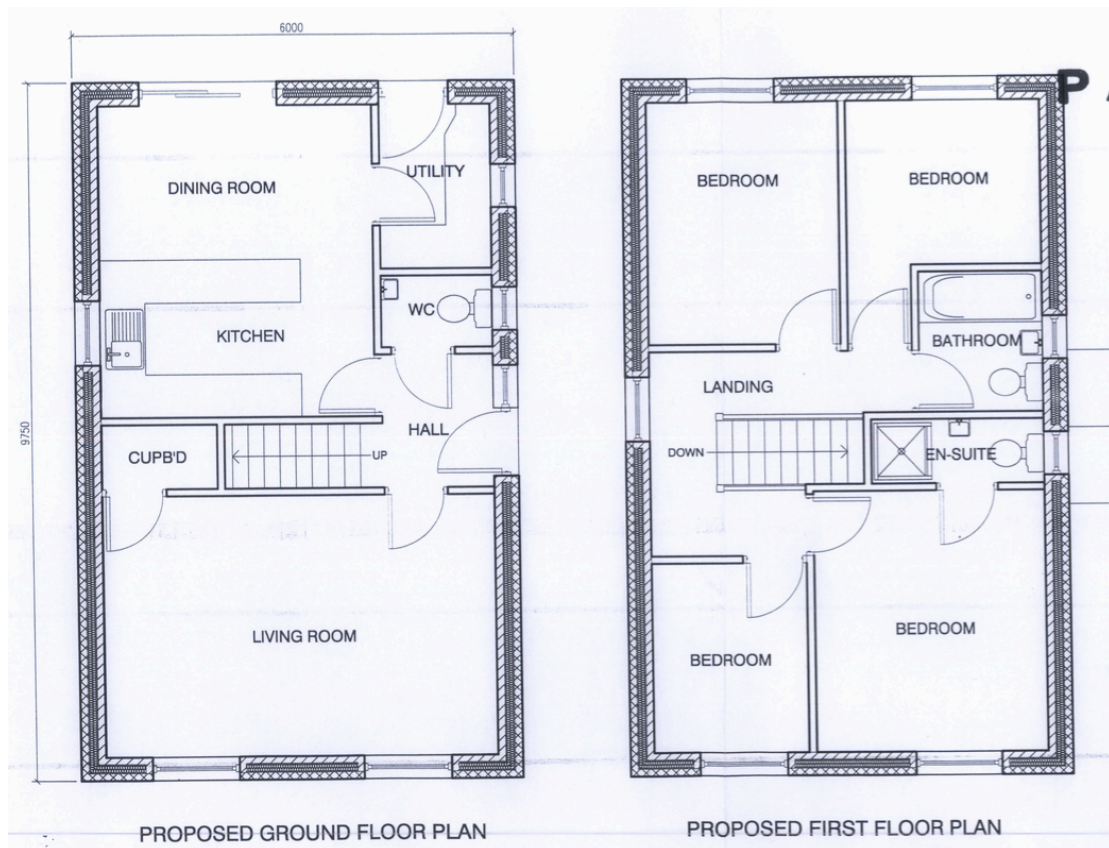


Figure 3 Floor plans of the proposed property

5.1.2 Internal noise levels - windows closed

For specification of building elements to BS8233, the BRE publication 'Sound Control for Homes' offers a simplified calculation method for building element specification (within 5dB) as follows:

$$R_w + C_{tr} = \text{External dB(A)} - \text{Internal dB(A)}$$

As noise reduction offered by building masonry walls and roof areas with plasterboard linings and mineral wool are far in excess of those for glazing and vents, the sound insulation offered by the buildings glazing and vents in habitable rooms is of primary concern.

The external noise levels were then used to determine the required sound insulation level of windows and ventilators for habitable rooms of the property - these being living, dining and sleeping areas.

With windows closed and given that *daytime* noise level was 44dB $L_{Aeq, 16\text{hour}}$, to achieve a BS8233 indoor noise level of 35dB $L_{Aeq, 16\text{hour}}$, noise reduction of 7dB is required:

$$R_w + C_{tr} = \text{External dB(A)} - \text{Internal dB(A)}$$

$$R_w + C_{tr} = 42 - 35 = \mathbf{7dB} \ R_w + C_{tr}$$

Applying the worst-case scenario of 5dB margin of error, this would result in a day time glazing and ventilation requirement of **12dB** $R_w + C_{tr}$.

With a *night-time* noise level of 42dB $L_{Aeq, 8\text{hour}}$ and a BS8233 indoor noise level of 30dB $L_{Aeq, 8\text{hour}}$, noise reduction of 12dB is required for night-time:

$$R_w + C_{tr} = \text{External dB(A)} - \text{Internal dB(A)}$$

$$R_w + C_{tr} = 42 - 30 = \mathbf{12dB} \ R_w + C_{tr}$$

Applying the worst-case scenario of 5dB margin of error, this would result in a night -time glazing and ventilation requirement of **17dB** $R_w + C_{tr}$.

This can be achieved by using standard Pilkington 4/(6-16)/4 standard double glazing units (or similar) rated at **25dB** $R_w + C_{tr}$ as can be seen from Table 7 below.

Sound insulation data for standard products

Glass	Sound reduction index (dB)									
	Octaveband Centre Frequency (Hz)						$R_w(C;C_w)$	R_w	R_w+C	R_w+C_w
	125	250	500	1000	2000	4000				
Insulating glass units										
4 mm / (6 - 16 mm) / 4 mm	21	17	25	35	37	31	29 (-1; -4)	29	28	25
6 mm / (6 - 16 mm) / 4 mm	21	20	26	38	37	39	32 (-2; -4)	32	30	28
6 mm / (6 - 16 mm) / 6 mm	20	18	28	38	34	38	31 (-1; -4)	31	30	27
8 mm / (6 - 16 mm) / 4 mm	22	21	28	38	40	47	33 (-1; -4)	33	32	29
8 mm / (6 - 16 mm) / 6 mm	20	21	33	40	36	48	35 (-2; -6)	35	33	29
10 mm / (6 - 16 mm) / 4 mm	24	21	32	37	42	43	35 (-2; -5)	35	33	30
10 mm / (6 - 16 mm) / 6 mm	24	24	32	37	37	44	35 (-1; -3)	35	34	32
6 mm / (6 - 16 mm) / 6 mm Laminated	20	19	30	39	37	46	33 (-2; -5)	33	31	28
6 mm / (6 - 16 mm) / 10 mm Laminated	24	25	33	39	40	49	37 (-1; -5)	37	36	32

Table 7 Pilkington glazing performance

(Available from: <https://www.pilkington.com/en-gb/uk/products/product-categories/noise-control>)

5.1.3 Internal noise levels with windows open

With windows open BS8233:2014 and the WHO *Guidelines for Community* noise both state a 15dB of attenuation of external noise through an open window. The sound insulation offered by the glazing units in the case of open windows has no effect on noise reduction.

The day time ambient sound level at the assessment location was **44 dB $L_{Aeq(16\text{hour})}$** , so allowing a 15dB attenuation for an open window results in an internal noise level of 29dB, which is compliant with BS8233:2014 and the WHO Guidelines.

The night time ambient sound level at the assessment location was **42 dB $L_{Aeq(8\text{hour})}$** , so allowing a 15dB attenuation for an open window results in an internal noise level of 27dB, which is also compliant with BS8233:2014 and the WHO Guidelines.

There were eleven 15-minute night time periods where the $L_{A_{f,max}}$ was above 60dB, which relates to an internal noise level of 45dB $L_{A_{f,max}}$. This was likely due to birdsong from the adjacent tree line, and as such is unlikely to noise nuisance.

5.1.4 Amenity of external areas

BS8233:2014 gives a target day time noise level for external amenity areas such as gardens and patios of 50dB $L_{Aeq, T}$.

At 44dB $L_{Aeq, 16\text{ hour}}$, the measured noise levels were compliant with this criterion.

6 Conclusion

Ambient noise levels were measured at the proposed development site at the land adjacent to 1 Bramble Court, to determine the noise climate and assess the noise impact on residents at the proposed development. The noise climate at the site is comprised of road noise from the Llay Road, birdsong, and occasional vehicle movements/reverse beepers from the adjacent brick yard.

A TAN 11 and BS8233:2014 noise assessment was carried out to determine the TAN 11 Noise Exposure Category (NEC) at the site and the internal noise climate of the proposed dwelling.

The day time noise level was determined as **44dB $L_{Aeq, 16\text{ hour}}$** which puts the development into **NEC A** when rated in accordance with TAN 11.

The night time noise level was determined as **42dB $L_{Aeq, 8\text{ hour}}$** which puts the development into **NEC A** when rated in accordance with TAN 11.

The noise levels measured on site indicated that no specific glazing or ventilation is required in order to comply with BS8233:2014 (and the WHO Guidelines for Community Noise 1999) for both day time or night time, assuming windows will be opened for ventilation purposes.

The daytime measured noise levels for external amenity areas such as gardens and patios were compliant with the BS8233:2014 criterion of 50dB $L_{Aeq, T}$.

Appendix A Measurement Data

Date	time from	time to	noise levels (dB)		
			LA90	LAF max	LAeq
11/06/2018	18:00:00	18:59:59	35	65	45
	19:00:00	19:59:59	35	68	46
	20:00:00	20:59:59	30	65	40
	21:00:00	21:59:59	28	85	47
	22:00:00	22:59:59	27	68	38
12/06/2018	23:00:00	23:14:59	29	66	44
	23:15:00	23:29:59	32	47	36
	23:30:00	23:44:59	32	44	35
	23:45:00	23:59:59	32	44	36
	00:00:00	00:14:59	32	43	35
	00:15:00	00:29:59	31	50	35
	00:30:00	00:44:59	32	43	34
	00:45:00	00:59:59	29	52	35
	01:00:00	01:14:59	26	41	29
	01:15:00	01:29:59	25	47	30
	01:30:00	01:44:59	24	37	26
	01:45:00	01:59:59	24	33	26
	02:00:00	02:14:59	23	43	27
	02:15:00	02:29:59	23	34	23
	02:30:00	02:44:59	23	54	36
	02:45:00	02:59:59	24	46	28
	03:00:00	03:14:59	25	34	26
	03:15:00	03:29:59	25	38	27
	03:30:00	03:44:59	25	59	38
	03:45:00	03:59:59	27	66	51
	04:00:00	04:14:59	28	65	40
	04:15:00	04:29:59	29	74	51
	04:30:00	04:44:59	25	69	42
	04:45:00	04:59:59	25	61	47
	05:00:00	05:14:59	28	70	45
	05:15:00	05:29:59	28	63	46
	05:30:00	05:44:59	26	57	39
	05:45:00	05:59:59	32	77	46
	06:00:00	06:14:59	29	65	38
	06:15:00	06:29:59	29	64	38
	06:30:00	06:44:59	28	58	36
	06:45:00	06:59:59	29	49	35
Day time	07:00:00	07:59:59	32	67	47
	08:00:00	08:59:59	32	73	42
	09:00:00	09:59:59	33	65	40
	10:00:00	10:59:59	33	60	42
	11:00:00	11:59:59	32	65	41
	12:00:00	12:59:59	33	74	40
	13:00:00	13:59:59	35	66	45
	14:00:00	14:59:59	35	73	44
	15:00:00	15:59:59	35	67	45
	16:00:00	16:59:59	37	68	44
	17:00:00	17:59:59	37	65	44

Table 8 24 hour measurement data for Bramble Court

Appendix B Measurement equipment

Noise levels were measured using a CESVA SC310 sound level meter and weather proof microphone kit, conforming to class 1 of BS EN 61672-1:2003 *Electroacoustics. Sound Level Meters. Specifications* & type 1 of the former standard BS EN 60804. Serial numbers are recorded in Table 9 follows:

Model	Equipment Type	Serial Number
CESVA SC310	Real Time Analyser	# T224211
CESVA CB-5	Sound Level Calibrator	# 49179
CESVA C-100	Microphone	# 13525
CESVA PA13	Preamplifier	# 2454
CESVA TK200	Outdoor Microphone kit	# T239019
CESVA CN-010	10m extension cable	# T982074

Table 9 Test equipment used for noise assessment

The test equipment has current calibration certification (calibration certificates available upon request).

The sound level meter was calibrated at 93.6dB before & after usage using a type 1 Acoustic calibrator. No noticeable drift was recorded.

All levels measured by the meter are accurate to one decimal place of a decibel, however they have been reported to the nearest decibel.

A summary of acoustics definitions follows:

The equivalent sound pressure level $L_{Aeq, T}$

The equivalent continuous A-weighted sound pressure level in decibels for time period T.

$L_{Af, max}$

The maximum level with A-weighted frequency response and Fast time constant.

The ambient noise

Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near & far.

The background sound level $L_{A90, T}$

The A-weighted sound pressure level exceeded for 90% of a given time interval of the total sound at the nearest noise sensitive site, at the time of maximum nuisance potential.

C_{tr}

Correction term applied against the sound insulation single-number values (R_w , D_w , $D_{nT,w}$) to provide a weighting against low frequency performance, based on urban traffic noise.

R_w Weighted sound reduction index

Single-number quantity which characterises the airborne sound insulating properties of a material or building element over a range of frequencies, as measured in a laboratory and rated in accordance with BS En ISO 717 – 1.

D_w Weighted level difference

Single-number quantity which characterises the airborne sound insulation between rooms, but which has not been adjusted to reference conditions.

$D_{n,e,w}$ Element weighted normalized level difference of a building element

Element weighted Normalized Level Difference of a building element. The calculation is normalised to a reference value for the absorption of the room

Appendix D

References

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Welsh Assembly (1997) Planning Guidance (Wales), *Technical Advice Note 11 – Noise*. (TAN 11)

World Health Organization (1999), *Guidelines for Community Noise*, WHO, Geneva

Appendix E

Qualifications and experience of the author

Darren Ryder – Qualifications and professional registrations

HNC Engineering – Avionics

Post Graduate Diploma in Acoustics and Noise Control (Institute of Acoustics)

MSc. Applied Acoustics (Derby University)

MIOA – Corporate member of the Institute of Acoustics

MIET – Member of the Institute of engineering and Technology

Darren Ryder - Brief Curriculum Vitae

Darren Ryder is a director and founder of 101 Acoustics Ltd. having worked in the field of acoustics since 2001. Experience includes the undertaking noise surveys and assessments to BS4142, BS8233, WHO Guidelines and TAN11, entertainment noise surveys in accordance with the “pop code”, the acoustic design of; dwelling houses in accordance with Approved Document E of the Building Regulations, hospitals in accordance with HTM08-01, pubs, clubs, auditoria, recording studios, factories etc. in accordance with BS8233 and client specifications and schools in accordance with BB93. He has previously worked for Amey, Highbury Design, Heart of England NHS Trust, Interserve, R.W.Twinings Ltd, Adi Technical Ltd, Birmingham City Council, M.W. Construction, Kerwood Property Development, CareTech, Matlab Architects, Greaves Welsh Slate Ltd. Zip World Ltd. and Warwickshire Construction, amongst many others.