Acoustic Associates Sussex Ltd

Transportation Noise Assessment (Residential Dwellings)

Site: 10 Brighton Road, Lancing, West Sussex

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Acoustic Associates

Sound Insulation Testing - Acoustic Design of Buildings - BS4142 - PPG24 - Schools Acoustics BB93 - Vibration - Expert Witness Testimony - Noise at Work - Air Tightness Testing - Auditorium Acoustics

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Contents

1 Introduction ..... - 2 -

2 Planning Policy, Context & Noise Assessment Criteria ..... - 3 -

2.1 Context ..... - 3 -

2.2 Planning Policy Guidance 24 (Planning and Noise) ..... - 3 -

2.3 WHO Noise Criteria Internal Noise ..... - 3 -

2.4 WHO Noise Criteria External Noise ..... - 3 -

3 Noise Survey Baseline Conditions & Results ..... - 4 -

3.1 Noise Survey Details ..... - 4 -

3.2 Noise Survey Results ..... - 5 -

3.3 Average Difference Survey Positions ..... - 5 -

4 Predicting Day and Night-time Noise Level ..... - 6 -

4.1 Daytime Noise Levels ..... - 6 -

4.2 Night-time Noise Levels ..... - 6 -

5 Noise Exposure Category ..... - 7 -

6 Road Noise Mitigation Measures and Amenity Areas ..... - 8 -

6.1 Noise Criteria ..... - 8 -

6.2 Façade/Window Attenuation ..... - 8 -

6.3 Glazing Summary ..... - 8 -

6.4 Ventilation ..... - 9 -

6.5 Outdoor Amenity Areas ..... - 9 -

7 Conclusion and Comparison with Noise Criteria ..... - 9 -

Tables & Figures

Figure 1: Survey Drawing ..... - 4 -

Figure 2: Measured road noise levels at survey position ..... - 5 -

Table 1: Measured Day & Night time noise levels - 5 -

Table 2: Daytime Noise Levels ..... - 6 -

Table 3: Night-timeNoise Levels ..... - 6 -

Table 4: NEC Table ..... - 7 -

Table 5: NEC Levels - Road Noise ..... - 7 -

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1 Introduction

Acoustic Associates have been appointed to undertake an acoustic assessment of the proposed residential dwelling (Granny annexe) at 10 Brighton Road, Lancing.

The purpose of this assessment is to assess road noise levels and the associated internal/external noise levels for the proposed development.

It is understood that this document will form part of the planning application for the proposed development.

At the front of the site is the single carriageway A259 Brighton Road therefore it will be necessary for road noise to be measured and assessed.

The road noise survey has been carried out following the guidelines of Planning Policy Guidance Note 24: Planning and Noise (PPG 24), and WHO

It is considered that if all of the noise mitigation measures, detailed in section 6, are completed the internal and external noise levels achieve the noise criteria laid out by the World Health Organisation.

For this reason it is considered that planning permission would not be refused on noise grounds.

2 Planning Policy, Context & Noise Assessment Criteria

2.1 Context

The proposed development will convert an existing non residential building into a self contained dwelling. The A259 road is in front of the proposed dwelling and the sea is behind. The dwelling has only two habitable rooms (Lounge/kitchen and bedroom) which are both dual aspect facing the road and the sea.

2.2 Planning Policy Guidance 24 (Planning and Noise)

Planning policy guidance notes set out the Government's policies on different aspects of planning. Until recently, it was the case that Local Authorities must take their content into account in preparing their development plans. They may be material to decisions on individual planning applications and appeals.

PPG24 gives guidance to local authorities in England on the use of their planning powers to minimise the adverse impact of noise.

It outlines the considerations to be taken into account in determining planning applications, introduces the concept of noise exposure categories for residential development and advises on the use of conditions to minimise the impact of noise.

PPG24 has recently been withdrawn and it has been superseded by the National Planning Policy Framework 2012. This later document places the onus on Local Authorities to implement their own local criteria. It is recommended in this case that an appropriate criterion is provided by World Health Organisation (WHO) noise guidelines.

2.3 WHO Noise Criteria Internal Noise

The target internal levels are based on guidelines laid out by the World Health Organisation (WHO) and are as follows:

Room Type	Maximum Internal Level - Leq dB (A)
Living rooms	35 (Daytime only)
Bedrooms	30 (Night)
Room Type	Maximum Internal Level – L(A)max dB (A)
Bedrooms	45 (not more than 10-15 times per Night)

The target internal noise level for a bedroom during the night time corresponds to the threshold of sleep disturbance. Internal noise levels above 30dB (A) are likely to cause sleep disturbance.

2.4 WHO Noise Criteria External Noise

With regard to outdoor amenity areas WHO states the following:

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB(A) on balconies, terraces and in outdoor living areas.

To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 50dB(A) on balconies, terraces and in outdoor living areas.

3 Noise Survey Baseline Conditions & Results

A noise survey was carried out on the 25th October 2012 in order to measure noise levels associated with the A259 Road.

3.1 Noise Survey Details

3.1.1 Equipment

- 2xNorsonic "NOR118" Type 1 Sound Level Meters (Front and Rear)
- Castle GA607 Class 1 Acoustic Calibrator

3.1.2 Personnel

Survey carried out by: Tom Attwood TechIOA MIDiagE

3.1.3 Weather conditions

Dry - Wind: variable direction no greater than 4ms^{-2}

3.1.4 Measurement Positions

Road noise was measured for three hours (in one minute measurement intervals) at the front of the development. For 90 (1min) intervals road noise levels were also (consecutively) measured at the rear of the proposed development. The measurements were taken at an approximate distance of 1m from the (to be converted) building. The microphone locations approximate the locations of the front and rear bedroom windows.Taking in to account the microphone location it follows that all measurements are facade measurements and therefore require a correction so that the assessment can be completed in terms of free-field noise levels. 3dB(A) has been subtracted from the façade level measurements to convert them to free field measurements. All further results will be expressed as free field values unless stated otherwise. The above correction is detailed in the PPG24 guidelines. The figure below shows the measurement positions and the proposed development:

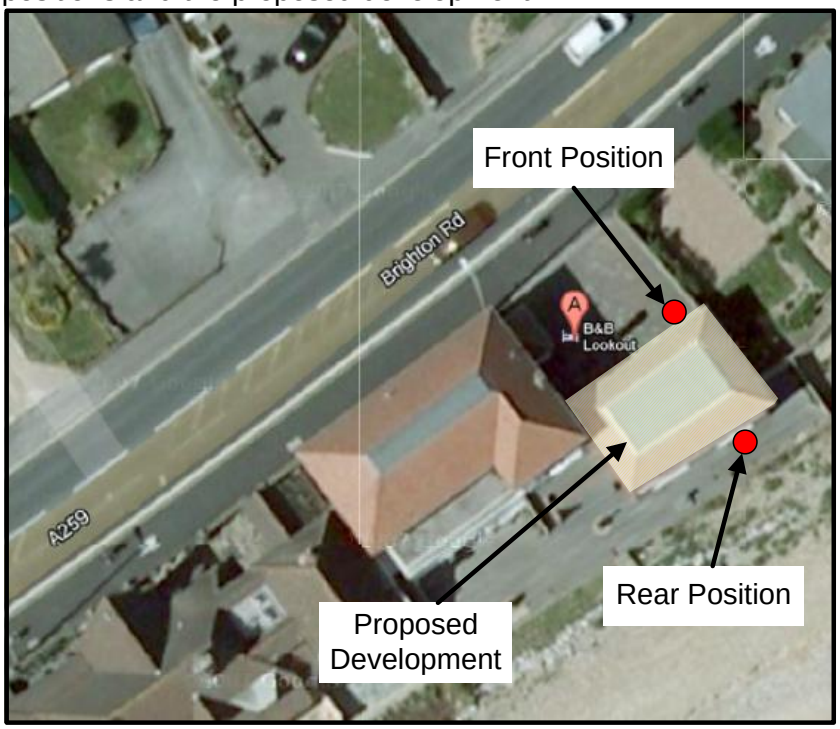

Figure 1: Survey Drawing

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3.2 Noise Survey Results

The graph below shows the free field $L(A)_{eq}$ and $L(A)_{max}$ noise levels measured at the front survey position (The free field $L(A)_{eq}$ noise levels measured at the rear survey position have also been shown):

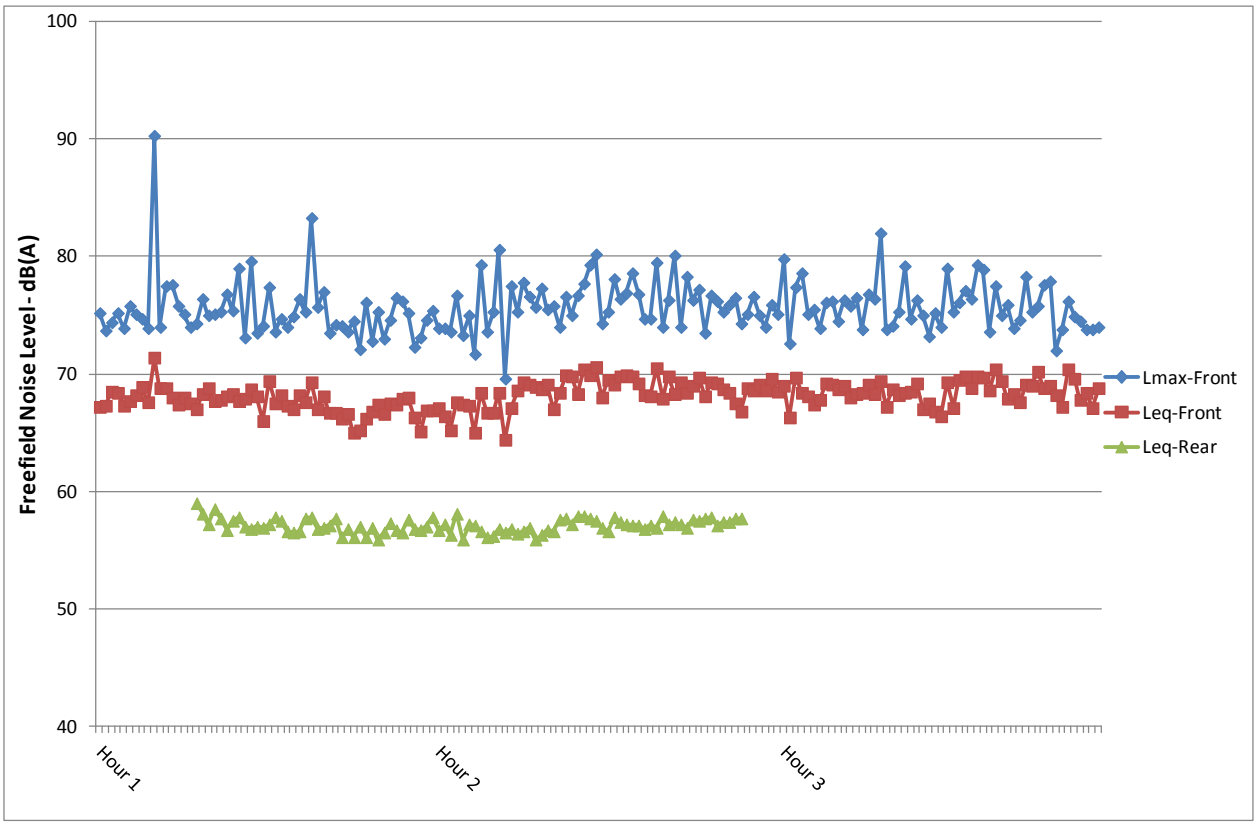

Figure 2: Measured road noise levels at survey position

The Table below shows the measured (and corrected to free-field) 3 hour average noise level:

Date	*$L(A)_{eq,3hour}$*
25/10/2012	68

Table 1: Measured Day & Night time noise levels

3.3 Average Difference Survey Positions

The average difference between the front and rear measurement positions has been calculated as 14dB(A). Therefore road noise levels at the rear of the property will be 14db(A) lower than at the front as the development itself is acting as a noise barrier.

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4 Predicting Day and Night-time Noise Level

4.1 Daytime Noise Levels

The Calculation of Road Traffic Noise (CRTN) document details the "Shortened form Measurement Method" which predicts the day time noise level based upon 3 hours of road noise measurements.

The calculation (shown below) of road traffic (CRTN) shortened form measurement method (Section III, Para 43) calculates the L10 18Hr:

Using L_{10} (3 Hour) as the arithmetic mean of the three consecutive[1] values of hourly L10, the current value of L10 (18 Hour) can be calculated from the following:

L10 (18 Hour) = L10 (3 Hour) – 1dB(A)

Using the above and the measurement details in 3.2 demonstrates that at the front of the development:

L10 (18 Hour) = 67dB(A)

The PPG24 document details day (07:00-23:00hrs) and night time (23:00-07:00 hrs) periods of 16 hours and 8 hours respectively

PPG24 States that the Leq (16 Hour) is approximately 2dB less than the L10 (18 Hour).

Therefore the daytime (07:00-23:00 Hours) road noise levels will be as follows:

Measurement Position	*$L(A)_{eq,16hour}$*
Front	65 dB(A)
Rear	51 dB(A)

Table 2: Daytime Noise Levels

4.2 Night-time Noise Levels

From experience night time noise levels will be at least 5dB(A)lower than the daytime noise level. This particular road is likely to be significantly busier between 07:00-23:00hrs than between 23:00-07:00hrs.

Acoustic Associates completed a day/night traffic noise survey at a nearby location (South Street Lancing). Road noise levels were measured for 24hrs and the difference between the night and daytime noise levels was 7dB(A).

Assuming that the difference in traffic flow levels (between day and night) on the A259 will be similar to the difference in traffic flow levels (between day and night) on South Street, the predicted night time noise levels are as follows:

Measurement Position	*$L(A)_{eq,16hour}$*
Front	58-60 dB(A)
Rear	44-46 dB(A)

Table 3: Night-time Noise Levels

[1] The three consecutive hours must be between 13:00-17:00hrs

5 Noise Exposure Category

PPG 24 states that:

"When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories (NEC) the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC, as below:"

NEC	
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 a desirable level.***
B	***Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.***
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 4: NEC Table

The following table taken from PPG24 shows the road noise level ranges for the different NEC's:

Noise Levels Corresponding To The Noise Exposure Categories LAeq,T dB				
	Noise Exposure Category			
Road Noise	**A**	**B**	**C**	**D**
07.00 - 23.00	<55	55 - 63	63 - 72	>72
23.00 - 07.00	<45	45 - 57	57 - 66	>66

Table 5: NEC Levels - Road Noise

The predicted noise levels and the above table have been used to determine that the (worst case) NEC, is NEC "C" for day time and night time periods.

Worst case daytime noise level = 65dB(A) and worst case night-time noise level = 60dB(A)

6 Road Noise Mitigation Measures and Amenity Areas

6.1 Noise Criteria

The target internal levels are based on guidelines laid out by the World Health Organisation (WHO) and are as follows:

Room Type	Maximum Internal Level - Leq dB (A)
Living rooms	35 (Daytime only)
Bedrooms	30 (Night)
Room Type	Maximum Internal Level – L(A)max dB (A)
Bedrooms	45 (not more than 10-15 times per Night)

6.2 Façade/Window Attenuation

With respect to outside-to-inside attenuation of various transportation noise sources PPG24 (Annex 6, Para. 4) states the following:

"Because the sound insulation of a window (and other components of the building envelope) varies with the frequency (or pitch) of the sound, the overall noise reduction provided by a window will depend, among other factors, on the spectrum of the external noise. Table 1 (below) shows typical reductions in noise levels from common sources which would be expected from various types of window installations fitted in brick/block walls in a dwelling. The insulation provided by any type of window when partially open will be in the region of 10-15 dB (A)"

Noise Source	Single Glazing	Thermal Double Glazing	Secondary Glazing
Road Traffic	28	33	34
Civil Aircraft	27	32	35
Military Aircraft	29	35	39
Diesel Train	28	32	35
Electric Train	30	36	41

Normal thermal glazing (4/12/4) will provide $R_{traffic}$ = 25dB(A) and Rw = 31 dB(A):source Pilkington Glass. Therefore 4/12/4 glazing when set in a masonry façade should mean that the façade will attenuate outdoor road noise levels by approximately 33dB(A).

The above and the predicted noise levels demonstrate that, if windows are kept closed, the worst case internal noise level will be 32dB(A) during the daytime and 27dB(A) during the night time. (External level minus façade attenuation level equals internal noise level) As these levels are close to the target levels it is recommended that 6/12/4 (or similar) glazing is used for windows facing the A259. With this glazing the internal night time LA(A)max noise level will also be well below the WHO 45db criterion for both daytime and nigh-time periods.

6.3 Glazing Summary

- A259 glazing should be a minimum of $R_{traffic}$ = 27dB(A) and Rw = 34 dB(A)
- Sea side facade glazing should be a minimum of $R_{traffic}$ = 25dB(A) and Rw = 31 dB(A)

6.4 Ventilation

As the development is in NEC "C", ventilation would be required by other means other than an open window on the A259 facade if the target internal noise levels are to be achieved. However as stated previously both habitable rooms have windows (or French doors) on the quieter sea facing façade. Based on the noise measurements the rear of the proposed development will fall in to NEC "B".

With respect to Noise Exposure Category "B" PPG24 states the following (Annex 2, Para 10):

"Because noise should be taken into account when determining planning applications in NEC B, it has been assumed that the minimum amelioration measure available to an occupant at night will be to close bedroom windows."

If the Local Authority still choose to follow the PPG24 guidelines stated above then the ventilation mitigation measures could be as follows:

If the windows facing the A259 are required to be fitted with trickle vents then acoustic trickle ventilators should be fitted. Trickle vents which are rated at least Dnew=34dB should be used. It may be possible to only fit (normal) trickle vents to windows on the quieter sea side façade. Therefore background ventilation would be provided without allowing the ingress of excessive road noise levels. An open window on the sea side facade would allow for purge ventilation.

6.5 Outdoor Amenity Areas

As mentioned in section 2 WHO states the following with regard to outdoor amenity areas:

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB(A) on balconies, terraces and in outdoor living areas.

To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 50dB(A) on balconies, terraces and in outdoor living areas.

The current plans show that there will be a small terrace to the rear of the proposed development. The noise calculations predict that the noise level in this amenity area (approximately 51 dB(A)) will be just over the "moderate annoyance" level but under the "serious annoyance level".

7 Conclusion and Comparison with Noise Criteria

The noise survey and assessment shows that basic noise mitigation measures will be required for plots

It is considered that if all of the noise mitigation measures, detailed in section 6, are completed the internal and external noise levels achieve the noise criteria laid out by the World Health Organisation.

For this reason it is considered that planning permission would not be refused on noise grounds.