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ASSESSMENT OF ENVIRONMENTAL NOISE

LAND TO THE REAR OF
43 – 45 BARNHAM ROAD, BARNHAM

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1. SUMMARY

- 1.1 An assessment of ambient noise has been undertaken at the site of a proposed residential development at land adjacent to Barnham Road, Barnham.
- 1.2 An acoustic survey was commissioned to assess the impact of noise from traffic on the neighbouring roads, noise from the mainline railway and noise from commercial activities in the adjacent garage units.
- 1.3 The existing ambient noise climate affecting the site has been established (Sections 3 & 4), and the survey has confirmed the levels of noise emanating from road and rail traffic. There was no evidence of significant noise from the garage units.
- 1.4 An outline assessment of the site's suitability for residential development has been provided (Section 5).
- 1.5 Means of mitigating the excess have been submitted (Section 6), in the form of a specification for suitable façade glazing, and the provision of attenuated ventilation for the critical accommodation.
- 1.6 It is concluded that, with these recommended measures in place, the occupants of the new flats and houses can be provided with an acceptable acoustic environment.

2. INTRODUCTION

- 2.1 An assessment of noise has been undertaken on land behind 43 – 45 Barnham Road, Barnham.
- 2.2 The site lies in the centre of Barnham, with Barnham Road to the north and the Brighton to Southampton railway line some 100m to the south (see Figure 1).
- 2.3 It is proposed the site be developed with a scheme comprising of 14 flats spread over two blocks.
- 2.4 It is recognised that the development could be subject to a significant level of noise arising from traffic on the Barnham Road, as well as some disturbance from the adjacent railway line. It is also noted that the site lies adjacent to a small garage/workshop.
- 2.5 The current assessment has therefore been commissioned to determine whether the noise affecting the site warrants particular acoustic measures. Formally, the objectives of the current exercise may be summarised as follows:
- (i) To determine the existing ambient noise climate affecting the development site;
 - (ii) To specify measures this will attenuate the external noise, to provide a good standard of accommodation for prospective residents.
- 2.6 This report details the investigations carried out in respect of each of these objectives and summarises the conclusions which have been reached.

3. SURVEY OF EXISTING NOISE – ROAD TRAFFIC/COMMERCIAL ACTIVITY

- 3.1 The first step in the assessment of potential noise impact is to measure and describe the existing noise levels affecting the site.
- 3.2 Given the security of the site, a long term noise survey was not possible. An attended survey was therefore carried out in accordance with the short survey technique described in the Calculation of Road Traffic Noise document, published by the Department of Transport (Welsh Office). This survey was undertaken on Wednesday 18th November 2009, between 12.45 and 15.45.
- 3.3 A Rion NL-30 Sound Level Meter was set up approximately 21m from the kerbside of Barnham Road, which represents the façade of the property, nearest to the road. The microphone was located at a height of approximately 1.5m above ground level, in a free field position. A Norsonic 118 Sound Level Meter was also used to take spot measurements of railway noise, close to the railway and away from all other noise sources.
- 3.4 The Rion was configured to measure 1-hour samples of the following acoustic parameters:

L_{Aeq} The A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.

L_{Amax} The A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).

L_{A10} A statistical parameter representing the A-Weighted noise level exceeded for 10% of each sample period. This is commonly used to describe road traffic noise levels.

3.5 The equipment was calibrated before and after the survey. The weather during the survey was dry with sunny spells, but there was a south-westerly wind of between 10 & 15 m/s. The temperature was approximately 18°C.

3.6 The table below confirms the measured levels during each hourly period.

Period	L _{Aeq} dB(A)	L _{Amax} dB(A)	L _{A10} dB(A)
12.45 – 13.45	58.6	76.2	61.3
13.45 – 14.45	59.2	79.4	61.5
14.45 – 15.45	60.0	80.5	61.3

3.7 The noise levels measured were primarily the result of traffic passing on Barnham Road, and the peak levels were generated by single vehicle drive-bys (generally lorries). Within each 1-hr sample, there were a number of events generating peak levels of the magnitude quoted above.

3.8 It is again noted that there was only evidence of modest and infrequent noise from the adjacent garages.

3.9 The CRTN document provides a formula for converting the 1-hour values of L_{A10} into a day time 18-hour L_{A10} value. The result of this calculation is as follows:

$$L_{A10, 18 \text{ hr}} = 60.4 \text{ dB (A)}$$

3.10 In fact, assessments of road traffic noise are now more commonly based on the L_{Aeq} parameter, rather than the L_{A10} parameter. It is therefore necessary to convert the 18-hour L_{A10} into the more usual 16-hour day time L_{Aeq} and the 8 hour night time L_{Aeq}.

- 3.11 The TRL Project Report PR/SE/451/02¹ provides formulae for making the necessary adjustment, and using these relationships, the figure of 60.4 dB(A) $L_{A10, 18 \text{ hours}}$ equates to the following:

$$\text{Day Time } L_{Aeq \text{ 07.00} - \text{23.00}} = 58.2 \text{ dB (A)}$$

$$\text{Night Time } L_{Aeq \text{ 23.00} - \text{07.00}} = 50.6 \text{ dB (A)}$$

- 3.12 These figures relate to the noise levels at the façade of the property closest to the Barnham Road, however the noise levels for properties at the southern end of the site a further 13m away, not accounting for any barrier attenuation from existing buildings, would be:

$$\text{Day Time } L_{Aeq \text{ 07.00} - \text{23.00}} = 56.1 \text{ dB (A)}$$

$$\text{Night Time } L_{Aeq \text{ 23.00} - \text{07.00}} = 48.5 \text{ dB (A)}$$

- 3.13 The significance of these values will be discussed in the following sections of this report.

¹ TRL Project Report PR/SE/451/02 CONVERTING THE UK TRAFFIC NOISE INDEX $L_{A10,18h}$ TO EU NOISE INDICES FOR NOISE MAPPING Prepared for DEFRA 2002

4. SURVEY OF EXISTING NOISE – RAILWAY NOISE

- 4.1 The second step in the assessment is to assess rail traffic noise affecting the site.
- 4.2 As a long term noise survey was not possible, an attended survey was carried out between 12.45 and 15.45 on Wednesday 18th November 2009.
- 4.3 A Norsonic 118 sound level meter was used to measure the noise levels of trains passing by the site. This was achieved by manually recording the noise levels of the trains as they approached and noting the duration of measurements.
- 4.4 The meter was set up 8m from the track and 99m from the façade of the nearest property.
- 4.5 The meter was configured to record the following parameters:

L_{Aeq} The A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.

L_{Amax} The A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).

- 4.6 The table below confirms the measured levels during a typical hourly period (mid afternoon).

Direction/Service	No. of Trains/hr	Duration	L_{Aeq}	L_{Amax}	L_{AE}
Westbound/Bognor Branch	2	25 secs	65.5	76.9	79.6
Westbound/Mainline	6	7 secs	69.4	73.5	78.2
Eastbound/Mainline	6	11 secs	80.5	92.4	91.1
Eastbound/Bognor Branch	2	15 secs	62.4	73.0	74.4

4.7 Of greater interest than 1-hour values are the noise levels over the 16 hour day time, or 8 hour night time periods. The total number of trains during the day time period (07.00 – 23.00) is 304 and the total during the night time period (23.00 – 07.00) is 40

4.8 From the information above, the calculated period noise levels are as follows:

$$\text{Day Time } L_{Aeq\ 07.00 - 23.00} = 76.2 \text{ dB (A)}$$

$$\text{Night Time } L_{Aeq\ 23.00 - 07.00} = 70.4 \text{ dB (A)}$$

4.9 However, these are the results measured at 8m from the railway, the nearest properties would be at least 107m from the railway and the free field noise levels at the southerly facades should be read as:

$$\text{Day Time } L_{Aeq\ 07.00 - 23.00} = 53.7 \text{ dB (A)}$$

$$\text{Night Time } L_{Aeq\ 23.00 - 07.00} = 47.9 \text{ dB (A)}$$

4.10 Free-field noise levels at the line of the northerly facades should approximately 1 dB lower.

5. ASSESSMENT OF AMBIENT NOISE LEVELS

- 5.1 An indication of the acceptability of the site for residential development can be found in the 1994 Planning Policy Guidance note 24, "Planning and Noise". This gives advice on how planning systems can be used to reduce the impact of noise on people, stating

"The planning system has the task of guiding development to the most appropriate locations. It will be hard to reconcile some land uses, such as housing, hospitals or schools, with other activities which generate high levels of noise, but the planning system should ensure that, wherever practicable, noise-sensitive developments are separated from major sources of noise (such as road, rail and air transport and certain types of industrial development). It is equally important that new development involving noisy activities should, if possible, be sited away from noise-sensitive land uses. Development plans provide the policy framework within which these issues can be weighed but careful assessment of all these factors will also be required when individual applications for development are considered. Where it is not possible to achieve such a separation of land uses, local planning authorities should consider whether it is practicable to control or reduce noise levels, or to mitigate the impact of noise, through the use of conditions or planning obligations."

- 5.2 PPG24 outlines the relevant considerations to be taken into account by local planning authorities when determining planning applications for residential developments which will be exposed to existing noise sources. It also sets out three key approaches by which noise impact can be minimised:

- "(i) Engineering - the reduction of noise at the point of generation, the containment of noise generated, and protection of surrounding noise sensitive buildings;*
- (ii) Lay-out - adequate distance between source & noise sensitive building and area; screening by natural barriers, other buildings or non critical rooms in a building;*
- (iii) Administrative - limiting operating time of source, restricting activities allowed on site, specifying an acceptable noise limit"*

- 5.3 In brief, the methodology of PPG24 involves a calculation of the noise affecting the site during a 16 hour day time period, and an 8 hour night time period. The calculated values are then compared to a set of tables which will categorise the results as being 'A', 'B', 'C' or 'D'. For each of these categories, PPG 24 clarifies the acoustic implications. For areas exposed to predominantly road traffic noise or an equal mixture of road and rail traffic, the categories would be determined as follows:

Noise Levels Corresponding To The Noise Exposure Categories For New Dwellings $L_{Aeq,T}$ dB				
	Noise Exposure Category			
Noise Source	A	B	C	D
Road Traffic or Mixed Sources				
07.00 – 23.00	<55	55 - 63	63 - 72	>72
23.00 – 07.00 ¹	<45	45 - 57	57 - 66	>66

- 5.4 Given the close vicinity of the road and railway it is necessary to determine if there is a dominate noise source. This may be achieved by the decibel addition of the two predictions given in Paras. 3.11/3.12 and 4.8/4.9. The table below shows the results:

Sources	Northerly Elevations		Southerly Elevations	
	Day Time L_{Aeq} 07.00 – 23.00	Night Time L_{Aeq} 23.00 – 07.00	Day Time L_{Aeq} 07.00 – 23.00	Night Time L_{Aeq} 23.00 – 07.00
Road Traffic	58	51	56	49
Rail Traffic	53	47	54	48
Combined Total	59	53	58	52

- 5.5 PPG 24 states that if any level of any one source lies within 2 dB (A) of the calculated combined value, that source should be taken as the dominant one and the site assessed against the appropriate NEC for that source.

- 5.6 Therefore, the site will be assessed for road traffic noise.

- 5.7 The site surveys suggest that the typical noise levels on the site (in the absence of façade reflections) would be no greater than:

Day Time L_{Aeq} 07.00 – 23.00	Night Time L_{Aeq} 23.00 – 07.00
59	53

- 5.8 The PPG document would classify the day time and night time values as 'Noise Exposure Category B'. This is defined as follows:

Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.

- 5.9 During the 3hr measurement period, the tables show that the highest $L_{Amax, fast}$ reading was 92.4 dB(A) measured 8m from the railway track. This equates to a level of 70.0 dB(A) at the façade of the nearest house. PPG 24 states that on sites where individual noise events regularly exceeds 82 dB(A) $L_{Amax, slow}$ several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq, 8hrs}$ (except where the $L_{Aeq, 8hrs}$ already puts the site in NEC D). As the value of $L_{Amax, slow}$ will typically be 2 – 3dB lower than the value of $L_{Amax, fast}$, in this instance, the maximum noise readings will not alter the PPG24 classification².

- 5.10 In view of the guidance of PPG24, Section 6 will describe measures which may be incorporated into the design to provide an acceptable environment for the residents of the proposed buildings.

² Note, the peak levels due to road traffic were 80 dB(A) $L_{Amax, fast}$, also well within the 82 dB(A) threshold.

6. RECOMMENDATIONS FOR NOISE ATTENUATION MEASURES

- 6.1 There is much guidance on the levels of intrusive noise which would be considered acceptable within a residential dwelling. Typical advice is found in British Standard 8233:1999 "Sound Insulation and Noise Reduction for buildings - Code of Practice" sets out limits for indoor ambient noise levels within living rooms and bedrooms. This suggests:

Living Rooms	30 - 40 dB(A) $L_{Aeq,t}$
Bedrooms	30 - 35 dB(A) $L_{Aeq,t}$ 45 dB(A) $L_{Amax, fast}$

- 6.2 It is therefore recommended that development is designed to achieve the following noise levels internally:

Living Rooms	35 dB(A) $L_{Aeq, 0700 - 2300}$
Bedrooms	30 dB(A) $L_{Aeq, 2300 - 0700}$ 45 dB(A) $L_{Amax, fast}$

- 6.3 Table I below defines the outside to inside sound level difference, dB(A), required through each façade of the building. These figures are based initially on the targets of Para 6.2 and the measured noise levels given in Para. 3.11/3.12 & 4.8/4.9.

- 6.4 Levels have been adjusted to account for the façade reflections which will occur in front of the new building. The values are shown in the table below.

TABLE I – PREDICTED NOISE LEVELS

Elevation	External Noise Level	Target Noise Level	Outside to inside level difference
Southerly Elevations			
Living Rooms	58 dB L _{Aeq} , 16 hrs	35 dB(A) L _{Aeq} , 16hrs	23 dB(A)
Bedrooms	52 dB(A) L _{Aeq} , 8 hrs 73 dB(A) L _{Amax} ³	30 dB(A) L _{Aeq} , 8hrs 45 dB(A) L _{Amax}	28 dB(A)
Northerly Elevations			
Living Rooms	59 dB L _{Aeq} , 16 hrs	35 dB(A) L _{Aeq} , 8hrs	24 dB(A)
Bedrooms	53 dB(A) L _{Aeq} , 8hrs 83 dB(A) L _{Amax} ⁴	30 dB(A) L _{Aeq} , 8hrs 45 dB(A) L _{Amax}	38 dB(A)

6.5 It is confirmed that a standard masonry or timber framed external wall construction will suffice. The overall sound insulation of the façade will, in fact, be dictated by the glazing.

6.6 For the glazing, the following performance specifications should be applied:

TABLE II – RECOMMENDED GLAZING PERFORMANCE

Elevation	Acoustic Performance for Glazing	Possible Glazing Configuration ⁵
Southerly Elevations		
Living Rooms	22 dB R _w + C _{tr}	4 / 16 / 4
Bedrooms	25 dB R _w + C _{tr}	4 / 16 / 4
Northerly Elevations		
Living Rooms	23 dB R _w + C _{tr}	4 / 16 / 4
Bedrooms	37 dB R _w + C _{tr}	10 / 12 / 8.4

³ Peak level due to rail traffic

⁴ Peak level due to road traffic

⁵ To be confirmed by glazing supplier.

6.7 Whichever level of glazing is provided for these sensitive facades, it is of course the case that when the windows are opened, the acoustic performance of the windows will be irrelevant. It may therefore be necessary to provide alternative means by which habitable rooms may be ventilated whilst keeping the acoustic integrity of the façade. The options for achieving this include:

- (i) An acoustic trickle vent, such as the Passivent TVALdB⁶ Acoustic Grille.⁶ An external grille providing a reduction of up to 48 dB. This fits in conjunction with a standard internal trickle vent;
- (ii) A wall ventilation system, such as the Passivent Fresh 90 dB Wall Ventilator. An internal grill and external louvre linked by 150mm diameter duct, providing 300mm² - 6000mm² ventilation;
- (iii) A whole house natural ventilation system, such as a Passivent PSV (passive) or AS (assisted) ventilation system. This uses acoustic inlet grills in the façade of the building and extract grill ducted through the building to a roof terminal. The inlet grills and extract ducting both incorporate acoustic insulation, to prevent the ingress of external noise.

6.8 The ventilation requirements, and preferred method of ventilation, should first be determined by the Architect (this may involve liaison with the Local Authority to determine any local standards which must be met). It is suggested that such provisions are required wherever enhanced glazing is proposed.

6.9 Details of the preferred means of ventilation should then be passed to Acoustic Consultant for confirmation of appropriate means of attenuation.

⁶ Passivent, by Willan Building Services 0161 962 7113

7. CONCLUSION

- 7.1 This assessment of noise has looked in detail at the proposed development at land behind Barnham Road, Barnham. It has been shown that the site is subject to a significant levels of ambient noise, the most noteworthy source being traffic on the Barnham Road itself.
- 7.2 However, it has been concluded that, by specifying appropriate glazing and by providing attenuated forms of ventilation to the most sensitive rooms, it will be quite possible to ensure that the internal environment within the building is well within normal design standards for such residential use.

FIGURE 1 - SITE LAYOUT

