Industrial Noise and Vibration Centre Limited
889 Plymouth Road • Slough • Berkshire • SL1 4LP
Tel : 01753 698800 Fax : 01753 567988
Email : consult@invc.co.uk
Web : www.invc.co.uk

Email to	:	Laura Anne Powell Planning Co-ordinator Taylor Wimpey
Email address	:	LauraAnne.Powell@taylorwimpey.com
From	:	Steve Ellis
Date	:	13 May 2014
Subject	:	Environmental noise and train vibration assessment — residential development north of the railway line at Rhoose Point, Vale of Glamorgan
Report No	:	7538

Introduction

The **Industrial Noise & Vibration Centre Limited (INVC)** was requested by Taylor Wimpey to assess the environmental noise and specifically train noise and vibration levels at the above site.

This report gives the results of the noise and vibration measurements undertaken on 26 February 2014 and compares the results with those given in Planning Guidance (Wales) Technical Advice Note 11 (Noise), British Standard 6742 : 2008 "Guide to evaluation of human exposure to vibration in buildings Part 1 : Vibration sources other than blasting" and the Vale of Glamorgan Council noise and vibration conditions.

Figure 1 shows the site in relation to the surrounding area and in particular, the railway line and existing housing.

Figure 1

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Noise and vibration measurements

Ambient and background noise measurements were taken at location 1, as shown on Figure 1. The 'A' weighted noise levels were taken at a height of approximately 1.5m above local ground level, in free field conditions using calibrated instrumentation conforming to the Type 1 specification of BS 61672 - 1 - 2003. In addition, specific noise measurements were taken of a goods train and the local diesel turbos that passed the measurement location. During the measurement period the weather was good, with clear skies and wind speeds of less than 3m/sec.

Figures 2 and 3 show a general view of the site and a typical passenger train respectively.

Table 1 gives the results of the noise measurements undertaken.

TABLE 1

Start Time	L_{Aeq}	L_{A10}	L_{A50}	L_{A90}
12:20	50	47	44	42
12:25	46	48	44	42
12:30	43	46	43	41
12:35	44	46	43	41
12:40	44	45	43	41
12:45	44	46	43	41
12:50	62 *	49	44	42
12:55	60 *	51	45	42
13:00	44	46	43	41
13:05	43	45	43	41
13:10	42	43	41	40
13:15	42	44	42	40
13:20	69 **	74	48	41
13:25	44	47	42	40
13:30	51	54	43	41
13:35	44	47	43	41
13:40	44	47	44	42
13:45	49	52	46	43
13:50	64 *	51	44	42
13:55	58 *	49	43	41
Average	59	49	44	41

* passenger train
** goods train

From the above results it can be seen that the ambient (L_{Aeq}) noise level is 59 dB(A) with an attendant background (L_{A90}) level in the region of 41 dB(A).

It is noteworthy that on the other side of the track the ambient noise level was 6 dB(A) lower, which initially caused pause for thought. After careful analysis it was concluded that the trains on the north side are accelerating away from the station and those on the south side are partially shielded by the embankment, hence the increase in noise when compared with those on the other side.

Vibration measurements were undertaken based on the criteria specified in British Standard BS 6472 : 2008 "Guide to evaluation of human exposure to vibration in buildings Part 1 : vibration sources other than blasting". The measurements of the goods train and diesel turbos were taken at the same time as the noise measurements and at the same location, which is considered to be typical of the location for the nearest houses on the site relative to the railway line. Vibration levels were below a point which could be detected and hence are below the "low probability of adverse comment" criterion given in BS 6472 and therefore vibration from the trains is not an issue.

Predicted noise levels

The following table, 2, gives the number of trains that have been used to calculate the free field noise levels at location 1, as shown on Figure 1. The number of trains used is based on the timetable as far as possible and are considered worst case.

TABLE 2

Train type	Number of trains		SEL dB(A)	16 hour free field (07:00 - 23:00) L_{Aeq} dB	8 hour free field (23:00 - 07:00) L_{Aeq} dB
	16 hours	8 hours			
Diesel turbo	32	8	86	53	50
Goods	8	2	96	57	54
			Total	58	55

From the above it can be seen that the free field 16 hour L_{Aeq} at location 1 is 58 dB and the 8 hour L_{Aeq} is 55 dB.

Discussion of results

In order to put the measured noise levels into context, reference has been made to Planning Guidance (Wales) Technical Advice Note (Wales) 11. The document makes reference to various noise exposure categories, A, B, C and D, for road traffic and train noise.

	Time period	L_{Aeq}	Comments
A	07:00 - 23:00 23:00 - 07:00	Rail traffic <55 16 hr L_{Aeq} <45 8 hr L_{Aeq}	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	07:00 - 23:00 23:00 - 07:00	Rail traffic 55 - 66 16 hr L_{Aeq} 45 - 59 8 hr L_{Aeq}	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	07:00 - 23:00 23:00 - 07:00	Rail traffic 66 - 74 16 hr L_{Aeq} 59 - 66 8 hr L_{Aeq}	Planning permission should not normally be granted. Where it is considered that permission should be granted, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	07:00 - 23:00 23:00 - 07:00	Rail traffic > 74 16 hr L_{Aeq} > 66 8 hr L_{Aeq}	Planning permission should normally be refused.

The measured levels, which take account of the train noise, place the development into Category A.

The Vale of Glamorgan Council set the following noise conditions for railway noise and vibration.

"Railway Noise
Prior to commencement of development a scheme shall be submitted and approved in writing by the Local Planning Authority to provide that all habitable rooms exposed to external daily noise in excess of 66 dB(A) $L_{eq\ 16\ hour}$ (free field) during the day (07.00 to 23.00 hours) or 59 dB(A) $L_{eq\ 8\ hour}$ (free field) at night (23.00 to 07.00 hours) shall be subject to sound insulation measures to ensure that ***all*** *such rooms achieve an internal noise level of 40 dB(A) $L_{eq\ 16\ hour}$ during the day and 35 dB(A) $L_{eq\ 8\ hour}$ at night. The submitted scheme shall ensure that habitable rooms subject to sound insulation measures shall be provided with acoustically treated active ventilation units. Each ventilation unit (with air filter in position), by itself or with an integral air supply duct and cowl (or grille), shall be capable of giving variable ventilation ranges ranging from —*

(1) an upper rate of not less than 37 litres per second against a back pressure of 10 newtons per square metre and not less than 31 litres per second against a back pressure of 30 newtons per square metre, to

(2) a lower rate of between 10 and 17 litres per second against zero back pressure.

No habitable room shall be occupied until the approved sound insulation and ventilation measures have been installed in that room. Gardens shall be designed to provide an area which is at least 50% of the garden area for sitting out where the maximum day time noise level does not exceed 55 dB(A) $L_{eq\ 16\ hour}$ (free field).

Reason : To ensure that the amenities of future occupiers are protected.

(Note to Officer: Development of any part of the site, subject to noise levels in excess of 74 dB(A) $L_{eq\ 8\ hour}$ [free field] at night would not be supported. You must also be satisfied that the garden criteria can be met).

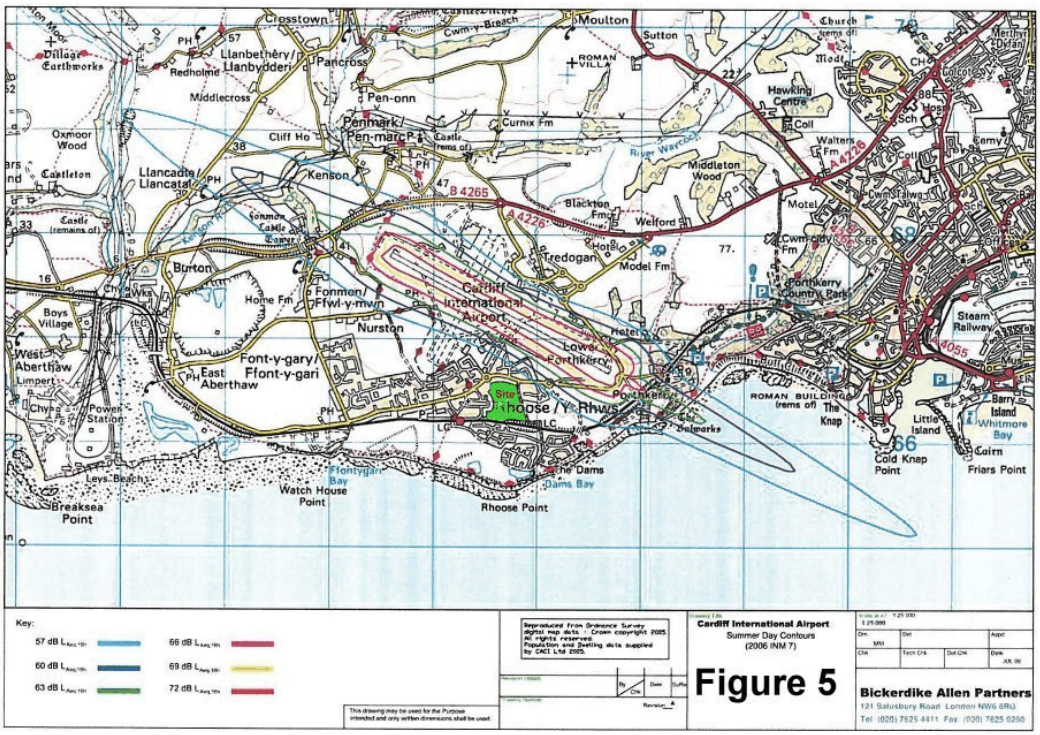
Railway Vibration
Prior to commencement of a development a scheme shall be submitted to and approved in writing by the Local Planning Authority to provide that the dwellings are designed and constructed so as to ensure that vibration dose values do not exceed $0.4m/s^{1.75}$ between 07.00 and 23.00 hours, and $0.26m/s^{1.75}$ between 23.00 and 07.00 hours, as calculated in accordance with BS 6472 : 1992, "Guide to Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)". The dwelling shall be constructed in accordance with the approved scheme.

Reason : To ensure that the amenities of future occupiers are protected."

From the results of the noise measurements, the properties that front the site next to the railway line are Category B and hence noise should be considered. With this in mind, and as shown by Figure 4, the front of the houses have been placed next to an access road which will subsequently protect the garden areas of the houses, negating the need for any gardens to be protected by a noise barrier. Glazing that can attenuate by 20 dB(A) should be installed along with trickle vents ensuring that the internal noise conditions of the Vale of Glamorgan are achieved.

One final consideration is the Cardiff Airport's noise profile. Figure 5 shows that the development is outside of the 57 dB L_{Aeq} contour and therefore does not present any concern with respect to noise.

Figure 1 – Cardiff International Airport 2006 $L_{Aeq,\ 16\ hour}$ air noise contours



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Conclusions

The development is in Category B of TAN 11 and hence noise levels should be attenuated to comply with reasonable standards as required by the Vale of Glamorgan. In view of this, the housing fronting the development will protect the garden areas and good quality glazing will ensure the internal noise levels are satisfactory.

Author

S ELLIS

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