08/67319/002

SOUND ADVICE ACOUSTICS LTD

HAVANT BOROUGH COUNCIL
19 DEC 2008
RECEIVED

REPORT

CLIENT

HJ Concepts Ltd
Suite 123 Fareham Reach
166 Fareham Road
Gosport
Hampshire PO13 0FW

SITE

Proposed Residential Premises
73 Third Avenue
Havant
Portsmouth
Hampshire

9 - 11 HURSLEY ROAD, CHANDLERS FORD, HAMPSHIRE SO53 2FW
TEL: (023) 8025 3010 FAX: (023) 8025 4774

EXTERNAL - INTERNAL
NOISE AND VIBRATION ASSESSMENT

CLIENT

HJ Concepts Ltd
Suite 123 Fareham Reach
166 Fareham Road
Gosport
Hampshire PO13 0FW

SITE

Proposed Residential Premises
73 Third Avenue
Havant
Portsmouth
Hampshire

SURVEY DATES

9th – 10th December 2008.

Report by:

Mr. B. Scrivener AMIOA

Dr. H. S. Sagoo CEng MIOA.

Checked by:

Mr. M. Scrivener MIOA

Sound Advice Acoustics Ltd
9 - 11 Hursley Road, Chandlers Ford, Hampshire, SO53 2FW
Tel: (023) 8025 3010 Fax: (023) 8025 4774
soundadvice.uk@virgin.net

CONTENTS PAGE

		PAGE NO:
1. INTRODUCTION		3
2. DESCRIPTION OF THE SITE		4
3. NOISE ASSESSMENT		
3.1	PROCEDURE	5
3.2	APPARATUS	6
3.3	ENVIRONMENTAL CONDITIONS	7
3.4	RESULTS	8
3.5	DISCUSSION OF RESULTS	9
3.6	NOISE EXPOSURE CATEGORY	10
3.7	RECOMMENDATIONS	11 - 13
4. VIBRATION ASSESSMENT		
4.1	PROCEDURE	14
4.2	APPARATUS	15
4.3	MEASUREMENT LOCATIONS	15
4.4	MEASUREMENT PROCEDURE	15
4.5	VIBRATION RESULTS	16 – 18
4.6	ASSESSMENT OF VIBRATION LEVELS	19
4.7	RECOMMENDATIONS	19
5. CONCLUSIONS		20
6. ATTACHMENTS		
	FIGURE 1 – DOWNLOADED NOISE RESULTS	21 - 26
	FIGURE 2 – BS 8233 : 1999 CALC BEDROOM	27
	FIGURE 3 – BS 8233 : 1999 CALC LOUNGE	28
	FIGURE 4 – VIBRATION RESULTS	29 – 30

1. INTRODUCTION:

Sound Advice Acoustics Ltd has been instructed by HJ Concepts Ltd, to carry out the relevant noise and vibration assessments and calculations at the proposed residential site at 73 Third Avenue, Havant, Hampshire. It is proposed that the existing vacant plot of land be redeveloped and three new terraced houses constructed along side the existing end of road premises.

Concerns have been raised by the local council's Environmental Health Department with regards to the positioning and layout of the proposed site and therefore this noise and vibration assessment has been undertaken in order to identify the existing background noise levels and existing vibration levels associated with the proposed site. In addition, Lmax levels are also to be assessed in accordance with PPG 24 for night time level exceedance.

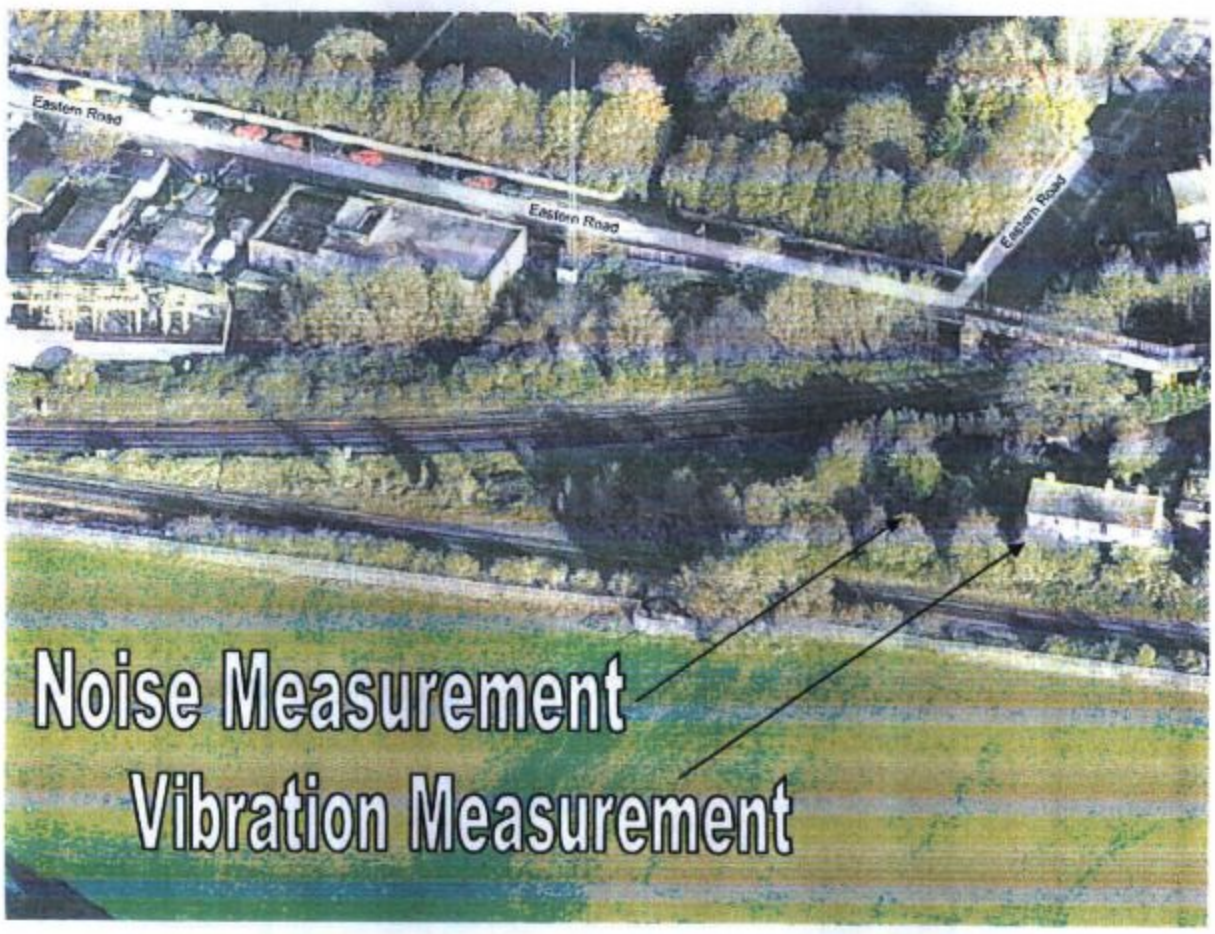
With regards to external ambient noise, noise levels are to be monitored generally in accordance with Planning and Policy Guidance PPG 24 and assessments and calculation made in accordance with BS 8233 : 1999 Sound Insulation and Noise Reduction for Buildings Code of Practice. The levels recorded are to be used to evaluate the NEC Category in accordance with PPG 24 and the minimum window specification required for the proposed residential care home development. With regards to ground borne vibration this assessment has been carried out and assessed in accordance with BS 6472-1:2008, 'Guide to evaluation of human exposure to vibration in buildings' and BS 7385:1993, 'Evaluation and measurement for vibration in buildings'.

External noise levels are to be recorded over, what has been considered for the site, an average / typical time period in order to assess the highest daytime and night time averages and therefore assess worse case scenario.

2. DESCRIPTION OF THE SITE:

The existing site sits at the end of Third Avenue and is positioned between two railway lines. The land site between two train lines, the Havant to Warblington and Havant to Rowlands Castle lines.

The trains passing the site all did so at extremely low speed. The Havant and Warblington stations are less than ½ mile apart and therefore the trains never have sufficient space to build up any speed. Even if the trains are just passing through both stations they are still under a speed restriction. With regards to the Havant to Rowlands Castle line, this section is on a 90 degree bend and therefore the trains are again under a speed restricted section of track.



3. NOISE ASSESSMENT:

3.1 PROCEDURE:

External noise levels were recorded over a typical weekday period 9th – 10th December 2008 at first floor height at the position of the nearest proposed residential window to the railway line to the south of the site. This line was considered to be the busiest of the two lines and therefore nearest façade assessments made to this location were considered to be worse case. Sample measurements were recorded over continuous 5 minute samples. Daytime hourly $L_{Aeq\ 16\ HOUR}$ dB level have been evaluated from this data on an energy basis. Sound Pressure Levels were recorded on the following setting along with a full octave band frequency analysis measured simultaneously and between 31.5 Hz and 16.0 kHz.

$L_{Aeq\ 5\ MINUTES}$ dB $L_{A10\ 5\ MINUTES}$ dB
$L_{AMAX\ 5\ MINUTES}$ dB $L_{A50\ 5\ MINUTES}$ dB
$L_{AMIN\ 5\ MINUTES}$ dB $L_{A90\ 5\ MINUTES}$ dB

The external results recorded were assessed in accordance with Planning and Policy Guidance PPG 24 for both the front and rear of the proposed development. Calculations have also been made in accordance with BS 8233 : 1999 'Sound Insulation and Reduction of Buildings - Code of Practice'. Recommendations were made for any additional acoustics measures to conform to these standards.

From the downloaded recorded results both the daytime and night time averages were assessed and used within the above calculations as $L_{Aeq\ 16\ HOUR}$ dB levels for daytime and $L_{Aeq\ 8\ HOUR}$ dB for night time. These are detailed on the attached figure 1.

3.2 APPARATUS:

The above equipment was calibrated using a sound pressure level of 114.0 dB at an octave band centre frequency of 1000Hz with reference to 2×10^{-5} Nm^{-2} before and after the tests and the equipment set to have no inaccuracy greater than 0.2 dB.

All the following equipment was calibrated by AV Calibrations Ltd, Shefford, Bedfordshire (UKAS NO: 0653) in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS) on the following dates.

Calibration schedules are implemented within Sound Advice Acoustics Ltd in accordance with UKAS directive LAB 23.

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Norsonic	118	31632	2 YEARS	12.12.07	12.12.09
12.5mm Microphone (with windshield)	Norsonic	1225	57535	2 YEARS	12.12.07	12.12.09
Microphone Pre – Amplifier	Norsonic	1206	30687	2 YEARS	12.12.07	12.12.09
Calibrator	Norsonic	1251	31310	1 YEAR	21.07.08	20.07.09

FULL UKAS CALIBRATION DATA SHEETS AND CERTIFICATES ARE AVAILABLE UPON REQUEST.

3.3 ENVIRONMENTAL CONDITIONS:

START OF TEST -	9th December 2008
Temperature:	6°C
Relative Humidity	82%
Average Wind Speed:	<0.5 m/s
Cloud Cover:	Moderate
Road Surface	Dry
Atmospheric Pressure:	1004

END OF TEST -	10th December 2008
Temperature:	4°C
Relative Humidity	86%
Average Wind Speed:	<0.5 m/s
Cloud Cover:	None
Road Surface	Damp
Atmospheric Pressure:	1001

* Wind speed, temperature and relative humidity were all recorded using standard equipment supplied by RS Components, Hedge End, Southampton and are taken as an average over the designated time period.

3.4 RESULTS:

$L_{Aeq,t}$ - The equivalent A weighted sound pressure level recorded over a time interval of 5 minutes night time and 1 hourly daytime.

$L_{A90,t}$ - The A weighted sound pressure level that is exceeded for 90% of the time period 5 minutes night time and 1 hourly daytime.

$L_{A50,t}$ - The A weighted sound pressure level that is exceeded for 50% of the time period 5 minutes night time and 1 hourly daytime.

$L_{A10,t}$ - The A weighted sound pressure level that is exceeded for 10% of the time period 5 minutes night time and 1 hourly daytime.

L_{Amax} - The maximum A weighted sound pressure level recorded over a time interval of 5 minutes night time and 1 hourly daytime.

L_{Amin} - The minimum A weighted sound pressure level recorded over a time interval of 5 minutes night time and 1 hourly daytime.

See attached Figures 1 and 3 for full downloaded results, and averages.

9th – 10th December 2008																
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
DAYTIME LOWEST	51.5	69.9	40.5	47.4	43.6	42.1	56.1	58.1	55.5	51.4	47.2	46.5	43.0	39.8	39.0	30.5
DAYTIME HIGHEST	56.8	73.2	48.2	58.1	50.6	49.5	61.1	62.8	59.0	55.2	53.1	52.4	48.5	44.2	40.9	30.3
DAYTIME AVERAGE	55.3	72.8	46.9	54.5	49.3	48.2	59.9	60.9	57.5	53.0	51.2	51.1	46.8	43.5	41.4	31.3
NIGHT TIME LOWEST	36.1	42.4	33.4	37.6	35.5	34.4	50.4	46.6	35.7	32.4	34.6	32.9	23.3	13.6	12.3	11.3
NIGHT TIME HIGHEST	62.3	79.0	35.6	58.0	39.9	37.3	54.4	63.7	68.2	55.7	60.5	58.1	53.9	46.5	35.9	22.6
NIGHT TIME AVERAGE	51.1	68.0	39.7	49.9	42.4	41.1	56.2	58.5	55.3	48.6	47.5	47.1	42.6	37.7	36.0	25.7

3.5 DISCUSSION OF RESULTS:

It can be seen from the attached graph and downloaded results that the external noise levels have followed the expected path and remained fairly constant throughout the day. The levels then gradually dropped off as the evening progressed and began to rise when morning traffic levels increased.

With regards to maximum levels, PPG 24 states that

"Night-time noise levels (23:00 – 07:00): sites where individual noise events regularly exceed 82 dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8h}$ (except where the $L_{Aeq,8h}$ already puts the site in NEC D)."

However, it can be seen from the attached figure 1 that the L_{Amax} level is has not been exceeded between 23:00 hrs and 07:00 hrs. Therefore the above statement does not apply.

3.6 NOISE EXPOSURE CATEGORIES:

The following noise exposure categories have been assessed in accordance with Planning Policy Guidance Planning and Noise PPG 24:-

AVERAGE LEVELS

Daytime - Average Level $L_{Aeq\ 16\ HOUR}$ (07:00 – 23:00 hrs) 55.3 dB
Noise Exposure Category B ($L_{Aeq,16\ HOUR}$ 55 - 63 dB)

Night Time - Average Level $L_{Aeq\ 8\ HOUR}$ (23:00 – 07:00 hrs) 51.1 dB
Noise Exposure Category B ($L_{Aeq,8\ HOUR}$ 45 - 57 dB

Noise on this particular site consist of rail noise from the close proximity railway lines and localised traffic noise. Therefore the mixed noise category has been used within this assessment and a suitable standard to evaluate ambient noise levels.

Category 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.

3.7 RECOMMENDATIONS:

The above noise tests have been assessed in accordance with PPG 24. It has been evaluated that the ambient noise levels fall within NEC 'B' for daytime and night time.

PPG 24 introduces the concept of Noise Exposure Categories (NECs) for residential developments; these are classified as shown in Table 1. Road traffic has been assessed as the predominant source at this site, the noise levels corresponding to the noise exposure categories for new housing are given in Table 2.

Policy Planning Guidance PPG 24 states within Annex 1 that for NEC category C:-

NEC A	Noise need not be considered as a determining factor in granting planning permission, although noise level at the high end of the category should not be regarded as a desirable level.
NEC 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.
NEC 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.
NEC D	Planning permission should not normally be given.

Table 1 - Noise Exposure Categories.

Noise Source	NEC A dB L_{Aeq}	NEC B dB L_{Aeq}	NEC C dB L_{Aeq}	NEC D dB L_{Aeq}
Mixed Sources				
07:00 to 23:00 hrs	<55	55-63	63-72	>72
23:00 to 07:00 hrs	<45	45-57	57-66	>66

Table 2 – Mixed Noise Sources.

Therefore in order to achieve the required noise levels of L_{Aeq} 35 dB for living rooms and L_{Aeq} 30 for Bedroom at night within the proposed residential properties, the following additional acoustic measures have been calculated.

(Details on calculation sheets Figure's 2 – 3 inclusive).

It should be noted that the calculations have been made with the proposed windows closed.

MINIMUM CONSTRUCTION DETAILS

It should be noted that this window specification has been selected using a standard cavity wall giving the following reduction value. This wall construction should be applied to all the proposed properties within this development.

STANDARD WALL CONSTRUCTION

63	125	250	500	1.0k	2.0k	4.0k	Frequency (Hz)
33.0	40.0	44.0	45.0	51.0	56.0	58.0	dB reduction

WINDOW CONSTRUCTION (4 / 16 / 4)

63	125	250	500	1.0k	2.0k	4.0k	Frequency (Hz)
21.2	21.1	19.7	31.1	38.2	41.3	38.7	dB reduction

ROOF CONSTRUCTION – MINIMUM VALUE

63	125	250	500	1.0k	2.0k	4.0k	Frequency (Hz)
26.0	28.0	34.0	40.0	45.0	49.0	54.0	dB reduction

D_{NE} TRICKLE VENTS

63	125	250	500	1.0k	2.0k	4.0k	Frequency (Hz)
35.0	33.0	32.0	29.0	29.0	31.0	30.0	dB reduction

The above trickle vents have been specified in order to ensure 4000mm / sec ventilation through the proposed dwellings with the windows closed as detailed in section 4 of BS 8233 : 1999.

The above are the minimum construction specifications that need to be implemented to all aspects of the proposed development.

4. VIBRATION:

4.1 PROCEDURE

HUMAN DISTURBANCE

Groundborne vibration needs to be assessed with regard to the likelihood of disturbance to humans and damage to building structure. As regards human disturbance, vibration criteria are specified in terms of Vibration Dose Values (VDV) in accordance with BS 6472[1]. The vibration dose reflects the accumulated acceleration vibration value over a given time period, integrated by time on a root mean quad basis, hence the unit $m/s^{1.75}$. The following table shows the VDV with various degrees of adverse comment, which may be expected in residential buildings.

For residential buildings	Low probability of adverse comment	Adverse comment possible	Adverse comment probable
16 hr day 07:00 to 23:00	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
8 hr night 23:00 to 07:00	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Table 3. Vibration Dose Values (given in $m/s^{1.75}$)

Human beings have different sensitivity to vibration in different directions, e.g. vertical and horizontal. But in terms of the assessment in accordance with BS 6472, vibration is usually evaluated for the single axis in which the magnitude is greatest. However, the resultant of the three orthogonal axes would represent the worst case.

[1] BS 6472-1:2008, Guide to evaluation of human exposure to vibration in buildings
[1] BS 7385:1993, Evaluation and measurement for vibration in buildings

DAMAGE TO BUILDINGS

In terms of the likelihood of damage to buildings, vibration is measured in peak particle velocity (ppv) mm/s and assessed in accordance with BS 7385[2]. In this particular case, the main source of vibration is trains and this is considered to cause transient vibration. The BS7385 standard states that for transient vibration, guide values at which cosmetic damage could occur to residential buildings are 15mm/s at 4 Hz, rising to 20mm/s at 15 Hz and rising further to 50mm/s at 40 Hz and above for new buildings. These limits can be reduced by 50% for older buildings.

4.2 APPARATUS

Vibration levels were recorded using a Vibrock V901 seismometer, serial number 1006. This instrument was connected with two tri-axial transducers for measuring the peak particle velocity and vibration dose value simultaneously.

4.3 MEASUREMENT LOCATIONS

The vibration transducers were sited on a substantial slab in front of an external door of the house (see Photo 1) facing the railway and being approximately 15m from the nearside railway track. This location is close as practically possible to the location of the main structural wall of the nearest building of the proposed development as shown on a layout drawing.

4.4 MEASUREMENT PROCEDURE

Ambient vibration levels were measured continuously from approximately 10:30 hrs on Tuesday 9th December 2008 to about the same time next day. This period represents both the periods when the ambient conditions are quietest, i.e. night-time, and periods when noisiest, i.e. peak traffic flow patterns of the morning and afternoon.

4.5 VIBRATION RESULTS

Detailed results of ground borne measurements are given in Table 4 below.

The measurement record shows a maximum value of 1.05 mm/s ppv which occurred soon after commencing the measurements at about 10:30 hrs on Tuesday. This is considered to be due to operator footfall or re-positioning the equipment. A vibration level of 0.57 mm/s ppv was noted when a westbound train passed the measurement location. Background vibration level was generally in the range up to about 0.15 mm/s ppv. The only source of vibration appeared to be trains on the Havant - Warblington and Havant - Rowlands Castle lines. The former is approximately 15m and the latter about 45m, respectively, from the measurement location to the nearest track. It was noted that trains travel at low speeds because Havant and Warblington stations are only about 500m to either side of the Development site and the track to Rowlands Castle has a curve adjacent to this site. The nearest main road is about 200m away.

The measurements show that in general ground borne vibration is below about 0.70 mm/s ppv. Vibration levels are slightly lower at night-time. A time history of the measurements shown in Figure 4, also indicate that trains operate through the night.

The vibration dose values were computed for 16 hr day as 0.131 $m/s^{1.75}$ for the first day and 0.113 $m/s^{1.75}$ for the second day and 0.06 $m/s^{1.75}$ during the night.

Table 4. Results of vibration measurements

	Vibration dose value (vdv)			Peak particle velocity (ppv)					
	X	Y	Z	X	Y	Z	Bank B		
Daytime				Cumulative			Hourly		
	16 Hour			Total			Max.		
	0.131	0.022	0.021				1.05mm/s	10:40:28	09/12/2008
	1 Hour			Total					
Hour 1	0.063	0.012	0.01	0.05	0.009	0.008	1.05mm/s	10:40:28	09/12/2008
Hour 2	0.052	0.01	0.01	0.06	0.012	0.011	.675mm/s	11:16:58	09/12/2008
Hour 3	0.063	0.01	0.01	0.074	0.013	0.012	.650mm/s	12:22:28	09/12/2008
Hour 4	0.06	0.011	0.01	0.081	0.015	0.014	.550mm/s	13:20:08	09/12/2008
Hour 5	0.069	0.01	0.01	0.09	0.016	0.015	.600mm/s	14:19:08	09/12/2008
Hour 6	0.076	0.01	0.01	0.1	0.016	0.016	.550mm/s	15:31:08	09/12/2008
Hour 7	0.083	0.011	0.01	0.11	0.017	0.016	.650mm/s	16:01:18	09/12/2008
Hour 8	0.07	0.011	0.01	0.115	0.018	0.017	.525mm/s	17:01:38	09/12/2008
Hour 9	0.068	0.011	0.01	0.118	0.018	0.018	.550mm/s	18:16:08	09/12/2008
Hour 10	0.064	0.011	0.01	0.121	0.019	0.018	.575mm/s	19:12:08	09/12/2008
Hour 11	0.052	0.011	0.01	0.122	0.02	0.019	.525mm/s	20:15:48	09/12/2008
Hour 12	0.045	0.012	0.01	0.122	0.02	0.019	.550mm/s	21:39:28	09/12/2008
Hour 13	0.05	0.012	0.01	0.123	0.021	0.02	.650mm/s	22:35:58	09/12/2008
	8 Hour								
	0.06	0.022	0.018				.575mm/s	00:11:50	10/12/2008
	1 Hour			Total					
Hour 1	0.05	0.013	0.01	0.05	0.013	0.01	.475mm/s	23:06:30	09/12/2008
Hour 2	0.043	0.013	0.01	0.056	0.015	0.013	.575mm/s	00:11:50	10/12/2008
Hour 3	0.02	0.013	0.01	0.056	0.017	0.014	.350mm/s	01:17:40	10/12/2008
Hour 4	0.016	0.013	0.011	0.056	0.018	0.015	.350mm/s	02:15:40	10/12/2008
Hour 5	0.018	0.013	0.01	0.056	0.02	0.016	.350mm/s	03:13:40	10/12/2008
Hour 6	0.021	0.013	0.01	0.056	0.021	0.017	.325mm/s	04:34:00	10/12/2008
Hour 7	0.032	0.013	0.01	0.058	0.021	0.017	.425mm/s	05:55:00	10/12/2008
Hour 8	0.035	0.013	0.01	0.06	0.022	0.018	.450mm/s	06:08:40	10/12/2008
	16 Hour								
	0.113	0.024	0.021				.675mm/s	11:31:00	10/12/2008
	1 Hour								
Hour 1	0.037	0.013	0.01	0.037	0.013	0.01	.450mm/s	07:39:30	10/12/2008
Hour 2	0.04	0.013	0.01	0.046	0.015	0.013	.600mm/s	08:30:00	10/12/2008
Hour 3	0.039	0.012	0.01	0.051	0.017	0.014	.500mm/s	09:31:00	10/12/2008
Hour 4	0.053	0.012	0.01	0.062	0.018	0.015	.550mm/s	10:30:50	10/12/2008
Hour 5	0.058	0.011	0.01	0.071	0.018	0.016	.675mm/s	11:31:00	10/12/2008
Hour 6	0.066	0.01	0.01	0.082	0.019	0.017	.600mm/s	12:46:00	10/12/2008
Hour 7	0.073	0.01	0.01	0.091	0.019	0.017	.675mm/s	13:15:50	10/12/2008

Measurements at the site adjacent to no. 73 Third Avenue, Havant.

The maximum vibration levels were 1.05 mm/s ppv during daytime and slightly lower at 0.57 mm/s during night-time.

Detailed results of the vibration measurements are given in the tables above and a summary is given in the table below.

Time Period	Vibration Dose Value $m/s^{1.75}$			Peak Particle Velocity mm/s
	X - radial	Y - lateral	Z - Vertical	Resultant Vector
Tuesday daytime (13 hours)	0.131	0.022	0.021	1.05
Wednesday daytime (7 hrs)	0.113	0.024	0.021	0.675
Tuesday night-time (8 hrs)	0.060	0.022	0.018	0.575

Table 5. Summary of Vibration Assessment

4.6 ASSESSMENT OF VIBRATION LEVELS

The measured vibration dose value for the daytime at this location is a maximum of 0.131 $m/s^{1.75}$. This is below range 0.2 to 0.4, which represents 'low probability of adverse comment'.

For night-time, the highest VDV in the horizontal axes was below 0.06 $m/s^{1.75}$. This is also below the value for 'low probability of adverse comment'.

In terms of cosmetic damage to building, the highest level of peak particle velocity measured at Havant was approximately 1 mm/s. This is well below the limit at which cosmetic damage to new buildings is likely; i.e. 15 mm/s. Consequently, the likelihood of vibration from trains to cause cosmetic damage to building is very low.

4.7 VIBRATION RECOMMENDATIONS

The measured levels of vibration at no. 73 Third Avenue, Havant, are at a level where, in terms of human discomfort in accordance with the guidelines in BS6487, there is likely to be 'low probability of adverse comment' for daytime and night-time. Consequently, ground borne vibration in this area appears to be acceptable.

As regards building damage, in accordance with BS7385, there is no likelihood of damage, even cosmetic, to the building.

5. CONCLUSIONS:

NOISE

In accordance with the Planning and Policy Guidance, PPG 24, summary of the average daytime noise levels show that the site is Category B. Consideration of the noise from trains at night also confirms that the site is within Category B. In accordance with guidance within PPG24, therefore, noise should be taken into consideration and adequate protection be provided.

The proposed construction details have been implemented onto the BS 8233 : 1999 calculation sheets and assessment made with regards to calculation internal noise levels within habitable room of the proposed development. These assessments have indicated the proposed window specification of 4 / 16 / 4 double glazing will be suitable for this development on all facades. The rest of the building will consist of a standard brick and block cavity wall construction and standard tiled roof. Standard open able trickle vents will also be acceptable.

VIBRATION

In terms of the peak particle velocity, the results for a location closest to the railway at no 73 Third Avenue, Havant show that the measured value is well within the limit with respect to building damage. Consequently, the likelihood of cosmetic damage to building due to vibration from trains is low.

In terms of the human disturbance, measurements indicate that ground borne vibration levels are below the level associated with 'low probability of adverse comments' for daytime and night-time.

It would appear that ground borne vibration at this site is acceptable and that it is unlikely to cause building damage or give rise to adverse comments from residents in the proposed development.

6. ATTACHMENTS:

NOISE

EXTERNAL NOISE ASSESSMENT
H CONCEPTS, 73 THIRD AVENUE, HAVALT

DOWNLOADED RESULTS
RECORDED 0 / 10 12.05

DAYTIME NOISE LEVELS 07:00 - 23:00																
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
07:00 - 08:00	56.7	74.4	48.8	56.0	50.7	49.0	60.3	61.8	55.0	54.1	52.8	53.0	43.4	42.4	36.8	27.5
08:00 - 09:00	55.7	71.3	50.4	55.0	52.5	51.0	62.4	62.7	57.0	53.5	53.0	52.1	40.1	40.1	34.3	20.9
09:00 - 10:00	55.5	70.0	49.2	55.6	51.5	50.5	61.3	61.9	58.7	54.4	52.5	51.0	45.0	40.2	33.3	20.0
10:00 - 11:00	56.3	73.2	48.2	58.1	50.0	49.5	61.1	62.6	59.0	55.1	53.1	52.4	48.5	44.1	40.0	30.2
11:00 - 12:00	55.0	70.2	47.0	54.2	49.0	48.5	60.8	60.9	55.0	51.0	51.7	52.1	40.7	42.0	41.0	29.2
12:00 - 13:00	54.0	74.2	47.7	52.7	50.2	49.1	60.7	59.7	55.3	49.8	50.2	51.1	45.8	42.0	41.5	30.7
13:00 - 14:00	54.3	71.2	48.5	52.5	49.4	48.1	59.5	59.6	56.2	51.0	49.6	49.9	45.8	43.0	42.1	30.6
14:00 - 15:00	54.0	72.1	48.0	52.5	49.2	48.0	61.0	61.1	57.1	52.1	50.4	50.1	46.3	42.4	41.0	30.0
15:00 - 16:00	56.0	73.1	48.3	55.0	48.9	47.8	59.7	61.4	58.2	55.1	51.0	52.3	47.0	42.5	38.2	28.9
16:00 - 17:00	55.0	71.5	47.0	54.1	49.5	48.4	59.6	61.0	57.8	52.7	51.0	50.9	48.1	46.4	45.0	33.4
17:00 - 18:00	56.0	74.1	48.0	55.7	49.1	47.0	60.4	60.0	58.1	54.7	52.3	52.5	47.7	45.5	43.0	32.1
18:00 - 19:00	54.7	71.0	45.5	52.2	48.2	47.1	58.8	60.0	57.5	52.6	49.7	49.7	46.3	45.0	43.8	34.0
19:00 - 20:00	54.0	72.0	44.4	54.1	47.0	45.8	57.9	60.3	58.1	53.1	50.0	50.2	46.7	44.2	43.0	35.0
20:00 - 21:00	54.2	71.0	42.4	52.1	46.5	44.0	57.0	59.5	57.3	52.1	49.3	49.4	46.3	42.9	42.1	31.0
21:00 - 22:00	53.8	71.0	41.5	52.0	44.9	43.4	56.7	59.4	56.0	52.0	49.4	49.0	45.8	42.0	40.2	30.1
22:00 - 23:00	51.5	69.0	40.5	47.4	43.0	42.1	56.1	58.1	55.5	51.4	47.2	46.5	43.0	39.5	39.0	30.5

FIGURE 1
PAGE 1 OF 6

EXTERNAL NOISE ASSESSMENT
HI CONCEPTS 73 THIRD AVENUE HAVANT

DOWNLOADED RESULTS
RECORDED o / 10 12.0[illegible]

NIGHT TIME NOISE LEVELS 23:00 - 07:00

Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	o3	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
	52.0	72.4	39.o	44.7	42.o	41.2	57.1	o1.9	5o.1	49.7	47.o	45.1	43.4	36.o	32.3	19.o
	54.2	70.5	40.0	53.0	43.2	41.o	5o.5	5o.6	58.1	52.0	48.0	49.7	47.8	41.8	3o.3	26.2
	52.3	72.o	39.5	44.8	42.2	41.3	55.8	o0.7	55.8	49.4	48.4	45.4	43.8	39.1	33.0	22.1
	42.4	48.5	39.1	43.o	42.0	40.o	51.3	48.o	41.o	4o.3	3o.3	39.6	29.8	19.0	13.4	12.5
	53.0	7o.8	39.1	45.7	41.5	4o.4	55.o	54.8	5o.3	53.5	48.4	49.4	43.4	37.9	33.3	27.5
23:00 - 00:00	52.o	7o.8	35.4	44.8	41.2	4o.1	55.8	54.7	57.3	53.o	47.o	49.2	43.8	35.o	3o.7	26.9
	52.2	o0.3	35.o	52.8	41.7	39.o	55.o	59.1	57.7	49.5	49.2	4o.3	45.2	35.7	3o.o	16.2
	45.8	o0.7	3o.1	43.5	41.4	39.4	53.4	5o.2	47.o	43.8	42.o	41.3	37.1	32.1	27.o	1o.2
	49.5	o3.8	37.2	5o.4	41.5	39.4	oo.3	oo.o	53.1	51.1	43.2	44.7	41.2	3o.o	37.8	32.5
	5o.2	73.7	35.2	53.o	42.7	4o.2	o3.3	73.1	o2.2	5o.5	51.o	55.2	52.3	45.2	42.o	31.o
	53.o	74.3	35.7	o2.4	41.7	4o.o	o2.3	o3.4	58.2	53.o	53.o	54.4	5o.o	4o.7	4o.8	37.1
	51.4	77.2	3o.5	4o.2	3o.7	37.7	o1.3	7o.8	o7.5	51.2	51.o	51.2	4o.8	4o.o	43.o	33.2
	3o.o	45.1	35.5	4o.4	38.5	37.5	51.7	4o.o	3o.o	35.7	37.o	3o.5	2o.o	13.2	12.3	11.2
	5o.1	72.7	3o.5	43.o	3o.4	38.1	56.5	o4.7	5o.3	53.5	53.8	52.o	47.o	41.o	3o.3	22.7
	38.7	4o.7	3o.1	4o.1	38.4	37.1	52.3	4o.5	38.8	25.o	37.3	25.5	2o.4	14.o	12.4	11.2
	3o.o	44.7	3o.1	4o.3	38.7	37.5	5o.o	4o.7	37.3	25.7	37.3	3o.2	25.1	12.1	12.3	11.2
	52.7	7o.7	3o.1	44.o	3o.5	38.1	5o.o	54.5	57.o	52.o	47.o	45.o	43.4	3o.o	37.5	3o.o
00:00 - 01:00	38.5	43.o	35.2	3o.8	35.2	37.o	5o.o	47.7	3o.8	24.o	3o.7	25.7	25.4	13.5	12.5	11.2
	37.7	44.o	34.4	3o.1	37.4	3o.2	5o.1	4o.2	35.3	24.3	35.8	25.1	23.5	11.5	12.2	11.2
	53.3	7o.2	35.3	43.o	38.2	3o.7	57.o	5o.o	oo.7	5o.3	48.7	47.o	43.1	38.5	38.2	25.4
	38.8	43.2	35.5	4o.2	38.o	3o.o	5o.1	47.8	35.1	24.5	3o.7	3o.4	25.5	12.1	12.3	11.2
	37.o	42.5	35.o	38.o	37.2	3o.2	51.o	49.o	38.o	24.o	35.o	24.o	23.o	14.2	12.5	11.2
	38.2	47.4	34.2	3o.8	37.2	3o.3	5o.3	49.o	3o.3	25.7	3o.o	25.2	2o.1	13.o	12.5	11.2
	37.8	48.4	33.2	38.o	37.1	35.o	5o.3	4o.7	38.7	25.4	3o.o	24.2	22.o	11.7	12.3	11.2
	3o.o	42.5	32.4	38.1	3o.o	35.2	5o.4	45.3	35.3	23.5	35.o	22.o	21.7	11.o	12.3	11.2
	3o.1	42.4	32.4	37.o	35.5	34.4	5o.4	4o.o	35.7	22.4	34.o	22.o	23.3	13.o	12.3	11.2
	37.3	42.7	32.4	38.o	37.1	35.3	5o.o	45.1	34.o	23.8	35.o	24.o	21.7	11.o	12.5	11.2
01:00 - 02:00	5o.o	72.o	34.2	48.5	37.5	35.7	57.5	58.o	oo.o	5o.o	5o.3	51.8	47.1	42.2	42.1	35.o
	37.8	43.o	34.2	3o.3	37.5	35.o	52.2	4o.3	3o.4	24.3	3o.3	24.8	24.3	12.o	12.4	11.2
	5o.o	75.1	35.1	4o.3	37.5	3o.4	55.5	58.8	55.o	47.1	48.5	4o.o	4o.o	45.5	51.8	3o.4
	37.o	44.7	34.o	3o.2	37.1	35.o	51.1	4o.2	35.o	24.3	3o.3	24.2	23.5	11.1	12.5	11.2

FIGURE 1
PAGE 2 OF o

EXTERNAL NOISE ASSESSMENT
HI CONCEPTS, 73 THRELD AVENUE HAVANT

DOWNLOADED RESULTS
RECORDED 0 / 10.12.08

NIGHT TIME NOISE LEVELS 23:00 - 07:00																
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
01:00 - 02:00	38.3	40.2	34.2	40.2	37.6	36.3	50.9	49.0	35.7	34.7	37.0	35.4	24.7	12.3	12.3	11.2
Continued	37.0	47.1	33.2	39.2	37.3	35.2	50.1	49.3	35.6	33.7	36.3	34.7	23.3	12.3	12.2	11.6
	37.0	44.2	34.3	39.3	37.2	35.7	50.5	49.3	35.7	34.2	36.7	34.5	22.5	12.0	12.0	11.2
	37.2	43.5	33.2	38.7	36.9	35.0	51.0	45.6	35.3	33.8	35.8	34.3	22.4	11.9	12.4	11.2
02:00 - 03:00	37.0	42.0	33.4	38.7	36.5	35.0	50.7	45.9	35.8	34.2	36.1	33.5	23.0	12.7	12.3	11.2
	39.7	47.0	35.4	41.8	38.5	37.0	51.3	47.3	39.8	36.1	37.9	35.9	30.0	13.0	12.8	11.2
	38.9	44.8	34.2	40.8	38.7	36.2	50.5	45.7	37.9	34.7	37.8	35.8	25.2	12.2	12.4	11.2
	37.9	42.8	34.2	39.7	37.2	35.7	50.3	49.1	37.8	35.1	36.8	34.5	23.5	11.8	12.3	11.2
	37.8	44.4	34.0	39.0	37.1	35.7	50.3	49.8	37.1	35.4	37.3	34.1	22.1	11.9	12.3	11.2
	38.4	45.1	33.9	40.7	37.8	35.4	49.8	45.9	38.2	34.9	37.0	35.7	23.0	11.8	12.3	11.2
	39.4	51.3	35.0	41.5	38.1	36.4	49.8	49.2	38.7	37.0	39.2	35.5	22.3	11.9	12.3	11.2
	40.2	47.4	36.2	41.9	39.6	38.0	50.1	49.5	39.4	39.1	38.4	37.7	26.0	13.3	12.4	11.2
	39.9	49.9	34.9	41.8	38.9	36.9	49.9	49.9	39.9	39.1	38.8	36.5	22.8	11.9	12.3	11.2
	41.1	51.1	34.8	42.9	40.4	39.9	51.5	51.8	44.2	39.2	39.1	38.1	28.8	17.2	12.7	11.2
	39.8	49.9	34.9	41.9	39.3	37.9	50.5	47.1	39.7	39.4	38.1	37.9	26.1	12.5	12.4	11.2
	39.7	49.7	35.4	41.7	39.0	37.9	50.9	48.7	38.8	38.7	38.7	36.5	24.4	12.9	12.3	11.2
03:00 - 04:00	40.2	47.8	34.5	42.2	39.4	37.9	51.3	47.8	39.9	38.2	39.9	37.9	25.3	12.4	12.7	11.5
	39.2	49.5	34.2	41.5	38.1	36.9	50.9	47.9	38.4	37.2	38.3	35.8	22.9	12.4	12.3	11.2
	39.9	48.2	34.2	41.9	38.2	36.5	51.3	48.7	37.7	35.9	38.9	35.9	24.4	12.1	12.3	11.2
	37.5	42.9	34.1	39.3	37.2	35.4	50.8	48.7	38.2	34.1	36.4	34.3	23.7	12.9	12.3	11.2
	39.5	49.9	33.9	42.1	38.1	35.3	50.7	47.1	37.4	34.9	38.4	35.9	24.3	12.2	12.3	11.2
	38.1	45.3	34.5	39.7	37.5	36.2	50.9	45.3	36.1	34.5	37.9	35.1	22.9	11.9	12.3	11.2
	36.3	41.5	32.7	38.1	35.5	34.4	49.9	43.9	34.2	33.3	35.9	33.9	20.9	11.5	12.3	11.2
	36.3	42.2	32.5	37.8	35.9	34.7	49.9	45.7	35.9	33.7	35.7	33.9	19.7	12.3	12.4	11.2
	36.7	42.5	33.9	38.3	36.2	35.9	49.8	45.1	36.3	34.8	36.1	33.1	20.3	11.4	12.2	11.2
	38.5	44.8	33.9	40.5	38.2	35.5	50.2	45.8	37.9	35.3	37.9	35.4	21.4	11.9	12.3	11.2
	38.1	43.1	33.7	40.1	37.7	35.8	49.9	45.9	36.8	35.2	37.4	34.8	21.5	11.7	12.3	11.2
	40.9	49.9	34.7	42.3	39.1	36.7	49.7	45.9	42.7	37.7	40.9	36.5	26.9	13.9	12.5	11.2
04:00 - 05:00	52.3	70.9	35.9	58.9	39.9	37.3	54.4	63.7	63.2	55.7	60.5	55.1	53.9	46.5	35.9	22.9
	37.5	44.5	33.9	39.7	36.9	34.9	50.9	49.3	37.1	36.3	37.2	33.5	19.9	11.4	12.3	11.2
	37.1	47.9	33.9	39.4	36.2	34.3	50.9	44.9	36.8	34.7	36.7	34.9	22.1	11.9	12.9	11.4
	39.5	49.1	35.4	41.1	39.1	37.6	49.9	45.8	36.1	36.9	37.9	36.7	25.9	11.7	12.4	11.2

FIGURE 1
PAGE 3 OF 9

EXTERNAL NOISE ASSESSMENT
H' CONCEPTS, 75 THIRD AVENUE, HAVANT

DOWNLOADED RESULTS
RECORDED @ 10:12:08

NIGHT TIME NOISE LEVELS 23:00 - 07:00

Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
23:00 - 00:00 Continued	39.2	70.4	35.4	41.1	38.7	37.9	50.0	49.3	36.9	39.4	37.5	36.2	24.7	21.5	12.4	11.2
	42.0	65.3	35.1	41.4	39.2	37.2	50.5	47.2	37.3	39.2	38.4	36.4	25.4	25.0	20.1	11.9
	39.5	44.1	36.1	40.7	39.3	38.2	50.3	47.1	40.3	37.7	38.4	36.2	24.0	22.2	13.0	11.4
	40.0	47.8	37.2	42.2	40.5	39.5	53.0	50.7	39.7	37.7	40.1	37.4	25.0	23.9	12.5	11.2
	40.7	44.2	37.5	42.1	40.5	38.8	53.0	48.4	38.4	38.8	40.0	37.0	26.2	22.9	12.0	11.2
	55.1	69.8	36.5	52.7	40.5	39.4	56.7	58.6	60.4	52.5	50.9	52.0	45.8	39.0	33.3	22.4
	54.0	63.8	37.5	50.8	41.5	39.4	55.8	59.3	55.4	47.9	50.5	50.3	40.4	41.0	28.1	15.2
	54.1	69.1	37.2	49.7	40.7	38.6	54.8	58.7	60.9	59.2	50.2	47.9	45.0	41.5	30.2	25.0
00:00 - 05:00	40.5	68.5	37.5	42.5	40.1	38.9	52.1	51.3	48.2	41.4	43.0	42.4	34.3	26.0	21.7	13.1
	55.3	70.0	36.5	48.4	42.1	39.1	58.7	59.4	58.4	54.5	50.9	50.8	48.4	42.9	35.8	22.1
	42.4	48.8	39.5	43.5	42.2	41.1	52.1	48.4	39.3	39.5	41.1	39.0	26.0	12.0	13.0	11.2
	50.1	66.3	41.4	45.4	43.0	42.5	53.7	54.7	54.7	50.8	47.0	44.8	41.7	37.0	31.3	19.2
	50.7	66.3	41.5	45.5	43.7	42.9	54.4	56.0	56.0	52.1	47.3	45.4	42.1	37.7	31.4	17.9
05:00 - 06:00	43.3	48.0	40.7	44.4	43.2	42.0	53.5	53.4	46.5	39.5	41.9	40.9	27.7	12.9	12.5	11.2
	52.3	66.7	40.7	46.1	43.2	42.1	55.1	57.9	58.5	51.9	47.9	46.1	43.0	35.5	31.0	17.4
	43.9	48.5	41.4	45.4	43.9	42.4	52.9	50.8	42.9	41.1	42.4	41.1	29.3	14.9	12.5	11.2
	45.9	47.9	42.2	46.9	45.9	43.9	53.9	52.1	42.2	41.9	43.9	42.9	31.9	19.7	13.4	11.2
	50.7	77.9	42.2	53.3	46.9	44.7	56.9	60.4	58.9	54.7	50.4	57.1	49.5	44.9	34.8	22.2
	45.2	57.9	43.9	46.1	44.9	44.1	54.1	52.9	42.5	41.9	43.9	42.5	30.5	13.5	12.3	11.2
	50.9	67.5	42.2	46.5	45.2	44.3	57.9	58.5	53.3	48.9	47.3	46.4	43.9	35.9	32.9	19.2
06:00 - 07:00	54.9	71.9	42.7	47.2	45.9	43.9	56.7	55.3	57.1	52.9	49.3	50.9	44.4	39.9	29.9	15.7
	45.9	55.5	42.7	46.5	45.5	44.7	53.4	51.9	42.9	42.1	43.9	42.4	33.9	17.5	13.1	11.2
	55.3	71.9	44.2	50.2	46.4	45.4	58.9	63.9	56.5	54.8	52.3	50.1	46.5	41.9	35.9	22.9
	53.9	66.3	44.1	49.7	46.2	45.1	56.5	59.5	54.3	48.4	49.4	48.9	43.1	42.1	29.2	15.5
	52.4	70.4	44.9	48.9	46.7	45.8	57.5	59.9	56.1	51.2	48.7	47.7	44.4	40.1	32.9	19.1
	52.9	66.5	45.5	48.9	47.5	46.9	56.9	61.4	55.2	49.7	50.2	48.4	43.9	37.9	32.5	20.9
	47.9	58.5	45.7	48.3	47.7	46.9	56.9	53.9	44.1	43.9	45.7	45.9	33.7	19.1	17.9	11.2
	54.2	66.3	45.4	50.9	47.7	46.9	57.7	58.3	54.9	48.7	51.1	51.3	44.9	39.9	29.1	15.5
	53.9	70.4	45.9	50.9	48.4	47.1	59.9	61.1	57.5	53.3	50.9	49.9	45.3	41.9	34.8	22.7
	48.9	55.1	46.5	49.9	48.9	47.7	58.9	57.1	45.9	45.1	46.9	46.1	35.9	21.5	20.9	11.4
	53.5	70.7	46.5	50.5	48.9	48.9	58.4	58.4	59.9	51.3	50.9	49.5	45.9	40.9	31.8	17.5
	56.5	70.9	47.4	58.2	49.5	48.7	61.9	62.1	59.3	51.9	52.9	51.9	47.9	47.5	35.1	21.5

FIGURE 1
PAGE 4 OF 6

EXTERNAL NOISE ASSESSMENT
H' CONCEPTS, 75 THIRD AVENUE, HAVANT

DOWNLOADED RESULTS
RECORDED @ 10:10:05

NOISE LEVEL SUMMARY ASSESSMENT

Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz) 31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME LOWEST	51.5	60.0	40.5	47.4	43.0	42.1	56.1	58.1	55.5	51.4	47.2	46.5	43.0	39.5	36.0	30.5
DAYTIME HIGHEST	56.3	73.2	45.1	58.1	50.0	49.5	61.1	62.9	59.6	55.2	53.1	52.4	48.5	44.2	40.0	30.2
DAYTIME AVERAGE	55.3	72.9	46.9	54.5	49.2	48.2	59.9	60.9	57.5	53.0	51.2	51.1	46.3	42.5	41.4	31.2
NIGHT TIME LOWEST	36.1	42.4	33.4	37.6	35.5	34.4	50.4	49.9	36.7	32.4	34.6	22.9	23.3	13.6	12.3	11.2
NIGHT TIME HIGHEST	62.3	70.0	35.0	58.0	39.0	37.3	54.4	63.7	68.2	55.7	60.5	55.1	53.0	43.5	35.0	22.0
NIGHT TIME AVERAGE	51.1	68.0	39.7	49.6	42.4	41.1	56.2	58.5	55.3	46.6	47.5	47.1	42.6	37.7	36.0	25.7

PPG 24 NOISE EXPOSURE CATEGORY

road traffic 07:00 - 23:00 23:00 - 07:00	[redacted]
rail traffic 07:00 - 23:00 23:00 - 07:00	[redacted]
air traffic 07:00 - 23:00 23:00 - 07:00	A [redacted]
mixed sources 07:00 - 23:00 23:00 - 07:00	[redacted]

FIGURE 1
PAGE 5 OF 6

DOWNLOADED RESULTS
RECORDED [illegible]

FIGURE:
PAGE [illegible] OF [illegible]

ENVIRONMENTAL NOISE ASSESSMENT
AT CONCERTS 73 THEAD AVENUE HAVANT

Client	HJ Concepts Ltd
Site	73 Third Avenue, Havant
Figure	2

Maximum Criteria	
Daytime	Night Time
35	30

Floor	1st Floor
Room	Bedroom (TYPICAL)

Daytime	MET
Evening	MET

Proposed Window Configeration	4 / 16 / 4

Leqff	*The equivalent continuous sound pressure level outside the room elements under consideration*
A0	*The reference absorption area of 10m2 and is independent of frequency*
Sf	*The total façade area of the room in question*
Swi	*The area of the windows in the room*
Sew	*The area of the external wall of the room*
Srr	*The area of the ceiling of the room (if applicable)*
S	*The total area of the elements through which sound enters the room*
Dne	*The insulation value of the trickle ventilator (if applicable)*
Rwi	*The sound reduction index of the window*
Rew	*The sound reduction index of the external wall*
Rrr	*The sound reduction index of the ceiling/roof (if applicable)*
A	*The equivalent absorption area of the receiving room where A=0.163V/T*

Formula	Leq2=Leqff+10log[A0/S*10^(-Dne/10)+Swi/S*10^(-Rwi/10)+Sew/10*10^(-Rew/10)+Srr/S*10^(-Rrr/10)] +10log(S/A) +3

	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
Sf	12	12	12	12	12	12	12
Sr	18	18	18	18	18	18	18
Swi	2	2	2	2	2	2	2
Sew	10	10	10	10	10	10	10
Srr	18	18	18	18	18	18	18
S	30	30	30	30	30	30	30
A0	10	10	10	10	10	10	10
V	36	36	36	36	36	36	36
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50	0.50
A	12	12	12	12	12	12	12
Daytime Leqff	60.9	57.5	53.0	51.2	51.1	46.8	43.5
Night time Leqff	58.5	55.3	48.6	47.5	47.1	42.6	37.7
Dne	35	33	32	29	29	31	30
Rwi	21.2	21.1	19.7	31.1	38.2	41.3	38.7
Rew	33.0	40.0	44.0	45.0	51.0	56.0	58.0
Rrr	26.0	28.0	34.0	40.0	45.0	49.0	54.0

*estimated

Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)	$L_{Aeq\ 16\ HOUR}$	29.7	dB(A)

Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)	$L_{Aeq\ 8\ HOUR}$	26.0	dB(A)

Client	HJ Concepts Ltd
Site	73 Third Avenue, Havant
Figure	3

Maximum Criteria	
Daytime	Night Time
35	30

Floor	Ground Floor
Room	Lounge (TYPICAL)

Daytime	MET
Evening	MET

Proposed Window Configeration	4 / 16 / 4

Leqff	*The equivalent continuous sound pressure level outside the room elements under consideration*
A0	*The reference absorption area of 10m2 and is independent of frequency*
Sf	*The total façade area of the room in question*
Swi	*The area of the windows in the room*
Sew	*The area of the external wall of the room*
Srr	*The area of the ceiling of the room (if applicable)*
S	*The total area of the elements through which sound enters the room*
Dne	*The insulation value of the trickle ventilator (if applicable)*
Rwi	*The sound reduction index of the window*
Rew	*The sound reduction index of the external wall*
Rrr	*The sound reduction index of the ceiling/roof (if applicable)*
A	*The equivalent absorption area of the receiving room where A=0.163V/T*

Formula	Leq2=Leqff+10log[A0/S*10^(-Dne/10)+Swi/S*10^(-Rwi/10)+Sew/10*10^(-Rew/10)+Srr/S*10^(-Rrr/10)] +10log(S/A) +3

	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
Sf	12	12	12	12	12	12	12
Sr	0	0	0	0	0	0	0
Swi	3	3	3	3	3	3	3
Sew	9	9	9	9	9	9	9
Srr	0	0	0	0	0	0	0
S	12	12	12	12	12	12	12
A0	10	10	10	10	10	10	10
V	48	48	48	48	48	48	48
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50	0.50
A	15	15	15	15	15	15	15
Daytime Leqff	60.9	57.5	53.0	51.2	51.1	46.8	43.5
Night time Leqff	58.5	55.3	48.6	47.5	47.1	42.6	37.7
Dne	35	33	32	29	29	31	30
Rwi	21.2	21.1	19.7	31.1	38.2	41.3	38.7
Rew	33.0	40.0	44.0	45.0	51.0	56.0	58.0
Rrr	26.0	28.0	34.0	40.0	45.0	49.0	54.0

*estimated

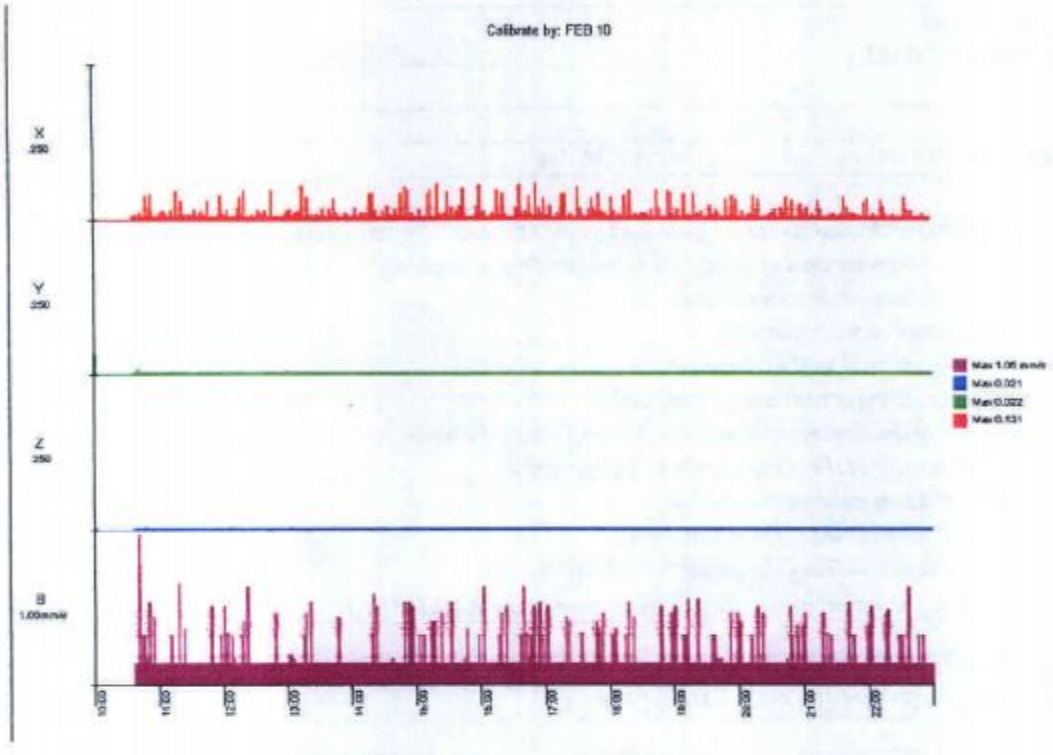
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)	$L_{Aeq\ 16\ HOUR}$	28.1	dB(A)

Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)	$L_{Aeq\ 8\ HOUR}$	24.3	dB(A)

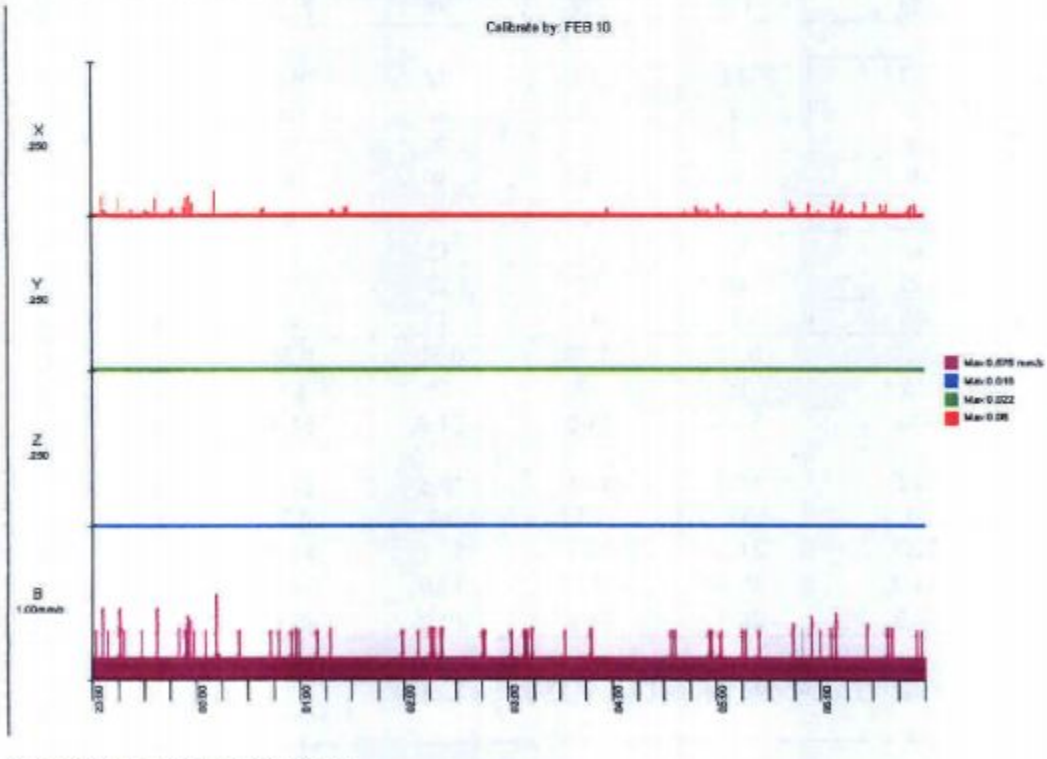
VIBRATION

Figure 4 Time histories of vibration measurements

Record from 10:30 to 23:00 hrs



Record from 23:00 to 07:00 hrs



Record from 07:00 to 13:40 hrs

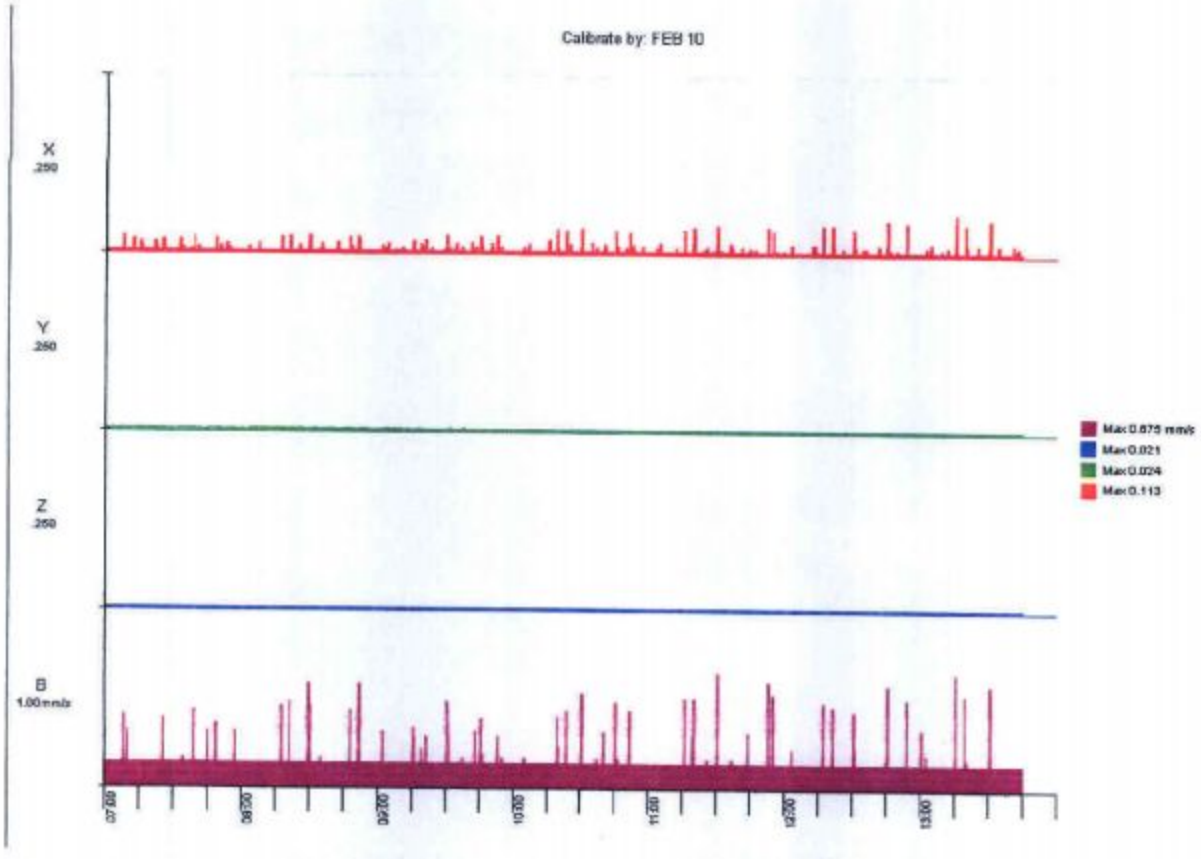


Photo 1 Groundborne vibration measurement location

