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Noise and Vibration Consultants

PROPOSED RESIDENTIAL DEVELOPMENT
FORMER POLAR FORD GARAGE, DODWORTH ROAD, BARNSLEY

ASSESSMENT AND CONTROL OF ROAD & RAIL TRAFFIC NOISE IMPACT

On behalf of:

Bellway Homes Ltd. (Yorkshire Division)

Report No.10732.01/1v1
August 2010

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Bellway Homes Ltd. (Yorkshire Division) to carry out an assessment of the potential impact of road & rail traffic noise on a proposed residential development at the site of a former Polar Ford Garage, Dodworth Road, Barnsley

1.2 The proposed development is on the site of a disused former car garage, which has been cleared. The surrounding area is predominantly residential.

1.3 Dodworth Road is heavily trafficked through the daytime and moderately trafficked at night.

1.4 The noise impact assessment has included:

i) Inspection of the site and surroundings and study of the plans provided by the client.

ii) Daytime and night time noise monitoring.

iii) Assessment of the potential impact of noise on the proposed development

iv) Consideration of noise control measures required to maintain acceptable noise levels within the proposed bedrooms and living rooms of the dwellings.

1.5 The recommendations in this report are based on the draft layout drawing 10-024 SK01 issued by QAD Architects. The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 NOISE SURVEY

2.1 Noise measurements were taken by Hepworth Acoustics at representative times during the daytime on Monday 23rd August 2010 and during the night time (early morning) on Wednesday 25th August 2010.

2.2 Noise levels were measured at the approximate locations of the nearest proposed properties to the road and rail line as shown in Figure 1 and described below.

Location 1- Dodworth Road, 13m from the northern kerb line.

Location 2- Northern Boundary of site, 17m from the railway line.

2.3 Location 2 was used to measure SEL noise levels during train pass-bys.

2.4 The noise measurements were carried out using a Brüel & Kjær 2260 'Type 1' Integrating Sound Level Meter. Noise was measured in terms of broadband A-weighted indices. Frequency analysis was carried out to assist with the design of noise control measures. Calibration checks were carried out both before and after the measurements with no variance observed.

2.5 Across the site, the main noise source was road traffic. There was intermittent rail traffic noise from the line running to the north of the site.

Road Noise

2.6 Daytime road traffic noise levels at Location 1 have been assessed in accordance with the shortened measurement method described in the Department of Transport document 'Calculation of Road Traffic Noise' (CRTN), 1988. The memorandum was prepared to enable entitlement under the Noise Insulation Regulations 1975 to be determined, but it is stated in the document, that the guidance is equally appropriate to the calculation of traffic noise for land use planning purposes.

2.7 The CRTN shortened measurement method involves taking traffic noise measurements (L_{A10}) over representative time periods within any three consecutive hours between 10:00 and 17:00. By using the $L_{A10\ (3\ hour)}$ as the arithmetic mean of the measured L_{A10} values, the $L_{A10\ (18\ hour)}$ value can then be calculated, (CRTN states, '$L_{A10\ (18\ hour)} = L_{A10\ (3\ hour)}$ - 1dB(A)'). The $L_{A10\ (18\ hour)}$ values have then been converted into the equivalent $L_{Aeq\ (16\ hour)}$ values for comparison with the noise exposure categories for new houses which are specified in PPG 24 'Planning and Noise'. PPG 24 'Planning and Noise'. (Annex 1 states that '$L_{Aeq,16h} \approx L_{A10,18h} - 2$ dB(A)').

2.8 The night-time $L_{Aeq\ (15min)}$ values at locations have been averaged logarithmically. The resulting values have been taken as being representative of the night-time $L_{Aeq\ (8\ hour)}$ values.

2.9 The results of the noise survey are shown in Appendices II and III and the daytime $L_{Aeq\ (16\ hour)}$ and night-time $L_{Aeq\ (8\ hour)}$ values are summarised in Table 1. The implications of the results are discussed in section 3.0.

Table 1: Daytime and Night-time Free Field Road Traffic Noise Levels

Elevation	Daytime $L_{Aeq\ (0700\text{-}2300\ hrs)}$	Night-time $L_{Aeq\ (2300\text{-}0700\ hrs)}$
1. Dodworth Road	67 dB	63 dB

Railway Noise

2.10 The railway noise was measured during each train pass in terms of the 'sound exposure level' (SEL) and the overall level has then been calculated in terms of the 'equivalent continuous noise level', L_{Aeq} using the formula

$$L_{Aeq\,(T)} = SEL + 10 \log N - 10 \log T$$

where $L_{Aeq\,(T)} = L_{Aeq}$ over time period T
SEL = 'Sound Exposure Level'
N = Number of train passes in time period T
T = Time period in seconds

2.11 The above calculation has been carried out for the daytime and night time periods for local passenger trains.

2.12 The number of passenger trains has been based on the number occurring during the survey period which has been checked against rail timetables. Freightmaster schedules were checked however there appears to be no Freight using this line and none was observed during the survey.

2.13 The results of the rail noise survey are shown in Appendix IV and the daytime $L_{Aeq\,(16\ hour)}$ and night-time $L_{Aeq\,(8\ hour)}$ values are summarised in Table 1. The implications of the results are discussed in section 3.0.

Table 2: Daytime and Night-time Free Field Rail Traffic Noise Levels

Elevation	Daytime $L_{Aeq\,(0700\text{-}2300\ hrs)}$	Night-time $L_{Aeq\,(2300\text{-}0700\ hrs)}$
2. Northern Boundary	40 dB	37 dB

3.0 ASSESSMENT OF NOISE IMPACT

Assessment to PPG24

3.1 The noise assessment for planning purposes has been based upon the noise exposure categories in the Department of the Environment guidance, PPG 24 'Planning and Noise' HMSO, 1994 for road traffic noise and rail noise as detailed below.

Road Traffic Noise	**Noise Exposure Category (dB L_{Aeq})**			
	A	**B**	**C**	**D**
Daytime (0700-2300 hrs)	<55	55-63	63-72	>72
Night-time (2300-0700 hrs)*	<45	45-57	57-66	>66
Rail Traffic Noise	**Noise Exposure Category (dB L_{Aeq})**			
	A	**B**	**C**	**D**
Daytime (0700-2300 hrs)	<55	55-66	66-74	>74
Night-time (2300-0700 hrs)*	<45	45-59	59-66	>66

[* sites where noise events regularly exceed 82 dB L_{Amax} several times in any hour at night should be treated as being in Category C]

Category A - Noise need not be considered as a determining factor in granting planning permission.

Category B - Noise should be taken into account and steps taken to ensure an adequate level of protection against noise

Category C - Planning permission should not normally be granted. Where development is permitted, steps should be taken to ensure a commensurate level of protection against noise.

Category D - Planning permission should normally be refused.

3.2 Table 3 below shows the daytime and night time Noise Exposure Categories for the site. The maximum noise levels at the rear of the site near the railway line do not affect the noise exposure category (however, they have been taken into account in the design of sound insulation measures).

Table 3: Daytime and Night-time Noise Exposure Categories

Elevation	Daytime NEC	Night Time NEC
1. Dodworth Road	C	C
2. Northern Boundary of Site	A	A

3.3 Sites that fall into Category A should not be refused on noise grounds. Most Planning Authorities allow residential development at Category C sites as long as adequate sound insulation measures are incorporated. Appropriate mitigation measures for the site are specified in Section 4.0 of this report.

Assessment Criteria

3.4 In order to protect the future residents against the impact of noise, a sound insulation scheme has been designed in accordance with the criteria given below.

Inside Bedrooms: *30dB $L_{Aeq(8\ hour)}$ (2300 to 0700 hours)*
*45dB L_{Amax} (2300 to 0700 hours)**

Inside Living Rooms: *35dB $L_{Aeq(16\ hour)}$ (0700 to 2300 hours)*

External in Gardens: *55dB $L_{Aeq(16\ hour)}$ (0700 to 2300 hours)*

**The maximum noise criterion may be exceeded on rare occasions but not multiple times in any one hour.*

4.0 NOISE CONTROL MEASURES

External Walls

4.1 The building envelope should preferably be of cavity masonry construction with a brickwork outer leaf and a solid dense blockwork inner leaf. If an alternative construction is proposed for the building envelope the specification should be checked by an acoustic consultant.

Glazing to Bedrooms in houses in the first row of properties adjacent to Dodworth Road

4.2 The glazing system for bedrooms in houses in the first row of properties adjacent to Dodworth Road should achieve the minimum sound reduction indices specified in the table below (any system which deviates from this table should be checked by an acoustic consultant). This applies to bedrooms which have a view of the road (direct or oblique) and it does not apply to windows which are completely screened and facing away from the road.

Required glazing acoustic performance

Minimum Sound Reduction Indices (dB) @ Octave Band Centre Frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
21	26	27	34	40	38	46	46

Such performance can typically be expected from the following glazing configuration;

- Double glazing comprising one pane of 10mm glass and one pane of 6mm glass separated by a nominal cavity (e.g. 10-20mm)

Glazing to all other noise sensitive rooms

4.3 The glazing system for all other noise sensitive rooms across the site should be a minimum of standard thermal double glazing comprising two panes of 4mm glass separated by a nominal cavity (10-20mm).

Ventilation

4.4 All bedrooms throughout the site and all living rooms in houses in the first row of properties adjacent to and with a view of Dodworth Road should have ventilation by one of the following means and there should be no standard trickle vent incorporated in the windows. Alternatives to this list should be checked with an acoustic consultant.

i. Silavent acoustic air bricks, type A.
ii. Greenwood AAB 4000 Acoustic Airbrick
iii. Greenwood MA3051 Acoustic Wall Ventilator

4.5 The ventilation to all other rooms can be via standard trickle vents.

4.6 The ventilation systems specified above are satisfactory acoustically but the selected system should be checked with the Local Authority to ensure that it meets their requirements with respect to air flow.

Gardens

4.7 The external noise levels near to Dodworth Road are over the 55dBL_{Aeq} noise criterion for garden areas. However, the proposed layout shows garden areas to the rear of the properties and therefore the gardens are expected to have noise levels below the criterion due to the screening provided by the properties.

Rooms in the roof space

4.8 For rooms in the roof space we recommend that the ceiling construction and inner face of any timber frame wall sections (if applicable) to the dormers be increased to 2 layers of 15mm Gyproc SoundBloc plasterboard (or similar) and that a minimum of 100mm mineral wool be used in the void

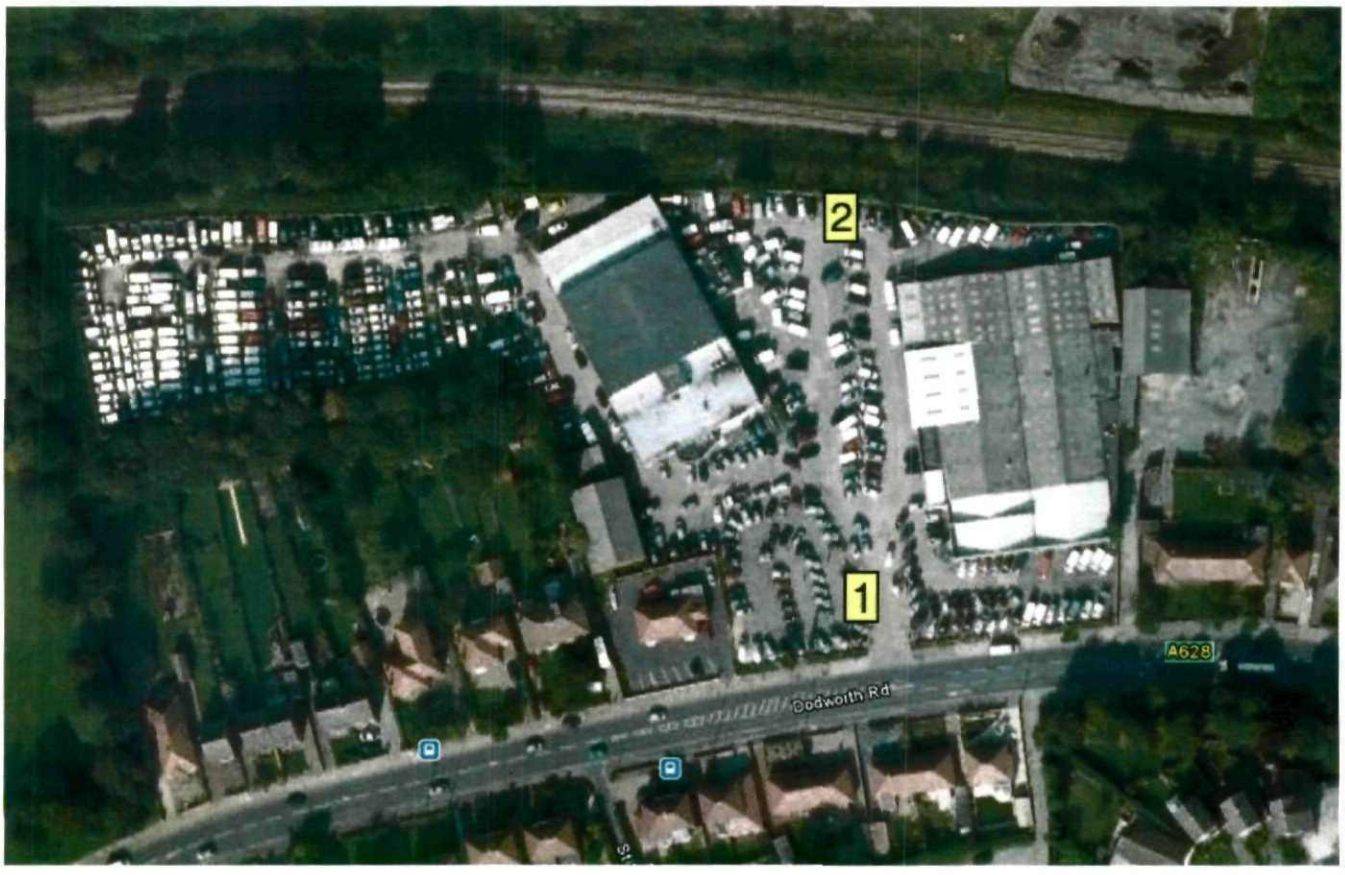
5.0 SUMMARY AND CONCLUSIONS

5.1 A noise assessment has been carried out for a proposed residential development at the former Polar Ford Garage on Dodworth Road, Barnsley.

5.2 The assessment has addressed the potential impact of road & rail traffic noise on the residential accommodation.

5.3 Noise control measures have been recommended in order to meet the criteria in Section 3.4 above.

FIGURE 1 – NOISE MONITORING LOCATIONS



Appendix I – Noise Units and Indices

a) Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

b) Frequency and hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

c) Glossary of Terms

When a noise level is constant and does not fluctuate over time, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a

number of other indices, including statistical parameters, are used. The indices used in this report are described below.

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

L_{A90} This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

L_{A10} This is the A-weighted noise level exceeded for 10% of the time period and is often used in the assessment of road traffic noise.

SEL This is the sound level, of 1 second duration, which would have the same sound energy as the noise event considered.

Appendix II – Results of Daytime Road Traffic Noise survey

Date Monday 23rd August

Equipment: Brüel & Kjær 2260 Type I integrating sound level meter

Weather: Sporadic showers during which monitoring was halted, Slight Breeze <5 m/s

Location 1, Dodworth Road – Free Field Levels

Time	L_{Aeq}	L_{Amax}	L_{A90}	L_{A10}	Comments
14:14 14:29	66.8	76.4	56.0	70.4	Road Traffic
15:00 15:15	67.0	79.3	58.4	70.0	
16:00 16:15	67.8	83.1	59.4	70.8	
Average	67.2	-	57.9	70.4	

Appendix III– Results of Night-Time Road Traffic Noise survey

Date: Wednesday 25th August 2010

Equipment: Brüel & Kjær 2260 Type I integrating sound level meter

Weather: Dry, Slight Breeze <5 m/s

Location 1, Dodworth Road – Free Field Levels

Time	L_{Aeq}	L_{Amax}	L_{A90}	L_{A10}	Comments
04:34 04:49	58.2	74.5	45.8	61.6	Road Traffic
05:28 05:43	63.5	80.4	51.8	67.6	
06:28 06:43	65.2	80.0	54.2	69.0	
Average	63.2	-	50.6	66.1	

Appendix IV– Results of Rail Noise survey

Date: Monday 23rd and Wednesday 25th August 2010

Equipment: Brüel & Kjær 2260 Type 1 integrating sound level meter

Weather: Dry, Slight Breeze <5 m/s

Location 2, Near railway line – free-field levels

Date	Time		Type	L_{Amax}	SEL
23/08/2010	14:56	14:56	Local passenger	73.1	74.5
23/08/2010	15:52	15:52	Local passenger	67.7	74.0
25/08/2010	06:01	06:02	Local passenger	76.1	79.5
25/08/2010	06:51	06:52	Local passenger	68.9	74.1