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**PROPOSED RESIDENTIAL DEVELOPMENT
LAND AT WOODCROFT PRIMARY SCHOOL, WATERLOOVILLE
NOISE IMPACT ASSESSMENT**

Technical Report: R4127-1 Rev 1

Date: 6th June 2012

For: Hampshire County Council
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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been retained by Hampshire County Council to undertake a noise impact assessment for land at Woodcroft Primary School, Waterlooville. It is proposed to construct 43 residential dwellings on land which is currently in use as school fields.
- 1.2 The site is located in a residential area off Woodcroft Lane, Waterlooville. The site is exposed to noise generated from school activities, primarily during break and lunch time periods, but also noise from road traffic using Eagle Avenue. Developers of an adjacent proposed residential development site are seeking planning permission north west of the site which if approved would increase the level of noise from road traffic. This noise impact assessment has therefore considered and assessed the noise generated by external school activities, local road traffic and proposed increases in road traffic.
- 1.3 An explanation of acoustical terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20 μ Pa.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

- 2.1 The site location and site boundary is shown in Figure 1. The existing site consists of a vacant school field which extends around to the western and southern school site boundary. It is proposed to construct 43 residential properties with access via Woodcroft Lane and Eagle Avenue. The proposed development scheme is shown in Figure 2.
- 2.2 Woodcroft Primary School is located directly north east of the proposed site. The majority of noise from the school is generated during break and lunch time periods. Two outdoor play areas are located east and west of the main school building which are both used during morning break time. During lunch time only the most easterly play area is used. Break time lasts approximately 30 minutes and lunch time approximately 1 hour.
- 2.3 Road traffic noise from Eagle Avenue is the main contributor to ambient noise at the site due to its relatively high traffic volume. Eagle Avenue is a two-way road with a speed limit of 30 mph. A proposed housing development north west of the site at Woodcroft Farm would increase the traffic volume on Eagle Avenue and require an access road to be constructed on the western site boundary, as shown in Figure 1. The proposed development is part of Havant Borough Council's Core Planning Strategy and aims to construct up to 700 additional residential properties with associated traffic using the local road network.

3.0 ASSESSMENT CRITERIA

National Planning Policy Framework

3.1 The National Planning Policy Framework (NPPF) [Reference 1] was published by the Department for Communities and Local Government on 27th March 2012. This document supersedes PPG 24 [Reference 2] which previously provided guidance on noise relating to planning and new development. For noise the NPPF policy states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions, while recognising that many developments will create some noise; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 3] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;
- Where possible, contribute to the improvement of health and quality of life.

3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

- 3.4 The NPPF and NPSE documents do not refer to specific noise criteria. For residential developments 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 8233: 1999 [Reference 4] and the World Health Organisation (WHO) 2000 Guidelines [Reference 5] are adopted for internal noise within dwellings and external noise in amenity spaces.

BS 8233: 1999

- 3.5 BS 8233 provides internal design sound levels for 'good' and 'reasonable' conditions. The values in Table 1, together with a night-time maximum value of 45 dB $L_{Amax,fr}$ are design recommendations from BS 8233: 1999 for reasonable internal noise levels. It should be noted that the World Health Organisation [Reference 5] recommends that for a 'good nights sleep' noise levels in bedrooms at night should not exceed 30 dB $L_{Aeq, 8 \text{ hour}}$ or regularly exceed 45 dB $L_{Amax,f}$.

Criterion	Typical Situation	Design Noise Levels (dB $L_{Aeq, T}$)	
		Good	Reasonable
Resting/ sleeping conditions	Living rooms	30	40
	Bedrooms	30	35

Table 1: Indoor Ambient Noise Levels ref: BS 8233

Summary

- 3.6 The impact of noise on the site has been assessed using the following methodology:
- NPPF for assessing the impact of noise on new residential developments. NPPF aims avoid adverse impacts on health and quality of life and mitigate impacts if necessary.

- BS 8233 for the assessment of internal and external noise levels. It is considered that an upper internal daytime level of 35 dB L_{Aeq} for lounges and a night-time level for bedrooms of 30 dB L_{Aeq} should apply. Similarly, a maximum night-time internal level of 45 dB $L_{Amax, fast}$ for regular events should apply in bedrooms.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

Measurement Instrumentation and Procedure

- 4.1 Noise measurements were taken for a period of approximately three hours on 22nd March to measure the ambient noise levels and noise from school activities at the proposed site. These measurements were taken at a height of 1.2m at several locations as shown in Figure 1.
- 4.2 The surveys were undertaken using the following instrumentation:
- | | |
|--|------------|
| Rion precision sound level meter (Class 1) | Type NA28; |
| Bruel and Kjaer calibrator | Type 4231. |
- 4.4 The sound level meter was equipped with an environmental windshield. The calibration of the instrumentation was checked before and after the tests and no signal variation occurred. Calibration of 24 Acoustics' equipment is traceable to National Standards. The weather was dry throughout the survey and the wind speed was less than 5 m/s. It is considered that the weather did not affect measurements obtained.
- 4.5 The noise monitors were configured to measure and store overall A-weighted statistical parameters including L_{Aeq} , L_{Amax} and L_{A90} (all measured on fast response) in 5 minute intervals. Measurements were made in accordance with BS 7445: 1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use," [Reference 6].
- 4.6 Noise measurements during school lunch time were taken at a range of locations around the playground and at the nearest proposed residential façade. These measurements were corrected for distance and combined to give an average noise level of school activities during the lunch hour for use within an acoustic model.

5.0 RESULTS AND ASSESSMENT

- 5.1 The results of the noise survey are shown in Appendix B. A summary of these results are shown below in Table 2. Maximum noise levels were found to be in the order of 71 dB $L_{Amax, f}$ at the nearest proposed façade to Eagle Avenue under free field conditions.

Location	Sound Pressure Level	
	$L_{Aeq, 5min}$ (dB)	$L_{A90, 5min}$ (dB)
1	46	44
2	48	43
3	48	44

Table 2: Ambient Noise Survey Results (free field)

- 5.2 Based on the measurements of school activities during lunch times, traffic data and predicted future traffic data, an acoustic model has been developed using Immi noise modelling software version 2011-1. Two scenarios have been considered within the model to understand the difference in noise level over time.
- 5.3 A worst case scenario is predicted with outdoor school activities and road traffic both influencing the proposed site. The first scenario considers existing traffic using Eagle Avenue during a school break time. The second scenario considers increased traffic from 700 additional homes at the Woodcroft Farm site (proposed to be constructed over the next 15-20 years inline with the Havant Borough Council Core Planning Strategy) during a school break time. The model incorporates a 1.8m close boarded garden fence in certain locations.
- 5.4 This worst case assessment relates to the noisiest period of the day, however, noise levels would in reality be lower when students are in classes and during school holidays. Projected traffic levels assume that the proportion of HGV traffic will remain constant at existing levels. This will provide a worst case assessment as HGV traffic is likely to be proportionally less than existing levels. The results of the model are shown below in Table 3 below and graphically in Appendix C.

Location	Existing Traffic - Predicted Noise Level L_{Aeq} (dB)	15 Year Projected Traffic - Predicted Noise Level L_{Aeq} (dB)
Plot 3, front garden	51	52
Plot 8, rear garden	49	53
Plot 22, rear garden	49	53
Plot 32, rear garden	48	48
Plot 41, rear garden	42	43
Plots 26-31 front	49	57
Plot 43, front garden	46	57

Table 3: Predicted Noise Levels at Proposed Residential Development.

Assessment – Existing Traffic Levels

- 5.5 The results of the acoustic modelling show that noise levels during peak times in external amenity areas for existing traffic levels will be below 55 dB $L_{Aeq,16\text{ hour}}$. These results include the effect of the proposed 1.8m close boarded timber fence at selected sections of the site boundary as shown in Figure 3.
- 5.6 Based on these results for existing traffic levels, noise levels should meet the requirements for 'good' internal noise levels for living rooms and bedrooms as stated in BS 8233. This assumes a standard construction (4mm glass: 16mm air gap: 4mm glass) and trickle ventilators which achieve a rating of 30 dB $D_{ne,w}$.
- 5.7 Maximum internal night-time noise levels will be in the range 36-38 dB L_{Amax} based on measurements as described in Section 5.1 above and including the glazing performance. This is compliant with the recommended internal maximum noise level of 45 dB $L_{Amax, f}$.

Assessment – Projected Traffic Levels

- 5.8 The results of the noise modelling exercise show that the noise levels during peak times in external amenity areas for the majority of the site, for 15 year predicted traffic levels, would be lower than 55 dB $L_{Aeq,16\text{ hour}}$. The model shows that noise levels will exceed 55 dB L_{Aeq} at the western side of the site due to traffic using the proposed access road. However, this will only affect the front façades of plots of plot on this side of the site and respective access and front garden areas. These results include the effect of the proposed 1.8m close boarded timber fence at selected sections of the site boundary as shown in Figure 3.

- 5.9 Based on these results for projected traffic levels, noise levels should meet the requirements for 'good' internal noise levels for living rooms and bedrooms as stated in BS 8233 for the site. This assumes a standard construction (glazing comprising, 4mm glass: 16mm air gap: 4mm glass) and trickle ventilators which achieve a rating of 30 dB $D_{ne,w}$.

6.0 CONCLUSIONS

- 6.1 Hampshire County Council has instructed 24 Acoustics Ltd to undertake a noise impact assessment for the proposed development at Woodcroft Lane, Waterlooville.
- 6.2 An ambient noise survey has been carried out at the site to determine existing noise levels. Measurements have also been undertaken of school activities to understand the impact of the school at the proposed development. The proposed 1.8 m close boarded timber fence in the locations A-B, C-D, E-F and G-H as shown in Figure 3 will be required to ensure future noise levels will be acceptable. The study has found that with mitigation measures in place, future residents will not be adversely affected by noise from Woodcroft Primary School, road traffic noise from Eagle Avenue and increases in road traffic from future residential development at Woodcroft Farm.
- 6.3 It is therefore considered that there will be no loss of amenity to the future occupiers of these proposed residential properties from School activities or road traffic noise.







REFERENCES

1. Department for Communities and Local Government. The National Planning Policy Framework (NPPF), 2012.
2. Department for the Environment, Planning Policy Guidance 24 'Planning and Noise', 1994.
3. Department for Environment, Food and Rural Affairs. Noise Policy Statement for England (NPSE), 2010.
4. British Standards Institution. British Standard 8233: Sound Insulation and Noise Reduction for Buildings, 1999.
5. World Health Organisation. Guidelines for Community Noise, 2000.
6. British Standards Institution. British Standard 7445: 1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use.

APPENDIX A: ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB(A) corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

- i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

- ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 [1] as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T , has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

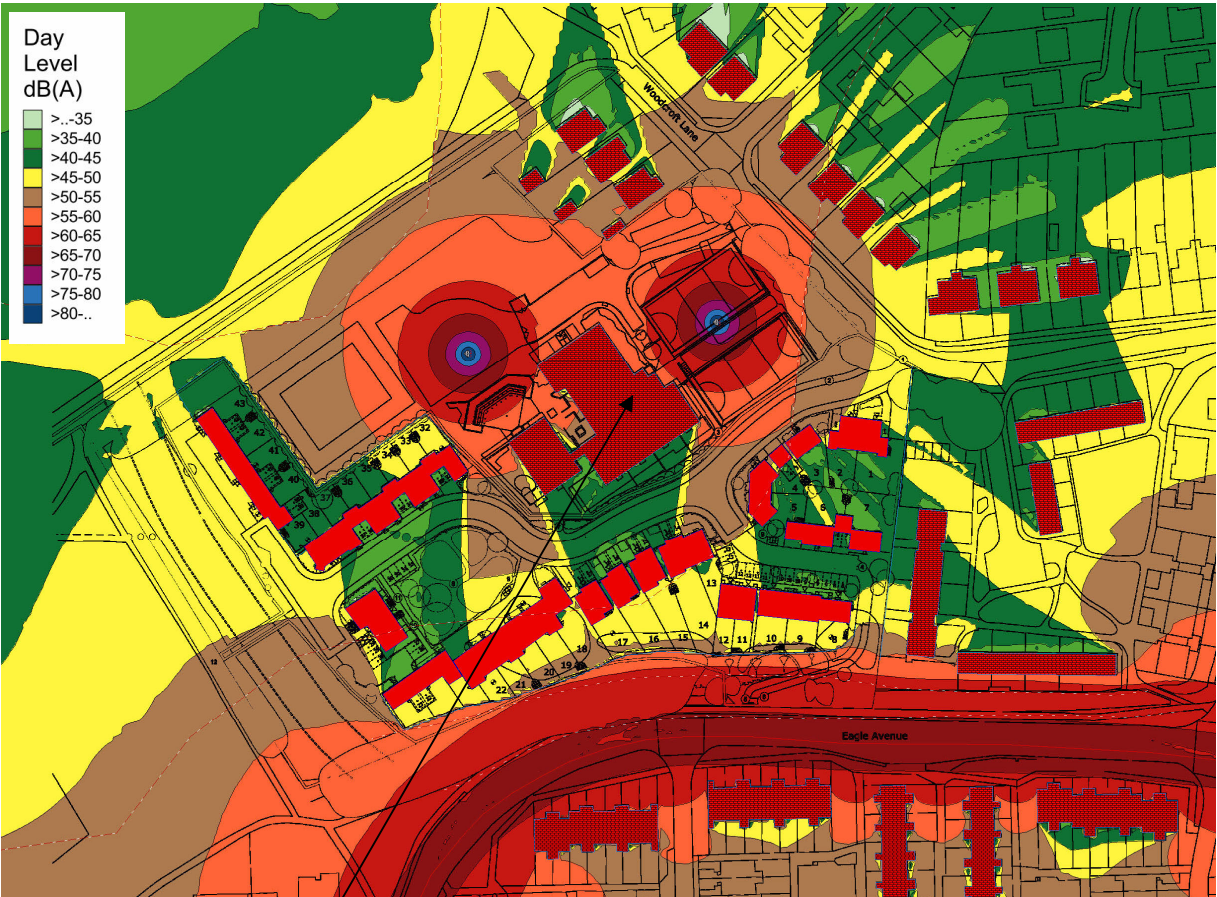
iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B: ENVIRONMENTAL SURVEY RESULTS

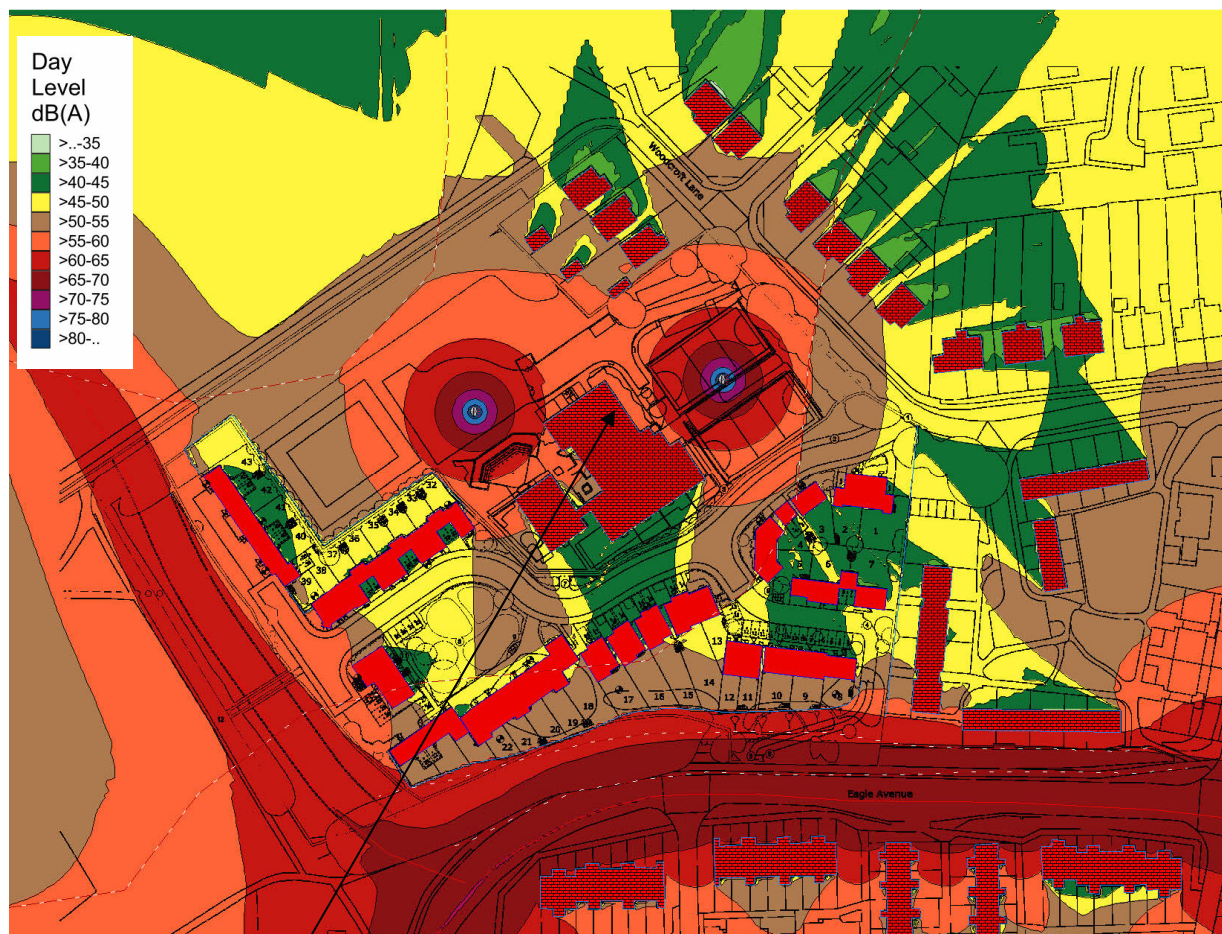
Location	Start Time	LAeq	LAm _{ax}	LA90	Comment
1	22/03/2012 10:59	45.1	57.0	43.0	Weather fine and dry. Normal school activities during classes. Road traffic noise from Eagle Avenue and Woodcroft Lane.
1	22/03/2012 11:04	46.1	53.1	43.7	
1	22/03/2012 11:09	47.0	60.0	43.7	
2	22/03/2012 11:17	46.8	62.5	42.7	Weather fine and dry. Normal school activities during classes. Road traffic noise from Eagle Avenue.
2	22/03/2012 11:22	48.7	70.9	42.0	
2	22/03/2012 11:27	48.7	58.0	43.8	
3	22/03/2012 11:48	47.4	63.2	44.4	Weather fine and dry. Normal school activities during classes. Road traffic noise from Eagle Avenue.
3	22/03/2012 11:53	47.1	54.6	43.6	
3	22/03/2012 11:58	46.6	57.5	43.9	
2	22/03/2012 13:08	48.5	59.8	42.6	Weather fine and dry. Normal school activities during classes. Road traffic noise from Eagle Avenue.
2	22/03/2012 13:13	48.8	61.5	42.6	
2	22/03/2012 13:18	47.7	58.3	41.3	
3	22/03/2012 13:26	48.0	62.3	43.5	Weather fine and dry. Normal school activities during classes. Road traffic noise from Eagle Avenue.
3	22/03/2012 13:31	48.2	65.1	43.2	
3	22/03/2012 13:36	48.4	60.5	43.9	
3	22/03/2012 13:41	46.4	51.5	44.2	

APPENDIX C1: EXISTING TRAFFIC – PREDICTED NOISE LEVELS



**Woodcroft Primary
School buildings**

APPENDIX C2: 15 YEAR PROJECTED TRAFFIC – PREDICTED NOISE LEVELS



**Woodcroft Primary
School buildings**