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**PROPOSED RESIDENTIAL DEVELOPMENT
BEDHAMPTON ROAD
BEDHAMPTON

NOISE ASSESSMENT**

Technical Report: R5011-2 Rev 0

Date: 26th February 2014

For: Fratton Building Services
6 Meadow Edge
Waterlooville
PO7 5AX

24 Acoustics Document Control Sheet

Project Title: Proposed Residential Development, Bedhampton Road, Bedhampton - Noise Assessment

Report Ref: R5011-2 Rev 0

Date: 26th February 2014

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For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

Revision	Description	Prepared By	Approved By
0	Approved for Issue	John Edhouse	Stephen Gosling

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Fratton Building Services to undertake a noise assessment for proposed residential accommodation at the former Bedhampton School Yard, Bedhampton Road, Bedhampton.
- 1.2 A desktop study was undertaken in December 2013 and following comments from Havant Borough Council's Environmental Health Office, this report has been updated.
- 1.3 24 Acoustics Ltd understands that noise arising from operations at the adjacent tyre fitting premises (National Tyres) has been highlighted as a potential concern. Accordingly, this noise impact assessment has included:
- Assessment of prevailing ambient noise levels
 - Assessment of noise from the commercial unit
- 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

- 2.1 The proposed site is located in the yard of the former Bedhampton School, Bedhampton Road, Bedhampton. Bedhampton Road is a single carriageway thoroughfare with a speed limit of 30 mph.
- 2.2 It is proposed to construct residential accommodation comprising three houses in a single block. The site is bounded by a commercial tyre fitting premises which fronts Bedhampton Road (to the east of the site). The surrounding area comprises a mixture of existing residential and commercial properties.
- 2.3 The tyre fitting premises operate during daytime hours (Monday - Friday 08:30 - 18:00, Saturday 08:30 - 17:00, Sunday 10:00 - 16:00). Noise emissions from the tyre fitting premises are most significant from the open front facade. Noise from the rear and side of the building is significantly lower as there are no openings.

- 2.4 The new dwellings would be built with the front facade located at a similar distance back from the road as the tyre fitting premises (ie, approximately 13m from the centre of the road).
- 2.5 The existing site layout is shown in Figure 1.

3.0 STANDARDS AND GUIDANCE

NPPF

- 3.1 The National Planning Policy Framework (NPPF) was published by the Department for Communities and Local Government in March 2012 [Reference 1]. This document replaces specific guidance contained within the planning policy guidance and statement documents which are currently in force. This document therefore 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.
- 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.
- 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] are adopted for internal noise within dwellings and criteria from British Standard 4142: 1997 [Reference 5] for the assessment of noise from industrial sources.

BS 8233: 1999

- 3.5 British Standard 8233 defines design criteria for 'good' or 'reasonable' acoustic conditions inside certain habitable rooms. Table 1 shows a summary of the levels recommended in BS 8233 for used for resting and sleeping.

Criterion	Typical Situation	Design Range, dB $L_{Aeq,T}$	
		Good	Reasonable
Reasonable resting/ sleeping conditions	Living rooms	30	40
	Bedrooms	30	35

Table 1: Indoor Ambient Noise Levels as per BS 8233

- 3.6 BS 8233 also states that for 'reasonable' acoustic conditions in bedrooms noise levels should not regularly exceed 45 dB $L_{Amax,f}$.

BS 4142 (Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas)

- 3.7 BS 4142 provides a method for rating the effects of industrial noise on mixed residential and industrial areas. The standard advocates a comparison between the typical measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction of +5 dB is applied. The standard states that a difference between the rating level and the background level of +10 dB indicates that 'complaints are likely', a difference of +5 dB is of 'marginal significance' and a difference of -10 dB is a 'positive indication that complaints are unlikely'.
- 3.8 It is relevant to note that although BS 4142 applies strictly to existing properties, it is considered to provide an indication of the likely impact for new properties.

Summary

- 3.9 Based upon the review of standards described above, noise has been assessed in accordance with the following approach:
- BS 8233 for the recommended interior noise levels inside the properties (of between 30 and 40 dB L_{Aeq} for 'good' and 'reasonable' conditions in living rooms respectively and between 30 and 35 dB L_{Aeq} for 'good' and 'reasonable' conditions in bedrooms and 45 dB $L_{Amax,f}$ for reasonable conditions in bedrooms);
 - BS 4142 for assessment of noise from industrial sources at the proposed properties.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS AND RESULTS

Measurement Instrumentation and Procedure

- 4.1 Measurements were undertaken to determine ambient noise levels at the proposed development site and noise from the adjacent tyre fitting facility. Noise levels were measured using the following equipment:

Norsonic precision sound level meter
Bruel and Kjaer acoustic calibrator

Type 118;
Type 4231.

- 4.2 Measurements were undertaken on 25th February 2014 in free field conditions at the closest proposed façade with Bedhampton Road. The survey location is shown in Figure 1.
- 4.3 The instrumentation was configured to measure and store overall A-weighted statistical parameters including L_{Aeq} , L_{Amax} and L_{A90} (all measured on fast response) over short time 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].
- 4.4 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 during the survey period was dry and the wind speed was less than 5 m/s. The microphones were mounted at a height of approximately 1.5m above local grade level and equipped with an environmental wind shield. Calibration certificates of the instrumentation are shown in Appendix B.

Results - Noise

- 4.5 The measured noise levels at the closest proposed façade to Bedhampton Road were found to be 63 dB $L_{Aeq, 1hour}$ and 56 dB $L_{A90 1hour}$.

Source term measurements – Tyre Fitting Facility

- 4.6 Measurements were undertaken on 25th February 2014 at the adjacent tyre fitting facility premises during typical tyre servicing works. Noise levels were measured at the entrance of the garage during tyre removal and replacement works. Activities within the garage workshop during the survey included; use of the vehicle lift, use of air impact wrench, removal and replacement of tyres using tyre fitting machines. Noise levels during the tyre servicing works were found to be in the order of 74 dB L_{Aeq} at the entrance of the garage workshop. Noise survey results are shown in full in Appendix C.

5.0 ENVIRONMENTAL NOISE ASSESSMENT

Assessment – Noise from Industrial Sources

5.1 Measured noise levels from the adjacent tyre fitting facility have been used to populate an acoustic model of the site using IMMI v2011 noise-mapping software. This has used the propagation methodology of ISO 9613 [Reference 7] taking into account the effects of geometric divergence, atmospheric and ground absorption and acoustic screening. The following parameters were used in the model:

- Ambient temperature: 10 degrees centigrade;
- Relative humidity: 70%;
- Ground effects: $G=0.0$ (100% 'hard' ground);
- Light downwind propagation conditions.

5.2 Results from the acoustic model show that noise levels at the nearest proposed property from the adjacent garage premises would be 46 dB $L_{Aeq,1hour}$. Results from the acoustic model are shown graphically in Figure 2. The model has included the proposed site layout and a 1.8m boundary fence between the proposed development and adjacent garage as detailed in proposed plans.

BS 4142 Assessment

5.3 The assessment of the noise from the adjacent tyre fitting facility has been undertaken in accordance with BS 4142. Table 2 below summarises the results of the assessment.

	Noise Level, Closest Proposed Property
Typical Background Noise Level	56 dB $L_{A90, 1hour}$
Specific Source Noise Level	46 dB $L_{Aeq, 1 hour}$
BS 4142 Penalty Correction	+5 dB
Rating Noise Level	51 dBA
BS 4142 Assessment Level	-5 dBA
BS 4142 Assessment Semantic	Significantly less than 'marginal significance'

Table 2: Summary of BS 4142 Assessment, Proposed Development Site

- 5.4 A penalty correction for noise character has been applied to the source noise level from the tyre fitting facility due to the distinctive and occasionally impulsive noise generated in the tyre workshop.
- 5.5 The assessment indicates that the noise from the tyre fitting facility at the closest proposed property will be a magnitude of less than 'marginal significance' as defined in BS 4142 and is therefore considered acceptable.
- 5.6 Noise from the tyre fitting facility will be negligible compared with prevailing ambient noise levels from road traffic using Bedhampton Road. On this basis it is considered additional mitigation measures will not be required to reduce the impact of noise from the adjacent tyre garage.

Assessment – Internal Noise Levels

- 5.7 Calculations have been undertaken using methodology provided in BS 8233 to determine the glazing and ventilation requirements for the proposed development to ensure that the noise levels inside the properties does not exceed 35 dB $L_{Aeq, 16 \text{ hour}}$ during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ at night (and also not regularly exceed 45 dB $L_{Amax,f}$ at night).
- 5.8 The acoustic requirements for the glazing apply to all habitable rooms on all façades. The requirements apply on all floors.

Rooms	Glazing Requirement	Ventilation Requirement
Living Rooms	A	A
Bedrooms	B	B

Table 3: Glazing and Ventilation Requirements

- 5.9 The required glazing specifications are shown in Table 4.

Description	SRI (dB) per Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Type A	-	21	17	25	35	37	31	-
Type B	-	20	18	28	38	34	38	-

Table 4: Required Glazing Performances

5.10 In making a comparison with the values in Table 4, it is important that the glazing figures used are the result of tests in accordance with ISO 140, Part 3: 1998 and that the quoted minimum sound reduction specifications are met by the window as a whole, including frames, seals and not just the glass.

5.11 In order to assist with the selection process, the following glazing configurations, if installed properly, are capable of achieving the required sound reduction performance:

Type A: 6 mm glass: 16mm cavity (minimum): 6 mm glass (or equivalent);

Type B: 4 mm glass: 16mm cavity (minimum): 4 mm glass (or equivalent).

5.12 For living rooms facing Bedhampton Road, Type A trickle ventilators (achieving a weighted elemental level difference of at least 47 dB $D_{ne,w}$) will be acceptable to provide adequate sound insulation. For bedrooms facing Bedhampton Road, Type B trickle ventilators (achieving a weighted elemental level difference of at least 36 dB $D_{ne,w}$) will be acceptable to provide adequate sound insulation.

5.13 To assist in the selection of ventilators the following products should achieve the required performance as stated in 5.12;

- Type A: SonAir F+, VKC242 tube, mineral wool in wall cavity
- Type B: Sound attenuated trickle ventilator

6.0 CONCLUSIONS

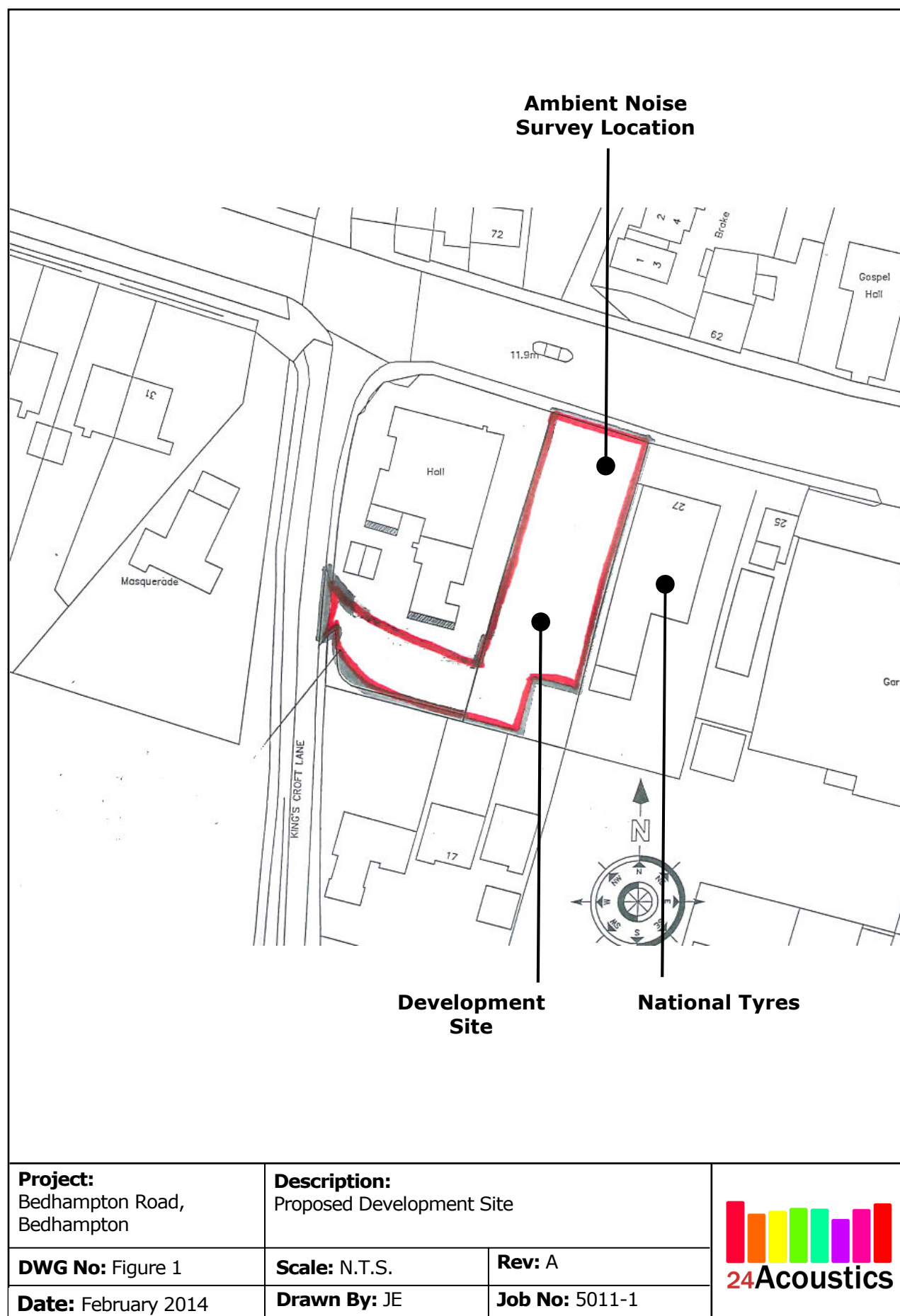
6.1 Fratton Building Services proposes to develop the land on Bedhampton Road, Bedhampton for residential use. The site is subject to noise from a tyre fitting facility (National Tyres) and also noise from traffic on Bedhampton Road.

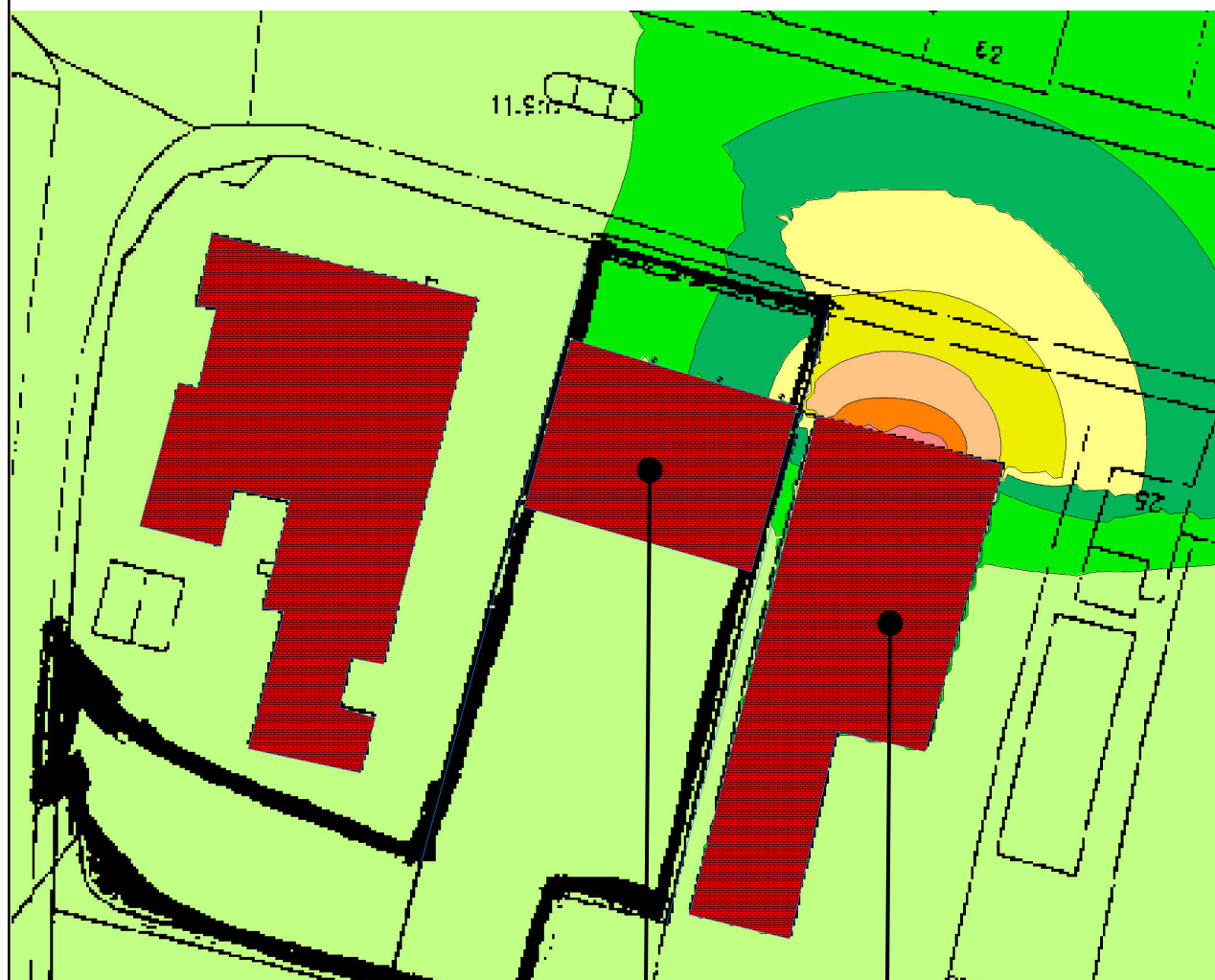
6.2 Noise impact arising from the tyre fitting facility, when assessed at the nearest proposed properties at the front of the site was found to be significantly less than 'marginal significance' as defined by BS 4142 criteria.

6.3 Glazing and ventilation specification has been calculated to provide suitable internal noise levels within the proposed properties following guidance given in BS 8233.

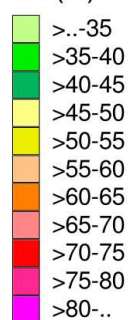
REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, March 2012.
2. Department for the environment, Planning Policy Guidance 24, Planning and Noise, 1994.
3. DEFRA, Noise Policy Statement for England, March 2010.
4. British Standards Institution. British Standard 8233: Sound Insulation and Noise Reduction for Buildings, 1999.
5. British Standards Institution. British Standard 4142. Method for Rating Industrial noise affecting mixed residential and industrial areas, 1997.
6. British Standards Institution. British Standard 7445: 1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use.
7. International Standards Organisation. ISO 9613, Acoustics- Attenuation of Sound During Propagation Outdoors, 1993.





Day
Level
dB(A)



Development
Site

National Tyres

Project:

Bedhampton Road,
Bedhampton

Description:

Acoustic Model Results

DWG No: Figure 2

Scale: N.T.S.

Rev: A

Date: February 2014

Drawn By: JE

Job No: 5011-1

APPENDIX A: NOISE UNITS

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 dB(A) is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB(A). 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.

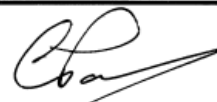
APPENDIX B: CALIBRATION CERTIFICATES

CERTIFICATE OF CALIBRATION	
ISSUED BY AV CALIBRATION	
Date of issue 2 January 2014	Certificate N° 1401001



AV Calibration
2 Warren Court
Chicksands, Shefford
Bedfordshire SG17 5QB
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Signed
G.Parry

CLIENT	24 Acoustics Ltd Pepper Mill Barn Old Salisbury Lane Romsey Hampshire SO51 0GD	
F.A.O.	Linda Haskell	
REF.	-	Job N° TRAC13/12323/01
DATE OF RECEIPT	19 December 2013	
PROCEDURE	AV Calibration Engineer's Handbook, Section 3	
IDENTIFICATION	Sound level meter Norsonic type 118 [serial no. 31465] connected via a preamplifier type 1206 [serial no. 30504] to a half-inch microphone type 1225 [serial no. 52308].	
CALIBRATED ON	2 January 2014	

The measurements detailed herein are traceable to units of measurement realised at the National Physical Laboratory.
This certificate may not be reproduced other than in full, except with the prior written approval of AV Calibration.

APPENDIX C: NOISE SURVEY RESULTS7

No.	Comment	Sound Pressure Level (dB)			Sound Pressure Level Single Octave Band Frequency, Hz (dB)								
		LAeq	LAmaz	LA90	31.5	63	125	250	500	1k	2k	4k	8k
1	Vehicle lift	67.1	68.8	64.6	57.8	67.5	61.3	61.3	61.2	64.4	59.9	50.4	45.2
2	Air impact wrench	78.8	86.8	64.5	69.5	73.2	69.8	68.3	71.0	70.9	71.7	73.0	71.4
3	Air impact wrench	71.0	84.9	57.3	65.1	67.5	63.8	63.9	64.3	66.9	64.0	61.9	57.8
4	Air impact wrench	72.4	84.5	62.3	66.7	74.6	69.8	68.2	65.2	66.4	63.3	64.8	66.1
5	Tyre fitting machine - remove tyre	69.7	86.8	63.2	68.5	69.7	64.3	65.0	63.8	65.7	62.4	60.1	57.0
6	Tyre fitting machine - remove tyre	69.4	86.7	59.3	66.2	67.8	64.1	64.1	63.7	65.4	62.3	59.4	54.4
7	Tyre fitting machine - fitting new tyre	73.8	95.2	62.8	65.9	69.3	66.3	67.5	68.3	69.6	68.2	61.3	56.2
8	Tyre fitting machine - fitting new tyre	74.7	95.6	63.9	69.5	75.0	70.4	68.1	69.4	69.2	68.2	67.1	58.3
9	General workshop activities	66.0	73.2	59.0	60.0	62.6	58.5	60.0	61.1	63.3	58.4	49.4	46.2
10	General workshop activities	67.2	70.5	60.6	69.3	72.8	63.3	62.0	62.7	64.2	59.5	50.3	45.5