



**Armstrong House
3 Bassett Avenue
Southampton
SO16 7DP**

T: 02381 555 000

**NOISE IMPACT ASSESSMENT
OAKFIELDS
FAIROAK**

Technical Report: R8687-1 Rev 5

Date: 10th December 2021

For: Mrs Antoinette Denham-Harding
c/o Southern Planning Practice Ltd
Youngs Yard
Churchfields
Twyford
Winchester
Hampshire
SO21 1NN

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	Name	Position	Signature	Date
Prepared by	Kiel Edwards BSc AMIOA	Consultant		10/12/2021
Reviewed by	Chris McConnell BSc MSc MIOA	Senior Consultant		10/12/2021
Approved by	Stephen Gosling BEng CEng MIOA	Principal Consultant		10/12/2021
For and on behalf of 24 Acoustics Ltd				

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Southern Planning Practice Ltd, on behalf of Mrs Antoinette Denham-Harding, to undertake an environmental noise impact assessment for land at Oakfields, Fair Oak which is proposed for residential development. The dominant noise source at the site is local road traffic.
- 1.2 This report addresses the impact of road traffic noise on the proposed development for eight residential dwellings.
- 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 a residential area of Fair Oak and currently comprises a large garden, associated with the property Oakfields on Winchester Road.
- 2.2 The B3353 (Winchester Road) follows the eastern site boundary with existing residential properties further to the east as well as to the south and west. A licenced premises, The Fox and Hounds, is located to the north, approximately 75m from the closest site boundary. Noise from traffic using the B3353 (30 mph speed limit) is the main noise source in the area.
- 2.3 It is proposed to construct eight dwellings on the site, comprising a mix of three and four bedroom detached and semi-detached houses with associated garages, located approximately 32m from the B3353. The existing Oakfields building is to be retained at the site with an additional garage unit proposed for use by Oakfields.
- 2.4 The site location is shown in Figure 1. The proposed layout plan is provided in Figure 2.

3.0 ASSESSMENT CRITERIA

NPPF, NPSE and PPG

3.1 The National Planning Policy Framework (NPPF) [Reference 1], revised in February 2019, states (paragraph 180) in relation to noise that planning policies and decisions should aim to:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

3.2 The NPPF refers to the Noise Policy Statement for England (NPSE) [Reference 2] 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 In 2019 the Planning Practice Guidance (PPG) was updated [Reference 3]. This is written to support the NPPF with more specific planning guidance. The PPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The PPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.
- 3.5 The PPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system. Table 1 is reproduced from the NPPG and summarises the noise exposure hierarchy, based on the likely average response.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observable Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extension and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non auditory	Unacceptable Adverse Effect	Prevent

Table 1: PPG Noise Exposure Hierarchy

- 3.6 In general terms it is considered that a noise impact with an effects level which is lower than SOAEL is acceptable (providing the effect is mitigated to a minimum). There is currently, however, a major discontinuity between the above guidance and objective technical criteria for use in planning noise impact assessments. For this site it is considered that the appropriate (technical and objective) standards for use in assessing the noise impact is those of British Standard 8233:2014 [Reference 4]. This is described below.

ProPG

- 3.7 The Professional Practice Guidance on Planning and Noise (ProPG) [Reference 5] was published jointly by the Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health in May 2017. The guidance relates to the consideration of existing sources of transportation noise upon proposed new residential development and strives to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- Improve understanding of how to determine the extent of potential noise impact and effect; and
- Assist the delivery of sustainable development.

- 3.8 The guidance describes a recommended approach for new residential development, which includes four key elements of the assessment process, identified below:

- (i) Good acoustic design process;
- (ii) Internal noise level guidelines;
- (iii) External amenity area noise assessment;
- (iv) Assessment of other relevant issues.

- 3.9 It is important to note that the guidance in ProPG does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy. It is provided for guidance only and has no formal place within planning legislation.

BS 8233:2014

- 3.10 BS 8233:2014 provides desirable internal ambient noise levels for habitable rooms. Table 2 shows a summary of the levels recommended in BS 8233 for living rooms and bedrooms.

Activity	Location	Design Range, dB $L_{Aeq, T}$	
		Daytime	Night Time
Resting	Living Room	35 dB $L_{Aeq, 16 \text{ hour}}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16 \text{ hour}}$	-
Sleeping	Bedroom	35 dB $L_{Aeq, 16 \text{ hour}}$	30 dB $L_{Aeq, 8 \text{ hour}}$

Table 2: Indoor Ambient Noise Levels as Recommended in BS 8233

- 3.11 BS 8233 also notes that “*Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax, F}$ depending on the character and number of events per night.*”
- 3.12 Although the guidelines have no formal standing, the World Health Organisation (WHO) provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines [Reference 6] suggest internal night-time noise levels not regularly (10 – 15 times per night) exceeding 45 dB $L_{Amax, f}$ for ‘a good night’s sleep’.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

- 4.1 Environmental noise measurements were undertaken over the period 6th to 11th August 2020. The following instrumentation was used during the surveys:

- Rion Class 1 sound level meter Type NL52
- Bruel and Kjaer Class 1 acoustic calibrator Type 4231

- 4.2 Calibration of all instrumentation was checked before and on completion of the measurements and no drift was found. The calibration of all 24 Acoustics’ equipment is traceable to National Standards.
- 4.3 The weather throughout the survey period was fine and dry with wind speeds typically lower than 5m/s.

- 4.4 The sound level meter was configured to monitor in five minute sample periods and was set up to measure and store overall A-weighted statistical parameters including the L_{Aeq} , L_{A90} , and $L_{Amax,f}$ and unweighted octave band sound pressure levels. Noise measurements were made at a height of 1.5m and in accordance with BS 7445: 1991 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use' [Reference 7].
- 4.5 The equipment was located to the boundary of the site overlooking the B3353, approximately 3 meters from the road edge, at a height of 2 meters. The measurement location is shown in Figure 1.
- 4.6 The measurement results are shown graphically in Appendix B and summarised in Table 3.

Date (August 2020)	Measured Sound Pressure Level		
	Daytime (07:00 - 23:00) dB, L_{Aeq} , 16 hour	Night-Time (23:00 - 07:00)	
		dB, L_{Aeq} , 8 hour	Typical dB, $L_{Amax,f}$
Thursday 6th	66*	61	82
Friday 7th	66	58	80
Saturday 8th	67	57	80
Sunday 9th	67	60	81
Monday 10th	67	61	83
Tuesday 11th	68*	-	-
Average	67	60	81

Table 3: Summary of Measured Noise Levels *Incomplete measurement period

- 4.7 24 Acoustics determines the typical night-time maximum level to be the tenth highest value during the relevant period.
- 4.8 Measured noise levels during daytime and night-time periods were controlled by road traffic movements on the B3353.

5.0 CALCULATIONS AND RECOMMENDATIONS

- 5.1 The new properties will be designed to not exceed noise levels of 35 dB $L_{Aeq, 16 \text{ hour}}$ during the day, 30 dB $L_{Aeq, 8 \text{ hour}}$ at night and 45 dB $L_{Amax, f}$ for regular events at night, inside habitable rooms (living rooms/bedrooms).
- 5.2 Calculations have been undertaken, based on drawings provided by T2 architects in December 2021, and include corrections for distance and screening (where appropriate). The minimum acoustic requirements for the glazing, applicable to all habitable rooms throughout the development, are summarised in Table 4.

Description	Minimum SRI (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Glazing	24	20	25	35	38	35

Table 4: Glazing Performances

- 5.3 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 10140, Part 2: 2010 and that the quoted minimum sound reduction specifications are met by the entire glazing system as a whole, including frames, seals, any insulated panels and not just the glass. The requirements also apply to any glazed doors to habitable rooms.
- 5.4 For guidance, the following glazing configuration would be capable of achieving the required values in Table 4:

- 4mm glass (6mm-20mm cavity) 4mm glass – 31 dB R_w

- 5.5 The acoustic performance specifications for ventilators are shown in Table 5.

Description	Minimum Acoustic Performance $D_{n,e}$ (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Vent Type 1	40	36	35	31	32	37
Vent Type 2	23	26	29	30	33	33

Table 5: Ventilators - Acoustic Performance

- 5.6 Vent type 1 is applicable in bedrooms only to the areas shown in Figure 2. Vent Type 2 is applicable to all living rooms at the development and all bedrooms within the unmarked façade areas in Figure 2.
- 5.7 In making a comparison with the specifications in Table 5, it is important that the figures used are the result of laboratory tests. The specific ventilation requirements (e.g. equivalent free area etc.) should be confirmed by others. The calculations assume one ventilator per habitable room. If multiple ventilators are required, this assessment should be revised.
- 5.8 For guidance, an acoustically attenuated trickle vent (e.g. Simon Acoustic FV vent) is capable of achieving the stated minimum performance for Vent Type 1 (overall performance 33 dB $D_{n,e,w}$). Standard trickle vents with an overall performance 32 dB $D_{n,e,w}$ should be capable of meeting the Vent Type 2 minimum performance requirement.
- 5.9 Façades not directly facing the B3353 will benefit from reduced line of sight and partial screening from the B3353, and will therefore be exposed to lower noise levels from road traffic.
- 5.10 Masonry external walls have been assumed in the calculations, achieving a minimum sound insulation performance of 52 dB R_w .
- 5.11 Assuming minimum 2m high close-boarded timber fencing to the properties' boundaries, noise levels in the external amenity areas (gardens) will be in the order of 50 dB $L_{Aeq, 16 \text{ hour}}$ or lower during daytime periods, which is considered acceptable in planning terms.

Uncertainty

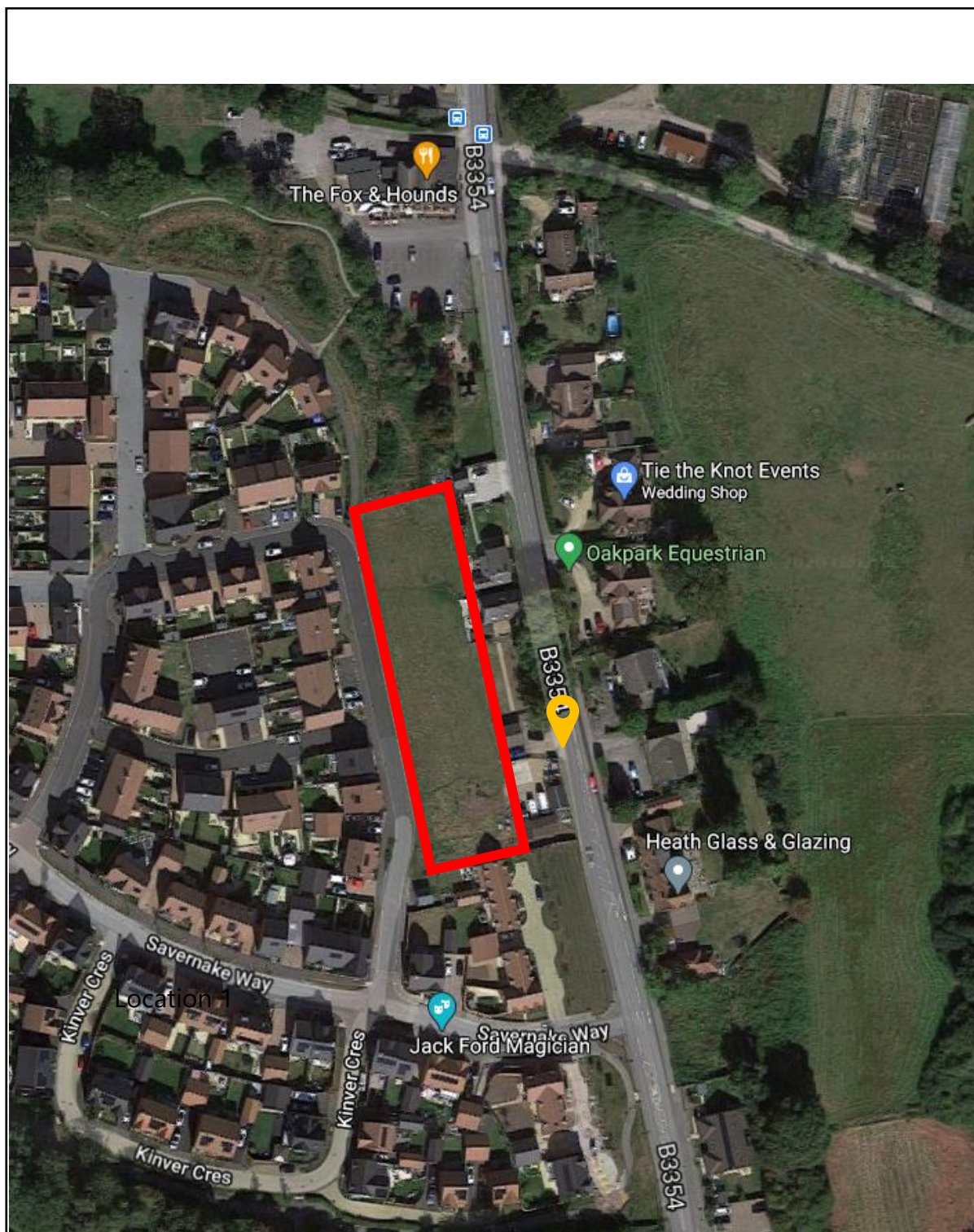
- 5.12 Noise assessments and associated predictions are subject to a degree of uncertainty, however, this has been minimised as follows:
- All measurements undertaken in accordance with relevant standards and guidance;
 - Calculation results and associated recommendations contain a suitable degree of tolerance (typically 2 to 3 dB);
 - The calibration of all equipment was checked prior to and following all measurements and tests and is traceable to national standards;
 - The environmental noise survey was undertaken over a prolonged period to reduce influence from potential atypical noise events in the local area (e.g. local short term events, weather).

6.0 CONCLUSIONS

- 6.1 24 Acoustics Ltd has been appointed by Mrs Antoinette Denham-Harding to undertake a noise impact assessment at Oakfields, Fair Oak.
- 6.2 Ambient noise measurements have been carried out at the site to determine existing noise levels from road traffic.
- 6.3 Recommendations for glazing and alternative means of ventilation have been provided to ensure that noise within habitable rooms would comply with maximum internal levels of 35 dB L_{Aeq} during the daytime and 30 dB L_{Aeq} and 45 dB $L_{Amax,f}$ at night for regular events.
- 6.4 Calculations demonstrate that, with the provision of close boarded timber fencing to the property's boundaries, noise levels in external amenity areas will be acceptable.

REFERENCES

1. National Planning Policy Framework, Department for Communities and Local Government, 2019.
2. Noise Policy Statement for England, Defra, 2010.
3. Planning Practice Guidance, Department of Communities and Local Government, July 2019
4. British Standards Institution. British Standard 8233: Sound Insulation and Noise Reduction for Buildings, 2014.
5. ProPG Professional Practice Guidance on Planning and Noise (ProPG), ANC, IOA, CIEH, May 2017.
6. World Health Organisation. Guidelines for Community Noise, 2000.
7. British Standards Institution. British Standard 7445: Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use, 1991.



Noise Measurement Location

Project: Oakfields, Fair Oak	Title: Site and Noise Measurement Location		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: A	
Date: December 2021	Drawn By: KE	Job No: 8687-1	

Vent Type 2 – All unmarked façades (and all living rooms)

Project: Oakfields, Fairoak		Title: Proposed Site Plan and Vent Type Locations		
DWG No: Figure 2		Scale: N.T.S.	Rev: E	
Date: December 2021		Drawn By: KE	Job No: 8687-1	

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 an 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 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: NOISE SURVEY RESULTS