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**PROPOSED RESIDENTIAL DEVELOPMENT ON LAND
AT HOME FARM, HEDGE END
NOISE IMPACT ASSESSMENT**

Technical Report: R9712-1 Rev 0

Date: 21st March 2023

For: Wykeham Homes
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24 Acoustics Document Control Sheet

Project Title: Proposed Residential Development on Land at Home Farm, Hedge End
Noise Impact Assessment

Report Ref: R9712-1 Rev 0

Date: 21st March 2023

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SUMMARY

24 Acoustics Ltd has been retained by Wykeham Homes to carry out a noise impact assessment on land at Home Farm, St John's Road, Hedge End. It is proposed to develop the site to provide eight dwellings. The site is potentially affected by road traffic noise from the M27 motorway which lies to the west of the site.

For internal noise in residential properties, acoustic design recommendations in terms of glazing and alternative means of ventilation have been provided. On this basis 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.

Taking into account the proposed 1.8 m high garden fences (which will have a minimum surface density of 12 kg/m²), and the existing 1.8 m high close board fence along the southern site boundary, noise levels in external amenity areas during the day are predicted to be no greater than 55 dB $L_{Aeq, 16hr}$. This is within the aspirational limit of 55 dB $L_{Aeq, 16hr}$ specified in BS 8233 and the Eastleigh Local Plan and is therefore considered acceptable in planning terms.

On the above basis it is considered that there are no reasons, on noise grounds, why planning consent for the proposals should not be granted.

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1.0 INTRODUCTION

- 1.1 Wykeham Homes has retained 24 Acoustics Ltd to carry out a noise impact assessment on a site at Home Farm, St John's Road, Hedge End. It is proposed to develop the site to provide 8 dwellings.
- 1.2 The site is potentially affected by noise from the M27 motorway which lies to the west of the site.
- 1.3 This report presents the results of the assessment, following site visits, subjective observations and noise surveys undertaken in February 2023.
- 1.4 All noise levels in this report are presented in dB relative to 20 μ Pa. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 SITE DESCRIPTION

- 2.1 The site is located on land at Home Farm off St John's Road, Hedge End. The M27 motorway lies approximately 40 m to the west of the site. Residential properties lie to the south-west of the site with woods to the north and east.
- 2.2 Planning consent is sought to construct 8 dwellings with a mixture of detached and semi-detached houses proposed.
- 2.3 There is potential for the development to be affected by noise from the M27 motorway and this is considered herein.
- 2.4 Figure 1 provides an aerial image of the site and surrounding area. Figure 2 shows the proposed layout of the site.

3.0 ASSESSMENT CRITERIA

National Planning Policy Framework and Noise Policy Statement for England

- 3.1 The National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- 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 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 The Planning Practice Guidance (PPG) [Reference 3] 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.
- 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 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 are British Standard 8233: 2014 [Reference 4] and guidance from the World Health Organisation [Reference 5] for habitable rooms in the proposed development.

Professional Practice Guidance on Planning & Noise (ProPG)

- 3.7 The Professional Practice Guidance on Planning and Noise (ProPG) [Reference 6] 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 but the spirit of the guidance may be applied to noise from commercial and industrial sources. It 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 the 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 and WHO Guidelines

- 3.10 BS 8233:2014 provides design guidance for dwelling houses, flats and rooms in residential use and recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16\text{ hr}}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq,16\text{ hr}}$ in dining rooms during the day and 30 dB $L_{Aeq,8\text{ hr}}$ in bedrooms at night.
- 3.11 The standard states that the above limits apply to steady external noise sources without specific character, and also states the following:

"Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."

- 3.12 BS 8233:2014 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."*
- 3.13 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 suggest internal night-time noise levels not exceeding 30 dB $L_{Aeq,8\text{ hr}}$ or regularly (10 – 15 times per night) exceeding 45 dB $L_{Amax,f}$ for 'a good night's sleep'.
- 3.14 As the BS 8233 target noise levels are derived from anonymous sources of noise such as transportation, it is considered appropriate to use target internal noise levels 5 dB lower than those recommended in BS 8233 to account for the potential character of some of the noise sources at this site. An upper internal daytime level of 30 dB $L_{Aeq,1\text{ hour}}$ should apply in living rooms and a night-time level of 25 dB $L_{Aeq,1\text{ hour}}$ should apply within the proposed bedrooms. A maximum night-time level of 40 dB L_{Amax} , fast should also apply in bedrooms for regular events.
- 3.15 In relation to external noise, BS 8233 proposes desirable levels no greater than 50 dB $L_{Aeq,T}$ with an upper guideline value 55 dB $L_{Aeq,T}$ but acknowledges that there will be circumstances where these guideline values are not achievable where development is desirable.

Eastleigh Borough Local Plan 2022

- 3.16 Paragraph 5.49 of the Adopted Eastleigh Borough Local Plan 2022 [Reference 7] contains a table specifying standards to be used to assess the acceptability of development proposals affected by steady external noise sources. The table is reproduced below.

Standards for Maximum Ambient Noise Levels (in spaces when they are unoccupied) for Dwellings Subject to Transport-Related Noise			
Living Area	Night-time (2300 – 0700) $L_{Aeq, 8\text{ hr}}$	Day-time (0700 – 2300) $L_{Aeq, 16\text{ hr}}$	Additional Requirements
Bedrooms	30	35	1. Individual noise events must not normally exceed 45 dB L_{Amax} (measured with fast time-weighting) during the night time. 2. Provision of suitable means of sound attenuating ventilation to allow for the fact that opening windows will render noise insulation ineffective.
Living Rooms	-	35	Provision of suitable means of sound attenuating ventilation to allow for the fact that opening windows will render noise insulation ineffective.
Gardens	-	55	Balconies will need to meet the same standard unless it is clear that they are not intended to be an outdoor living area, for example due to their small size.

Table 1: EBC Local Plan Noise Standards

- 3.17 The site is identified as allocated for housing under Policy HE3 of the Eastleigh Borough Local Plan, 2022. In relation to noise it notes that planning permission will be granted for development “ensuring an acceptable noise environment for new homes through appropriate siting of development and the provision of suitable noise mitigation measures, in light of the proximity of the M27 Motorway to the west.”

Summary

- 3.18 The impact of noise upon the proposed development has been assessed using the following recommended maximum internal noise levels:
- 35 dB $L_{Aeq, 16\text{ hr}}$ daytime noise level for living rooms;
 - 30 dB $L_{Aeq, 8\text{ hr}}$ night-time noise level for bedrooms;
 - 45 dB $L_{Amax, f}$ night-time noise levels in bedrooms for regular events.

- Aspirational target noise level of 55 dB $L_{Aeq,16\text{ hr}}$ during the day in private amenity spaces with justification provided where this is not possible.

4.0 NOISE MEASUREMENT PROCEDURE AND RESULTS

Instrumentation

4.1 Noise measurements were undertaken on the site between 3rd and 8th February 2023 using the following equipment:

- Rion (Class 1) precision sound level meter x 2 Type NL52;
- Brüel and Kjær acoustic calibrator Type 4231.

Noise Measurement Procedure

4.2 The noise measurement locations used (shown in Figure 1 and described below) were chosen to establish how noise from the M27 motorway affects the proposed site. Two unattended long-term measurement locations were selected and are described below:

- Location 1 – Western site boundary at the closest point to the M27 with clear line of sight to the motorway.
- Location 2 – Western site boundary near the site entrance.

4.3 In order to assess typical ambient noise levels, the sound level meters were configured to continuously monitor in one minute sample periods. The meters were set up to measure and store overall A-weighted statistical parameters including the L_{Amax} and L_{Aeq} parameters (measured on fast response). Noise 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 8].

4.4 The instrumentation was powered by external batteries and stored in a weatherproof case. Throughout the course of the survey, an outdoor microphone windshield was used. The weather was generally dry with wind speeds less than 5 m/s.

4.5 Calibration of all noise monitoring instrumentation was checked before and on completion of the measurements and no drift was found. The calibration of 24 Acoustics' instrumentation is traceable to National Standards.

Results

- 4.6 The results of the survey are shown graphically in Appendix B and are summarised in Tables 1 and 2.

Date and Time	Daytime	Night	
	L _{Aeq} , 16 hour	L _{Aeq} , 8 hour	L _{Amax,f} Typical
Fri 3rd February 2023	71	63	72
Sat 4th February 2023	70	62	72
Sun 5th February 2023	69	65	75
Mon 6th February 2023	71	65	75
Tue 7th February 2023	71	66	75
Wed 8th February 2023	73	-	-
Representative	71	64	75 max

Table 2: Noise Survey Results, Location 1

* partial measurement

Date and Time	Daytime	Night	
	L _{Aeq} , 16 hour	L _{Aeq} , 8 hour	L _{Amax,f} Typical
Fri 3rd February 2023	63	54	62
Sat 4th February 2023	61	53	62
Sun 5th February 2023	60	56	66
Mon 6th February 2023	62	56	66
Tue 7th February 2023	62	57	67
Wed 8th February 2023	64	-	-
Representative	62	55	67 max

Table 3: Noise Survey Results, Location 2

* partial measurement

- 4.7 From subjective observations, it was noted that road traffic noise from the motorway dominated ambient noise levels across the site.

5.0 NOISE IMPACT ASSESSMENT

Calculated Noise Levels – Road Traffic Noise

- 5.1 An acoustic model of the site has been developed to determine the noise levels across the site for the proposed development. The model has been produced using IMMI 2021 noise mapping software and has used the propagation methodology of CRTN [Reference 9] which takes into account the effects of distance, geometric divergence and acoustic screening.

- 5.2 The landform rises from the motorway to the site and the proposed location of the dwellings is within the lowest part of the site. This topography, which provides natural screening to the proposed development from motorway noise, is taken into account within the acoustic model.

Internal Noise Levels

- 5.3 The analysis given below has been based on 24 Acoustics' understanding of the envelope construction to be used for this scheme (based on a cavity masonry construction or equivalent performance). Calculations have been undertaken utilising drawings showing internal layouts and elevations of the various house types provided by Wykeham Homes in March 2023.
- 5.4 Results of acoustic modelling have been used to determine the glazing and ventilation requirements for the proposed residential scheme which will ensure that the noise levels inside the properties do not exceed 35 dB $L_{Aeq, 16 \text{ hour}}$ during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ at night and also do not regularly exceed 45 dB $L_{Amax,f}$ at night.
- 5.5 Windows when installed should be capable of achieving the performance stated below in Table 4.

Glazing	Minimum SRI (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
All Areas	21	17	25	35	37	39

Table 4: Required Window Performance

- 5.6 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 external glazed doors to habitable rooms.
- 5.7 In order to assist with the selection process, the following suggested glazing configurations, if installed properly, would be capable of achieving the required sound reduction performance. These configurations should not be used for design purposes:

- Glazing Type A: 4 mm glass: 6-16 mm cavity (minimum): 4 mm glass,
Minimum 29 dB R_w .

- 5.8 It is understood that a continuous MEV system will be utilised for the development. In order for acceptable internal noise levels to be achieved in bedrooms on the western and southern facades of the dwellings, sound attenuated trickle vents will be required. Standard trickle vents will be suitable in all other areas. Acoustic specifications for ventilators are provided in Table 5 below and the relevant areas are identified in Figure 2.

Vent	Minimum Vent Weighted Normalised element weighted level difference, $D_{ne,w}$, dB	Example of Type of Vent
Type A	36	Sound attenuated trickle vent
All other areas	32	Standard trickle vent

Table 4: Required Vent Performance

- 5.9 In making a comparison with the above specifications, it is important that the figures used are the result of laboratory tests with the vent in the open position. Note that the stated minimum performance value assumes two ventilators per living /bedroom and 3 ventilators in open plan family / kitchen / dining rooms. The specific ventilation requirements (e.g. equivalent free area etc.) to meet the requirement of Part F of the Building Regulations [Reference 10] should be confirmed by others.
- 5.10 It is considered that with the measures detailed above, suitable internal noise levels can be achieved for the proposed dwellings. If the site layout / housing types change then these calculations should be revised accordingly.

External Noise Levels

- 5.11 Taking into account the proposed 1.8 m high garden fences (which will have a minimum surface density of 12 kg/m²), and the existing 1.8 m high close board fence along the southern site boundary, noise levels in external amenity areas during the day are predicted to be no greater than 55 dB $L_{Aeq, 16hr}$. This is within the aspirational limit of 55 dB $L_{Aeq, 16hr}$ specified in BS 8233 and the Eastleigh Local Plan and is therefore considered acceptable in planning terms.

6.0 CONCLUSIONS

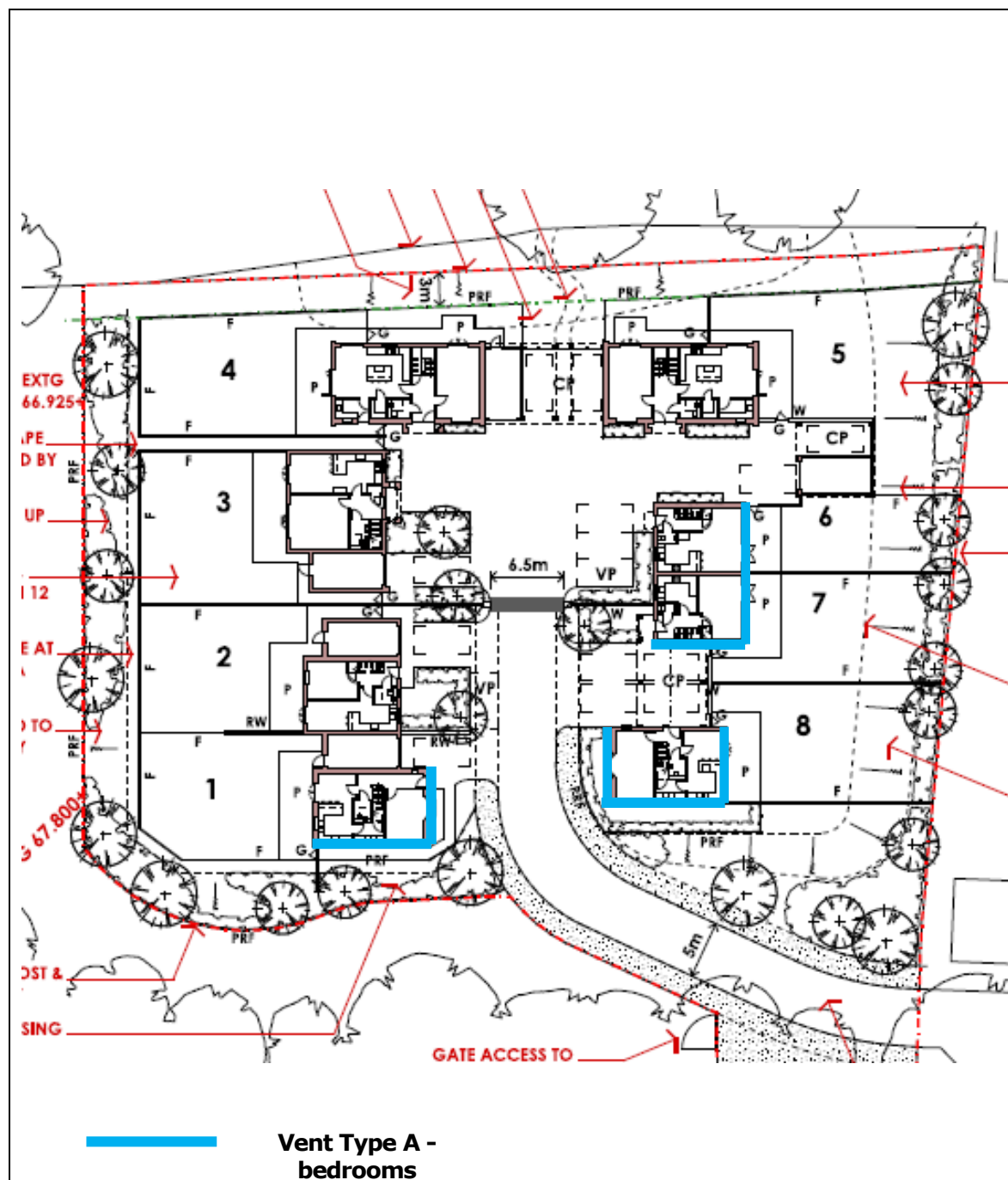
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- 6.3 Taking into account the proposed 1.8 m high garden fences (which will have a minimum surface density of 12 kg/m²), and the existing 1.8 m high close board fence along the southern site boundary, noise levels in external amenity areas during the day are predicted to be no greater than 55 dB $L_{Aeq, 16hr}$. This is within the aspirational limit of 55 dB $L_{Aeq, 16hr}$ specified in BS 8233 and the Eastleigh Local Plan and is therefore considered acceptable in planning terms.
- 6.4 On the above basis it is considered that there are no reasons, on noise grounds, why planning consent for the proposals should not be granted.

REFERENCES

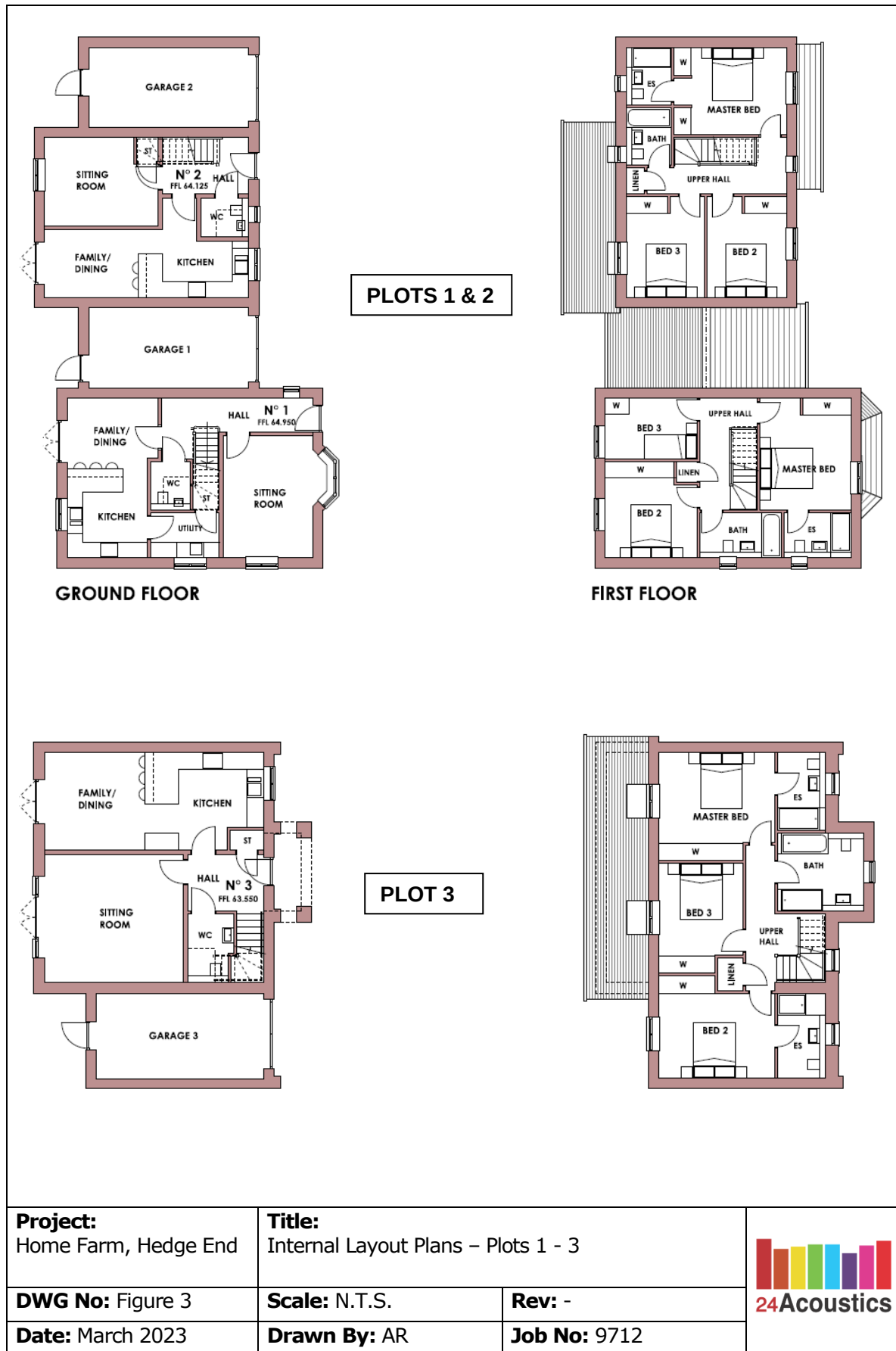
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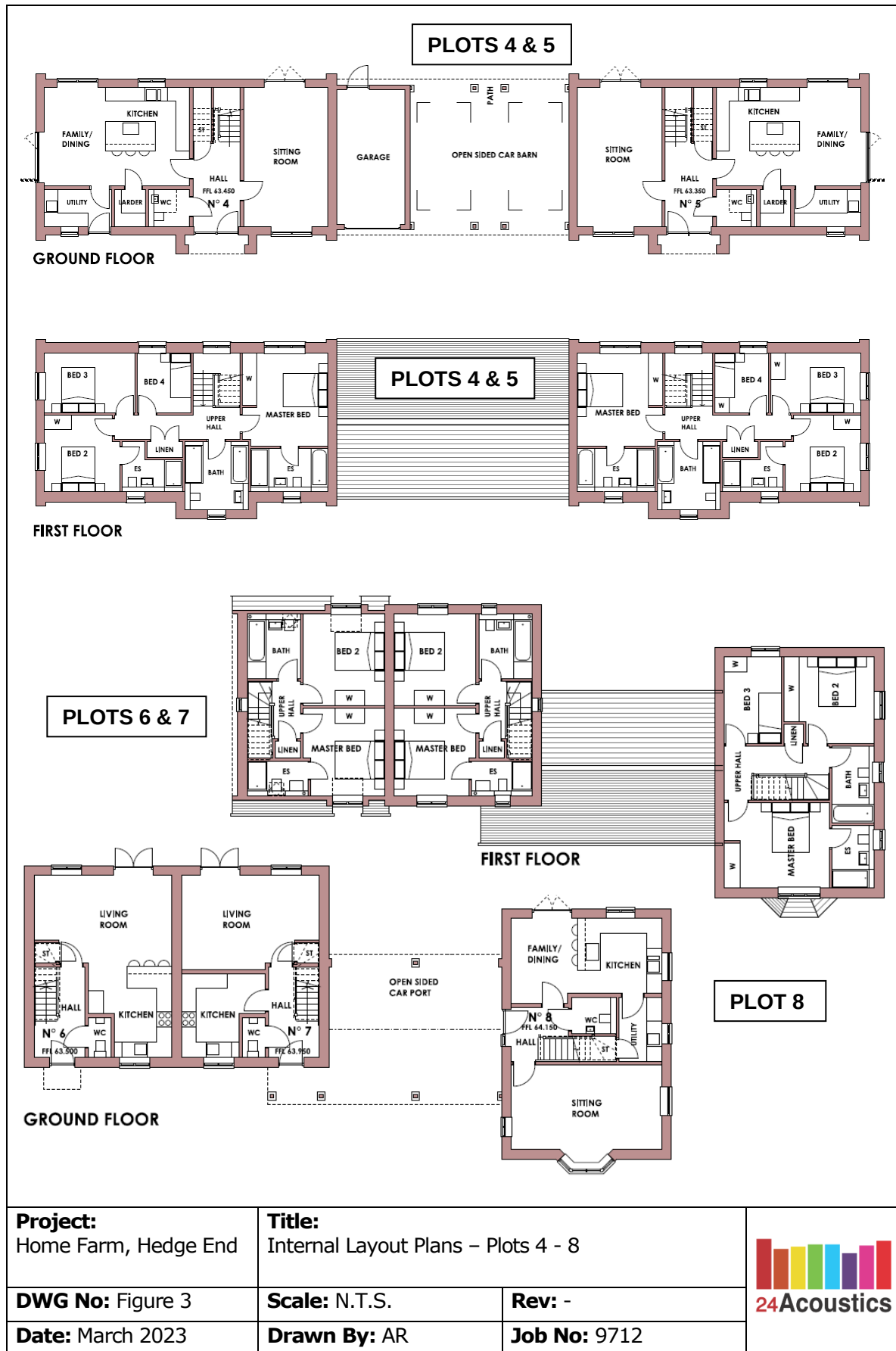


Project: Home Farm, Hedge End	Title: Site Location and Noise Survey Locations		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: -	
Date: March 2023	Drawn By: AR	Job No: 9712	



Project: Home Farm, Hedge End	Title: Proposed Site Development		 24Acoustics
DWG No: Figure 2	Scale: N.T.S.	Rev: -	
Date: March 2023	Drawn By: AR	Job No: 9712	





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 dBA 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 dBA 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 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

