

Land West of Pagham Road Pagham

Noise Assessment

HALLAM LAND MANAGEMENT

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Appendix A – Noise Terminology

1 Introduction

- 1.1 Brookbanks is appointed by Hallam Land Management to assess the noise environment in support of an outline planning application for the construction of up to 106 new homes, formation of access onto Pagham Road, new pedestrian and cycle links, the laying out of open space, new strategic landscaping, habitat creation, drainage features and associated ground works and infrastructure, identified as the Application Site in the remainder of this report. The site is located within the administrative area of Arun District Council.
- 1.2 This report has regard to the generated noise from vehicular traffic adjacent to the Application Site. This noise assessment will be used to determine what measures, if any are required to achieve a suitable noise environment for the Application Site.
- 1.3 Human subjects, under laboratory conditions, are generally only capable of noticing changes in steady noise levels of no less than 3 dB(A). Additionally, environmental noise rarely reaches the sound pressure levels associated with hearing impairment. However, noise can cause annoyance and therefore the potential impact needs to be assessed.
- 1.4 The following sections of this report will consider the noise environment adjacent to the Application Site in accordance with national noise guidance.
- 1.5 The site location is indicated below. The site is bound to the north by open fields and to the west by woodland. To the south, the site is bound by an area of existing residential properties. To the east, the site is bound by Pagham Road, situated adjacent to which is the Pagham North Strategic Site allocation.
- 1.6 The Site location and boundary is shown indicatively on **Figure 1-1** below. This plan does not aim to replicate the Red Line Plan.

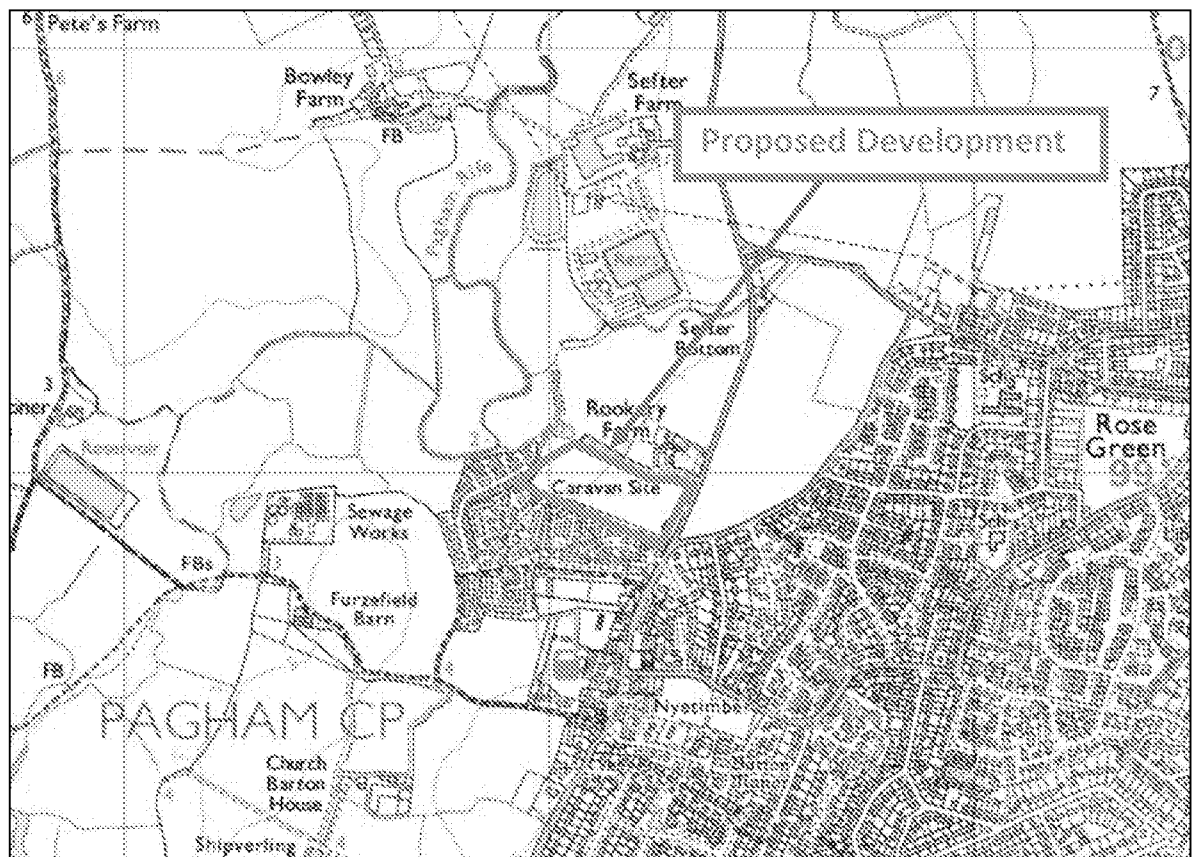


Figure 1-1: Site Location

2 Legislation and Planning Context

The Control of Pollution Act 1974

- 2.1 The Control of Pollution Act 1974 section 62 and 63 contains powers for local authorities to deal with noise and vibration from construction and demolition sites.

The Planning and Compulsory Purchase Act 2004

- 2.2 The Planning and Compulsory Purchase Act 2004 requires local authorities to draw up local Development plans. Setting the broad framework for acceptable Development in their area and reconciling the conflicts inherent in Development.
- 2.3 Under the Town and Country Planning Act 1990, local planning authorities may include planning conditions to Planning Consents which could include controls on the emission of noise and to provide mitigation, if relevant, to ensure an acceptable noise environment for residents. Advice on the use of these powers is given to English authorities in the light of the Government's Noise Policy Statement for England in the National Planning Policy Framework.

National Planning Policy Framework

- 2.4 The National Planning Policy Framework (NPPF) sets out the Government's National Planning Policies for England and how these can be applied by local communities when developing their local plans or deciding planning application to best reflect the needs and priorities of the local communities. Current planning law requires Local Authorities to determine planning applications in accordance with the local development plan unless there are material considerations which justify them to reach a different decision.
- 2.5 NPPF indicates that Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative 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 impact 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

Noise Policy Statement for England

- 2.6 The Noise Policy Statement for England of March 2010 (Defra 2010) provides a more overarching policy statement on the approach to noise in England. The NPSE provides guidance on the management of noise from sustainable development without placing unreasonable cost or time restraints on sustainable developments.
- 2.7 The explanatory note of NPSE defines the following terms:
- "There are two established concepts from toxicology that are currently being applied to noise impacts. They are:

- *NOEL: No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
- *LOAEL: Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected.*
- *SOAEL: Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur."*

2.8 The NPSE does not provide a numerical value for the SOAEL, stating at paragraph 2.22:

"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."

2.9 The first aim of the NPSE is:

"Avoid significant adverse impact on health and quality of life"

2.10 To meet the first aim of the NPSE the resultant noise levels as a result of the proposed development should be below the Significant Observed Adverse Effect Level (SOAEL) at the noise sensitive properties.

2.11 The second aim of the NPSE is:

"Mitigate and minimise adverse impacts on health and quality of life"

2.12 To meet the second aim of the NPSE the resultant noise levels as a result of the proposed development should be below the Significant Observed Adverse Effect Level (SOAEL) but above the Lowest Observed Adverse Effect Level (LOAEL) at the nearest noise sensitive properties.

2.13 Third Aim of the NPSE is where possible, the noise levels as a result of the proposed development at the nearest residential property should be lower than the existing noise levels improving the noise climate for the local community.

National Planning Practice Guidance NPPG, 2014

2.14 In February 2014 National Planning Practice Guidance (NPPG) was published. The section entitled "Noise" provides the following general advice and relates to paragraph 123 of the NPPF.

2.15 The main objective is to:

"Identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation."

2.16 A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the NPPG.

2.17 The guidance identifies that the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:

- The source and absolute level of the noise together with the time of day it occurs.
- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise.
- The spectral content of the noise (i.e. whether the noise contains particular high or low frequency content) and the general character of the noise.

- 2.18** In relation to how noise can be mitigated, this is dependent on the type of development being considered and the character of the proposed location. In general, for noise making developments, there are four broad types of mitigation:
- Engineering: reducing the noise generated at source and/or containing the noise generated.
 - Layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission using screening by natural or purpose-built barriers, or other buildings.
 - Using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels differentiating as appropriate between different times of day, such as evenings and late at night.
 - Mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building.
- 2.19** There are further considerations relating to mitigation of noise on residential developments. The noise impact may be partially off-set if the residents of those dwellings have access to:
- A relatively quiet facade (containing windows to habitable rooms) as part of their dwelling, and/or;
 - A relatively quiet external amenity space for their sole use or a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings;
 - A relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).

BS8233:2014: Sound Insulation and Noise Reduction for Buildings

- 2.20** BS8233:2014 gives recommendations for the control of noise in and around buildings and suggests appropriate criteria and internal noise limits for habitable rooms of residential dwellings.
- 2.21** The standard goes onto to provide details of the approach to be taken when assessing the design in terms of planning:
- Assess the site, identify significant existing and potential noise sources, measure or estimate noise levels and evaluate layout options
 - Determine design noise levels for spaces in and around the buildings
 - Determine sound insulation of the building envelope, including the ventilation strategy
 - Identify internal sound insulation requirements
 - Identify and design appropriate noise control measures
 - Establish quality control and ensure good workmanship
- 2.22** In accordance with the requirements of BS8233:2014, the following internal and daytime noise limits will need to be met within sensitive rooms of the residential dwellings:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35dB LA _{eq} (16 hour)	-
Dining	Dining room	40dB LA _{eq} (16 hour)	-
Sleeping / Daytime resting	Bedroom	35dB LA _{eq} (16 hour)	30dB LA _{eq} (8 hour)
External Amenity Space	Gardens	55dB LA _{eq,T}	-

Table 2-1: BS8233 recommended noise levels

- 2.23** In considering the application of the outdoor criteria, it is important to take account of the feasibility of achieving such a level. A review of 'Health effect-based noise assessment methods: A review and feasibility study' (National Physics Laboratory report CMAM16 HMSO) reported the following:

"Perhaps the main weakness is that they fail to consider the practicality of actually being able to achieve any of the stated values. From the recent national survey of noise exposure carried out in England and Wales that around 56% of the population are exposed to daytime noise levels exceeding 55dB. The percentage exposed above the guideline values could not be significantly reduced without drastic action to virtually eliminate road traffic noise from the vicinity of houses. The social and economic consequences of such action would be likely to be far greater than any environmental advantages of reducing the proportion of the population annoyed by noise. There is no evidence that anything other than a small minority of the population exposed at such noise levels find them to be particularly onerous in the context of their daily lives."

- 2.24** Due to the difficulty in satisfying the external criteria, the BS provides an over-arching consideration of how to treat outdoor areas:

"However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."

3 Proposed Methodology

- 3.1** During the development of this assessment, a review of recent planning applications has been carried out to determine the agreed methodology used in similar planning applications. A recent application (reference: P/30/19/OUT) was submitted for a resident development to the east of Pagham Road which included a noise assessment. The methodology used to assess P/30/19/OUT was based on BS8233.
- 3.2** Therefore, BS8233 is the most appropriate method to assess the noise environment.

4 Baseline Conditions

Site and Area Description

- 4.1 The Application Site comprises an area of an open field located to the west of Pagham Road. An existing residential area is identified to the south of the site.
- 4.2 Traffic noise is identified as the dominant noise source.

Baseline Monitoring

- 4.3 Existing Noise measurements have been carried out on the site boundary to confirm the existing noise environment across the site.
- 4.4 All acoustic measurement equipment used during the noise surveys conformed to Type 1 specification of British Standard 61672: 2003: Electroacoustics, Part 1 Specifications.

Equipment Description	Manufacturer	Serial Number
Sound level meter	Norsonic 118	28952
Acoustic Calibrator	Norsonic 1251	32856

Table 4-1: Survey equipment

- 4.5 The surveys were completed in accordance with relevant guidance such as BS7445:2003; Description and Measurement of Environmental noise.
- 4.6 The survey recorded LAeq, LAmx, LA10 and LA90 noise levels. The monitoring locations are indicated in **Figure 4-1**.



Figure 4-1: Monitoring locations

- 4.7** Point one Survey location was located to be representative of the proposed housing locations. The microphone was installed in free-field conditions mounted on a tripod approximately 1.5 m high.
- 4.8** The background levels remained steady during the monitoring period due to road traffic noise from Pagham Road.

5 SoundPLAN Model

- 5.1 In order to predict the future noise environment across the site, a 3D noise model has been generated through the SoundPLAN computer software package. This was established through the following steps:
- Production of a 3D ground profile
 - Confirming location of existing highways
 - Defining existing traffic levels
 - Confirming future traffic levels
 - Confirming location of development
- 5.2 The 3D SoundPLAN model is then used to predict noise levels across the site.

6 Residential Assessment

- 6.1** The suitability of the Application Site in relation to noise will be based on the thresholds identified in BS8233. The SoundPLAN 3D noise model has been used to determine the ground floor and first floor façade noise levels. Traditional brick built façades having standard double glazing attenuates the façade noise levels by 33dB. Based on the assessment contained in the Defra Report NANR116 (Open/Closed Window Research – Sound Insulation through Ventilated Domestic open Windows) a window that is partially open to provide background ventilation provides approximately 15 dB. Therefore, based on the thresholds contained in Table 2-1, acceptable internal noise levels will be achievable with the following façade noise levels:
- Daytime resting with windows closed – 68dB LAeq (16 hour)
 - Daytime resting with windows open – 50dB LAeq (16 hour)
 - Night time sleeping with windows closed – 63dB LAeq (8 hour)
 - Night time sleeping with windows open – 45dB LAeq (8 hour)
- 6.2** Where façade noise levels exceed the above criteria, habitable rooms (living rooms and bedrooms) may require suitable ventilation systems as an alternative to opening the windows, which could include acoustic trickle ventilators or acoustic air bricks.

BS8233:2014 Assessment of Day Time Noise Levels in Living Rooms

- 6.3** The daytime façade levels predicted by the SoundPLAN model are indicated in **Table 6-1** together with internal levels.

Location	Façade noise level	Internal noise level – closed windows	Internal noise level – open windows
Façade facing Pagham Road	63	30	48

Table 6-1: Daytime Façade Modelled Noise Levels (dB)

- 6.4** The above assessment clearly demonstrates that with closed windows the BS8233 internal noise levels will be met. However, opening windows for ventilation purposes will increase noise levels. Therefore, alternative means of ventilation for those properties fronting the highway may be necessary.
- 6.5** It is considered appropriate to consider the use of air brick ventilation and / or trickle vents on the properties fronting Pagham Road.

BS8233:2014 Assessment of Night-Time Noise Levels in Bedrooms

- 6.6** The night-time façade levels predicted by the SoundPLAN model are indicated in **Table 6-2** together with internal levels.

Location	Façade noise level	Internal noise level – closed windows	Internal noise level – open windows
Façade facing Pagham Road	53	20	38

Table 6-2: Night time Façade Modelled Noise Levels (dB)

- 6.7** The above assessment clearly demonstrates that with closed windows the BS8233 internal noise levels will be met. However, opening windows for ventilation purposes will increase noise levels. Therefore, alternative means of ventilation for those properties fronting the highway may be necessary.
- 6.8** It is considered appropriate to consider the use of air brick ventilation and / or trickle vents on the properties fronting Pagham Road.

BS8233:2014 Assessment of External Noise Levels

- 6.9** BS8233 indicates that for traditional external areas that are used for amenity space, such as gardens and patios, an upper guideline value of 55 dB LAeq,T is acceptable during the daytime. However, BS8233 also recognises that the guideline values are not achievable in all circumstances, such as city centres or urban areas adjoining the strategic transport network.
- 6.10** BS8233 identifies that in such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but external noise should not be prohibitive on development delivery.
- 6.11** A review of the noise environment across the site has indicated that the external noise does not exceed 55 dB within the residential area of the site, with back garden areas shielded by the buildings themselves.

7 Off Site Sensitive Receptors

- 7.1** Traffic noise predictions have been made using the CRTN prediction methodology. The methodology has been used to predict the magnitude of any change in noise level resulting from the development proposals at the roadside of the local network. A road's Basic Noise Level (BNL) represents the free-field noise level at a distance of 10m from the carriageway. The BNL is based on traffic flow and composition. Other factors like screening or distance remain constant between modelled scenarios. Therefore, the difference between the BNL reflects the actual noise change at an identified receptor. This can be used to provide an indication of the noise level changes associated with the development.
- 7.2** The predicted changes in noise level, identified with respect to the road traffic noise impact assessment criteria, are presented in **Table 7-1**, indicating the future year scenario with and without the completed development impact, respectively.

Link	Without Development	With Development	Difference
Pagham Road north of Hook Lane	67.7	68.1	0.4
Pagham Road south of Hook Lane	68.6	68.6	0.0
Hook Lane	66.3	66.4	0.1

Table 7-1: Predicted Noise Levels within Local Road Network

- 7.3** This demonstrates that the majority of the receptors will experience a negligible increase with minor increases reported adjacent to the development. It is considered that an increase of less than 3db is not discernible and therefore it is concluded that the development will have a negligible impact.

8 Conclusion

- 8.1** A noise assessment has been carried out to assess the acceptability of the site. A specific noise survey of site was conducted, recording background levels together with site specific noise events.
- 8.2** This report has demonstrated that the target internal noise levels for bedroom and living/dining areas in accordance with internal ambient levels from the guidance in BS8233:2014 can be achieved with appropriated specified glazing together the supply of trickle vents to habitable rooms fronting Pagham Road.

9 Limitations

- 9.1** The conclusions and recommendations highlighted above are limited to the general availability of background information and the Proposed Development of the Site.
- 9.2** Third party information has been used in the preparation of this report, which Brookbanks, by necessity assumes is correct at the time of writing. While all reasonable checks have been made on data sources and the accuracy of data, Brookbanks accepts no liability for same.
- 9.3** The benefits of this report are provided to HLM for the Proposed Development at Land western of Pagham Road. Brookbanks excludes third party rights for the information contained in the report.

Appendix A – Noise Terminology

The scale used to identify noise sources is the decibel (dB) scale which extends from 0 to 140 decibels (dB) corresponding to the intensity of the sound pressure level. The ear recognises sound, based on pitch and frequencies. Microphones cannot record noise in the same way; to counter this, the noise-measuring instrument applies a correction to correspond more closely to the frequency response of the ear. The correction factor is called "A Weighting" and the resulting measurements are written as dB(A). Typical dB(A) noise levels for familiar noise are indicated below.

Approx. noise level	Noise Example
10 dB	Normal breathing
20 dB	Rustling leaves,
30 dB	Whisper
40 dB	Stream, refrigerator
50 dB	Quiet office
60 dB	Normal
70 dB	In car noise without
80 dB	Vacuum cleaner /
90 dB	Lawnmower
100 dB	Train
110 dB	Pneumatic Drill
120 dB	Thunder
130 dB	Plane taking off
140 dB	Threshold of pain

The noise levels indicated above are sound pressure levels (SPL) and describe the noise level at a single point in space. Noise levels at a receptor vary over time depending on the occurring noise generating activities. The following indices are used to take into account noise level variation over time:

- LAeq T is the equivalent continuous sound level and is the sound level over the time period (T). It is possible to consider this level as the ambient noise encompassing all noise at a given time. LAeq T is considered the best general-purpose index for environmental noise.
- LA90 T represents the noise level exceeded for 90% of the measurement period and is used to indicate quieter times during the measurement period. It is usually referred to as the background noise level.
- LA10 T refers to the level exceeded for 10% of the measurement period. LA10 T is widely used as a descriptor of traffic noise.
- LMax is maximum recorded noise level during the measurement period.



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