



**QUEENS FARM
QUEENS FARM ROAD, SHORNE
GRAVESEND, KENT**

PROPOSED CONVERSION SCHEME FOR INDUSTRIAL UNITS

NOISE & VIBRATION IMPACT ASSESSMENT

Report No. MRL/100/2276.1v1
May 2026

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1.0 INTRODUCTION

1.1 MRL Acoustics was commissioned by Evesham Properties Ltd to carry out a noise and vibration impact assessment in relation to a proposed commercial development scheme at Queens Farm, Queens Farm Road, Shorne, Gravesend, Kent.

1.2 The proposal comprises the conversion of an existing agricultural building to storage/workshop units along with the conversion of the end bay of the adjacent building from agricultural use to a workshop.

1.3 We understand that for development of this type, Gravesham Borough Council's local validation checklist requires a Noise and Vibration Impact Assessment to be submitted with a planning application. It requires specifically, that the assessment should:-

- Assess existing background noise/vibration levels. Such monitoring should be sufficient to account for the worst-case scenarios;
- Predict noise/vibration levels using accepted acoustic calculations /modelling assess the impact of the proposed use/development with reference to relevant standards/guidance.

1.4 Our brief was to:

- i) Attend the site to carry out a survey of the ambient noise climate and vibration levels at the site boundary with the nearest affected noise-sensitive property to the proposed converted buildings;
- ii) Assess the noise and vibration impact by reference to the relevant standards and guidelines;
- iii) Provide advice on noise mitigation, sound insulation and anti-vibration measures for the new commercial units, if required, to minimise any impact.

1.5 This report details our findings and our recommendations.

- 1.6 All recommendations are given for acoustic reasons only and compliance with other requirements (e.g. fire protection/structural integrity, etc.) must be checked by other specialist members of the design team.
- 1.7 The noise and vibration survey and report were carried out and prepared by Matthew Lawrence who has over 30 years' experience in the acoustic industry and an MSc and Diploma in Acoustics & Noise Control, and who is a Member of the Institute of Acoustics (IOA). MRL Acoustics Ltd is also a member of the Association of Noise Consultants (ANC).
- 1.8 Noise levels referred to in the text have been rounded to the nearest whole decibel (dB), as fractions of decibels are imperceptible.
- 1.9 An explanation of acoustical terms used in this report is provided in Appendix I.

2.0 DESCRIPTION OF THE SITE

- 2.1 The development site is located at Queens Farm, Queens Farm Road, Shorne, Gravesend, Kent and comprises several agricultural buildings and some commercial units.
- 2.2 The site is very rural and is some distance away from any major roads. There is a railway line located approximately 275m to the north of the site that serves both passenger and freight trains.
- 2.3 The site comprises 3 no. large buildings as indicated on the site plan below, 1 of which has already been partly converted to commercial use (outlined in green) with the building to the east of the site currently in use as a grain store and the building to the north comprising an open-fronted barn.

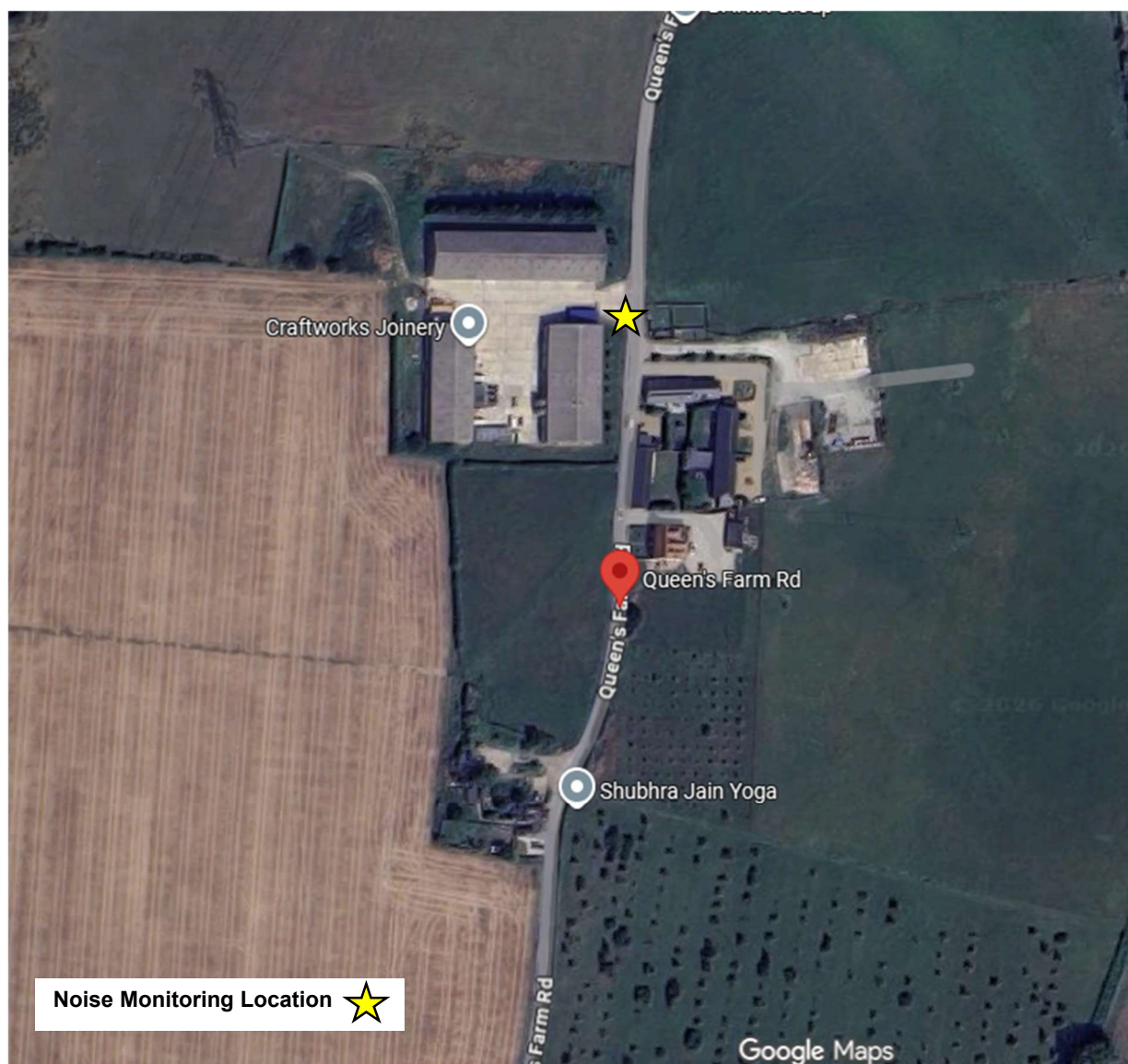


- 2.4 The nearest affected dwelling is located on the opposite side of Queens Farm Road and is indicated outlined in blue on the site plan above.
- 2.5 Queens Farm Road is a fairly quiet, low-trafficked road, however, approximately 250m distance to the north-east of the site is an industrial estate comprising a skip firm, a waste transfer station, a construction company, an auto repair business and a freight train cargo yard.
- 2.6 As a result, it was observed whilst on site setting up the noise and vibration equipment, that the majority of the passing road traffic consists of commercial vehicles, skip lorries, vans, etc.
- 2.7 Noise from passing trains was also audible at the site, albeit at low levels, and on a very intermittent basis.

3.0 NOISE LEVEL SURVEY

Existing Ambient Noise Levels

- 3.1 Noise measurements of the existing ambient noise climate were carried out at the site boundary in order to represent the noise climate at the nearest affected residential property to the buildings subject to the change of use, as shown in the plan below:-



- 3.2 The measurements were carried out on Tuesday 14th April 2026 from 08:00 hours until 17:00 hours and consisted of consecutive 30-minute samples of noise in order to represent the ambient external noise climate at the residential boundary during a typical weekday period.

- 3.3 The noise monitoring was carried out over a weekday period as the development site is currently within an agricultural yard with some lawful commercial uses that all would typically operate between 8am and 6pm during the weekday periods.
- 3.4 The noise climate at the noise monitoring location during the daytime period consisted of intermittent passing road traffic noise, occasional train noise, some commercial noise from activities from the existing commercial units at the site, albeit at low levels, and some birdsong and intermittent aircraft noise.
- 3.5 The results of the ambient noise level survey at the site are detailed in Appendix II at the end of this report and are summarised in Table 1 below:-

Table 1: Existing Ambient Noise Levels

Time (Hours)	Noise Levels (dB)				Comments
	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}	
Daytime (08:00 – 17:00)	62	76	61	47	Noise from intermittent local road traffic and trains, occasional commercial noise, aircraft and birdsong

- 3.6 The noise survey was carried out using a Rion NA-28 'Class 1' Sound Level Meter (serial no. 01291241) fitted within an environmental weather-proof case. The calibration level of the meter was checked before and after the survey to a level of 94.0 dB with a Rion NC-74 sound calibrator (serial no. 35094450) with no variation in the levels observed.
- 3.7 The microphone was mounted on a metal tripod approximately 1.6 height above ground level and was fitted with a Rion WS-15 weather-proof windshield at all times.
- 3.8 The sound level meter was set to measure the following parameters:-

- L_{Aeq}
- L_{A10}
- L_{Amax}
- L_{A90}

- 3.9 The frequency weighting of the meter sub-channel was set to 'A' and the time-response set to 'Fast'. In addition, the meter main channel was set to measure the above parameters in 1/1 octave-centre frequency bands using 'Z' frequency weighting and 'Fast' time response.
- 3.10 Details of the equipment used during the noise level survey are shown in Table 2 below. Current calibration certificates for the equipment can be provided if required.

Table 2: Details of Equipment Used During Noise Survey

Equipment Description	Manufacturer	Type/Number	Serial Number	Date of Expiration of Calibration	Calibration Certification Number
Sound Level Meter	Rion	Type NA-28	01291241	01/07/2026	TCRT24/1484
Microphone	Rion	UC-59	01683	01/07/2026	TCRT24/1484
Pre-Amplifier	Rion	NH-23	81273	01/07/2026	TCRT24/1484
Calibrator	Rion	Type NC-74	35094450	01/07/2026	TCRT24/1480

- 3.11 The weather conditions for the survey were generally warm and dry with a light breeze throughout and are shown in Table 3 below:-

Table 3: Weather Conditions During Noise Survey

Date	Temperature (°C)		Wind Speed (m/s)	Wind Direction	Rainfall (mm)	Cloud Cover (%)	Acceptable Conditions
	Start	End					
14/04/2026	8	15	1.6	SW	0	20	Yes

- 3.12 The weather conditions were measured on-site using a Kestrel 2000 hand-held weather meter and supported by weather data from the Meteorological Office app relating to local weather conditions for this area.
- 3.13 The noise survey was carried out in general accordance with the requirements outlined in BS 7455 – 1 : 2003 for environmental noise surveys.
- 3.14 The measured results are ‘free-field’ levels as the microphone was not within 3.5m of a reflective surface (other than the ground) and therefore a -2.5 dB façade correction is not applicable to the measured results for any assessment based on the noise criteria outlined in BS 8233 : 2014.
- 3.15 It should also be noted that the large existing agricultural building at the northernmost part of the site was currently not in use at the time of the survey and therefore there was no contribution of noise upon the measured ambient noise climate from this particular building.

4.0 NOISE IMPACT FROM COMMERCIAL UNITS

National Planning Policy Framework (NPPF)

4.1 National Government Guidance is available in the form of the National Planning Policy Framework (NPPF) – December 2024. The NPPF sets out the Government's planning policies for England and how these are expected to be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced.

4.2 Paragraph 187 of Section 15 of the NPPF, 'Conserving and enhancing the natural environment' provides general guidance regarding planning and noise. It states:-

"Planning policies and decisions should contribute to and enhance the natural and local environment by:-

- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);
- b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;
- c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;
- d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible,

help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

- f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.”

4.3 Paragraph 198 of Section 15 of the NPPF, ‘Conserving and enhancing the natural environment’ goes on to state:-

“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:-

- a) 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;
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”

The Noise Policy Statement for England 2010 (NPSE)

4.4 The NPSE sets out the long term vision for government noise policy which is 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.”

4.5 This is supported by the following aims:-

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:-

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.”

4.6 The first aim of the NPSE should be read in the context of Government policy on sustainable development indicating that significant adverse effects on health and quality of life should be avoided while accommodating the principles of sustainable development.

4.7 The second aim of the NPSE is applicable where the impact falls between LOAEL and SOAEL (see Section 4.9 below) requiring that all reasonable measures to mitigate and minimise adverse impacts on health and quality of life be implemented while accommodating the principles of sustainable development. This does not imply that any adverse effects cannot occur.

4.8 The third aim of the NPSE is to actively improve health and quality of life through effective management of noise within the context of Government policy on sustainable development wherever it is possible and reasonable to do so.

4.9 The NPSE applies the following concepts adapted from toxicology:-

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.

- 4.10 It should be noted that there are no numerical values for these concepts defined in the NPSE. There is also no single objective noise-based measure that defines Observed Effect Levels that is applicable to all sources of noise in all situations and consequently, the levels are likely to be different for different noise sources, for different receptors and at different times.
- 4.11 Table 4 below summarises the noise exposure hierarchy outline above, based on the likely average response:-

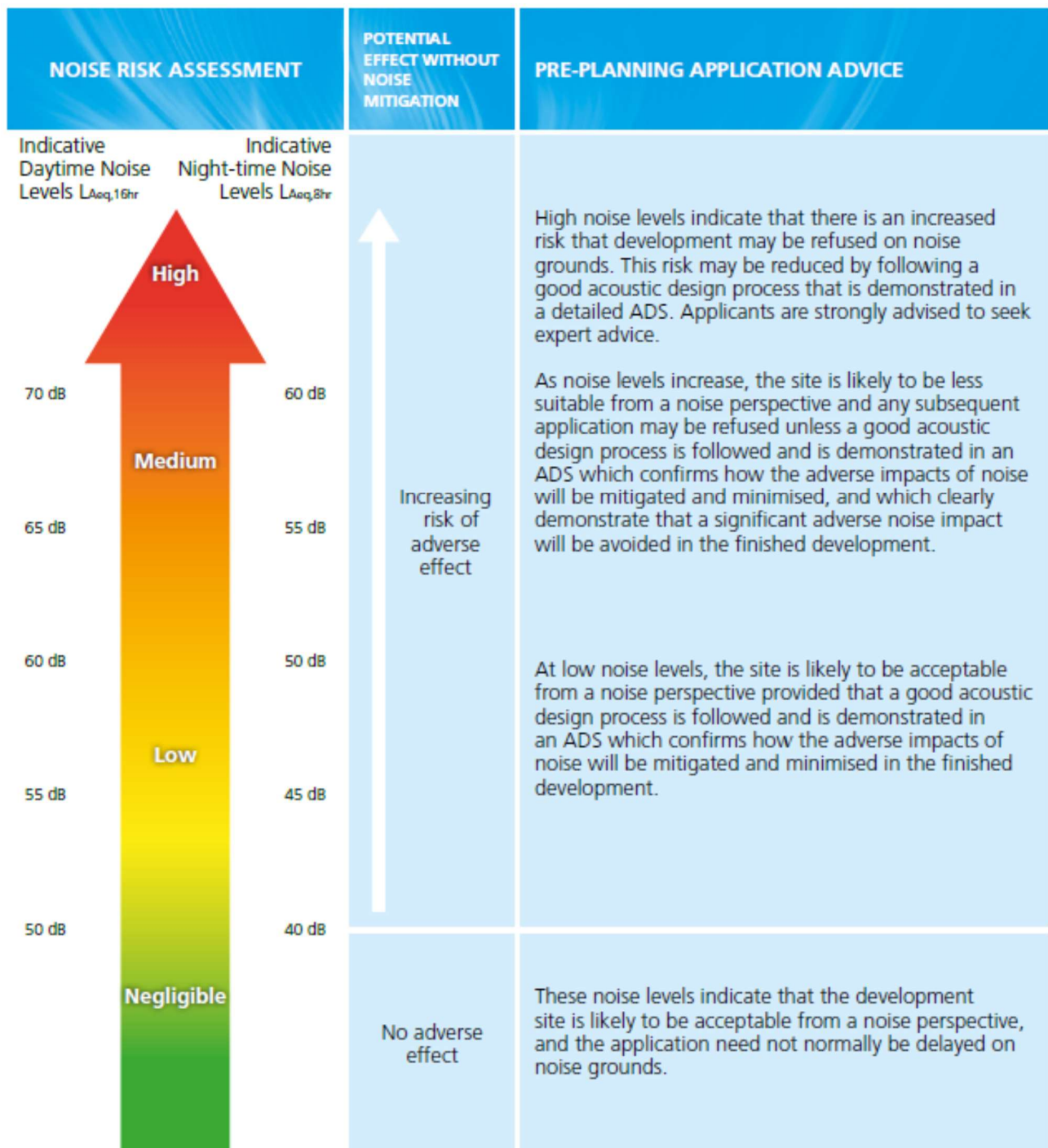
Table 4: Noise Exposure Hierarchy + Likely Average Response

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
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

Perception	Examples of Outcomes	Increasing Effect Level	Action
Lowest Observed Adverse Effect Level			
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			
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 Effect	Avoid
Noticeable and very disruptive	Extensive 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

Professional Practice Guidance On Planning & Noise (ProPG)

- 4.12 The Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The National Planning Policy Framework (NPPF) encourages improved standards of design. The CIEH, IOA and the ANC have worked together to produce this guidance which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.
- 4.13 This ProPG provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers. It aims to complement Government planning and noise policy and guidance. In particular, 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.
- 4.14 Figure 1 of the ProPG document and also Figure 2 of the ProPG document indicating the internal noise level guidelines are reproduced on the following pages.

**Figure 1 Notes:**

- Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".
- $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.
- An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F} > 60$ dB means the site should not be regarded as negligible risk.

Figure 1. Stage 1– Initial Site Noise Risk Assessment

ACTIVITY	LOCATION	07:00 – 23:00 HRS	23:00 – 07:00 HRS
Resting	Living room	35 dB $L_{Aeq,16\text{ hr}}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\text{ hr}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\text{ hr}}$	30 dB $L_{Aeq,8\text{ hr}}$ 45 dB $L_{Amax,F}$ (Note 4)

NOTE 1 The Table provides recommended *internal L_{Aeq} target* levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The *internal L_{Aeq} target* levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the *internal L_{Aeq} target* levels recommended in the Table.

NOTE 3 These *internal L_{Aeq} target* levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4 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. Sporadic noise events could require separate values. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (see Section 3.D).

Figure 2. ProPG Internal Noise Level Guidelines (additions to BS8233:2014 shown in blue)

British Standard 8233 : 2014

- 4.15 Guidance on acoustic design goals for new residential developments is set out in British Standard 8233 : 2014 '*Guidance on sound insulation and noise reduction for buildings*'. The World Health Organisation '*Guidelines for Community Noise*' and the ProPG guidance generally concurs with the recommendations of BS 8233 : 2014. The criteria are summarised in Table 5 below:-

Table 5: BS 8233 Recommended Acoustic Design Criteria

Location	Internal Noise Levels	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Living Room	35 dB L _{Aeq}	-
Dining Room	40 dB L _{Aeq}	-
Bedroom	35 dB L _{Aeq}	30 dB L _{Aeq}
Garden	Desired Limit Not Exceeding 50 dB L _{Aeq} Upper limit of 55 dB L _{Aeq}	

5.0 ASSESSMENT OF NOISE IMPACT

- 5.1 The results of the noise level survey indicate that at the noise monitoring position at the site boundary at the entrance to Queens Farm, the existing ambient daytime external noise climate is 62 dB L_{Aeq} .
- 5.2 This level of noise is considered to be representative of the noise climate that would be experienced at the façade of the nearest affected dwelling as the noise monitoring location is a similar distance away from the road as the dwelling is to the road.
- 5.3 At this juncture, there is no information as to the exact types and natures of businesses that will occupy the proposed new commercial units, except for workshops and storage.
- 5.4 Therefore, it would be prudent to establish a target design noise level for the daytime period that any noise from the new commercial units should not exceed.
- 5.5 We understand that the existing joinery workshop at the site operates under conditions for hours from 8am – 6pm, Monday to Friday. If we assume that the same conditions will apply for the converted barn building, then based on our measured ambient noise level data, we would recommend the following target design noise levels:-

Table 6: Target Design Noise Levels At Residential Boundary

Time (Hours)	Noise Levels (dB)			
	Existing L_{Aeq}	Existing L_{A90}	Target L_{Aeq}	Target L_{A90}
Daytime (08:00 – 18:00)	62	47	57	42

- 5.6 We would consider that for the daytime period (08:00 – 18:00 Hours), the noise emissions from the new units should not exceed 57 dB L_{Aeq} when assessed at the residential boundary.

- 5.7 This target design noise level is 5 dB(A) below the existing ambient noise climate level of 62 dB(A) measured at the representative location of the nearest residential boundary.
- 5.8 In terms of the background noise climate, we would consider that the noise emissions from the new units should not exceed 42 dB L_{A90} when assessed at the residential boundary.
- 5.9 This target design noise level is 5 dB(A) below the existing background noise climate level of 47 dB(A) measured at the representative location of the nearest residential boundary.
- 5.10 In accordance with the NPPF, the target design noise levels outlined above should ensure that the proposed development will avoid noise giving rise to significant adverse impacts on health and the quality of life.
- 5.11 In terms of the NPSE, the target design noise levels should amount to 'No Observed Adverse Effect', i.e. noise can be heard but does not cause any change in behaviour or attitude and can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.
- 5.12 The target design noise level for the proposed commercial units of 57 dB L_{Aeq} is 5 dB(A) lower than the existing daytime ambient noise climate. In accordance with BS 8233 : 2014, if we allow 15 dB(A) attenuation for an open window, the resultant internal noise level within any habitable rooms will be approximately 42 dB(A). However, as the nearest dwelling is already affected by a higher ambient noise climate resulting from road traffic noise, this level of noise impact is considered to be within acceptable limits.
- 5.13 Noise from any proposed offices or storage units should not be an issue and these generally do not generate significant levels of noise.
- 5.14 In order to minimise any noise break-out and noise impact from the new industrial buildings we would recommend the following outline design measures:-
- The proposed building envelope construction for the walls and roofs of the new units, including any roof-lights (but excluding any proposed roller-shutter doors), should have a minimum sound reduction index of at least 25 dB R_w ;

- For the proposed industrial units, additional sound insulation linings may need to be added depending up the end-user of each unit;
- All gaps at the junction of the walls with the roof panels should be sealed as part of any overall cladding system;
- We would recommend that any access doors, fire escape or small personnel doors, should have a minimum sound reduction performance of at least 25 dB R_w to minimise any noise break-out;
- If any external building services plant is proposed, then it should be designed with a total resultant noise level of a maximum of 42 dB L_{Aeq} when assessed at the nearest affected residential boundary and it should not operate during the night-time period unless a specific scheme of noise mitigation measures is provided so as to not exceed 35 dB L_{Aeq} at the nearest affected residential boundary.

6.0 VIBRATION SURVEY AND ASSESSMENT

- 6.1 BS 6472 : 2008 'Guide to evaluation of human exposure to vibration in buildings' - Part 1, describes how to determine the Vibration Dose Value (VDV) from frequency-weighted vibration measurements. It then explains how the VDV is used to estimate the probability of adverse comment which may be expected from human beings experiencing vibration in a building.
- 6.2 A vibration level survey at the development site was carried out over a typical working day period between 08:00 hours and 17:00 hours on Tuesday 14th April 2026 in order to establish the general daytime vibration levels.
- 6.3 The measurements were taken at the site entrance to Queens Farm to represent a similar distance back from the road that the nearest affected dwelling is sited back from the road. The vibration monitoring location was the same as for the ambient noise level survey.
- 6.4 Vibration levels were measured continuously throughout the entire duration of the survey and were carried out using a Vibrock V901-02 triaxial vibration recorder fitted with a Vibrock V901-VDV transducer.
- 6.5 The unit was set to record both PPV and VDV in each of the three orthogonal directions at 5 minute intervals. These values have been combined to give the 9-hour daytime VDV value for comparison with the value ranges for various probabilities of adverse comment given in BS 6472.

Results

- 6.6 The measured vibration levels are detailed in Appendix III at the end of this report and are summarised in Table 7 overleaf:-

Table 7: Overall Vibration Dose Values in $\text{m/s}^{-1.75}$

Date	Measured 9-Hour Daytime VDV		
	X (Parallel)	Y (Radial)	Z (Vertical)
14/04/2026	0.231	0.172	0.116

- 6.7 BS 6472 : 2008 - 'Guide to evaluation of human exposure to vibration in buildings' - Part 1 describes how to determine the Vibration Dose Value (VDV) from frequency-weighted vibration measurements and how the VDV is used to estimate the probability of adverse comment which may be expected from human beings experiencing vibration in a building.
- 6.8 The vibration threshold levels stated in BS 6472-1 : 2008 for the probability of adverse comment (in $\text{ms}^{-1.75}$) in residential buildings at which various degrees of adverse comment may be expected are quoted in BS 6472 and are reproduced in Table 8 below:-

Table 8: BS 6472 Threshold VDV's in $\text{m/s}^{-1.75}$

Time Period	Low Probability of Adverse Comment ($\text{ms}^{-1.75}$) ⁽¹⁾	Adverse Comment Possible ($\text{ms}^{-1.75}$)	Adverse Comment Probable ($\text{ms}^{-1.75}$) ⁽²⁾
Daytime (07:00 – 23:00)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Night-time (23:00 – 07:00)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Note:- (1) Below these ranges adverse comment is not expected;

(2) Above these ranges adverse comments is very likely.

- 6.9 The results of the vibration survey shown in Table 7 indicate that the existing vibration levels at the site boundary amount to vibration dose values (VDVs) that are lower than the thresholds for the onset of annoyance that are quoted in BS 6472, as outlined in Table 8.

- 6.10 The calculated VDV's are within the threshold levels where there is a low probability of adverse comment during the daytime period.
- 6.11 At this juncture, we do not know what plant and machinery will be installed within the proposed new commercial units.
- 6.12 However, it would be prudent to recommend that any heavy duty fixed plant and machinery that produce high levels of vibration should all be fitted on suitable anti-vibration mounts and pads with any associated ductworks, service cables, etc. also all fitted on anti-vibration mounts.
- 6.13 The anti-vibration measures should be designed to ensure that the measured existing vibration levels at the site boundary are not increased above those outlined in Table 7 of this report as a result of the proposed plant and machinery to be used at the site.
- 6.14 It is expected that any amplification of vibration from transfer functions (e.g. by the proposed building or furniture supporting a person) will not be significant, ensuring that vibration levels experienced by the existing residents of the nearby dwellings will still be within the range of 'low probability of adverse comment.'

7.0 SUMMARY AND CONCLUSIONS

- 7.1 MRL Acoustics has carried out a noise and vibration assessment on behalf of Evesham Properties Ltd in relation to a proposed commercial development scheme at Queens Farm, Queens Farm Road, Shorne, Gravesend, Kent.
- 7.2 As part of the scheme, part of an existing commercial building and a large single agricultural barn building will be converted into storage/workshop units.
- 7.3 The assessment has involved carrying out measurements of the existing ambient noise climate and the existing levels of vibration at a representative location of the nearest affected residential property to the site over a typical working daytime period.
- 7.4 The results of the vibration assessment indicate that existing ground vibration exposure levels were found to be within the threshold levels of 'low probability of adverse comment' for the daytime period, as defined in BS 6472-1 : 2008.
- 7.5 In order to minimise any noise break-out from the proposed new commercial units, we have recommended an outline scheme of sound insulation and noise mitigation measures for the building envelopes of the units.
- 7.6 Target design vibration levels have also been provided for any new heavy plant and machinery that may be installed within the new commercial units, along with an outline scheme of suitable anti-vibration measures that should ensure that existing vibration levels at the nearest affected dwelling are not exceeded.
- 7.7 In conclusion, it is considered that with the careful design of the commercial buildings and any plant and machinery to be used, that the proposed commercial development scheme at the Queens Farm site should not result in a significant noise and vibration impact or adverse effect on any existing local residential amenity.

APPENDIX I – NOISE UNITS AND INDICES

a) Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

b) Frequency and hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

c) A-weighting

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBLA.

d) Glossary of Terms

When a noise level is constant and does not fluctuate over time, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The indices used in this report are described below:-

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period and is the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

L_{A10} This is the A-weighted noise level exceeded for 10% of the specified time period. L_{A10} is most often used as a measure of traffic noise.

L_{A90} This is the A-weighted noise level exceeded for 90% of the specified time period. L_{A90} is used as a measure of 'background noise'.

SEL	The 'sound exposure level' of a single event (such as a passing train) and is the L_{Aeq} value of the whole event normalised to a 1 second period level of a sound.
L_{PA}	The A-weighted sound pressure level.
L_{WA}	The A-weighted sound power level.
R_w	The weighted laboratory measured sound reduction of an element describing the sound transmitted through that element.
NR	A graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
RT	Measured reverberation time in receiver room in seconds.
RT_0	Standard reverberation time of 0.5 seconds.
B_g	The receiver room background noise level, L_{eq}
T_{mf}	The reverberation time (RT_{60}) is the time taken for the sound pressure level (SPL) to reduce by 60 dB when the sound source is instantaneously cut off. Rooms with many hard surfaces are very reverberant and have long reverberation times. Rooms with many acoustically absorbent finishes tend to have short reverberation times because the sound decays rapidly. T_{mf} is the RT_{60} within a space averaged across the 500 Hz, 1 kHz and 2 kHz octave bands. These are the frequencies used for speech and by controlling reverberation at these frequencies, speech intelligibility can be improved.
D	Level difference, effectively $D = \text{source level} - (\text{receiver level corrected for background level})$.
D_{nT}	Standardised level difference, standardised to a receiver room reverberation time of 0.5 seconds, $D_{nT} = D + 10 \log (RT/RT_0)$.

- $D_{nT,w}$ Weighted standardised level difference, a single figure generated by comparing the D_{nT} with a reference curve. The reference curve is shifted in 1 dB steps until the sum of adverse deviation of the test curve, compared to the reference curve, is as large as possible, but no more than 32.0 dB. The value of the shifted reference curve at 500 Hz is taken as the $D_{nT,w}$. N.B. As $D_{nT,w}$ for airborne transmission represents a level difference, an improvement generates a larger figure.
- C_{tr} A 'spectrum adaptation term' used to correct the $D_{nT,w}$ in order to reflect low frequency performance of the wall or floor tested.
- L Level, effectively L = receiver level corrected for background level.
- L'_{nT} Standardised level, standardised to a receiver room reverberation time of 0.5 seconds, $L'_{nT} = L - 10 \log (RT/RT_0)$.
- $L'_{nT,w}$ Weighted standardised level, a single figure generated by comparing the L'_{nT} with a reference curve. The reference curve is shifted in 1 dB steps until the sum of adverse deviation of the test curve, compared to the reference curve, is as large as possible, but no more than 32.0 dB. The value of the shifted reference curve at 500 Hz is taken as the $L'_{nT,w}$. N.B. As $L'_{nT,w}$ for impact transmission represents an absolute level, an improvement generates a smaller figure.

APPENDIX II – RESULTS OF NOISE LEVEL SURVEY

Date: Tuesday 14th April 2026

Equipment: Rion NA-28 'Class 1' sound level meter, Rion NC-74 acoustic calibrator, environmental weather case, Rion WS-15 windshield, microphone, tripod

Weather: Generally warm and dry with a light breeze throughout

Results: All values in dB(A)

Table A1: Ambient Noise Level Results

Date	Time	Run Time	Leq	Lmax	L10	L90	SPL Time Weighting	Frequency Weighting
14/04/2026	08:00	00:30:00	58.6	75.9	60.4	50.5	Fast	A
14/04/2026	08:30	00:30:00	66.6	84.3	67.8	50.5	Fast	A
14/04/2026	09:00	00:30:00	62.0	83.5	62.8	50.2	Fast	A
14/04/2026	09:30	00:30:00	59.5	80.5	60.8	48.0	Fast	A
14/04/2026	10:00	00:30:00	44.9	63.0	47.0	42.0	Fast	A
14/04/2026	10:30	00:30:00	61.4	81.0	62.7	43.8	Fast	A
14/04/2026	11:00	00:30:00	66.4	81.7	68.2	46.9	Fast	A
14/04/2026	11:30	00:30:00	58.3	76.1	60.0	47.6	Fast	A
14/04/2026	12:00	00:30:00	56.6	70.2	59.6	47.8	Fast	A
14/04/2026	12:30	00:30:00	44.7	59.8	48.8	43.4	Fast	A
14/04/2026	13:00	00:30:00	59.1	80.2	60.3	44.3	Fast	A
14/04/2026	13:30	00:30:00	68.1	83.8	70.9	45.2	Fast	A
14/04/2026	14:00	00:30:00	65.3	87.2	66.4	44.8	Fast	A
14/04/2026	14:30	00:30:00	51.1	69.1	53.2	43.0	Fast	A
14/04/2026	15:00	00:30:00	49.6	59.7	52.2	50.4	Fast	A
14/04/2026	15:30	00:30:00	59.9	75.1	62.3	49.6	Fast	A
14/04/2026	16:00	00:30:00	64.7	80.0	66.9	49.7	Fast	A
14/04/2026	16:30	00:30:00	62.1	78.4	64.9	50.3	Fast	A

APPENDIX III – RESULTS OF VIBRATION LEVEL SURVEY

Table A2: Results of 9-Hour Daytime Vibration Measurements

Date	Start Time	X Axis PPV	Y Axis PPV	Z Axis PPV	X Axis VDV	Y Axis VDV	Z Axis VDV
14/04/2026	08:00	1.04	0.81	0.47	0.285	0.168	0.106
14/04/2026	08:30	1.37	0.82	0.44	0.281	0.169	0.111
14/04/2026	09:00	1.16	0.83	0.40	0.284	0.162	0.123
14/04/2026	09:30	1.19	0.71	0.42	0.279	0.173	0.101
14/04/2026	10:00	1.20	0.72	0.45	0.28	0.157	0.109
14/04/2026	10:30	1.19	0.75	0.42	0.301	0.18	0.105
14/04/2026	11:00	1.33	0.77	0.45	0.27	0.173	0.107
14/04/2026	11:30	1.11	0.90	0.46	0.266	0.175	0.099
14/04/2026	12:00	0.95	0.81	0.49	0.25	0.187	0.105
14/04/2026	12:30	0.80	0.67	0.46	0.243	0.189	0.097
14/04/2026	13:00	0.65	0.70	0.40	0.207	0.158	0.085
14/04/2026	13:30	0.97	0.74	0.43	0.229	0.162	0.101
14/04/2026	14:00	0.84	0.88	0.44	0.237	0.189	0.11
14/04/2026	14:30	0.59	0.58	0.38	0.171	0.138	0.066
14/04/2026	15:00	0.23	0.27	0.19	0.084	0.192	0.17
14/04/2026	15:30	0.14	0.09	0.12	0.061	0.164	0.241
14/04/2026	16:00	0.06	0.12	0.09	0.197	0.163	0.189
14/04/2026	16:30	0.57	0.77	0.34	0.24	0.201	0.07