hepworth acoustics

DUTTON PARK FARM, DUTTON
RESIDENTIAL CONVERSION OF BARN BUILDINGS & REPLACEMENT DWELLING

RAILWAY NOISE ASSESSMENT

On behalf of:

Dutton Park Farm

Report No: P21-423-R01v2
March 2022

DUTTON PARK FARM, DUTTON
RESIDENTIAL CONVERSION OF BARN BUILDINGS & REPLACEMENT DWELLING

RAILWAY NOISE ASSESSMENT

Report prepared by:
Hepworth Acoustics Ltd
21 Little Peter Street
Manchester
M15 4PS

On behalf of:
Dutton Park Farm

CONTENTS

1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Dutton Park Farm to carry out a noise assessment in connection with a proposed planning application for the conversion of barn buildings at Dutton Park Farm, Dutton into residential use and replacement of an existing dwelling with a new dwelling. The noise study is required to assess the impact of railway noise on the proposed development.

1.2 The location and extent of the proposed residential development is shown in Figure 1. The site is located on a farm and is therefore surrounded by farmland. The West Coast Main Line runs from south to west of the site, and is approximately 110 metres from the nearest barn buildings.

1.3 It is proposed to renovate some of the barns and demolish and remove others. The barn buildings are of solid brick two-storey construction with slated roofs. Vehicular access to the development will be via a lane to the north which leads onto Lodge Lane.

1.4 The noise assessment has included:

An inspection of the site and surrounding area;

Measurement of railway noise levels over a 24-hour period; and

Outline recommendations of appropriate noise mitigation measures.

1.5 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 GUIDANCE AND ACOUSTIC DESIGN CRITERIA

NPPF:2021

2.1 Paragraph 185 of the National Planning Policy Framework (NPPF) 2021 states that planning policies and decisions should *"*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;*"*

NPSE:2010

2.2 The Noise Policy Statement for England (NPSE) 2010, which is referred to the in NPPF, includes three aims:

i. Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

ii. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

iii. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

BS 8233:2014

2.3 No specific guidance is given in the NPPF on acoustic design criteria, therefore, the guidance discussed below has been used for acoustic design purposes.

2.4 Guidance on acceptable noise levels in habitable rooms and private gardens of proposed new dwellings is set out in British Standard 8233: 2014, 'Guidance on sound insulation and noise reduction for buildings', which carries the full weight of an adopted British Standard. BS 8233 recommends that it is desirable that noise from external sources does not exceed the guidelines

values that are shown in Table 1 inside habitable rooms for daytime (07:00 – 23:00 hours) and night-time (23:00 – 07:00 hours) periods.

Table 1: BS 8233:2014 recommended acoustic design criteria (dB $L_{Aeq,T}$)

Activity	Location	Daytime 07:00 – 23:00 hours	Night-time 23:00 – 07:00 hours
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30

2.5 BS 8233 also recognises that regular individual noise events at night can cause sleep disturbance. Peaks of noise from individual events are usually described in terms of $L_{Amax,F}$ values and these can be highly variable and unpredictable.

ProPG

2.6 There is also guidance in 'ProPG: Planning & Noise – New Residential Development' (2017), although this guidance does not constitute official government guidance and has no legal standing. The ProPG describes a staged approach to the assessment of noise impact on proposed new residential development sites. Stage 1 is an initial site noise risk assessment, indicating whether the proposed site is considered to pose a negligible, low, medium or high risk from a noise perspective.

2.7 The ProPG initial site noise risk assessment criteria are shown in Chart 1.

Chart 1: ProPG Stage 1: Initial Site Noise Risk Assessment Criteria

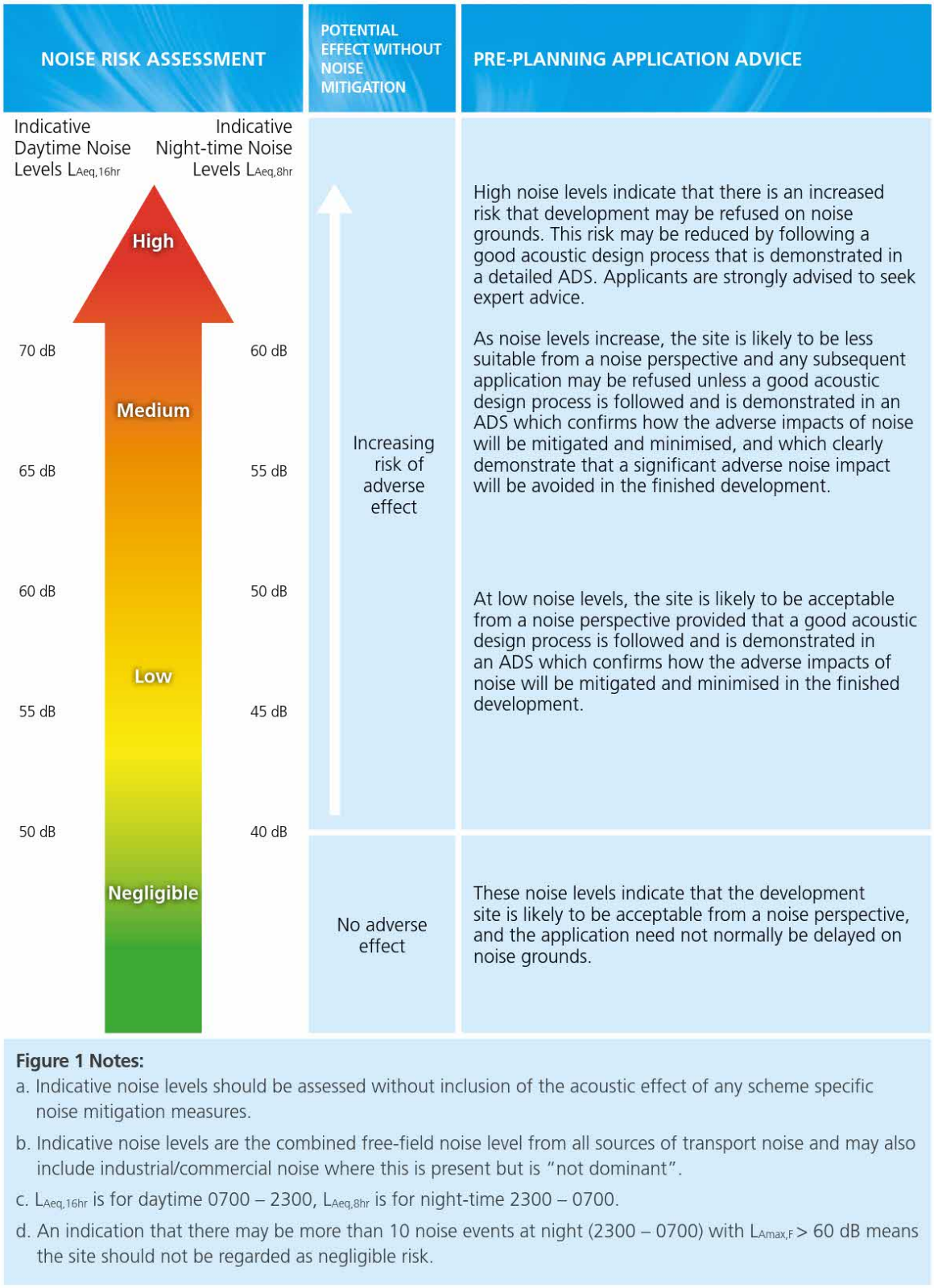


Figure 1 Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. 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".

c. $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.

d. 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.

2.8 Chart 1 broadly sets out indicative noise levels that define the element of risk of noise impact on proposed residential development land, ranging from 'Negligible' to 'High'.

2.9 The guidance states that these noise levels "should be interpreted flexibly having regard to the locality, the project and the wider context".

2.10 Stage 2 of the ProPG approach is a more detailed assessment in the form of an Acoustic Design Statement (ADS). However, the acoustic design criteria that are specified in ProPG, and which forms the basis of the ADS, are essentially the same as those recommended in BS8233, as summarised previously in Table 1 of this report.

2.11 Similarly to BS 8233, ProPG recognises that regular individual noise events at night can cause sleep disturbance. The ProPG guidance suggests that for design purposes, wherever practicable, peaks of noise inside bedrooms from external sources should not exceed 45 dB $L_{Amax,F}$ more than 10 times per night'.

Acoustic Design Criteria

2.12 For this development we therefore recommend the following noise criteria be adopted in respect of railway noise with windows closed and trickle ventilation provided:

> Daytime noise not exceeding 35 dB $L_{Aeq,16hr}$ inside living rooms and bedrooms, 40 dB $L_{Aeq,16hr}$ inside dining rooms; and
>
> Night-time noise levels not exceeding 30 dB $L_{Aeq,8hr}$ and generally not exceeding 45 dB L_{AmaxF} in bedrooms (i.e. no more than 10 times per night).

2.13 For private outdoor amenity spaces of the new dwellings (e.g. rear gardens) BS8233 states that 'it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,16hr}$ with an upper guideline value of 55 dB $L_{Aeq,16hr}$ which would be acceptable in noisier environments'. In our experience, most local planning authorities have traditionally adopted, or accepted, the 55 dB(A) guideline value for rear gardens of proposed new residential developments near busy roads and railways. However, the standard also recognises that these guideline values are not achievable in all circumstances where development might be desirable and in such cases, for sites near to the 'strategic transport network' higher noise levels than 55 dB $L_{Aeq,16hr}$ in gardens may be acceptable. Nevertheless, for this development, we have adopted a criterion of 55 dB $L_{Aeq,16hr}$ in gardens as far as is practicable.

3.0 RAILWAY NOISE SURVEY

3.1 Automated noise measurements were carried out at a location outside the nearest proposed residential façade of the barn buildings to the railway line in terms of a series of consecutive 5-minute measurements from Wednesday 6 to Thursday 7 October 2021. The measurement location is indicated in Figure 1.

3.2 The noise measurements were taken at a microphone height of approximately 1.4m above the ground. Calibration checks were carried out both before and after the measurement periods with no variance in levels noted. Frequency analysis and audio recordings was also carried out.

3.3 We understand the railway line was operating normally including typical numbers of freight trains running during the day and at night.

3.4 The weather conditions during the noise survey were suitable for the purposes of the survey and subsequent assessment.

3.5 The railway noise exposure values outside the barn buildings are shown in Table 2. The full results, along with details of the equipment used and the weather conditions during the survey periods, are shown in Appendix II.

Table 2: Railway noise exposure values at Barn Buildings (dB)

	Daytime $L_{Aeq,16hr}$	Night-time $L_{Aeq,8hr}$
110 metres from railway line	52	46

3.6 The values shown in Table 4 represent modest levels of railway noise. Short-term peaks of noise at this location were in the range of 36 – 76 dB $L_{Amax,F}$ with the 10th highest value being 70 dB $L_{Amax,F}$.

3.7 The implications of the noise exposure values are set out in Section 4.0 and have been used to determine the type and extent of any noise mitigation measures necessary to achieve the adopted noise design criteria.

4.0 NOISE ASSESSMENT & OUTLINE NOISE MITIGATION

Initial Noise Risk Assessment

4.1 The railway noise exposure levels on the site are 'Negligible' in the daytime and 'Low' at night in terms of the risk categories of ProPG.

4.2 It is considered that that the site is suitable for residential development, however railway noise levels on western facing elevations do need to be taken into account and noise mitigation provided where necessary, particularly in respect of noise at night.

Outline Noise Mitigation Measures

4.3 Our outline noise mitigation recommendations are described below.

Gardens

4.4 The daytime railway noise exposure level in the area close to the barns was found to be 52 dB $L_{Aeq,16hr}$, which is within the 55 dB $L_{Aeq,16hr}$ upper limit for gardens that is recommended in BS 8233. As such no specific noise mitigation is required for gardens.

Glazing

4.5 We recommend that bedrooms of the proposed dwellings that would be exposed to (i.e. with a view towards) the railway line, as indicated in Figure 2, are fitted with the following enhanced specification of glazing (minimum 29 dB $R_w + C_{tr}$):

6.4mm Solaglas 'Stadip Silence' laminated glass - nominal (8-20mm) cavity - 4mm glass; or

8mm glass - nominal (8-20mm) cavity - 4mm glass.

4.6 For all other bedrooms, and all living rooms, on the development, we recommend standard double glazing of 4mm glass - nominal (10-16mm) cavity - 4mm glass (25 dB $R_w + C_{tr}$).

4.7 Due care and attention must be taken to ensure that all glazing is well-fitted.

Ventilation

4.8 All bedrooms that would be exposed to (i.e. with a view towards) the railway line, as indicated in Figure 2, should be fitted with an acoustically treated means of ventilation, instead of standard window frame slot vents, to achieve the internal noise criteria. We would recommend either:

Aereco EHA2 Acoustic Trickle Ventilator with acoustic canopy and sleeve (44 dB $D_{n,e,w}$); or

Rytons AAC125HP Super Acoustic Controllable LookRyt AirCore Ventilator (43 dB $D_{n,e,w}$); or

Another ventilation system with a good acoustic performance (i.e. above 40 dB $D_{n,e,w}$).

4.9 Ventilation proposals will need to be agreed with the Council at an early stage.

Rooms in Roof Spaces

4.10 We recommend that any bedrooms in roof spaces on outward facing elevations in the direction of the railway line as indicated in Figure 2 are fitted with ceilings of 2 layers of 15mm dense plasterboard (e.g. Gyproc 'SoundBloc' or Gyproc 'Fireline', or equivalent).

External Walls

4.11 We understand that the existing walls are of solid 300mm thick brick construction. However, for any new walls or areas of wall which need improving, the sound insulation should be designed to match that of the existing walls (i.e. using materials having a sound insulation performance of not less than 50 dB R_w).

Planning Condition

4.12 The need to ensure that an adequate scheme of noise mitigation is implemented can be formalised by an appropriately worded planning condition that requires a scheme of noise mitigation measures to be implemented prior to occupation of relevant dwellings.

Conclusion

4.13 Subject to the recommendations for mitigation measures made above we conclude that potential noise impact from the railway line would not result in any unacceptable harm to residential amenity by reason of noise disturbance.

4.14 Furthermore, 'significant adverse impacts' would be avoided and 'adverse impacts' would be mitigated/minimised, bringing the development in line with the aims of the Noise Policy Statement for England (NPSE) 2010.

5.0 SUMMARY

5.1 The impact of railway noise has been assessed for the proposed conversion of former barn buildings to residential use and demolition of an existing detached dwelling and construction of replacement dwelling in approximately the same location at Dutton Park Farm, Dutton.

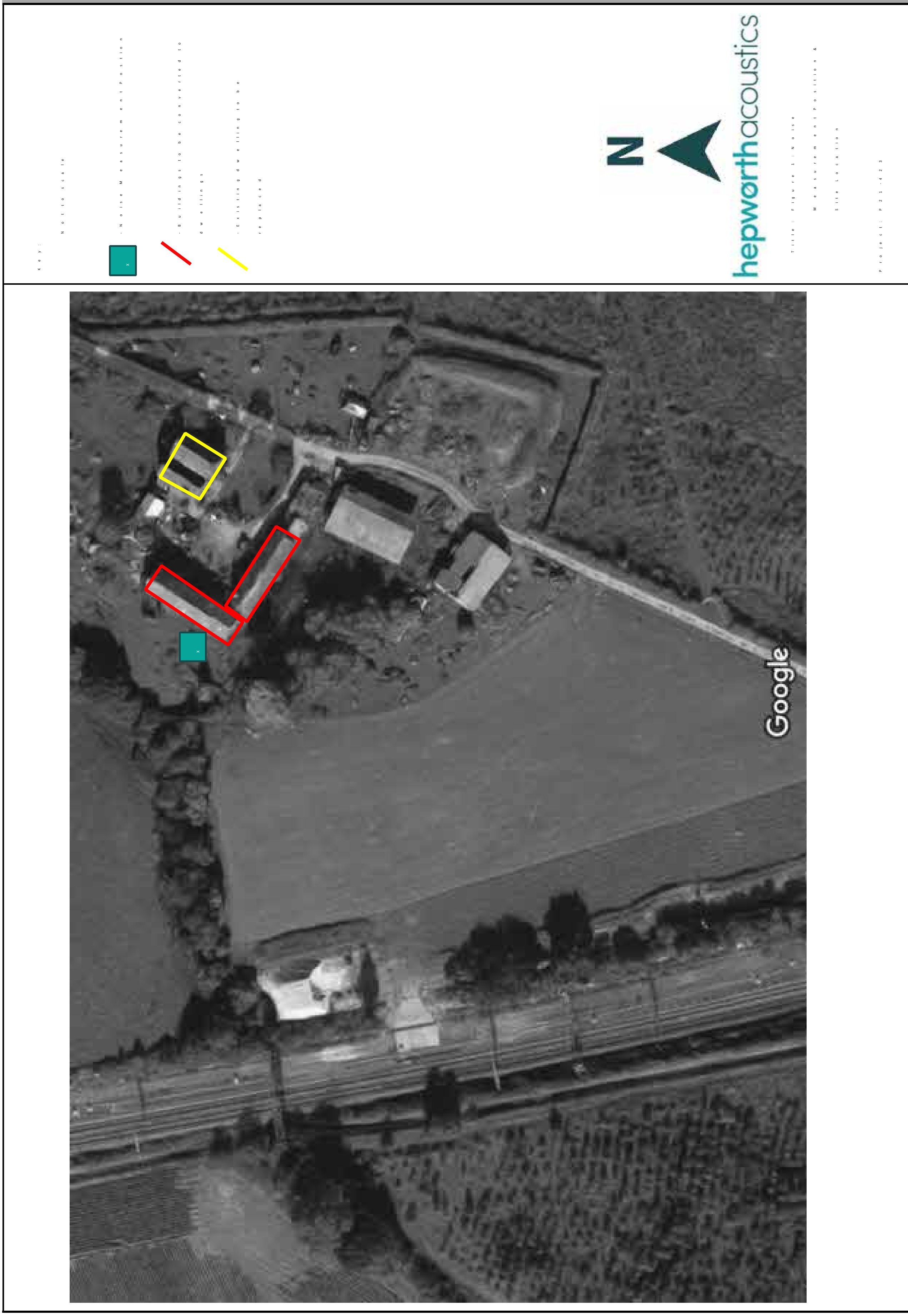
5.2 The assessment has included the measurement of railway noise levels over a 24 hour period at an appropriate location on the site.

5.3 The ProPG Initial Site Noise Risk Assessment indicates the development land is of 'Negligible' risk in daytime and 'Low' risk at night from the adverse effects of railway noise.

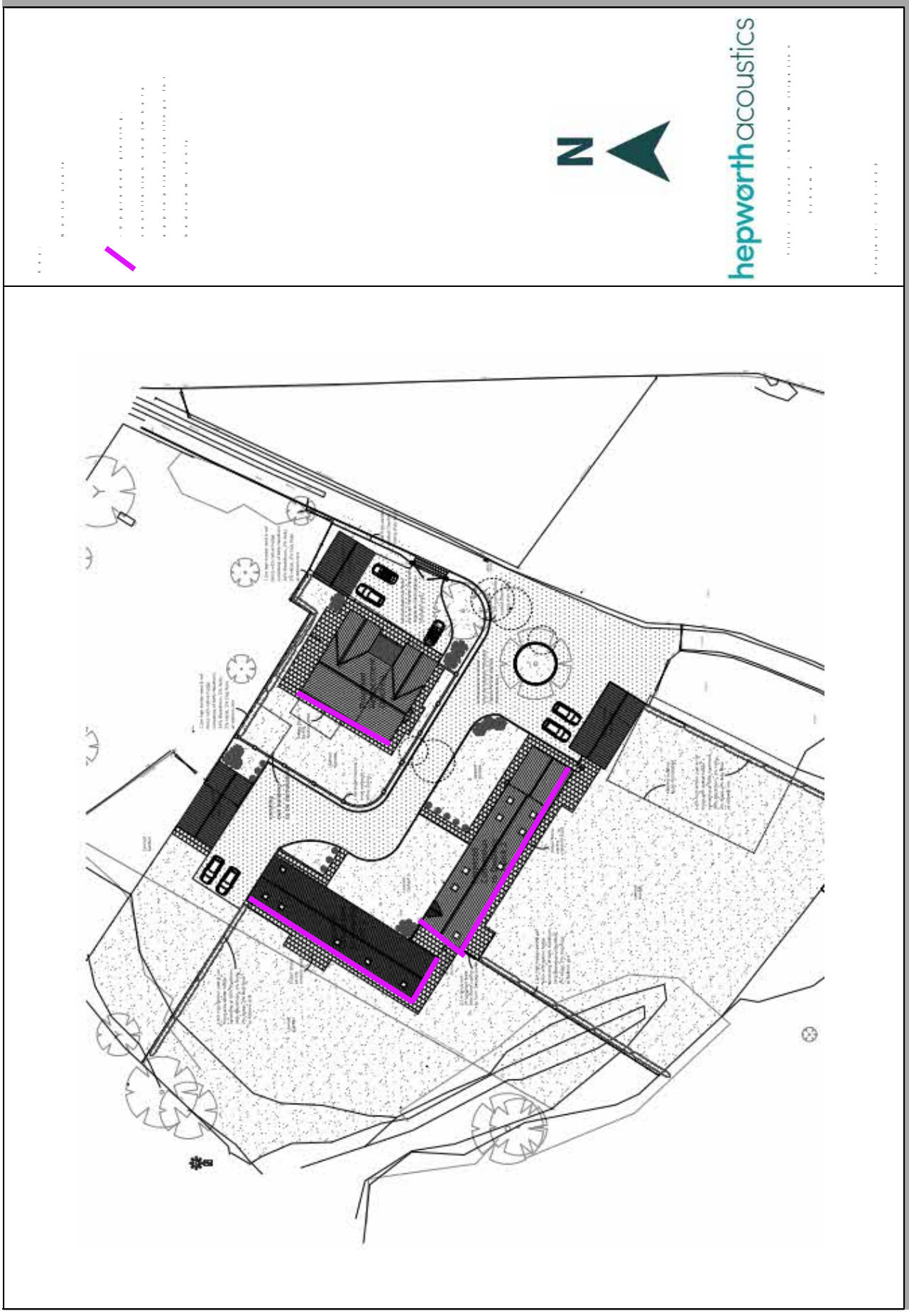
5.4 Nevertheless, we have recommended that an appropriate scheme of sound insulation is implemented for bedrooms of the new dwellings that would be exposed to railway noise that will protect the amenity of the new residents.

5.5 Our outline recommendations for these buildings include sound insulation of windows and provision of acoustically treated ventilation.

5.6 The implementation of an adequate scheme of noise mitigation measures can be ensured by the use of an appropriately worded planning condition.


Key:
Not to scale
Noise Measurement Position
Buildings to be converted to dwellings
Existing dwelling to be replaced
N
hepworthacoustics
Google
Title: Figure 1: Noise Measurement Position & Site Location
Project: P21-423

D



Appendix I: Noise Units & Indices

Sound and the decibel

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 120dB (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.

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 dBA.

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 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, 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 can be used. The indices used in this report are described below.

C_{tr} This is an A-weighted urban traffic noise spectrum, which can be added to $D_{nT,w}$ or R_w in some standards to take into account different source spectra such as low frequency sound.

R This is the 'Sound Reduction Index' as measured in a laboratory, and is a measure of the sound insulation properties of an building element in a stated frequency band.

R_w This is the 'Weighted Sound Reduction Index', and is a single figure quantity of R, the laboratory measured Sound Reduction Index.

$D_{n,e,w}$ This is the weighted element normalized level difference as measured in a laboratory, and is a measure of the sound insulation properties of small building elements such as ventilators.

$L_{Aeq,T}$ 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, LAeq 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. It is increasingly being used as 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.

$L_{A90,T}$ This is the A–weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

Appendix II: Noise Survey Results

Date(s):	Wednesday/Thursday 6/7 October 2021
Equipment:	Rion NL-52 'Class 1' sound level meter (serial no. 00610178) with calibrator and environmental kit, pole and windshield
Weather:	Dry, mild (~10-17ºC), clear skies and calm (<3 m/s)

All levels in dB(A)

Location : 110m from Railway Line