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PROPOSED RESIDENTIAL DEVELOPMENT AND RESPITE CENTER AT AMETHYST LANE, READING

NOISE IMPACT ASSESSMENT

Technical Report: R9942-1 Rev 1

Date: 18th April 2023

For: Gleeds Cost Management
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1.0 INTRODUCTION

- 1.1 Gleeds Cost Management has retained 24 Acoustics Ltd to undertake a noise assessment for a residential development at Amethyst Lane, in Reading. It is proposed to redevelop the site for 21 houses and a single-storey respite centre.
- 1.2 The impact of noise from traffic using Liebenrood Road has the potential to affect the proposed dwellings. Accordingly, this noise impact assessment has included:
- External environmental noise monitoring;
 - Consideration of the noise arising from road traffic movements;
 - Assessment of internal noise levels within proposed dwellings.
- 1.3 This report presents the results of the assessment, following site visits and environmental noise survey undertaken between 1st to 8th March 2023.
- 1.4 An explanation of noise terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20 µPa.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

- 2.1 The site is located in a residential area to the west of Reading and north of Bath Road (A4). The south of the site is bounded by Amethyst Lane.
- 2.2 The site currently comprises two derelict buildings and an outside car park area. Noise arising from distant road traffic controls ambient levels in the vicinity.
- 2.3 The proposed development scheme includes 21 houses and a Respite centre with approximately 500m² as shown in Figure 2.

3.0 STANDARDS AND GUIDANCE

National Planning Policy Framework and Noise Policy Statement for England

3.1 Paragraph 185 of the National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions 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.

3.2 The NPPF also 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 be considered in the context of the wider characteristics of the development proposal, its likely users and its surroundings.
- 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 The NPPF, NPSE and PPG documents do not refer to specific noise criteria. For residential developments 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 8233: 2014 and guidance from the World Health Organisation are adopted for internal noise levels within dwellings.

Professional Practice Guidance on Planning & Noise (ProPG)

- 3.7 The Professional Practice Guidance on Planning and Noise (ProPG) [Reference 4] was published jointly by the Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health in May 2017. The guidance relates to the consideration of existing sources of transportation noise upon proposed new residential development and strives to:
- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
 - Encourage the process of good acoustic design in and around new residential developments;
 - Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
 - Improve understanding of how to determine the extent of potential noise impact and effect; and
 - Assist the delivery of sustainable development.

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

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

3.9 It is important to note that the guidance in ProPG does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.

BS 8233:2014 and WHO Guidelines

3.10 BS 8233:2014 [Reference 5] 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 $L_{Aeq,16hr}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq,16hr}$ in dining rooms during the day and 30 dB $L_{Aeq,8hr}$ in bedrooms at night (BS 8233 Table 4).

3.11 Note 7 under Table 4 of BS 8233 states the following:

"Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

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 [Reference 6] suggest internal night-time noise levels not exceeding 30 dB $L_{Aeq,8hr}$ or regularly (10 – 15 times per night) exceeding 45 dB $L_{Amax,f}$ for 'a good night's sleep'.

3.14 BS 8233:2014 suggests an upper guideline value of 55 dB $L_{Aeq,16hr}$ for noise levels in external amenity spaces such as gardens. This is considered an aspirational limit and BS 8233 recognises that the desirable noise levels for external amenity areas are not always achievable in certain locations. BS 8233 also states that development should not be prohibited on the basis of noise levels within external amenity areas.

Building Regulations, Approved Document O – Overheating

- 3.15 Approved Document O [Reference 7] came into effect in June 2022 and requires all new dwellings to provide mitigation to control overheating. The overheating mitigation strategy must be usable, and Section 3 of the approved document provides thresholds for night-time noise levels within bedrooms. The document states:

"Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).

b. 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)."

BS 4142:2014+A1:2019 - Methods for Rating Industrial and Commercial Sound

- 3.16 BS 4142:2014+A1:2019 [Reference 8] provides a method for rating the effects of industrial and commercial sound on residential areas.
- 3.17 The standard advocates a comparison between the representative measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.
- 3.18 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, also depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).
- 3.19 BS 4142 requires the noise impact to be assessed depending on the context. In relation to situations where background noise levels are low, the standard states *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night"*.

Summary

- 3.20 The impact of transportation noise upon the proposed development has been assessed in accordance with the following methodology:
- (i) BS 8233: 2014 and the WHO Guidelines for the following maximum noise levels inside the proposed dwellings and respite centre bedrooms/sleeping areas:
 - daytime level 35 dB $L_{Aeq, 16 \text{ hour}}$ in bedrooms and living rooms;
 - night-time level of 30 dB $L_{Aeq, 8 \text{ hour}}$ in bedrooms;
 - night-time internal level of 45 dB $L_{Amax, fast}$ in bedrooms for regular events.
 - Aspirational target limit of 55 dB $L_{Aeq, 16hr}$ in external amenity areas.
 - (ii) Noise from new fixed plant associated with the development will be assessed using the guidance of BS 4142: 2014.

4.0 NOISE MEASUREMENTS

Instrumentation and Procedure

- 4.1 Noise measurements were undertaken on the site from 1st to 8th March 2023 using the following equipment:
- Rion (Class 1) precision sound level meters Type NL52;
 - Brüel and Kjær acoustic calibrator Type 4231.
- 4.2 The instrumentation was set up at the location as described below and shown in Figure 1:
- Monitoring Location – South east of the site at a height of approximately 4m above local ground level.
- 4.3 In order to assess typical ambient noise levels, the instrumentation was configured to continuously monitor in five-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 9].

- 4.4 The instrumentation was powered by external batteries and stored in a weatherproof case. An outdoor microphone windshield was used. The weather was generally dry with wind speeds less than 5 m/s.
- 4.5 Calibration of 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.

Measurement Results

- 4.6 The noise survey results are shown graphically in Appendix B and are summarised in Table 1 below.

Day and Date	Noise Level		
	Daytime Level (07:00 - 23:00) dB LAeq, 16 hour	Night-time Level (23:00 - 07:00) dB LAeq, 8 hour	Typical night-time dB LAmax, f
Wednesday 1/3/23	*46	43	60
Thursday 2/3/23	47	42	59
Friday 3/3/23	47	42	59
Saturday 4/3/23	46	41	59
Sunday 5/3/23	46	44	60
Monday 6/3/23	49	45	60
Tuesday 7/3/23	48	43	61
Design Level	48	43	60

Table 1: Ambient Noise Levels at Monitoring Location (* = incomplete period)

- 4.7 24 Acoustics considers the typical max event to be the 10th highest noise level during the relevant night-time period.
- 4.8 The dominant noise source at the monitoring location was traffic noise from Liebenrood Road.
- 4.9 The measured typical background noise levels representative of the existing noise sensitive properties to the east and west of the site, were in the order of 40 dB LA90,1hr during daytime periods (07:00 – 23:00) and 29 dB LA90,15min during the night (23:00 to 07:00 hours).

5.0 CALCULATIONS AND ASSESSMENT

External Noise Break-in

- 5.1 Calculations have been undertaken, using the noise measurement results, to determine the window and ventilation requirements for the facades, which will ensure that the noise levels inside the properties do not exceed BS 8233 and WHO guidelines.
- 5.2 The proposed room dimensions and window areas (as described in drawings from HTA Design LLP submitted to 24 Acoustics in April 2023) have been used in the calculations. If there are any future changes to the properties' layouts the calculations should be reviewed accordingly.

Non-Glazed Elements

- 5.3 Non-glazed elements of the external façades shall be designed and specified to achieve a minimum sound insulation performance of 50 dB R_w . The required performance is readily achieved by traditional cavity masonry constructions.

Glazing

- 5.4 The minimum required sound insulation performances for glazed elements to all living rooms and bedrooms are described in Table 2.

Glazed Elements	Minimum SRI (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
	21	20	25	35	37	31

Table 2: Minimum Glazing Performance

- 5.5 In making a comparison with the values in Table 2, it is important that suppliers provide glazing figures that 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 (i.e. from balcony areas).

- 5.6 In order to assist with the selection process, a standard double glazed unit (e.g. 4mm glass / 12mm cavity / 4mm glass) minimum 31 dB R_w , in a suitable frame, would be capable of achieving the required sound reduction performances in Table 2.

Ventilation

- 5.7 It is understood that mechanical ventilation (MVHR) is to be provided to all habitable rooms with no trickle ventilators or passive ventilation openings in the façades of habitable rooms in all of the development. This would be acceptable for external noise intrusion.
- 5.8 It is considered feasible for bedrooms to comply with the night-time noise level requirements of Approved Document O with an overheating strategy of opening windows. The overheating ventilation strategy should be confirmed and reviewed against the acoustic requirements as early in the design as possible.

External Amenity Areas

- 5.9 Based on the noise survey results, external noise levels of 55 dB L_{Aeq} , or lower during the daytime would be achieved in all gardens.

New Plant Noise Criteria

- 5.10 It is anticipated that the respite centre will include new external plant. Full details of proposed plant are not yet known. It is recommended that the cumulative noise level from all new plant associated with the development should have a maximum rating noise level of 5 dBA below the existing background noise levels when assessed at the nearest sensitive property in accordance with BS 4142:2014.
- 5.11 The daytime and night-time plant noise level criteria, for new plant associated with the development, are shown in Table 3 below.

Period	Maximum Rating Noise Level (dB)
Daytime (07:00 to 23:00)	35 dB L_{Aeq} , 1 hour
Night-time (23:00 to 07:00)	24 dB L_{Aeq} , 15 min

Table 3: Plant noise level criteria

- 5.12 The plant noise level criteria shown in Table 3 are to be achieved at the nearest noise sensitive properties to the site, namely the residential properties to the west (Amethyst Lane

and Jenkins Close), to the south on Amethyst Lane and to the east on Ashdene Gardens . The noise levels in Table 3 apply to the cumulative noise level from all new plant associated with the development. Plant noise levels shall be assessed in accordance with BS 4142: 2014.

6.0 CONCLUSIONS

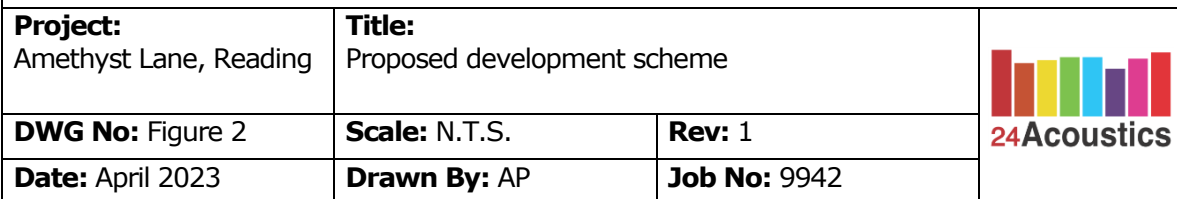
- 6.1 Gleeds Cost Management has retained 24 Acoustics Ltd to undertake a noise assessment for a residential development at Amethyst Lane, in Reading. It is proposed to redevelop the site for 21 houses and a Respite centre.
- 6.2 The site is affected by noise from distant road traffic using Liebenrood Road.
- 6.3 Acceptable internal noise levels would be achieved within the proposed properties and sleeping accommodation using standard thermal double glazing and the proposed use of mechanical ventilation (MVHR), in accordance with defined criteria (BS 8233:2014 and WHO:2000).
- 6.4 The assessment indicates that noise levels in external amenity areas will be within the constraints identified in British Standard 8233.
- 6.5 External noise criteria have been established for new plant associated with the respite centre, based on the measured background noise levels and BS 4142: 2014.
- 6.6 On this basis, it is considered that an appropriate internal and external acoustic environment can be provided to the proposed residential properties on this site.

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, 2018.
2. DEFRA. Noise Policy Statement for England, 2010.
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5. British Standards Institution. British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings, 2014.
6. World Health Organisation. Guidelines for Community Noise, 2000.
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8. British Standards Institution. British Standard 4142:2014+A1:2019. Method for rating and assessing industrial and commercial sound, 2019.
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Project: Amethyst Lane, Reading	Title: Site Location and Noise Survey Locations		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: 1	
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APPENDIX A: NOISE TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB(A) is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB(A). The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB(A) corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In 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 [1] 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.

APPENDIX B: Noise Survey Results

