Land at Wrens Nest Road, Glossop

Environmental Noise Assessment

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Prepared for: SDG (Glossop) Limited

Prepared by: BDP Acoustics
11 Ducie Street
PO Box 85
Piccadilly Basin
Manchester
M60 3JA

BDP.

ARCHITECTURE ▪ DESIGN ▪ ENGINEERING ▪ URBANISM ▪ SUSTAINABILITY ▪ LIGHTING ▪ ACOUSTICS

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Report written by:

M. Rickard BA (Hons) PG Dip AMIOA
Acoustic Consultant

Report checked by:

G. Stevenson PG Dip MIOA
Head of BDP Acoustics

1. Introduction

BDP Acoustics has been commissioned by SDG (Glossop) Limited to undertake an acoustic survey and report to appraise environmental noise levels affecting a proposed new housing development on the land at Wrens Nest Road, Glossop.

The proposed development consists of a total of 72no. residential houses with a range of 2 – 4 bedrooms. Mitigating measures (specifically schemes of glazing and ventilation) are proposed where necessary to enable satisfactory internal noise levels to be achieved.

In summary this report addresses the following issues:

- Noise climate in the vicinity of the proposed development
- National Planning Policy Framework implications
- Acoustic recommendations for an appropriate scheme of glazing and ventilation

A glossary of acoustic terms is presented in Appendix I for reference.

2. Noise Measurement

2.1 Local Area Description

The site is located on the land to the north of Wren Nest Road. On the opposite side of Wren Nest Road is a large supermarket with large industrial properties to the south and southwest; east of the site are more industrial units; north is a railway line serving Glossop station to the east; and west of the site is a vacant field.

2.2 Description of Noise Climate

Night time L_{max} noise levels were controlled by train pass-bys and occasional HGV related activity on Wren Nest Road; L_{eq} and L_{90} noise levels were controlled by the surrounding industrial units, with the most significant contribution coming from the 'Kingspan Tarec' unit to the east.

2.3 Survey Details

Measurements were undertaken at five locations in on site at ground level between approximately 06:00 to 09:25 hours on 21st November. This monitoring period encompasses the 'worst case' night and daytime periods, between 06:00 to 07:00 hours and 07:00 to 09:00 hours respectively.

Weather conditions during the survey were dry with a slight breeze.

The locations of the spot level measurements can be seen in Figure 1.

Figure 1 – Proposed site plan showing noise monitoring locations

2.4 Survey Procedure

The instrumentation used during the survey was a Brüel & Kjær Precision Sound Level Meter Type 2250. The sound level meter was calibrated before and after the survey using a Brüel & Kjær calibrator type 4231 and no drift in level was observed. A-weighted fast response levels and respective octave band levels were measured throughout with the meter recording 5 minute sample measurements over 10 minute measurement periods.

The microphone was positioned at approximately 1.5 metres from the ground.

2.5 Survey Results Summary

Table 1 summarises the levels measured during the survey period.

Table 1: Summary of measured noise levels dB, 21st November 2014

Pos	Start	Period	Day / night	$L_{Aeq,5min}$(range)	$L_{A90,5min}$(range)	$L_{Amax,5min}$(range)
1	06:00	10min	Night	48 – 51	47	52 – 64
2	06:13	10min	Night	48 – 51	46	58 – 63
3	06:25	10min	Night	50 – 51	48	60 – 63
4	06:39	10min	Night	47	45	53 – 57
5	06:52	10min	Night	59 – 61	57 – 58	67 – 72
1	07:06	10min	Day	53	53	56 – 57
2	07:22	10min	Day	51 – 52	49 – 50	59 – 62
3	07:34	10min	Day	53	51 – 52	58 – 60
4	07:47	10min	Day	49 – 50	48	54 – 57
5	08:00	10min	Day	62 – 63	61	66 – 67
1	08:15	10min	Day	54 – 55	52 – 53	63 – 68
2	08:30	10min	Day	52	50	59 – 62
3	08:41	10min	Day	53 – 54	51 – 52	61 – 73
4	08:54	10min	Day	49 – 51	47 – 49	53 – 59
5	09:08	10min	Day	60 - 63	60	65 – 69

3. Relevant Guidance

3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) has replaced Planning Policy Guidance 24 (PPG24) for when considering noise affecting new residential developments. Unlike PPG24 which it replaces, NPPF does not contain any methodology for objective assessment. The relevant Local Planning Authority must therefore consider the suitability of any proposed scheme themselves, based on evidence such as this environmental noise impact assessment report.

3.2 BS 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

This code of practice recommends suitable acoustic rating criteria for various indoor environments and uses. BS 8233 recommends levels for overall noise design of a building based on existing guidelines issued by the WHO for areas where a controlled acoustic environment is necessary.

The following criteria for unoccupied living rooms and bedrooms are suggested.

Table 2: BS 8233:2014 (table 4) recommended internal ambient noise levels for dwellings

Activity	***Location***	***07:00 to 23:00***	***23:00 to 07:00***
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

3.3 WHO Guidelines: 1999

In 1999 the World Health Organisation (WHO) issued Guidelines for Community Noise, which focused on the adverse health effects of noise. It deals with noise break-in and break-out from buildings, sound transmission within buildings, environmental noise and sound propagation.

Table 1 of the WHO document gives guidelines for community noise in specific environments, suggesting noise levels at which adverse health and annoyance effects are likely. An extract relating to bedrooms is tabled below, which largely agrees with the recommendations given in BS 8233: 2014.

Table 3: Extract from WHO 'Guideline values for community noise in specific environments'

Typical situations	***Critical health effect(s)***	***Guide Limit***
Dwelling, indoors	Speech intelligibility and moderate annoyance	≤ 35 dB $L_{Aeq,16hr}$
Inside bedrooms	Sleep disturbance, night-time	≤ 30 dB $L_{Aeq,8hr}$
Inside bedrooms	Sleep disturbance, night-time	≤ 45 dB L_{AFmax}

3.4 WHO Night noise guidelines for Europe, 2009

In 2009 the WHO issued night noise guidelines for Europe to provide expertise and scientific advice to the Member States in developing future legislation in the area of night noise exposure control and surveillance, with support of the European Commission. This guideline document reviews the health effects of night time noise exposure, examines exposure-effects relations, and presents guideline values of night noise exposure to prevent harmful effects of night noise in Europe.

The internal and external noise threshold levels quoted in this document are lower than quoted in WHO Guidelines for Community Noise, 1999 and would prevent the development of residential buildings in significant areas of Towns and City centres within the UK. We have therefore not considered this guidance document in this assessment.

3.5 High Peak Borough Council Requirements

High Peak Borough Council do not have a standard set of acoustic criteria for residential developments; however after discussing the requirements of the site with a member of their environmental health team, it was agreed that designing to the WHO guideline levels for internal ambient noise shown in table 3 would be suitable.

3.6 Proposed Internal Noise Criteria used for this Assessment

It has been agreed with High Peak Borough Council to design to the following internal noise levels:

- Daytime internal noise levels within living areas not to exceed $L_{Aeq,\ 16\ hour}$ = 35 dB
- Night-time internal noise levels within bedrooms not to exceed $L_{Aeq,\ 8\ hour}$ = 30 dB
- Typical individual noise events not in excess of 45dB L_{Amax} in bedrooms between 23.00 and 07.00 hours

It is assumed that the figures stated above are to be achieved whilst providing the Building Regulations Approved Document F background ventilation requirements only.

Designing to these levels will result in a good internal acoustic environment within the apartments, and these levels are in line with current guidance and codes of practice.

4. Noise Break-In Predictions

It is the glazing and background ventilation elements that usually provide the least resistance to airborne sound when considering a building façade. Therefore noise break-in calculations have been undertaken to identify indicative glazing and background ventilation specifications which will achieve the internal noise targets discussed in section 3.6.

In order to assess noise break-in to the residential dwellings, internal noise level predictions were made for sample room configurations, based on levels measured at the five survey locations shown in Figure 1. As rooms plans do not currently exist for the development at this early stage, typical room dimensions and glazing areas have been assumed as described below.

The following assumptions were made for the calculations:

- The day time and night-time noise level criteria proposed in Section 3.6 of this report were used for the living rooms and bedrooms respectively.
- 4m(L) x 3m(W) x 2.8m(H) room dimensions assumed for bedrooms and living rooms
- 2 external walls per room (i.e. corner location)
- 2.4m^2 glazing area for bedrooms and living rooms
- Numerous types of sealed double-glazing systems were assessed based upon manufacturer sound insulation data.

4.1 Acoustic Specifications

The following section presents indicative sound insulation performance specifications for building envelope elements to enable compliance with the noise limits specified in Section 3.6 of this report. The specifications provided are representative of the quietest and noisiest survey measurements; the requirement for individual houses on the development is therefore expected to fall somewhere within the stated specification range depending on their position relative to site noise sources such as the industrial units and related activity to the east and south of the site.

The specifications should be used as a guide only at this stage to determine scheme feasibility. More detailed calculations will be required once layouts are finalised to determine exact specifications.

4.1.1 'Quietest' locations - required specification

Glazing: R_w 31
Ventilation: Standard trickle ventilation (8000mm^2 open area)

4.1.2 'Noisiest' locations – required specification

Glazing: R_w 40
Ventilation: 'Airbrick' type trickle ventilation (8000mm^2 open area)

4.1.3 Glazing Specification

Table 4 presents the required minimum octave band Sound Reduction Index (SRI) requirements for the two R_w ratings. The sound insulation performance requirement applies for the complete window or panel assembly (e.g. including frame and seals).

Table 4: Required minimum octave band SRI (dB) requirements for R_w (dB) rated glazing

Glazing assembly R_w rating	***Typical double glazing build-up required (glass/airgap/glass)***	***Octave Band Centre Frequency (Hz)***						
		63	***125***	***250***	***500***	***1K***	***2K***	***4K***
R_w 31	4/12/4 mm	15	24	20	25	35	38	35
R_w 40	6/12/9 mm	21	26	27	36	45	46	53

It should be noted that slight shortfalls from the specified octave band performance requirements may be acceptable in some cases but would need to be reviewed by an acoustic consultant.

4.1.4 'Airbrick' Trickle Ventilation Specification

Table 5 outlines the minimum element-normalised level difference ($D_{n,e}$) assumed for the Airbrick type background trickle ventilator.

Table 5: Required minimum octave band $D_{n,e}$ for 'Airbrick' trickle ventilators

Octave Band Centre Frequency (Hz)	**125**	**250**	**500**	**1K**	**2K**	**4K**	**$D_{n,e,w}$**
Minimum required $D_{n,e}$ (dB)	32	40	39	45	45	45	**44**

It should be noted that slight shortfalls from the specified octave band performance requirements may be acceptable in some cases but would need to be reviewed by an acoustic consultant.

4.1.5 External Wall Performance

Our predictions assume external walls provide the following minimum octave band SRI (dB) performance. The sound insulation performance requirement applies for the complete wall assembly.

Table 6: Minimum octave band SRI (dB) requirements for external walls

Octave Band Centre Frequency (Hz)	***63***	***125***	***250***	***500***	***1K***	***2K***	***4K***	***R_w***
Minimum required R (dB)	32	41	48	57	66	73	77	60

The specification provided is based on a timber frame design with masonry outer leaf. It should be noted that slight shortfalls from the specified octave band performance requirements may be acceptable in some cases but would need to be reviewed by an acoustic consultant.

4.1.6 Roof Performance

Our predictions assume the combined roof and ceiling system provide the following combined minimum octave band SRI (dB) performance. The sound insulation performance requirement applies for the complete roof and ceiling assembly.

Table 7: Minimum octave band SRI (dB) requirements for roofs (including any ceilings below)

Octave Band Centre Frequency (Hz)	***63***	**125**	**250**	**500**	**1K**	**2K**	**4K**	**R_w**
Minimum required R (dB)	27	36	41	46	50	47	50	48

It should be noted that slight shortfalls from the specified octave band performance requirements may be acceptable in some cases but would need to be reviewed by an acoustic consultant.

5. Conclusions

BDP Acoustics has been commissioned by SDG (Glossop) Limited to undertake an acoustic survey and report to appraise environmental noise levels affecting a proposed new housing development on the land at Wrens Nest Road, Glossop.

A manned noise survey has been completed to determine ‘worst case’ day and night-time noise levels at the proposed site.

Indicative facade element acoustic specifications have been provided based on achieving adequate internal noise levels within the houses based on WHO Guideline levels, as agreed with High Peak Borough Council.

Appendix I – Glossary of acoustic terms

Decibel, dB

This is the unit to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). We therefore use a logarithmic scale to describe sound pressure level, intensities and sound power levels. Subjectively, an increase of 10 dB corresponds to a doubling in the perceived loudness of sound.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of approximately 20Hz to 20kHz, and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands, and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. (For instance the octave bands above and below the 500Hz octave band are 1kHz and 250Hz respectively). For finer analysis, each octave band may be split into three one-third octave bands or in some cases, fine frequency bands.

A-Weighting

Normal hearing covers the frequency range from about 20Hz to 20kHz but sensitivity is greatest between about 500Hz and 8kHz. The 'A-Weighting' is an electronic filters network incorporated in sound level meters which approximately corresponds to the frequency response of the ear. The unit of measurement of A-weighted sound level is dBA.

Equivalent Continuous Sound Level L_{eq} or L_{Aeq}

The continuous equivalent sound level, L_{Aeq} is a notional sound level. It is the sound level, which, if maintained for a given length of time, would produce the same acoustic energy as a fluctuating noise over the same time period. The A-weighted L_{eq} is widely used to measure any environmental noise which varies considerably with time and is denoted as the L_{Aeq}.

Statistical Level: L_{90}

Sound pressure level that is exceeded for 90% of the measurement time. Consequently it is indicative of the general background noise level in the absence of any higher level short duration events that occur during the period.

Statistical Level: Lmax

This is the maximum RMS sound pressure level measured during the measurement period.