

ENVIRONMENTAL NOISE & VIBRATION ASSESSMENT

PROPOSED RESIDENTIAL DEVELOPMENT, LAND OFF DINTING LANE, GLOSSOP

REPORT REFERENCE NO. J004216-6000-SI-03

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Tel: 01925 759380

Email: enquiries@pdaltd.com





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Client Address:	Company Address:
Hollinwood Business Centre Albert Street Hollinwood Oldham OL8 3QL	PDA Ltd 3 Bridgewater Court Barsbank Lane Lymm Cheshire WA13 0ER

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	Name	Position
Prepared By	Sam Iles	Acoustic Intern
Checked By	David Hible BA(Hons) AMIOA	Consultant

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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.



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1.0 SUMMARY

PDA Ltd was commissioned by PCW Developments Ltd to carry out an environmental noise and vibration assessment report for the proposed residential development at Dinting Lane, Glossop. The proposed development consists of 5 no. new detached residential dwellings. This report has been produced to support the planning application.

Noise level surveys were undertaken at various positions on site representative of day and night-time hours. During the daytime, the local noise climate is dominated by road traffic from Dinting Lane to the north of the site, and train noise from the railway line to the south of the site. During the night-time, the local noise climate is again dominated by the road traffic from Dinting Lane, however this is less prominent compared to the daytime. Sporadic activity is also observed around the neighbouring roads and residential areas, with activities such as birdsong and human conversation.

Based upon the measured and predicted noise levels, calculations have been undertaken for the Bedrooms and Living Spaces to evaluate the internal noise levels. Recommendations are given for glazing, ventilation and building façade elements to meet the internal noise level requirements of good practice guidance given in BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. Calculations suggest that the noise level criteria of BS8233:2014 can be achieved within the proposed accommodation. An additional fence line has been proposed to the amenity areas bordering the north boundary of site, adjacent to Dinting Road in order to achieve the external noise criteria set out by WHO Guidelines.

In addition, a vibration survey has been undertaken at various day-time periods. The measured and predicted vibration levels are significantly below the '*Low probability of adverse comment*' criterion of BS 6472 for both day and night-time periods and as such, BS 6472 would suggest that for levels below the ranges, adverse comment is not expected.

2.0 SITE DESCRIPTION

The proposed development consists of 5 no. new residential dwellings, all of which will be for detached units. The current site is disused comprising of overgrown vegetation.

The proposed site is bordered by Dinting Road to the north, Dinting Lane to the east and the Glossop-Manchester railway line to the south-west. Additionally to the north and east are existing residential properties (on Dinting Road and The View). To the west of the area is continuous woodland area.

A site plan showing the location of the site and surrounding local area is shown in Figure 1 below.



Figure 1. Location with proposed site outlined.

3.0 NOISE ASSESSMENT CRITERIA

3.1 National Planning Policy Framework

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in July 2021. With regard to Noise the Framework states the following;

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

- *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.*

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

The terms 'significant adverse' and 'adverse' impacts are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE)' which states;

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The notes also offer an explanation of the term 'adverse impacts' as follows;

... refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

Although no specific noise limits for LOAEL and SOAEL have been defined, in 2014 the UK Government published a planning practice guidance document for noise which indicates where these limits fall with relation to the perception of noise, updated in July 2019. A summary is reproduced in Section 4.2 below, and the full document is published at <https://www.gov.uk/guidance/noise--2>. It is considered that guidance from other acoustic standards may be employed to determine suitable levels within the overall principal of the National Planning Policy Framework.

3.2 Planning Practice Guidance – Noise

The UK Planning Practice Guidance on noise offers further guidance on the typical levels which constitute the NOEL, LOAEL and SOAEL, reproduced in the table below.

Table 1. Planning Practice noise level guidance

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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 Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.3 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

Dwelling houses, flats and rooms in residential use

British Standard 8233:2014, *Guidance on Sound Insulation and noise reduction for buildings*, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 2. BS8233 recommended indoor ambient noise levels

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)	Bedrooms	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

In addition BS 8233 suggests, '*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*'.

With regard to external areas of residential developments BS8233:2014 states the following;

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

3.4 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following internal noise levels are applicable within dwellings.

Table 3. WHO Guidelines for Community Noise criteria

Specific Environment	Critical Health Effect(s)	L_{Aeq} dB	Time Base (hours)*
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16
Inside bedrooms	Sleep disturbance, night time	30	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours and night time 23:00 – 07:00 hours.

In addition to the above continuous equivalent noise levels, WHO guidelines indicates that exceedances of 45 dB L_{Amax} for single sound events should be limited to no more than 10 – 15 times per night, when measured with a 'fast' time weighting.

3.5 Approved Document O (ADO)

Approved Document O (ADO) 2021, provides guidance on meeting the requirements of the Building Regulations 2010, part 'O1 Overheating mitigation'. The aim of the Building Regulations part O1 is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

Building Regulations part O1 requires that dwellings, institutions or any other buildings containing one or more rooms for residential purposes (other than a room in a hotel) to:

(a) *Limit unwanted solar gains in summer:*

(b) *Provide an adequate means to remove heat from the indoor environment*

However in meeting the obligations of ADO the buildings overheating mitigation strategy for use by occupants must consider 'Noise at night' in addition to other non-noise related considerations.

In regards to 'Noise at night', ADO stipulates the following.

In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

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)**

It should be noted that the above noise limits are with reference to internal noise levels within a bedroom. BS 8233 advises that based on a partially opened window noise at the external façade of the building will reduced by approximately 15 dB. Therefore ADO infers that windows will be required to remain closed when the external noise climate exceeds the following external noise limits.

55dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)

70dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)

Subsequently, where windows are required to be closed at night (due to the above noise limits being exceeded), the overheating mitigation strategy as required by ADO must provide an alternative method to removing heat other than relying on windows remaining open.

3.6 BS6472:2008 Guide to Evaluation of human exposure to vibration in buildings

BS6472:2008 develops guideline limiting vibration criteria for residential and other premises. BS6472 uses the Vibration Dose Value (VDV) parameter to assess the probability of adverse comments when human subjects are exposed to vibration from typical environmental sources of vibration (e.g. rail traffic). BS6472 gives the following envelope limiting values to describe varying degrees of perception:

Table 4. BS6472 Guideline Vibration Limiting Criteria for residential use

VDV Period	VDV $\text{ms}^{-1.75}$		
	Low Probability of Adverse Comment	Adverse Comment Possible	Adverse Comment Probable
Residential Buildings 16hr day 07:00 – 23:00 hours	0.2 – 0.4	0.4 – 0.8	0.8 – 1.6
Residential Buildings 8hr night 07:00 – 23:00 hours	0.1 – 0.2	0.2 – 0.4	0.4 – 0.8

BS6472 states that for levels below the ranges in the table above adverse comment is not expected.

4.0 SURVEY DETAILS AND RESULTS

4.1 Environmental Noise Survey

A noise level survey was undertaken at the site between 16:32 hours on Friday 20th January and 12:17 hours on Monday 23rd January 2023. The noise levels were chosen to be representative of daytime and night-time hours.

The noise measurements were taken at two different locations on site as can be seen in Figure 2. A long-term vibration survey was also carried out as indicated in Figure 2.

Figure 2. Noise and vibration survey locations.



The measurement positions are detailed as follows:

- NS 1 (16:32 20/1/23 – 12:07 23/1/23)– microphone located on a pole approximately 1.5m above ground level towards the northern boundary. This was deemed to have no reflective surfaces affecting the noise level measurements.
- NS 2 (16:36 20/1/23 – 12:17 23/1/23)– microphone located on a pole approximately 1.5m above ground level at the south-west boundary. This was deemed to have no reflective surfaces affecting the noise level measurements.

All measurements were made and partially attended by Mr Sam Iles and Mr Joseph Meadows both of PDA Ltd. Measurements were of continuous 5 minute samples. The noise surveys were conducted



using 2 NTi XL2 sound level meters across all measurement positions. Calibration certificates for the sound level meters are held.

The NTi meters are Class 1 frequency response as per BS EN 61672-1:2003. For all surveys the sound level meter was field calibrated both before and after the measurement period, during which time no significant deviation from the calibrated level was observed. The sound level meter was fitted with a microphone windshield at all times.

The microphone of the sound level meter at each position was mounted on a mast/tripod at least 3m from surrounding structures and can be assumed to be a free field measurement. All measurements were undertaken with a fast time-weighting and broadband statistics were measured throughout. In addition, octave band frequency spectra and audio were recorded.

Noise Sources

The local noise climate is dominated by reasonably constant road traffic from Dinting Road throughout the day and night-time. Vehicles primarily consisted of cars, vans, motorbikes, and occasionally HGVs. There was also train noise from the railway line that contributed to the noise climate during the day, and after further research, this was estimated to occur approximately 8 times per hour.

Sporadic activity is also observed towards the north and east of site with activity from members of the public including for conversation and movement along the roads.

There are woodland areas to the west of the proposed site with what is assumed to be material storage areas – however it was concluded that no significant noise was generated in these areas throughout the survey.

4.2 Vibration

The vibration survey was conducted using a Svan 958 vibration analyser. The Svan 958 vibration analyser is a continuous monitoring vibration analyser with a tri-axial geophone sensor. The Svan 958 was set up on an area of grassland to the south-west of the proposed site towards the rail-line, as can be seen in Figure 2. The transducer was mounted to the ground via a rigid surface plate with a mass ratio (m/p^3) of not more than 2 in accordance with BS7385-1.

Vibration data was recorded between 16:30 hours on 20/1/23 to 12:25 hours on 23/1/23. The vibration analyser was set to measure continuously and calculate VDV values over 15-minute periods throughout the measurement periods.

4.3 Weather

20/01/2023

- Temperature: -3 – 4°C
- Wind Speed: 1-3m/s N
- Clear skies and no precipitation

21/01/2023

- Temperature: -4 – 4°C
- Wind Speed: 0-3m/s N
- Clear skies and no precipitation

22/01/2023

- Temperature: 0 – 4°C
- Wind Speed: 1-3m/s S

- Mixture of clear skies and overcast, no precipitation

23/01/2023

- Temperature: 3 – 6°C
- Wind Speed: 1-3m/s N
- Cloudy/overcast skies, no precipitation

4.4 Measurement Results

Environmental Noise

Measurement positions on site are shown on Figure 2 section 4.1 of this report. A summary of the results is given below:

Table 5. Summary of environmental noise measurements – Position 1

Date	Time Period (hh:mm)	Duration (hh:mm)	L _{Aeq,T} (dB)	Range of L _{Amax,5mins} (dB)	Range of L _{A90,5mins} (dB)
Friday 20 th January	Day 16:32 – 23:00	06:28	60	65 - 87	36 - 55
Saturday 21 st January	Day 07:00 – 23:00	16:00	61	65 - 80	36 - 58
Sunday 22 nd January	Day 07:00 – 23:00	16:00	59	46 - 87	34 - 55
Monday 23 rd January	Day 07:00 – 12:07	05:07	61	68 - 84	42 - 57
20 th – 21 st January	Night 23:00 – 07:00	08:00	51	41 - 79	32 - 43
21 st – 22 nd January	Night 23:00 – 07:00	08:00	51	40 - 78	32 - 41
22 nd – 23 rd January	Night 23:00 – 07:00	08:00	51	37 - 78	29 - 46

Table 6. Summary of environmental noise measurements – Position 2

Date	Time Period (hh:mm)	Duration (hh:mm)	L _{Aeq,T} (dB)	Range of L _{Amax,5mins} (dB)	Range of L _{A90,5mins} (dB)
Friday 20 th January	Day 16:36 – 23:00	06:24	56	57 - 93	39 - 51
Saturday 21 st January	Day 07:00 – 23:00	16:00	56	55 - 78	38 - 52
Sunday 22 nd January	Day 07:00 – 23:00	16:00	55	45 - 78	36 - 50
Monday 23 rd January	Day 07:00 – 12:17	05:17	56	57 - 78	41 - 53
20 th – 21 st January	Night 23:00 – 07:00	08:00	48	40 - 76	33 - 42
21 st – 22 nd January	Night 23:00 – 07:00	08:00	45	40 - 74	33 - 41
22 nd – 23 rd January	Night 23:00 – 07:00	08:00	48	38 - 76	30 - 45

4.5 Vibration Results

A summary of the vibration measurements in terms of VDV $\text{ms}^{-1.75}$ is given in the Table below. The results have been calculated by using the following formula:

$$VDV(T) = \sqrt[4]{\sum (VDV(dT))^4}$$

Table 7. Summary of Vibration Measurements VDV $\text{ms}^{-1.75}$

Period	Time	VDV $\text{m/s}^{-1.75}$		
		X axis (horizontal)	Y axis (horizontal)	Z axis (vertical)
Friday 20 th January	Day 16:30 – 23:00	0.007	0.007	0.026
Saturday 21 st January	Day 07:00 – 23:00	0.017	0.009	0.031
Sunday 22 nd January	Day 07:00 – 23:00	0.014	0.009	0.028
Monday 23 rd January	Day 07:00 – 12:25	0.009	0.007	0.024
20 th – 21 st January	Night 23:00 – 07:00	0.007	0.007	0.015
21 st – 22 nd January	Night 23:00 – 07:00	0.015	0.007	0.010
22 nd – 23 rd January	Night 23:00 – 07:00	0.007	0.007	0.015

5.0 VIBRATION ASSESSMENT

Vibration was measured to the south-west of the proposed site. The location was judged to be as representative as practically possible to the proposed buildings. No amplification has been applied to the x and y axes. These amplification factors are in accordance with Association of Noise Consultants guidelines for the assessment of ground-borne vibration.

The measured and predicted vibration levels are compared to the criteria of BS 6472 in Table 8 below.

Table 8. Comparison of measured vibration with BS 6472 criteria

Measured Period	Reference Period	BS 6472 'Low probability of adverse comment' criterion [VDV]	Predicted vibration [VDV] $\text{m/s}^{-1.75}$		
			X	Y	Z
20/01/2023	Residential Buildings 16hr day 07:00 – 23:00 hours	0.2 – 0.4	0.007	0.007	0.026
21/01/2023			0.017	0.009	0.031
22/01/2023			0.014	0.009	0.028
23/01/2023			0.009	0.007	0.024
20 – 21/01/23	Residential Buildings 8hr night 23:00 – 07:00 hours	0.1 – 0.2	0.007	0.007	0.015
21 – 22/01/23			0.015	0.007	0.010
22 – 23/01/23			0.007	0.007	0.015

It is understood that the majority of the vibration data is as a result of train pass-bys from the Glossop – Manchester rail line to the south of site. The measured vibration levels are well below the 'Low probability of adverse comment' criterion of BS 6472 for both day and night-time periods and as such, BS 6472 would suggest that for levels below the ranges in the table, adverse comment is not expected.

6.0 NOISE PROPAGTION AND IMPACT ASSESSMENT

A 3-dimensional computer noise model has been constructed using SoundPlan noise modelling software to determine the noise level impact upon the proposed development. All calculations have followed the methodology contained within ISO 9613-2:1996 *Attenuation of sound during propagation outdoors - Part 2: General method of calculation*. The topographical data for the site and surrounding area is taken from Google Maps Terrain height data. The proposed site and internal layouts are derived from the received Whiteley Eaves drawings, ref. 'HT4 – Proposed Plans and Elevations' and 'HT5 – Proposed Plans and Elevations' – both dated July 2023, and which encompass all rooms across both sets of properties.

The model has been calibrated to the noise levels measured on-site. Both the railway line and Dinting Lane have been modelled as line sources. A ground absorption coefficient of 0 has been used to take into account the predominantly hard surfaces of roads, hard standing, etc. We would suggest this as a worst-case scenario where, soft ground absorption from garden space has not been accounted for.

Noise levels have been calculated at each building receiver which is representative of the façade for each dwelling and its respective rooms.

Figure 3. Calculated levels at receivers – daytime, night-time, -- , L_{max} .



6.1 Discussion

It is PDA's experience that developments with the calculated noise levels stated above are suitable for residential development provided that adequate acoustic attenuation is provided to habitable areas. Considering the acoustic weak points of a building façade, typically the glazing and the ventilation elements, calculations have been undertaken to determine specifications for these building elements and the internal noise levels. The criteria is detailed in Table 9 below.

Table 9. Internal noise level criteria

Space	L _{Aeq,T} dB	Time Base (hours)
Living Rooms/Bedrooms, Daytime	35	16 (07:00 – 23:00 hours)
Bedrooms, Night time	30	8 (23:00 – 07:00 hours)

In addition for bedrooms at night time (23:00 – 07:00 hours) individual noise events should not normally exceed 45 dB L_{Amax}, when limited to no more than 10 – 15 times per night.

7.0 NOISE LEVEL PREDICTIONS

Based upon the predicted noise levels in Section 6, calculations have been undertaken to determine internal noise levels for the proposed accommodation.

7.1 Glazing and Ventilation Attenuation Requirements

The dominant paths for noise transfer to the interior of buildings are generally the glazing and ventilation elements of the façade constructions. Based on this premise, to achieve the required internal noise levels from Tables 2 and 3 would require the following glazing and ventilation specifications.

The calculation of noise break-in to the residential rooms has been undertaken in accordance with the calculation methods of BS EN 12354-3:2000 *Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements. Part 3: Airborne sound insulation against outdoor sound*, in octave bands. Reverberation time is 0.5 seconds as per the BS EN 12354-3 reference time for dwellings.

Figure 4. Colour coded site façade schedule – HT4 (Houses 1-4)

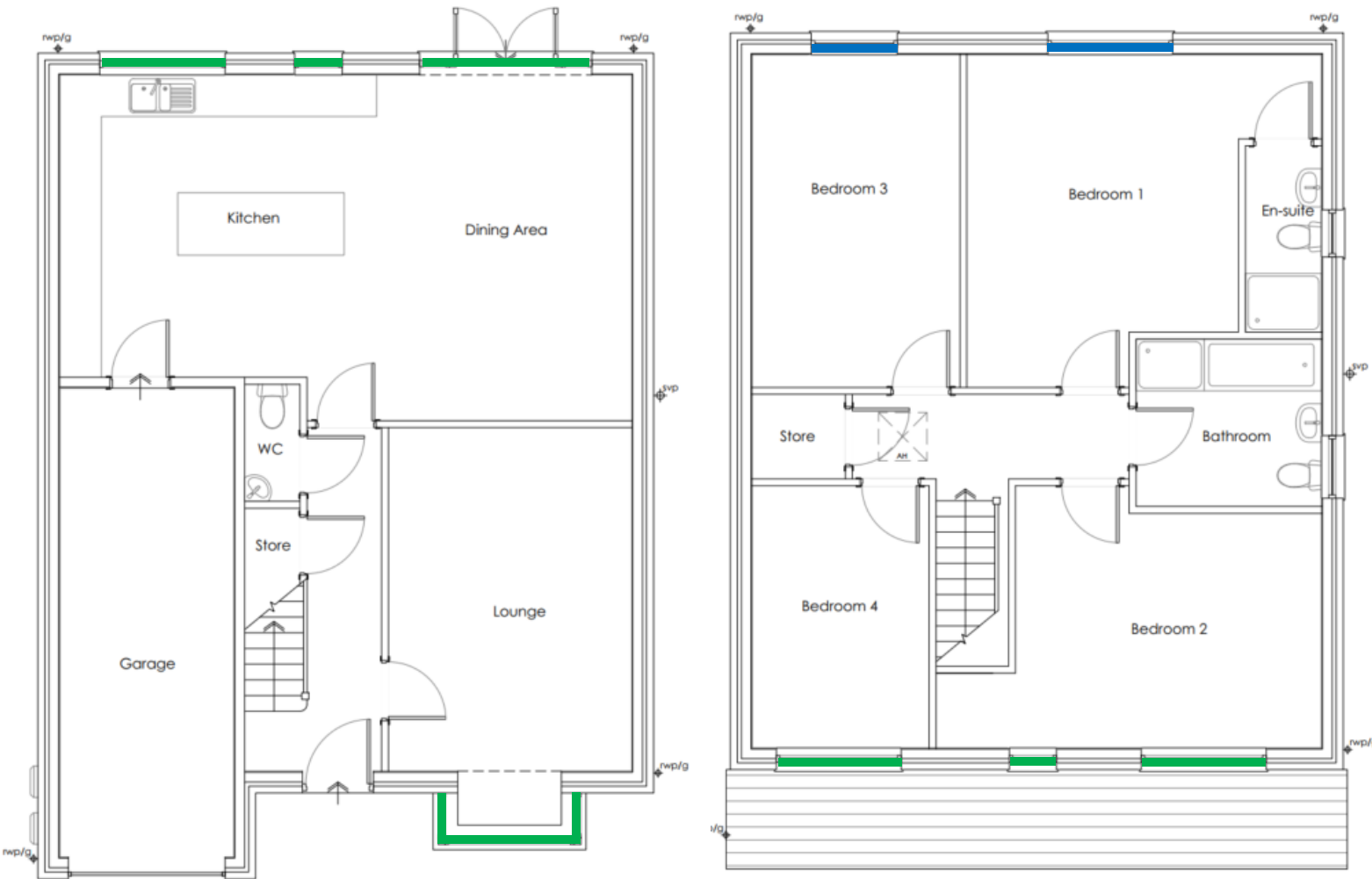


Figure 5. Colour coded site façade schedule – HT5 (House 5)

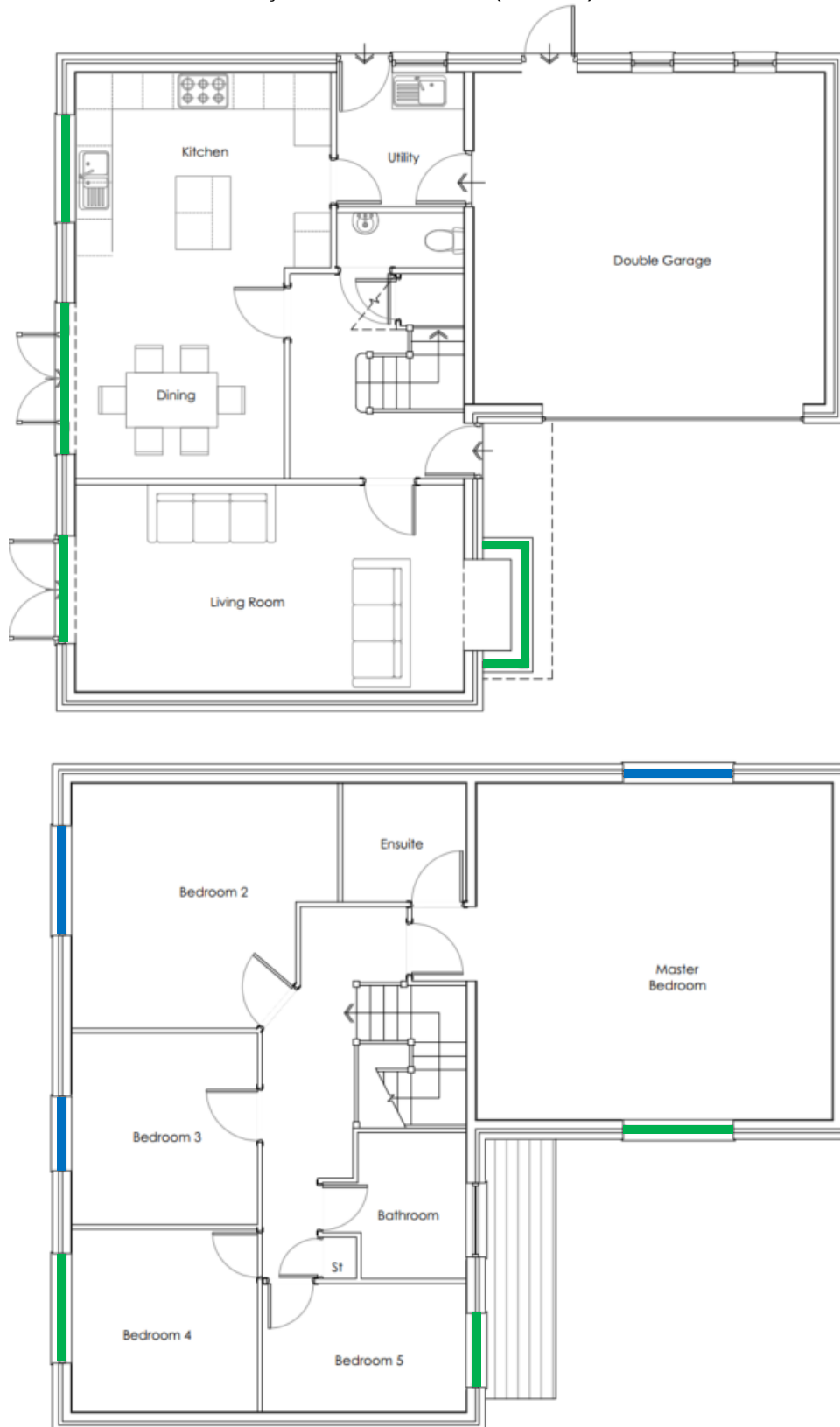


Table 10. Glazing and Ventilator Schedule

Colour	Houses	Facades	Rooms	Minimum Glazing Rating R_w dB	Minimum combined Ventilator Rating $D_{n,e,w}$ dB ¹	Internal Noise Level Target (Day/Night/Night L_{max}) ²	Calculated Internal Noise Level
Green	1-4	North	Kitchen/Diner	33	29	40/-/-	34/-/-
		South	Lounge			35/-/-	23/-/-
			Bedrooms			35/30/45	25/16/30
	5	North	Kitchen/Diner			40/-/-	36/-/-
		South	Lounge			35/-/-	23/-/-
			Bedrooms			35/30/45	27/18/32
Blue	1-4	North	Bedrooms	33	33	35/30/45	33/24/42
	5	North	Bedrooms				33/24/42

Notes:

- Calculations have allowed for one vent for bedrooms and two for kitchen/living rooms
- Values for night-time and night L_{max} are only required in bedrooms.

With the glazing and ventilator specifications proposed in Table 10 above, calculations suggest that the internal day and night-time BS8233:2014/WHO noise level requirements can be achieved. Calculated internal noise levels are given on the worst-case internal receivers.

In addition to the above, calculations have been undertaken to determine L_{Amax} noise levels within the bedrooms at night-time. Using the full night-time L_{Amax} noise levels measured across site with the glazing and ventilation specifications above, the calculated L_{Amax} values will not normally exceed 45 dB L_{Amax} .

7.1.1 Glazing Specification and Installation Notes

Notes on Glazing Installation

For the glazing specifications in Table 11, all sound insulation values quoted must be achieved by the overall combination of frame and glazing, and not just by the glazing alone. The frame should not reduce the performance of the system overall. Glazing framing systems must be fully sealed with any small gaps (<10mm nominal) around the perimeter to be stuffed with dense mineral wool to full frame depth and sealed both sides with acoustic non-setting mastic, with additional weathering protection to be applied additionally externally to this. No gaps should be left unsealed.

Minimum performance requirements for the combination of glazing and framing recommended in the above tables are as follows:

Table 11. Required Minimum Sound insulation of Combined Glazing and Framing

Typical Product	Minimum Sound Reduction Index R (dB) at Octave Band Centre Frequency (Hz)								R_w dB
	63	125	250	500	1k	2k	4k	8k	
6/12/6	18	20	19	29	38	36	45	45	33

Figures stated in the table above are based on Saint Gobain manufacturer quoted data. Acoustic ratings should be checked with the manufacturer and supported by laboratory test reports where necessary.

Any areas of aluminium panelling (if proposed) adjacent to the window glass should meet the same minimum specification as the glass to which they are adjacent.

7.1.2 Ventilator Requirements.

The ventilator inlets described in the following table are calculated to provide adequate sound insulation to maintain internal noise levels compliant with the guidance criteria when used in conjunction with the selected glazing. Example ventilator products are noted below.

The acoustic specification relates to the combined performance of all ventilation elements. Where two or more ventilators are required to meet the ventilation requirement, the acoustic performance for a single ventilator must be selected so that the combined performance is as stated in the table below, e.g. for 2 no. ventilators, the acoustic performance of each will need to be $D_{n,e,w}$ 36 dB to meet a combined specification of $D_{n,e,w}$ 33 dB. Requirements should be checked with the manufacturer. Please note that the treatment is generally not considered necessary for non-habitable rooms such as bathrooms etc.

Table 12 below gives the acoustic performance of the ventilator used in the calculations. Any alternative vent should achieve the same performance or greater in each octave band.

Table 12. Required ventilator performance

Typical Product	Minimum Sound Reduction Index R (dB) at Octave Band Centre Frequency (Hz)								$D_{n,e,w}$ dB
	63	125	250	500	1k	2k	4k	8k	
Simon Airstrip 300	23	28	26	26	29	29	29	36	29
Simon Acoustic TTF Slimline	38	38	35	35	31	32	35	40	33

Please note that the specification of vents is in terms of acoustic performance only. Ventilation strategy needs to be checked with Local Authority and other standards and regulations for compliance. It should be noted that inclusion of ventilators alone does not ensure compliance with Building Regulations or other regulatory requirements for ventilation.

7.2 Approved Document O (ADO), Method of Removing Heat

With reference to the noise survey results taken on site and predicted noise levels at the receivers from Section 6, it should be noted that noise levels at the North façades of the proposed development are predicted to exceed the following criteria in regards to L_{AFmax} .

55dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)

70dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)

Consequently based on a partially open window, noise within the bedrooms North façades is predicted to exceed the following ADO limits above which windows are expected to remain closed to control the ingress of external noise in regards to L_{AFmax} .

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

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

Therefore for the North façades the overheating mitigation strategy as required by ADO must provide an alternative method to removing heat other than relying on windows remaining open during the night time period.

7.3 External Walls

It is assumed that the external wall construction will be a cavity masonry construction. Within our calculations it has been determined that the sound insulation performance of the façade should be no less than 54 dB R_w .

Please note that the external façade should have no unsealed penetrations, and any openings for ventilation should meet the specifications for ventilators above.

7.4 External Amenity Areas

Using the measured noise level data stated in Section 4.4, a 3-dimensional computer noise model has been constructed using SoundPlan noise modelling software to the same specification as that discussed within Section 6.0.

It is understood that there is a 2m high timber fence that divides each external amenity area. We would consider that this is of a solid construction with no gaps between the panelling and of at least 10 kg/m³ surface mass. The results of the model are presented in Figure 6 below:

Figure 6. Predicted noise levels in external amenity areas



Within Section 3.3, it is discussed how an external noise level of 55dB L_{Aeq} is desirable in noisier environments as stated within BS8233:2014. Therefore, we have considered the implementation of another 2m high timber dividing fence (at least 10 kg/m³ surface mass and no gaps), running along the rear of all houses, and parallel to Dinting Road. This is shown through Figure 7.

Figure 7. Predicted noise levels in external amenity areas – with the addition of fence to northern boundary

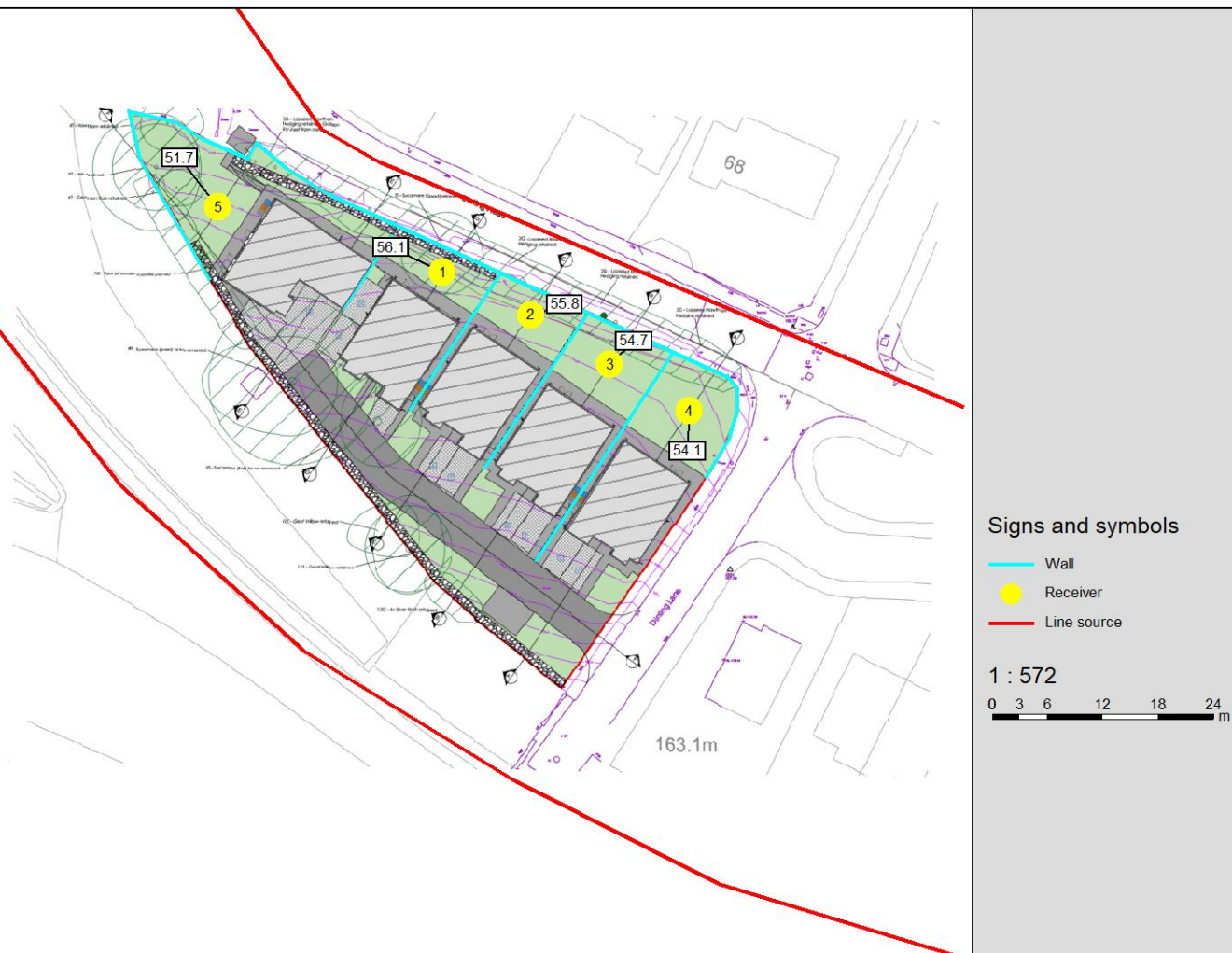


Figure 7 shows that the addition of the timber fence is successful in lowering the predicted noise levels towards a more acceptable level. As previously mentioned within Section 3.3, it is discussed how the external noise level of 55dB L_{Aeq} is desirable in noisier environments as stated within BS8233:2014. However, it is also considered within the standard how:

'In higher noise areas, such as city centers or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted.'

Therefore, we would consider that, given the location of development which borders the Glossop – Manchester rail line and Dinting Road which serves as a throughfare between Glossop and Woolley Bridge, the predicted external amenity noise levels presented in the figure above may be warranted. It is understood that 2m high walls are surrounding the garden areas, with the addition of the rear wall, and therefore enabling the amenity area to achieve the lowest practicable levels through design.

We would note that the majority of the amenity areas are predicted to be within the 55dB L_{Aeq} upper guideline level. Exceedances are seen at receivers 1 and 2, however we would comment that an exceedance of 1dB is negligible, and understood to be an unidentifiable noise level change to the typical receiver.



8.0 CONCLUSIONS

PDA Ltd was commissioned by PCW Developments Ltd to carry out an environmental noise and vibration assessment report for the proposed residential development at Dinting Lane, Glossop. The proposed development consists of 5 no. new detached residential dwellings. This report has been produced to support the planning application.

Noise level surveys were undertaken at various positions on site representative of day and night-time hours. During the daytime, the local noise climate is dominated by road traffic from Dinting Lane to the north of the site, and train noise from the railway line to the south of the site. During the night-time, the local noise climate is again dominated by the road traffic from Dinting Lane, however this is less prominent compared to the daytime. Sporadic activity is also observed around the neighbouring roads and residential areas, with activities such as birdsong and human conversation.

Based upon the measured and predicted noise levels, calculations have been undertaken for the Bedrooms and Living Spaces to evaluate the internal noise levels. Recommendations are given for glazing, ventilation and building façade elements to meet the internal noise level requirements of good practice guidance given in BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. Calculations suggest that the noise level criteria of BS8233:2014 can be achieved within the proposed accommodation. An additional fence line has been proposed to the amenity areas bordering the north boundary of site, adjacent to Dinting Road in order to achieve the external noise criteria set out by WHO Guidelines.

In addition, a vibration survey has been undertaken at various day-time periods. The measured and predicted vibration levels are significantly below the '*Low probability of adverse comment*' criterion of BS 6472 for both day and night-time periods and as such, BS 6472 would suggest that for levels below the ranges, adverse comment is not expected.



APPENDIX A – NOTES FOR QUALITY CONTROL

1. Blockwork

All blockwork is to be mortared to an almost fair faced standard both horizontally and vertically. Only perfect blocks may be used with no pitting or cracks. The blockwork must seal effectively to the underside of the soffit.

Where blockwork walls form a cavity wall, care should be taken to avoid rubble and snots from bridging the cavity. This is especially important where one or more of the leaves is floating.

2. Plasterboard

All plasterboard joints are to be butted tight. The rule of thumb is that the joint should be tight enough over its entire length to prevent a normal business card from being inserted. Multiple layers should be fitted with staggered joints.

Base details and deflection heads are to be as per the British Gypsum White Book unless otherwise stated, and copious amounts of mastic to be used when fitting to the walls, floor and ceiling respectively.

3. Mineral Fibre

Mineral fibre slabs are to be butted tightly together and to boundary structures, to form a homogeneous layer.

4. Windows

All window frames are to be a good tight fit into the building structure with any gaps to be filled both internally and externally with a non-setting mastic in addition to the usual weather proofing seal to the exterior. Any gaps between the frame and building that are greater than 5 mm are to be packed with a dense mineral fibre prior to mastic sealing.

5. Electrical Sockets

Electrical sockets must not be fitted back to back and removed areas of blockwork and plasterboard should be kept to an absolute minimum.

6. Water Pipes

All water pipes (and any other pipework) are to be resiliently mounted to avoid “water hammer”. This is particularly important for plasterboard walls.

7. Penetrations

Penetrations are to be dealt with as described in this report. Details for specific services penetrations may be supplied upon request.

8. Approved Samples and Inspections

Samples of each individual acoustic element should be provided for inspection at the beginning of its installation. Once approved, the Clerk of Works must ensure that the same level of quality continues throughout construction.

APPENDIX B – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq} . Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq} . It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An} . It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max} , dB L_{Amax} , etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq} , L_{90} , L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.

APPENDIX C – SURVEY DATA CHARTS

Figure 6. Ambient Noise Level Survey – Top of Hill (NS1)

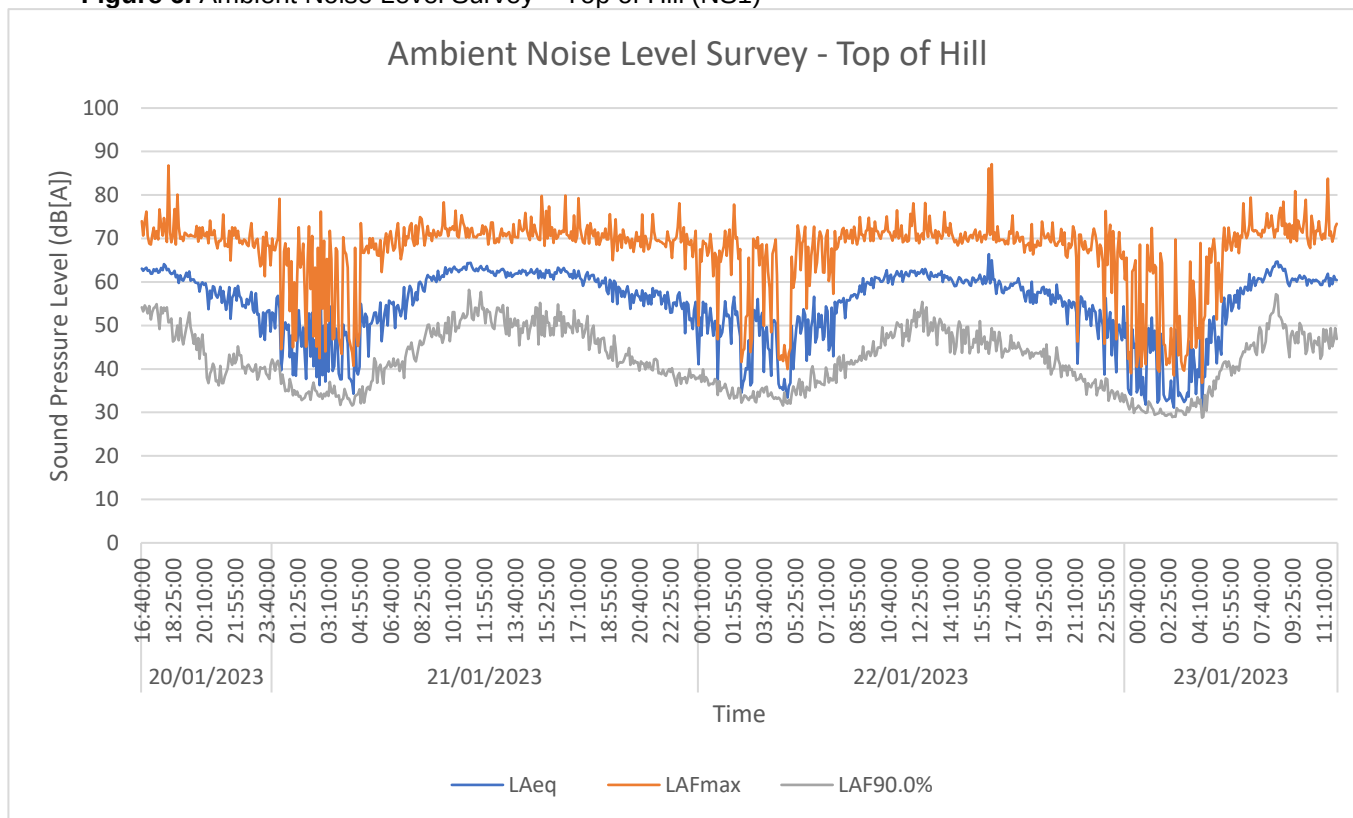


Figure 7. Ambient Noise Level Survey – Bottom of Hill (NS2)

