



Acoustic Survey and Assessment for Proposed residential development at land off Bradford Road/Birkby Lane, Bailiff Bridge, Halifax,

Prepared for:

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1. Introduction

- 1.1. Martin Environmental Solutions has been commissioned to undertake a noise survey and an acoustic assessment in support of a planning application for a proposed residential development on land at the corner of Bradford Road and Birkby Lane, Bailiff Bridge, Halifax.

Site Location and Context

- 1.2. The site is located on the corner of the A641 Bradford Road and Birkby Lane, is roughly rectangular in shape and covering an area of approx. 0.53 ha. It is currently unused waste land being a former industrial site demolished in the early 2000-09.
- 1.3. To the east of the site are additional recent residential units, to the south industrial warehousing, to the west retail units, a park and primary school and to the north a light industrial area. An aerial photograph is enclosed in Figure 1.
- 1.4. The assessment has been undertaken due to the potential adverse impact from the passing traffic and industrial units, although subjectively the industrial were not producing any sound that could be readily identified from the site during the two site visits.



2. Policy and Guidance

- 2.1 The impact of noise can be a material consideration in the determination of planning applications. The planning system has the task of guiding development to the most appropriate locations. It is recognised that on occasions it will be difficult to reconcile some land uses, such as housing, hospitals or schools, with other activities that generate high levels of noise. However, the planning system is tasked to ensure that, wherever practicable, noise-sensitive developments are separated from major sources of noise (such as road, rail and air transport and certain types of industrial development).
- 2.2 The Government's publication of the National Planning Policy Framework (NPPF), which seeks to prevent new and existing development from contributing to or being put at unacceptable risk from noise pollution, has replaced previous Planning Policy Statements and Planning Policy Guidance Notes.
- 2.3 The Government have also issued the Noise Policy Statement for England (NPSE). The NPSE clarifies the Government's underlying principles and aims in relation to noise and sets a vision to promote good health and a good quality of life through the effective management of noise while having regard to the Government's sustainable development strategy. The NPSE aims to mitigate and minimise adverse impacts on health and quality of life through the effective management and control of noise.
- 2.4 The NPSE introduces the following terms although no sound levels are given to represent these many authorities have identified the sound level criteria in line with the World Health Organisation, BS8233:2014 and BS4142: 2014 levels. The terms introduced by the NPSE are:
- NOEL – No Observed Effect Level (<30dB(A) inside <50dB(A) outside, 10dB below background)
 - LOAEL – Lowest Observed Adverse Effect Level (30-35dB(A) inside 50-55dB(A) outside, background to +5dB)
 - SOAEL – Significant Observed Adverse Effect Level (>35dB(A) inside, >55dB(A) outside, >+10dB above background)
- 2.5 The sound levels within the brackets of the previous paragraph are those determined by Lancashire authorities as appropriate levels to indicate the relevant effect levels represented by the NPSE and represent the levels identified within other commonly used guidance documents.



- 2.6. Other commonly used examples of standards utilised by Local Planning authorities for the consideration of noise impacts include comparison of the likely noise levels to be experienced at a development, with levels that have been recommended by the World Health Organisation (WHO) as Guidelines for the prevention of Community Noise Annoyance and within BS8233: 2014.
- 2.7. The WHO recommended noise levels for outdoor amenity areas (gardens) that should not be exceeded are 55dB(A) $L_{Aeq,16hr}$ in order to avoid 'Serious Community Annoyance' or 50dB(A) $L_{Aeq,16hr}$ to avoid 'Moderate Community Annoyance' during the day. For indoor levels WHO set 35dB(A) $L_{Aeq,16hr}$ during the day to prevent Moderate Annoyance and 30 dB(A) $L_{Aeq,8hr}$ at night to prevent sleep disturbance.
- 2.8. BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' also specifies desirable noise levels to be achieved inside dwellings.
- 2.9. BS 8233:2014 'Sound insulation and noise reduction for buildings – Code of Practice' also specifies desirable noise levels to be achieved inside dwellings. BS 8233 presents two levels, the first between the hours of 07:00 – 23:00 and the second between 23:00 -07:00.
- 2.10. The daytime period suggests internal noise levels of 35dB $L_{Aeq,16hr}$, for resting in living rooms and bedrooms while for night time a level of 30dB $L_{Aeq,8hr}$ is recommended.
- 2.11. PPG 24 "Planning and Noise" now revoked by the National Planning Policy Framework provided detailed guidance on how the planning system could be used to minimise the adverse impact of noise without placing unreasonable restrictions on development, and is still used by many authorities in the country.
- 2.12. PPG24 outlined the key considerations to be taken into account in determining planning applications for both noise sensitive developments and those activities that generated noise. It aimed to help local planning authorities in their consideration of applications for residential development near transport related noise sources.



- 2.13. The guidance provided a method whereby a plot of land could be rated and placed into a Noise Exposure Category (NEC) for residential development following consideration of the prevailing sound levels in the area principally from transport sources.
- 2.14. While the guidance has been revoked by the NPPF, the information and methodology detailed within it is still sound, and many authorities are still using the principles contained within in conjunction with the above guidance to assess the impact on proposed developments.
- 2.15. In addition, the recently published 'ProPG Planning & Noise, Professional Practice Guidance on Planning & Noise, New Residential Development' provides a 4-staged approach to undertaking a risk assessment in relation to anticipated sound levels at new residential development and the provision of mitigation measures.



3. The Assessment

- 3.1. Attended monitoring of the sound levels impacting on the site were measured on two occasions. The first, undertaken on the 8th November 2017 resulted in a problem with the power supply to the meter and so the background monitoring was again undertaken on the 14th November 2017.
- 3.2. The weather during the monitoring period was dry and overcast with no wind. The road surface was however wet which would only result in an increased sound level being recorded.
- 3.3. All measurements were taken using a Cirrus, Optimus Green CR-171B, Type 1 sound level meter. The meter was calibrated before and after use and no significant deviation was identified. The calibration certificate is shown in Appendix B.
- 3.4. Ideally an assessment of traffic noise should be taken over the periods 07:00 to 23:00 hours for daytime and/or 23:00 to 07:00 hours for night-time, and the overall figures then compared with the relevant guidance documents. However, it is rare to find ideal monitoring conditions within the North of the UK to undertake such a prolonged period of monitoring and the site in question is open to access, risking the security of the monitoring equipment if left unattended.
- 3.5. For road traffic, it has been found by experience that a good PPG24 value can be obtained by an alternative method of daytime averaging, as detailed in the '*Department for Transport- Welsh Office; Estimating Road Traffic Noise 1988*'. This method involves measuring the L_{A10} of the traffic noise between 10:00 and 17:00 hours in three separate 1-hour periods. From this data, an estimate can be made of both the 18-hour L_{A10} and then the 16-hour L_{Aeq} . This method is very useful in combating variable weather conditions since consistent conditions for 16-hours are fairly rare in the UK.

The formula are: $L_{A10(18hr)} = \sum 3x L_{A10(1hr)}/3 - 1dB$

$$PPG24 L_{Aeq(16hr)} = L_{A10(18hr)} - 2dB$$

- 3.6 For night-time sound levels, the Transport Research Laboratory provides a method for converting the $L_{A10,18hr}$ level to the L_{night} level using the following formula.

$$L_{night} = 0.90 \times L_{A10(18hr)} - 3.77dB$$



- 3.7 PPG24 advised that noise measurements should be taken 'on an open site at the position of the proposed dwellings, well away from any existing buildings, and 1.2 to 1.5m above the ground'.
- 3.8 The full results are provided within Appendix A, and have been used to calculate the $L_{Aeq,16hr}$ sound level at the property as 65.1dB and the $L_{Aeq,8hr}$ as 56.6dB. The monitoring position was located on the southwestern corner of the site near to the junction of Bradford Road and Birkby Lane, thus representing the worse-case location on site, in line with the proposed properties along that boundary.
- 3.9 An open window provides 15dB attenuation¹ and therefore the resulting sound level within the proposed properties will be 50.1dB(A) during the day and 41.6dB(A) during the night, with a maximum sound levels not regularly exceeding 80dB(A), identified as the maximum sound level during the monitoring period (minus a couple of incidents of emergency sirens and horns).
- 3.10 The measured levels are above those recommended within the guidance detailed above and as such it is recommended that further mitigation measures are required to ensure a suitable internal sound level in all habitable rooms to the property.
- 3.11 A standard 6/12/6 double glazing unit will provide a sound reduction, $R_w(C;C_{tr})$, of 33(-1;-3). Thus, for this project a reduction of 30dB when closed. This would be adequate to the protect the properties during the day and night from the average sound levels, however the maximum sound levels to be experienced would still be above the 45dB(A) guidance value.
- 3.12 Therefore, a slightly improved specification of glazing is required to ensure suitable levels are achieved at night within the bedrooms. While standard glazing will be adequate for the day-time levels. It is recommended that a 6 mm / 16 mm argon / 8.8 mm Pilkington Optiphon glazing unit, sound reduction 41(-2;-6) $R_w(C;C_{tr})$ or equivalent is installed to the bedroom areas of plots 9, 10, 11, 12, 14, 15, 16, 18, 19, 20 (see Appendix A).

¹ BS8233: 2014; Guidance on sound insulation and noise reduction for buildings



- 3.13 In order to be able to keep windows closed additional ventilation provision must be provided for the property. As such it is recommended that a ventilation system is used incorporating acoustic trickle ventilators for all windows to the proposed properties. The ventilators must achieve a similar or better performance to the windows when open and a number of suitable models are available from suppliers including the Greenwood EAR42W Vent providing 42dB attenuation or the Titon, SF Xtra Ventilator providing 41dB (C_{tr}) attenuation for the enhanced glazing and Greenwood DN Vent providing 34dB attenuation or the Titon, Trimvent Xtra16 Ventilator providing 31dB (C_{tr}) attenuation for the standard glazing units. Other models and manufacturers are available.
- 3.14 For the external area BS8233:2014 and the World Health Organisation recommend a lower level of 50dB $L_{Aeq,16hr}$, with an upper level of 55dB $L_{Aeq,16hr}$. However, BS8233:2014 identifies that it is not always possible to obtain the levels and in such situations development should be designed to achieve the lowest practicable levels in external amenity areas.
- 3.15 The above monitoring identifies that the current external sound levels are in excess of the upper limits and as such additional mitigation measures are required to some plots to ensure adequate external sound levels are achieved.
- 3.16 A 1.8m close boarded acoustic fence with a minimum density of 12Kg/m² along the rear garden boundaries to the west and south of the site will provide in excess of 15dB attenuation to the nearest properties. Ensuring that all garden areas on site will be adequately protected and ensuring that a level of 50dB(A) or less is achieved in line with the guidance in section 2.



4. Conclusions

- 4.1. Monitoring of the current background sound levels on site have identified that the prevailing background noise consists largely of passing traffic along the two main roads to the west and south of the proposed development. Measured sound levels have identified that the current sound levels to be experienced are above those guidelines within BS8233: 2014 and from the World Health Organisation. As such additional mitigation measures are required.
- 4.2. With the exception of plots 9-12, 14-16 and 18-20 all properties require standard double-glazing units with a sound reduction value of 30dB (C_{tr}), to be fitted to all habitable rooms with additional ventilation measures to allow windows to remain closed. The ventilation must achieve a similar sound reduction to the glazing units as detailed within the body of the report.
- 4.3. For those plots mentioned above in paragraph 4.2 enhanced glazing and suitable alternative ventilation is required to all bedrooms to ensure suitable internal sound levels are achieved during the night-time period specifically from maximum sound levels. An equivalent sound reduction value of 35dB (C_{tr}) is required from these glazing units and the ventilation.
- 4.4. For external areas a close boarded acoustic fence is required to rear gardens of the plots along the western and southern boundaries of site. The fencing should be at least 1.8m in height and have a minimum density of 12Kg/m².
- 4.5. The above mitigation measures will ensure that sound levels within the external amenity areas and internal environment will achieve the recommended guidance levels contained within BS8233:2014 and from the World Health Organisation, thus resulting in a No Observed Effect Level.
- 4.6. As such no adverse impact will be experienced from future residents, ensuring that the development will meet the requirements of the National Planning Policy Framework with respect to noise.

Figure 1 – Aerial Photograph

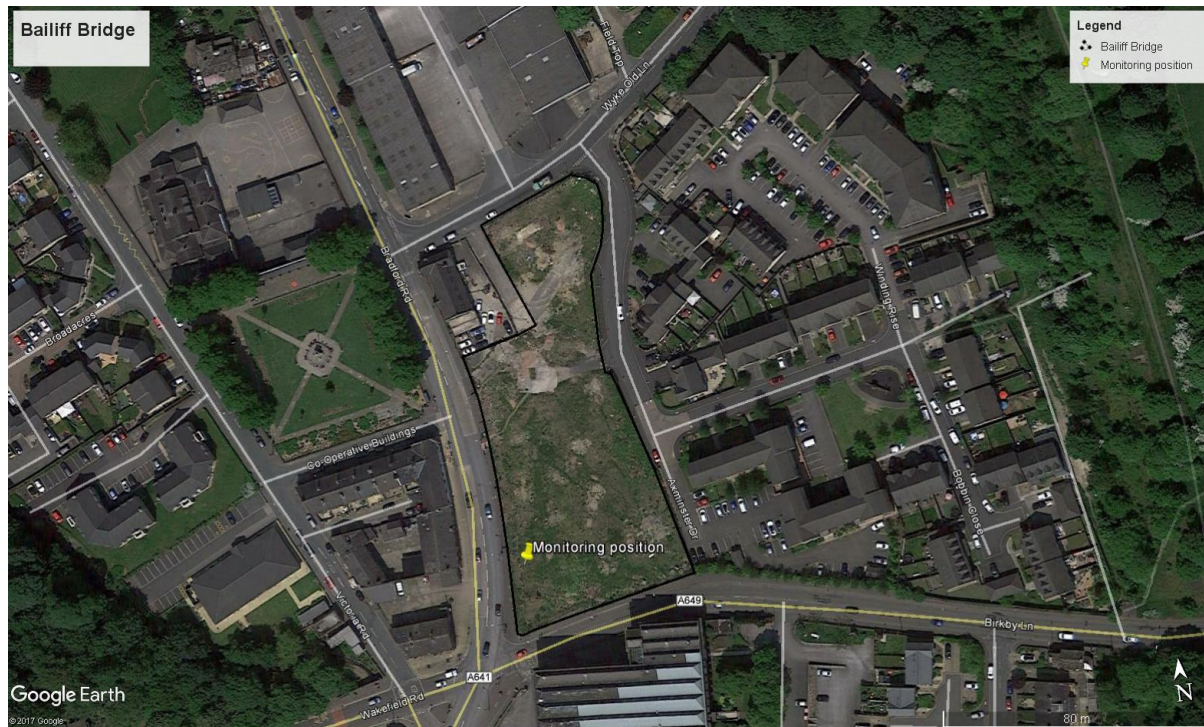


Figure 2 Site Layout



Appendix A – Monitoring Results

Time	L _{Aeq} (dB)	L _{AMax} (dB)	L _{A10} (dB)
14/11/2017 10:00	66.1	84.0	68.5
14/11/2017 11:00	65.6	85.0	68.0
14/11/2017 12:00	67.7	95.1	67.9

Barrier attenuation

Distance = 11.5m

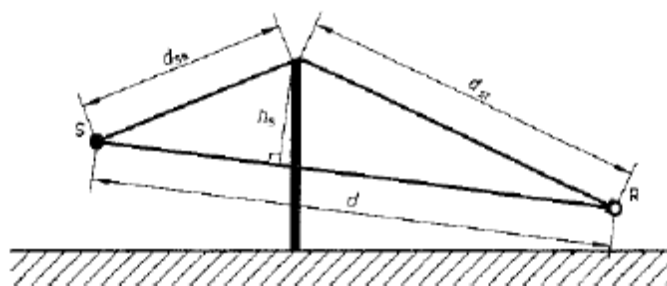
Height of source = 0.5m above ground level (1.5m higher than the site)

Height of receiver = 1.5m above ground level (76m above sea level)

Height of Barrier = 1.8m above garden ground level

Distance from source to barrier = 7m

Distance from Barrier to receiver = 4.5m



Barrier Attenuation Calculations

Barrier Attenuation has been calculated using the following formula:

$$10 \log \left(3 + \frac{40\delta}{\lambda} \right)$$

where; δ = path difference

λ = wavelength,

$$\lambda = \frac{\text{speed of sound (330 m/s)}}{\text{frequency (Hz)}}$$

Path Difference

0.129679918

Attenuation

15.4dB

Distance attenuation to properties,



Plot 13, 17, 21, based on monitoring location 7.5m from road.

Plot	Distance from Rd (m)	Distance Attenuation (dB) (line source)	Glazing $R_w(C_{tr})$	Resultant max sound level (dB), based on max 80dB.
13	27	-5.6	30	44.4
17	22	-4.7	30	45.3
21	24	-5.1	30	44.9



Appendix B – Calibration Certificates

Certificate of Calibration



Equipment Details

Instrument Manufacturer Cirrus Research plc
Instrument Type CR:171B
Description Sound Level Meter
Serial Number G066429

Calibration Procedure

The instrument detailed above has been calibrated to the publish test and calibration data as detailed in the instrument hand book, using the techniques recommended in the latest revisions of the International Standards IEC 61672-1:2013, IEC 61672-1:2002, IEC 60651:1979, IEC 60804:2001, IEC 61260:1995, IEC 60942:2003, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986 and ANSI S1.43-1997 where applicable.
Sound Level Meters: All Calibration procedures were carried out by substituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

Calibration Traceability

The equipment detailed above was calibrated against the calibration laboratory standards held by Cirrus Research plc. These are traceable to International Standards {A.0.6}. The standards are:

Microphone Type	B&K 4192	Serial Number	1920791	Calibration Ref.	S6450
Pistonphone Type	B&K 4220	Serial Number	613843	Calibration Ref.	S6388

Calibrated by

Calibration Date

07 April 2017

Calibration Certificate Number

248049

This Calibration Certificate is valid for 12 months from the date above.

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
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Email: sales@cirrusresearch.co.uk



Certificate of Calibration

Certificate Number: **111525**
Date of Issue: **07 April 2017**



Acoustic Calibrator

Manufacturer: **Cirrus Research plc** Serial Number: **65564**
Model Number: **CR:515**

Calibration Procedure

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC 60942:2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

Date of Calibration: **06 April 2017**

Initial Calibration Results

Measurement	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
1	93.90	1000.3	0.33
2	93.89	1000.3	0.34
3	93.91	1000.3	0.34
Average	93.90	1000.3	0.33
Uncertainty	± 0.13	± 0.1	± 0.10

The reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level.

Adjusted Calibration Results

Measurement	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
1	94.00	1000.3	0.34
2	93.99	1000.3	0.34
3	94.01	1000.3	0.34
Average	94.00	1000.3	0.34
Uncertainty	± 0.13	± 0.1	± 0.10

The reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level.

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UK Registration No. 987160



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EMS 552104



Certificate of Calibration



Certificate Number: **111526**

Date of Issue: **07 April 2017**

Microphone Capsule

Manufacturer: **Cirrus Research plc**

Serial Number: **204018A**

Model Number: **MK224**

Calibration Procedure

The microphone capsule detailed above has been calibrated to the published data as described in the operating manual of the associated sound level meter (where applicable).

The frequency response was measured using an electrostatic actuator in accordance with BS EN 61094-6:2005 with the free-field response derived via standard correction data traceable to the National Physical Laboratory, Middlesex, UK.

The absolute sensitivity at 1 kHz was measured using an acoustic calibrator conforming to IEC 60942:2003 Class 1.

Date of Calibration: **04 April 2017**

Open Circuit **47.7 mV/Pa**

Sensitivity at 1 kHz: **-26.4 dB rel 1 V/Pa**

Environmental Conditions

Pressure: **101.50 kPa**

Temperature: **21.0 °C**

Humidity: **42.0 %**

Calibration Laboratory

Laboratory: Cirrus Research plc
Acoustic House, Bridlington Road, Hunmanby
North Yorkshire, YO14 0PH, United Kingdom

Test Engineer: Debra Swalwell

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