MARTIN
ENVIRONMENTAL
SOLUTIONS

Acoustic Survey and Assessment for Proposed change of use of barn to flexible use, Stubbins House Farm, Stubbins Lane, Claughton-On-Brock, Preston, PR3 0PL

Prepared for:

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7 East Cliff,
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PR1 3JE

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Contents

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 change of use of a barn at Stubbins House Farm, Stubbins Lane, Claughton-On-Brook to a flexible commercial use.

Site Location and Context

1.2. The site is located to the south of Stubbins Lane, Claughton-on-Brook and forms part of the larger Stubbins House Farm. The main farm buildings and farm house lie to the west of the site. To the north is another larger farm, Stubbins Farm and to the northeast a commercial unit and residential property. Further east is the main west coast railway line and the M6 motorway.

1.3. The site consists of a standard agricultural barn consisting of concrete panels to the lower section and slated wooden upper section. Therefore, additional internal construction work is required to make the building suitable for the intended use. An aerial photograph is contained within Figure 1.

1.4. The request for this acoustic assessment has been made sue to the potential impact of the intended use on surrounding residential properties.

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 including those within Lancashire 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. These levels are detailed with in the Lancashire Planning

Guidance document on noise which is in the process of being finalised and is currently used by a number of Lancashire authorities

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 LAeq,8hr is recommended with exterior levels mirroring those identified by the World Health Organisation. British Standard 4142:2014 'Method for rating industrial and commercial sound' compares the sound predicted by the source in question against the background, LA90 sound levels.

2.11. The "residual" L_{Aeq} measurement is then subtracted from the "ambient" L_{Aeq} measurement (with the sound source) to calculate the sound level created by the "problem" sound alone -termed the "specific" sound level.

2.12. If the "problem" sound is tonal, such as whine or hum, or if it is impulsive such as bangs or clatters or if it is irregular enough to attract attention a correction is added to the

"specific level" to produce the "rating level". The "background" LA90 measurement is then compared against the "rating level".

2.13. If the "rating level" exceeds the "background" by around 10 dB(A) or more this "indicates a significant adverse impact". A difference of around 5 dB(A) 'indicates an adverse impact. The lower the commercial noise level is, the lower the likely impact.

2.14. 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 the Council have requested a BS4142: 2014 assessment of the proposed impact of the proposed flexible use units. At this stage the final use of the units is unknown, with various uses being permitted under the proposed permission including shops, financial and professional services, restaurants and cafes, business, storage. The exact sound levels to be emitted from the site are therefore unknown.

3.2 Given the potential uses of the units it is not anticipated that the internally generated sound levels will be particularly high, and therefore in order to undertaken the requested assessment an internal level of 80dB(A) has been assumed.

3.3 This relates to the lower action value within the Noise at work guidelines and is highly unlikely to be exceeded within the identified uses even for short periods of time.

3.4 On site background sound level monitoring was undertaken for a period of a little over 24hours on the 8th-9th December 2017. The full results are provided within Appendix A, and have identified the following background sound levels on site;

Start Time	End Time	Duration	LAeq	LA90	LAMax
08/12/2017 08:00	08/12/2017 19:00	10:59:59	57.7	54.3	88.9
08/12/2017 19:00	08/12/2017 23:00	04:00:00	54.1	51.0	65.2
08/12/2017 23:00	09/12/2017 07:00	08:00:00	52.1	47.0	67.4
09/12/2017 07:00	09/12/2017 08:15	01:15:01	55.6	51.2	67.0

3.5 The weather during the monitoring period was dry and overcast with little wind and cold.

3.6 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 C. The monitoring location was situated adjacent to an existing barn which is currently being considered for conversion into residential property and therefore represents the potential nearest noise sensitive receptor.

3.7 Based on the measured background sound level on site and the assumed internally generated noise level and insulation value for the proposed units can be calculated, that will achieve the sound levels recommended above.

3.8 BS4142: 2014 states the greater the difference between the background sound level and the rating level is, the greater the magnitude of the impact. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

3.9 As such a criteria level of 10dB below the background level has been chosen in order to design the proposed units to ensure no adverse impact is observed.

3.10 The lowest background sound level observed was during the night-time period at 47.0dB $L_{A,8hr,}$ therefore a criterion of 37.0dB at the nearest noise sensitive property will apply.

3.11 Ignore any intervening buildings between the site and the nearest noise sensitive receptor standard distance attenuation over the 38.5m separation distance provides 23.7dB attenuation.

$$L_w = L_p + 20log(r) + 11 - 3$$

$$Distance\ att. = 20log(r) - 8$$

$$Distance\ att. = 20log(38.5) - 8$$

$$Distance\ att. = 23.7dB$$

3.12 The above results in a level of 60.7dB(A) outside the proposed units. This figure can then be used to calculate the required attenuation of the building based on the assumed internal sound level of 80dB(A).

$$SPL_{ext} = SPR_{int-}attenuation\ (R_w) - 6$$

$$attenuation\ (R_w) = SPR_{int} - SPL_{ext} - 6$$

$$attenuation\ (R_w) = 80 - 60.7 - 6$$

$$attenuation\ (R_w) = 13.3$$

3.13 At this time the final use of the proposed units is unknown and as such no assessment can be made of any tonal, impulsive or intermitted sounds. It is unlikely that the proposed uses will have any tonal, impulsive or intermittent sound emissions from the building but a further 5dB has been applied to the criteria so that the resulting sound level will be 15dB below the existing quietest background sound level and 22dB below the daytime background sound level measured on site.

3.14 Base on the above the sound attenuation of the building will need to be at least 18.3dB R_w.

3.15 A bare 100mm thick standard block wall will provide a sound reduction of approximately 42dB[1], increasing if plastered to 45dB, while a cavity wall system will provide 50dB R_w. Alternatively, a built-up metal profile cladding system will provide upwards of 40dB[2] attenuation. While standard double glazing will provide a sound reduction of 30dB.

3.16 As can be seen from the above information a number of common building materials can be used that will easily achieve the required 18.3dB sound attenuation and thus ensure that any sound emissions from the proposed units will not result in an adverse impact on the nearest noise sensitive receptor.

3.17 As requested by the Council a BS4142: 2014 assessment has been carried out based on the above measured sound levels and assumed sound reduction of 30dB from the building fabric, equivalent to the glazing unit. The full assessment is shown in Appendix

[1] http://www.kayelaby.npl.co.uk/general_physics/2_4/2_4_4.html

[2] https://www.tatasteelconstruction.com/static_files/Tata%20Steel/content/Tools%20&%20Resources%20articles/Download%20Zone/Colorcoat/Colorcoat_Acoustic_TechPaper_FINAL.pdf

B and concludes that the sound emissions will not have an adverse impact, with the predicted sound level over 20dB below the prevailing background sound level.

3.18 In addition, in line with the recommended sound levels within BS81233: 2014, from the World Health Organisation and those identified by Lancashire authorities the sound level to be experienced inside the nearby property will be 5.3dB(A), 24.7dB below the recommended level of 30dB(A) for internal bedroom areas during the night-time period. Based on an open window providing 15dB attenuation[3] .

[3] BS8233: 2014; Guidance on sound insulation and noise reduction for buildings

4. Conclusions

4.1. The use of the proposed units is currently unknown although the permissible use suggests low sound levels will be generated within them. In order to undertake a suitable assessment in line with the Council's requirement of a BS4142:2014 assessment the sound levels to be emitted have had to be estimated. An assumed level of 80dB(A) has been taken to allow for a robust assessment.

4.2. The current barn will need to have some construction work undertaken in order to split it up into the proposed units and to make them suitable for the intended uses. This work will improve the current structure and provide suitable attenuation to the building.

4.3. A minimum reduction of 30dB R_w is required by the building envelope, a figure easily achievable by most construction methods.

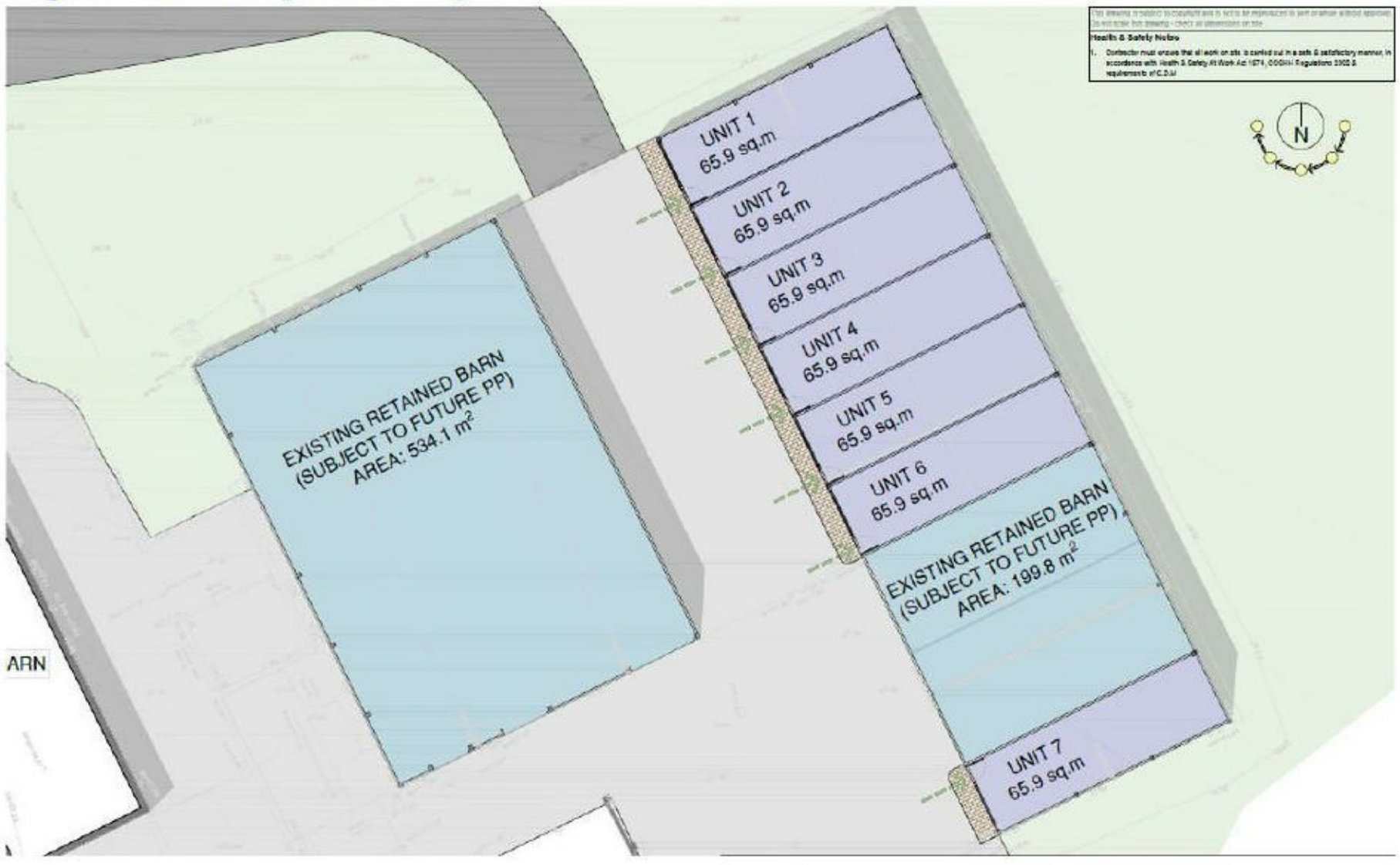
4.4. The above reduction will ensure that sound levels within the external amenity areas and internal environment will achieve the recommended guidance levels contained within BS8233:2014 and from the World Health Organisation, thus resulting in a No Observed Effect Level.

4.5. In addition, the BS4142:2014 assessment has shown that the proposed development is unlikely to results in an adverse impact on nearby receptor locations.

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 – Proposed Layout



Appendix A – Background Measurement Data

Time	Duration	L_{Aeq} (dB)	L_{AMax} (dB)	L_{A90} (dB)
08/12/2017 08:00	00:15:00	59.4	72.5	56.6
08/12/2017 08:15	00:15:00	61.4	81.6	58.4
08/12/2017 08:30	00:15:00	59.2	67.4	57.0
08/12/2017 08:45	00:15:00	57.5	68.9	55.4
08/12/2017 09:00	00:15:00	58.4	68.9	56.3
08/12/2017 09:15	00:15:00	58.1	69.4	55.7
08/12/2017 09:30	00:15:00	60.5	86.4	54.1
08/12/2017 09:45	00:15:00	56.6	67.7	53.7
08/12/2017 10:00	00:15:00	56.5	73.1	53.9
08/12/2017 10:15	00:15:00	55.4	65.2	53.2
08/12/2017 10:30	00:15:00	59.4	75.2	53.8
08/12/2017 10:45	00:15:00	57.0	73.2	54.6
08/12/2017 11:00	00:15:00	56.3	64.5	54.2
08/12/2017 11:15	00:15:00	55.6	61.5	54.0
08/12/2017 11:30	00:15:00	57.2	71.9	53.1
08/12/2017 11:45	00:15:00	56.0	68.8	53.3
08/12/2017 12:00	00:15:00	55.6	66.6	53.7
08/12/2017 12:15	00:15:00	55.9	73.6	53.6
08/12/2017 12:30	00:15:00	55.7	65.0	53.3
08/12/2017 12:45	00:15:00	55.8	65.0	53.5
08/12/2017 13:00	00:15:00	59.0	88.9	54.9
08/12/2017 13:15	00:15:00	57.0	66.6	54.8
08/12/2017 13:30	00:15:00	57.6	68.9	55.4
08/12/2017 13:45	00:15:00	56.6	66.6	54.5
08/12/2017 14:00	00:15:00	56.5	68.4	54.7
08/12/2017 14:15	00:15:00	57.2	64.8	55.1
08/12/2017 14:30	00:15:00	57.3	68.6	55.0
08/12/2017 14:45	00:15:00	58.1	77.5	55.9
08/12/2017 15:00	00:15:00	58.5	74.0	56.0
08/12/2017 15:15	00:15:00	58.4	72.5	56.3
08/12/2017 15:30	00:15:00	58.6	65.2	56.7
08/12/2017 15:45	00:15:00	57.8	67.3	55.5
08/12/2017 16:00	00:15:00	57.7	62.3	55.9
08/12/2017 16:15	00:15:00	58.4	65.2	56.7
08/12/2017 16:30	00:15:00	58.5	74.7	56.4
08/12/2017 16:45	00:15:00	59.4	71.9	57.1
08/12/2017 17:00	00:15:00	60.2	82.1	56.5
08/12/2017 17:15	00:15:00	58.3	75.2	56.2
08/12/2017 17:30	00:15:00	57.5	62.9	55.3
08/12/2017 17:45	00:15:00	56.5	71.8	54.3
08/12/2017 18:00	00:15:00	55.3	60.9	53.6

08/12/2017 18:15	00:15:00	55.4	61.4	53.6
08/12/2017 18:30	00:15:00	54.6	68.4	52.8
08/12/2017 18:45	00:15:00	55.9	66.5	53.5
08/12/2017 19:00	00:15:00	55.2	61.2	52.7
08/12/2017 19:15	00:15:00	56.0	64.0	53.8
08/12/2017 19:30	00:15:00	55.3	65.0	53.7
08/12/2017 19:45	00:15:00	54.9	64.3	52.4
08/12/2017 20:00	00:15:00	53.5	59.9	51.6
08/12/2017 20:15	00:15:00	54.0	62.8	51.9
08/12/2017 20:30	00:15:00	54.8	64.7	52.4
08/12/2017 20:45	00:15:00	54.3	65.2	51.5
08/12/2017 21:00	00:15:00	54.0	61.7	51.4
08/12/2017 21:15	00:15:00	53.1	63.0	50.9
08/12/2017 21:30	00:15:00	53.6	61.7	51.0
08/12/2017 21:45	00:15:00	53.5	62.3	51.0
08/12/2017 22:00	00:15:00	52.5	59.6	50.1
08/12/2017 22:15	00:15:00	53.4	61.8	50.1
08/12/2017 22:30	00:15:00	52.8	62.7	49.9
08/12/2017 22:45	00:15:00	51.5	58.0	48.8
08/12/2017 23:00	00:15:00	51.4	60.0	47.8
08/12/2017 23:15	00:15:00	51.1	65.3	48.3
08/12/2017 23:30	00:15:00	50.0	62.6	46.9
08/12/2017 23:45	00:15:00	48.8	56.2	45.6
09/12/2017 00:00	00:15:00	50.8	63.3	45.9
09/12/2017 00:15	00:15:00	49.7	58.0	45.5
09/12/2017 00:30	00:15:00	51.0	58.7	47.0
09/12/2017 00:45	00:15:00	49.5	57.9	45.1
09/12/2017 01:00	00:15:00	50.7	63.9	46.6
09/12/2017 01:15	00:15:00	52.0	62.9	46.4
09/12/2017 01:30	00:15:00	52.3	67.4	47.9
09/12/2017 01:45	00:15:00	52.8	61.4	49.1
09/12/2017 02:00	00:15:00	51.1	58.3	46.1
09/12/2017 02:15	00:15:00	51.4	60.9	45.8
09/12/2017 02:30	00:15:00	49.3	56.9	44.9
09/12/2017 02:45	00:15:00	50.8	61.9	46.4
09/12/2017 03:00	00:15:00	48.6	57.2	44.4
09/12/2017 03:15	00:15:00	49.3	60.3	45.7
09/12/2017 03:30	00:15:00	51.3	64.0	46.2
09/12/2017 03:45	00:15:00	51.2	59.6	46.2
09/12/2017 04:00	00:15:00	51.2	66.3	45.2
09/12/2017 04:15	00:15:00	51.2	57.4	48.5
09/12/2017 04:30	00:15:00	53.3	62.0	50.1
09/12/2017 04:45	00:15:00	55.3	66.8	51.4
09/12/2017 05:00	00:15:00	52.6	60.0	49.5

09/12/2017 05:15	00:15:00	52.5	60.7	49.0
09/12/2017 05:30	00:15:00	52.7	63.0	49.7
09/12/2017 05:45	00:15:00	52.1	66.4	50.0
09/12/2017 06:00	00:15:00	54.2	61.1	51.3
09/12/2017 06:15	00:15:00	53.9	61.3	51.4
09/12/2017 06:30	00:15:00	54.2	62.2	52.3
09/12/2017 06:45	00:15:00	56.6	64.2	54.0
09/12/2017 07:00	00:15:00	57.4	64.2	54.0
09/12/2017 07:15	00:15:00	55.2	65.1	53.1
09/12/2017 07:30	00:15:00	55.8	62.2	52.4
09/12/2017 07:45	00:15:00	52.0	64.1	48.1
09/12/2017 08:00	00:15:00	55.9	67.0	53.4

Appendix B – BS4142 Assessment

Specific sound level

$$Specific\ sound\ level\ = SPL_{int} - R_w - 6 - Dist.Attenuation$$
$$Specific\ sound\ level\ = 80 - 30 - 6 - 23.7$$
$$Specific\ sound\ level\ = 20.3dB$$

Measured Ambient sound level	L_{Aeq} = 48.8dB Distance corrected	Lowest measured on site (48.2+20.3)
Residual Sound level	L_{Aeq} = 48.8dB	Night-time average measured sound level (quietest period)
Background Sound Level	L_{A90} = 45.6dB	Lowest from critical night-time period (23:00-00:00 & 06:00-07:00)
Reference period 15 minutes		Normal ref period,
Specific sound Level	L_{Aeq} = 20.3dB	Calculated
Acoustic feature	+5dB	No information available so assumed 5dB correction given
Rating level	(20.3+5) = 25.3dB	
Background sound level	L_{A90} = 51dB	
Excess of Rating level over background level	(25.3-45.6) dB = **-20.3dB** indicates not a significant adverse impact	
Uncertainty		Final design of site, use of buildings and sound level to be created is unknown. No confirmation that the nearest sensitive receptor will be built. No consideration of intervening barrier attenuation considered.

Appendix C – Calibration Certificates

Certificate of Calibration

Cirrus Research plc
dedicated to noise measurement

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 subsitituting 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 T. A. Goodhill

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
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
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.

Cirrus Research plc, Acoustic House, Bridlington Road
Hunmanby, North Yorkshire, YO14 0PH, United Kingdom
Telephone: 0845 230 2434 **Int**: +44 1723 891655
Email: sales@cirrusresearch.co.uk
Web: www.cirrusresearch.co.uk
UK Registration No. 987160

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 Sensitivity at 1 kHz: **47.7 mV/Pa**
-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

[redacted]

Cirrus Research plc, Acoustic House, Bridlington Road
Hunmanby, North Yorkshire, YO14 0PH, United Kingdom
Telephone: 0845 230 2434 **Int**: +44 1723 891655
Email: sales@cirrusresearch.co.uk
Web: www.cirrusresearch.co.uk
UK Registration No. 987160