

PEAK acoustics

Noise Assessment Report

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Rev. 0 28/11/2019

Noise Impact Assessment

Project Reference Number: PA933

Report Reference Number: KD0110193NR

Assessment Standard: BS4142:2014

Client: McCormick Europe Ltd.

Site: 138 Whitelees Road, Littleborough, OL15 8BZ

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Contents

Project Information 4
Assessment Summary 5
1. Proposed Noise Sources 6
2. Subjective Impressions 6
3. NSR and Measurement Locations 7
4. Measurement Procedure 8
5. Measurement Equipment 8
6. Weather Conditions 8
7. Background Sound Level 9
8. Specific Sound Levels 9
9. Rating Level 10
10. Rating Level Vs Background 11
11. Mitigation 12
12. Mitigated Noise Levels 12
13. Conclusion 13
APPENDIX A – Measurement Details 14
APPENDIX B - Equipment Details 14
APPENDIX C - Meteorology Details 14
APPENDIX D - Calibration Details 14
APPENDIX E – Noise Survey Results 15
APPENDIX F – Calculations 18
APPENDIX G – Approximate Fencing Plan 21

Project Information

Peak Acoustics has been commissioned to undertake the assessment detailed within this report. Below is a summary of pre-commencement requirements and comments as communicated to Peak Acoustics by involved parties. This information forms the basis of the assessment and report.

Client Contact	Tony Cocker
Client Requirement	A Noise Impact Assessment has been requested by the client in relation to seasonal operation of an industrial HVAC system. McCormick is looking to operate a HVAC system during the warmer summer months, a noise assessment is to determine the noise impact and provide methods of mitigation, if required.
Selected Methodology	*'BS4142:2014 – Methods for rating and assessing industrial and commercial sound'*
Methodology Justification	BS4142:2014 is a recognised standard for determining the noise impact of fixed plant machinery via relation of emissions to the measured background noise levels on site.
Local Authority Contact	N/A
Local Authority Consultation	N/A
Local Authority Guidance/Unitary Development Plans/Unique or bespoke standards	N/A

Assessment Summary

A Noise Impact Assessment has been conducted at McCormick Europe, 138 Whitelees Road, Littleborough, OL15 8BZ in relation to the proposed seasonal operation of an industrial HVAC system.

A background noise survey was undertaken from 14th – 15th October 2019 to obtain measurements of the existing noise climate representative of nearby Noise Sensitive Receptors (NSRs). The nearest receptors were identified as residential dwellings east and south of the site location on Wood Street and Church Street respectively.

A BS4142:2014 assessment identified the potential for adverse noise impacts upon both identified noise sensitive receptors, with rating levels exceeding the background sound level by 14 dB at the worst affected NSR.

Mitigation in the form of fencing has been recommended to reduce the noise impact upon nearby residents

Provided that the recommended mitigation described within this report are implemented and maintained, operation of the industrial HVAC system will be unlikely to give rise to adverse noise impacts upon the surrounding residential community.

1. Proposed Noise Sources

1.1 McCormick Europe are proposing to install and operate an industrial HVAC system in an effort to control internal temperatures during the warmer summer months.

1.2 It is understood that the unit(s) is to be installed during late spring - early summer and removed mid – late Autumn.

1.3 The exact make and model of the unit(s) could not be discerned however, it was determined that the system comprises of two identical units operating simultaneously.

1.4 The system is to be installed in a grassed area at the rear of the site on Stockton Street.

1.5 McCormick's site operates 24hrs and therefore the system has potential to operate during the night-time.

1.6 Measurements of the HVAC system in situ derived a noise level of 83 dBA at 2m.

2. Subjective Impressions

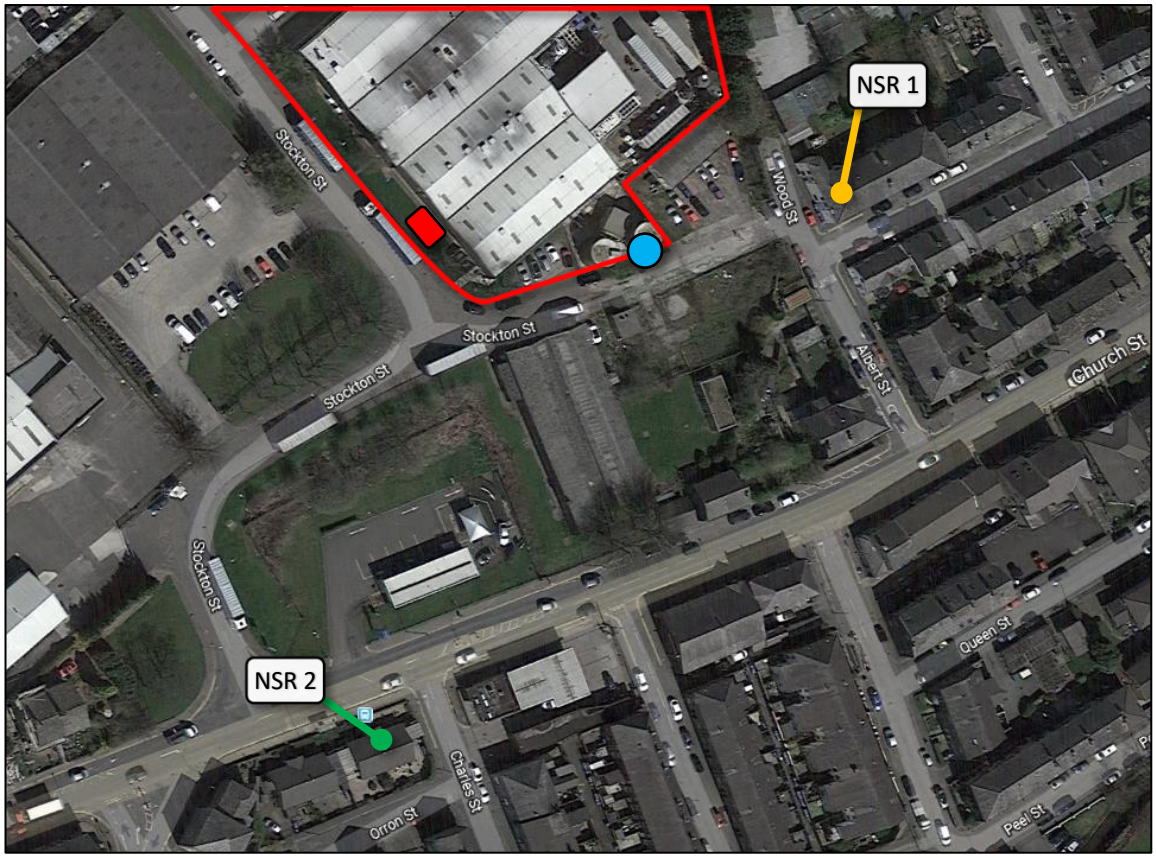
2.1 The existing noise climate on site consists primarily of industrial activity and vehicle traffic. Heavy goods vehicles and other large industrial vehicles regularly access the industrial estate via Church Street (A58) whereby noise from engines and road/tire interaction is dominant. A regular flow of traffic passes on Church Street (A58), the main road through Littleborough, and is the dominant noise source at the NSR locations. Conversing pedestrians and general commercial activity was also a notable source.

3. NSR and Measurement Locations

3.1 The nearest Noise Sensitive Receptors (NSRs) have been identified as residential dwellings east of the site location on Wood Street ('NSR 1') and South on Church Street ('NSR 2').

3.2 The site, NSRs, noise monitoring location and noise source location are shown in **Figure 1** below.

Figure 1: Measurement and NSR Locations



Background Sound Monitoring Location (M1)

HVAC unit(s) Location (Approx.)

NSR 1 Location

NSR 2 Location

McCormick Site Boundary (Approx.)

4. Measurement Procedure

4.1 Measurements of the HVAC system in situ were conducted on Monday 14th October from 11:00 – 11:30. Noise from the system was continuous in level therefore a 5-minute measurement was deemed suitable. As the measurement was conducted with the system in situ, reflections from nearby surfaces have been accounted for. Measurements of L_{eq} were logged at 1/3 octave resolution. Measurement data is shown graphically in **Appendix E.**

4.2 A 15-minute measurement of the residual noise climate was conducted to negate the influence of other unrelated sources.

4.3 An unattended background noise survey was conducted at position M1 over a period of 24 hours from 14th – 15th October 2019. Measurements of $L_{Aeq,T}$ and $L_{A90,T}$ were logged in 5-min intervals.

4.4 At position M1 the microphone was placed approximately 1.7m from ground level.

4.5 In an effort to nullify the influence of noise sources related to McCormick's site, external plant equipment close to the measurement location was turned off from 23:00 – 07:00 during measurement M1. Analysis of the measurement data post survey indicated that certain commercial sources were captured during the survey. The measured levels have therefore been offset to account for this; described in more detail in **Section 7.**

5. Measurement Equipment

5.1 Measurements were obtained using Class 1 instrumentation. Full equipment details are given in **Appendix B**.

5.2 Equipment was calibrated before and after use and no significant drift occurred during measurements. Full calibration details are provided in **Appendix D**.

6. Weather Conditions

6.1 Weather conditions were generally dry with temperatures of around 13°C and wind speeds of 2 – 3 m/s. Some light precipitation occurred during the evening of the 14th but did not influence the measurement data. Detailed meteorological information can be found in **Appendix C**.

7. Background Sound Level

7.1 As the system has the potential to operate anytime, the assessment will consider the night-time criteria as representative of the most time sensitive period.

7.2 As described in Section 4, noise sources relating to McCormick influenced the background measurement data. In an effort to account for this the lowest 15-minute period measured during the background noise survey will be utilised with a further 10 dB reduction applied; deemed representative of the likely lowest levels at the NSR locations.

7.3 The background sound level considered within the assessment is summarised in **Table 1** below.

Table 1: Night-time Background Sound Levels

Location	Day/Night	Period	Lowest Background, dB $L_{A90,T}$	Corrected Background, dB $L_{A90,T}$
M1	Night *(23:00 – 07:00)*	02:05 – 02:20 on 15/10/19	47	37

8. Specific Sound Levels

8.1 The Specific Sound Level is denoted L_{As} and is the A-weighted, equivalent noise level at the NSR location.

8.2 The Specific Sound Levels have been calculated to the NSR locations while accounting for distance attenuation and shielding provided by surrounding structures.

8.3 The location of NSR 1 in relation the HVAC location is such that it is provided a full blockage in line of sight between the source and receiver, corresponding to a 10 dB attenuation of noise levels

8.4 Full calculations are shown in **Appendix F** and the derived Specific Sound Levels are tabulated below:

Table 2: Specific Sound Levels

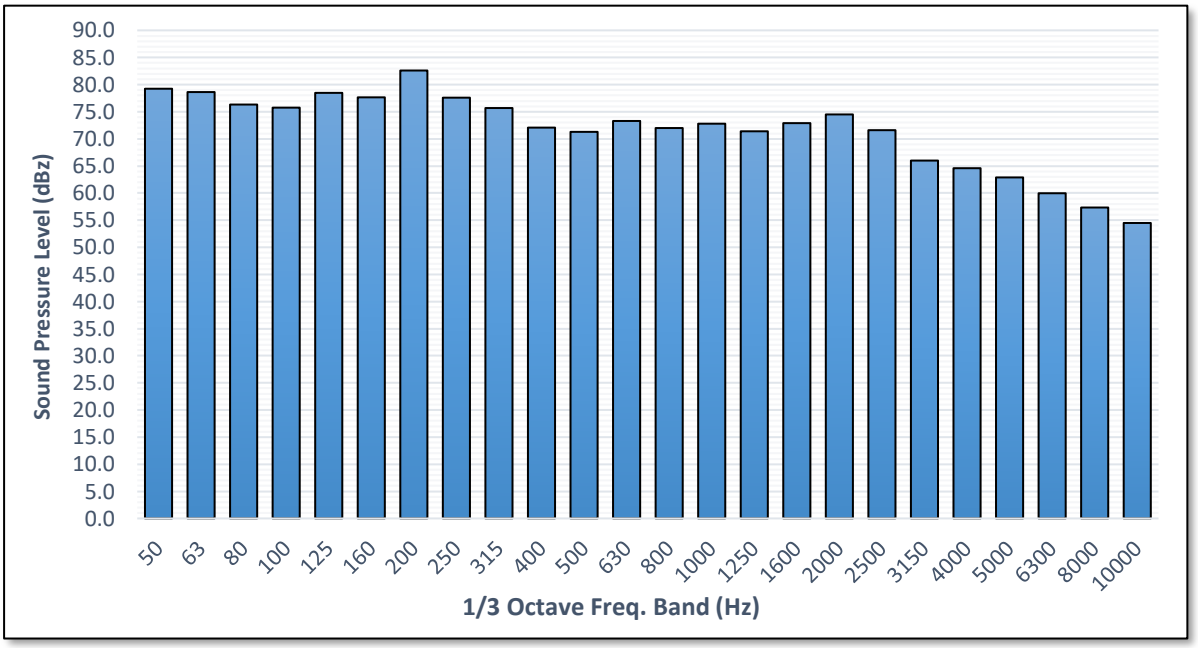
NSR	Specific Sound Level, dB L_{As}
1	40
2	48

9. Rating Level

9.1 In accordance with BS4142:2014, the Specific Sound Levels may be corrected for characteristics that make the sound more noticeable at the NSR location such as tonality, impulsivity and intermittency.

9.2 The tonality of the system has been assessed via the objective method described in BS4142:2014 Annex C, p53. The measured L_{eq} values have been graphed below and demonstrates that the no dominating tone is present and therefore no penalty for tonality is applicable.

Figure 2: Measured HVAC Frequency Content



9.3 The output and operation of the HVAC system may vary in response to changes in temperature; a 3 dB penalty for intermittency is therefore deemed applicable.

9.4 The HVAC system produces no impulsive characteristics; penalties for impulsivity is therefore not deemed appropriate.

9.5 The Rating Levels following application of character corrections are summarised in **Table 3**.

Table 3: Rating Level Calculations

NSR	Specific Sound Level, dB L_{As}	Total BS4142 Corrections	Sound Rating Level, dB L_{Ar}
1	40	+ 3.0	**43**
2	48	+ 3.0	**51**

10. Rating Level Vs Background

10.1 The noise impact of the proposed noise source is to be determined in accordance with BS4142:2014.

10.2 The rating levels are to be compared to the background sound level to determine noise impact in accordance with BS4142:2014:

A Sound Rating Level at or below the background noise level is indicative of *Low Impact;*

A Sound Rating Level that exceeds the background noise level by around +5dB is likely an indication of *Adverse Impact*, depending on the context;

A Sound Rating Level that exceeds the background noise level by around +10dB is likely an indication of *Significant Adverse Impact*, depending on the context;

10.3 The noise impact at the NSR locations is tabulated below:

Table 4: Noise Impact

NSR	Rating Level, dB L_{Ar}	Background, dB L_{A90}	Difference, dB	Impact
1	43	37	+ 6	*Adverse*
2	51	37	+ 14	*Significant Adverse*

10.4 The rating levels at the NSR locations indicated the potential for adverse noise impacts upon the noise sensitive receptors. Mitigation to reduce rating levels is provided in **Section 11.**

11. Mitigation

11.1 Noise emissions from the HVAC system could be adequately controlled at the NSR locations using appropriate screening in the form of close boarded fencing. The section of fencing should conform to the following specifications:

- Located approximately as shown in **Appendix G**
- At least 2.2m in height
- Have minimum mass per unit area of 15 kg/m^2
- No gaps within the structure or between panels

11.2 An example of a manufacturer that supplies suitable fencing is *Jacksons. Jacksons* also manufacture acoustically rated security barriers if required.

11.3 The barrier calculation shown in **Appendix F** demonstrates that 13 dB insertion loss is achievable.

12. Mitigated Noise Levels

12.1 Rating Levels have been re-calculated considering the proposed mitigation and are tabulated below.

Table 4: Mitigated Noise Impact

NSR	Rating Level, dB L_{Ar}	Background, dB L_{A90}	Difference, dB	Impact
1	30	37	- 7	*Low Impact*
2	38	37	+ 1	*Low Impact*

12.2 Following implantation of the recommended mitigation, the noise impact upon all nearby noise sensitive receptors would be *Low* in accordance with BS4142:2014. The minor exceedance of 1 dB at NSR 2 is considered imperceptible with regards to human hearing.

13. Conclusion

13.1 A Noise Impact Assessment has been conducted for the proposed installation and seasonal operation of an industrial HVAC system at McCormick Europe, 138 Whitelees Road, Littleborough, OL15 8BZ.

13.2 A background noise survey was undertaken to derive representative background sound levels at the nearest noise sensitive receptors.

13.3 Noise Sensitive Receptors were identified as residential dwellings east and south of the site location.

13.4 A BS4142:2014 assessment identified the potential for adverse noise impacts upon nearby receptors. Mitigation in the form of close board fencing has been recommended to control noise emissions and ensure a Low Impact is maintained.

APPENDIX A – Measurement Details

Measurement	Kit	Start Date	Start Time	End Date	End Time
M1 ***(BG)***	A4	14/10/19	12:00	15/10/19	12:00
M2 ***(Source)***	A4	14/10/19	11:20	14/10/19	11:25
M3 ***(Residual)***	A4	14/10/19	11:28	14/10/19	11:46

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A4	Sound Meter	Svantek	971	1	60688
A4	Pre-Amp	Svantek	SV18	1	62781
A4	Microphone	ACO	7052E	1	66703
A4	Calibrator	Svantek	SV33A	1	90273

APPENDIX C - Meteorology Details

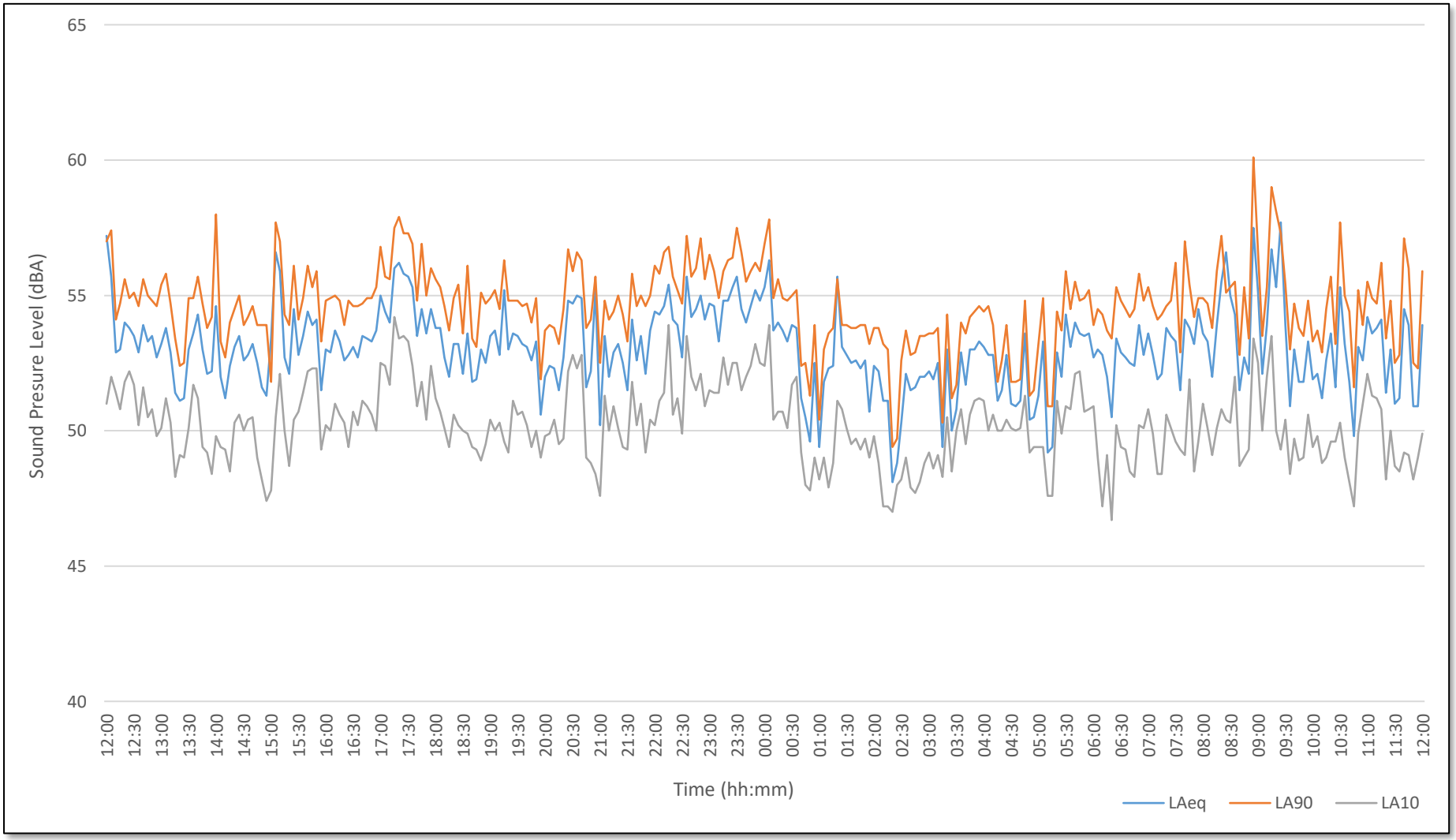
Date	Temp C°	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
14/10/19 ***(Start of Survey)***	14	2 – 3	N	83	0.0	1/8
15/10/19 ***(End of Survey)***	12	2 – 3	N	84	1.0	1/8

APPENDIX D - Calibration Details

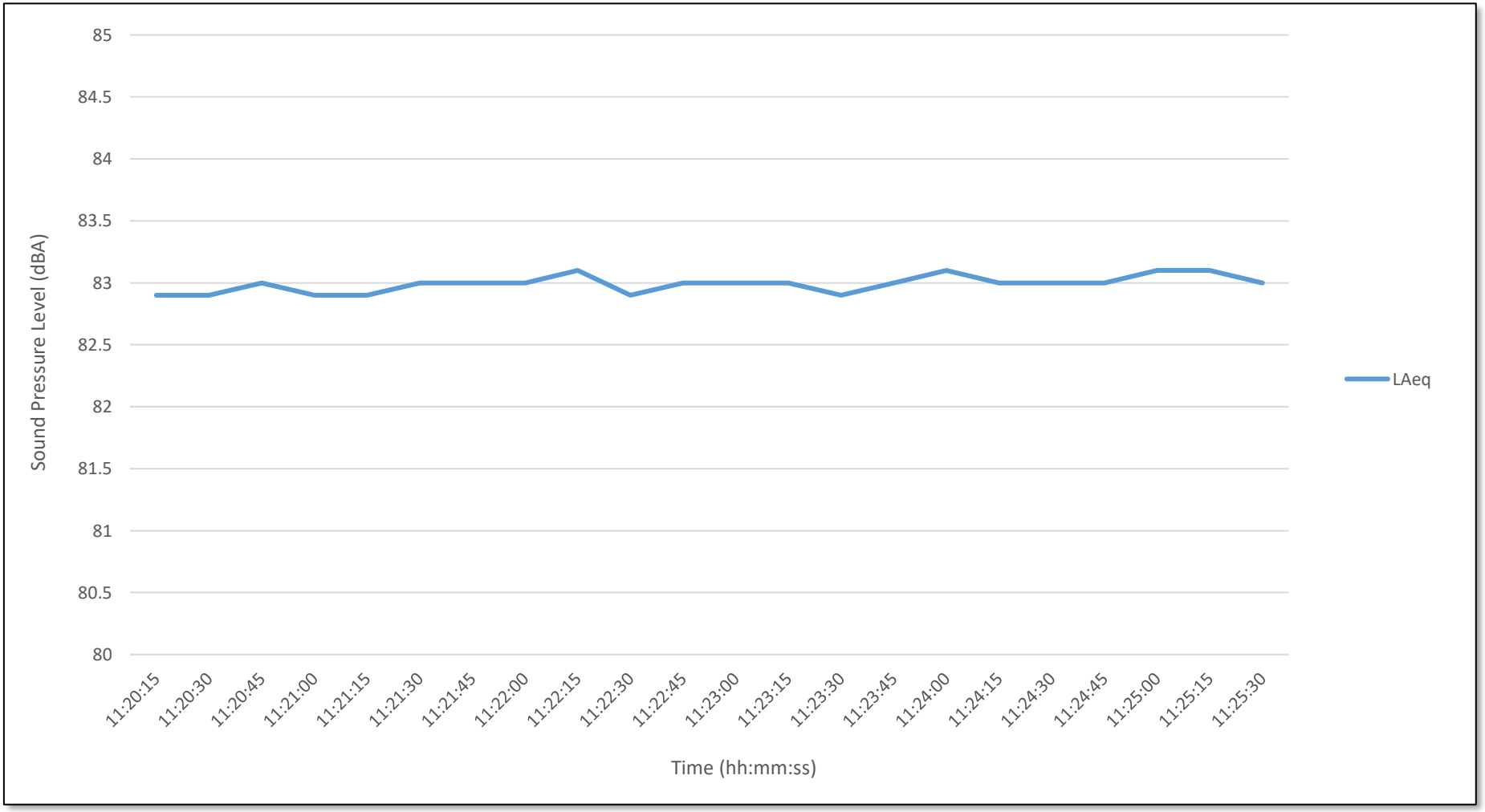
Measurement	Calibrator Ref Level (dB)	Level Before (dB)	Deviation Before (dB)	Level After (dB)	Deviation After (dB)
M1	114.0	114.5	0.5	114.0	0.5

APPENDIX E – Noise Survey Results

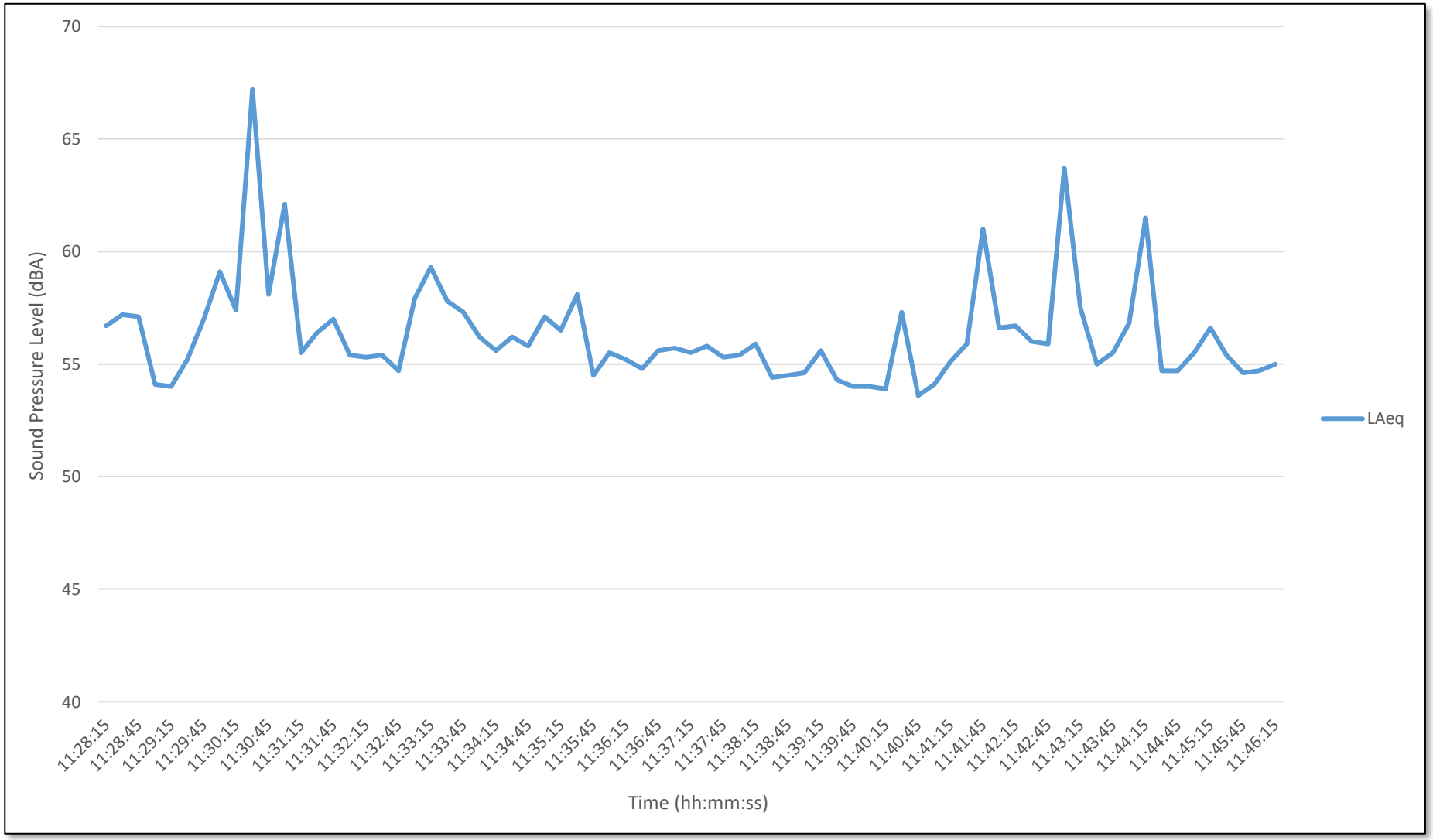
Measured Background Sound Levels [M1] 14th – 15th October 2019



Measurement M2 – HVAC Unit



Measurement M3 – Residual Sound Level



APPENDIX F – Calculations

Noise Source Calculations

Noise Source Levels											
		Hz	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
Measurement M2 - HVAC Unit	2	m	83.1	82.2	84.4	77.1	76.9	77.9	69.5	62.6	
Measirement M3 - Residual Levels			65.1	61.7	55.7	52.6	49.9	46.6	44.6	42.3	
Corrected Levels - HVAC unit	2	m	83.0	82.2	84.4	77.1	76.9	77.9	69.4	62.6	83.2

Noise Impact Calculations

HVAC System											
No Mitigation		**Hz**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
HVAC Unit(s)	2	m	83	82	84	77	77	78	69	63	83
NSR 1 (E)											
Line-of-Sight (Full Blockage)			-10	-10	-10	-10	-10	-10	-10	-10	
NSR 1 (E) -Distance Loss			-33	-33	-33	-33	-33	-33	-33	-33	
NSR 1 (E) - Total			40	39	41	34	34	35	26	20	40
NSR 2 (S)											
NSR 2 (S) - Distance Loss			-35	-35	-35	-35	-35	-35	-35	-35	
NSR 2 (S) - Total			48	47	49	42	42	43	34	28	48

HVAC System											
Mitigation (2.2m Fencing)		**Hz**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
HVAC Unit(s)	2	m	83	82	84	77	77	78	69	63	83
NSR 1 (E)											
Line-of-Sight (Full Blockage)			-10	-10	-10	-10	-10	-10	-10	-10	
2.2m Close Board Fencing Loss			-6	-8	-9	-12	-14	-17	-20	-23	
NSR 1 (E) -Distance Loss			-33	-33	-33	-33	-33	-33	-33	-33	
NSR 1 (E) - Total			34	31	32	22	20	18	7	-3	27
NSR 2 (S)											
NSR 2 (S) - Distance Loss			-35	-35	-35	-35	-35	-35	-35	-35	
2.2m Close Board Fencing Loss			-7	-8	-10	-12	-15	-17	-20	-23	
NSR 2 (S) - Total			41	39	40	30	27	25	14	4	35

Barrier Calculations

Barrier Calculation - NSR 1 (E)

Distance - Barrier to Source	m	**1**
Height - Source from Ground	m	**1.5**
Distance - Barrier to NSR	m	**84**
Height - NSR from Ground	m	**4.5**
Height - Barrier Top from Ground	m	**2.2**
(C) Direct Path	*m*	85.1
(A) Source-to BarrierTop	*m*	1.22
(B) NSR-to-BarrierTop	*m*	84.03
Path Diff.	*m*	**0.20**

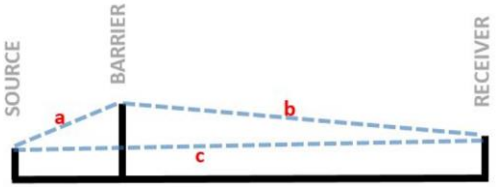
Barrier performance estimated using the *Maekawa* formula:

$$A_{barrier} = 10\log(3 + 20N)$$

Where:

$$N\ (\text{Fresnel Number}) = \frac{2\delta}{\lambda}$$

$$\delta = \text{Path Difference } (a + b - c)$$



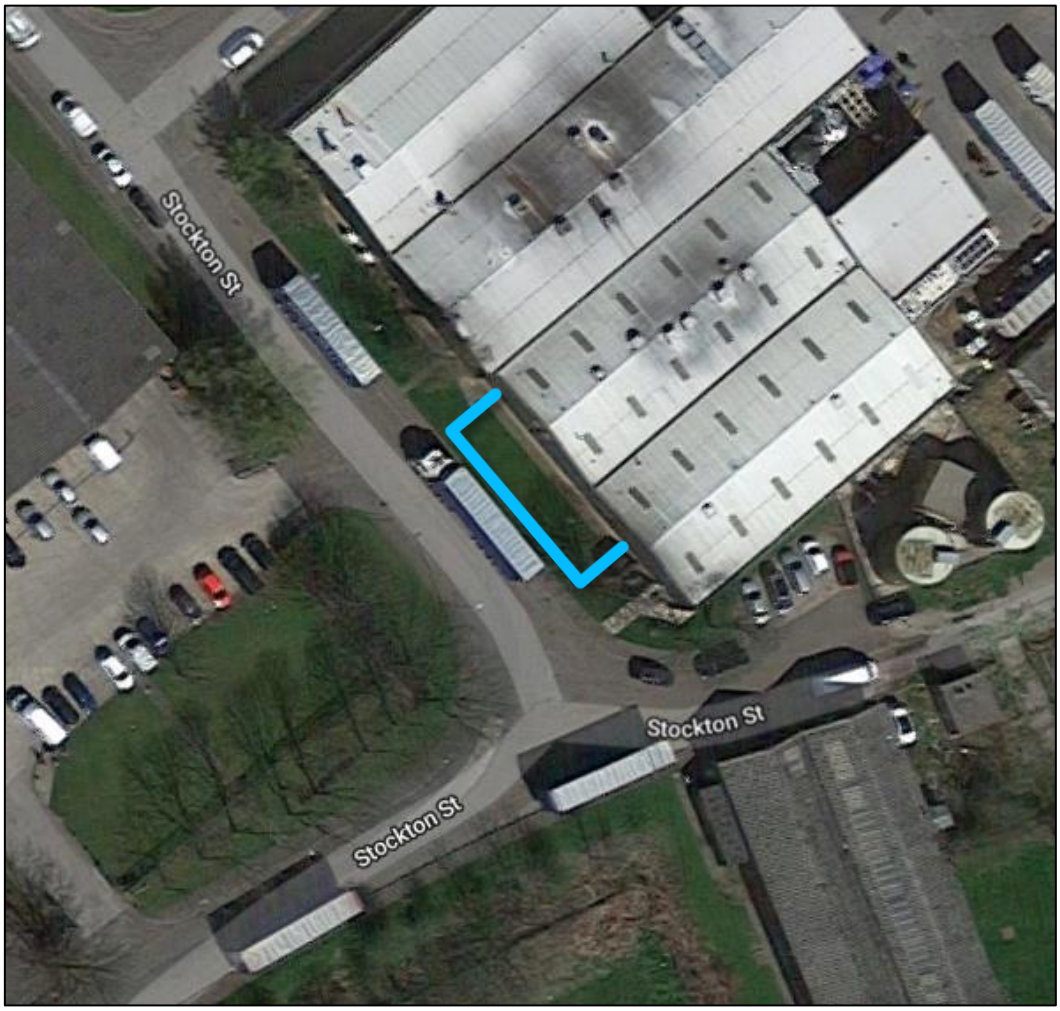
Frequency (Hz)	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***	**dBA**
Wavelength (m)	5.444	2.744	1.372	0.686	0.343	0.172	0.086	0.043	
Fresnel No.	0.07	0.15	0.29	0.58	1.16	2.32	4.65	9.27	
Δbarrier (dB)	**6.5**	**7.7**	**9.4**	**11.6**	**14.2**	**16.9**	**19.8**	**22.7**	
Barrier Loss	**-6.5**	**-7.7**	**-9.4**	**-11.6**	**-14.2**	**-16.9**	**-19.8**	**-22.7**	

Barrier Calculation - NSR 2 (S)

Distance - Barrier to Source	m	**1**
Height - Source from Ground	m	**1.5**
Distance - Barrier to NSR	m	**107**
Height - NSR from Ground	m	**1**
Height - Barrier Top from Ground	m	**2.2**
(C) Direct Path	*m*	108.0
(A) Source-to BarrierTop	*m*	1.22
(B) NSR-to-BarrierTop	*m*	107.01
Path Diff.	*m*	**0.23**

Frequency (Hz)	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***	**dBA**
Wavelength (m)	5.444	2.744	1.372	0.686	0.343	0.172	0.086	0.043	
Fresnel No.	0.08	0.16	0.33	0.66	1.32	2.64	5.28	10.52	
Δbarrier (dB)	**6.7**	**8.0**	**9.8**	**12.1**	**14.7**	**17.5**	**20.4**	**23.3**	
Barrier Loss	**-6.7**	**-8.0**	**-9.8**	**-12.1**	**-14.7**	**-17.5**	**-20.4**	**-23.3**	

APPENDIX G – Approximate Fencing Plan



- Approximate Fencing Location

PEAK acoustics



Let us introduce ourselves

Peak Acoustics formed in 2011, we are a fully accredited specialist consultancy and testing organisation.

We are a diverse team of Acoustic Consultants, Specialist Engineers and Building Compliance Technicians, with a network spanning the UK. We are proud to offer our services nationally, with no job too big or small.

We provide Acoustic Consultancy, Building Compliance Testing and Energy Services.

Additional Services

We offer an extensive range of services in the sectors of Acoustic Consultancy, Building Compliance & Energy Efficiency. We are able to put together custom packages combining multiple services which saves both time and money for you.

Building Compliance

- **Sound Insulation Testing**
- **Air Tightness Testing**
- **Ventilation Testing**
- **Water Efficiency Calculations**
- **Sound Insulation Specification**

Energy Efficiency

- **SAP Calculations**
- **EPC's**
- **SBEM Calculations**
- **Energy Statements**
- **Sustainability Statements**
- **MEES Regulations**
- **Commercial EPC's**

Acoustic Consultancy

- **Noise Assessment for planning conditions**
- **Construction site noise monitoring**
- **Noise at work assessments**
- **Noise & Vibration Impact Assessments**

Peace of mind

We are accredited and registered by all the relevant major UK authorities to provide the services we offer. Peak Acoustics is UKAS accredited for sound insulation testing, ATTMA registered for Air Leakage Testing. and our Energy team are all Domestic On-Completion Energy Assessors.

Our Added Value

We combine our detailed knowledge of building regulations with our technical understanding of building physics, acoustics and environmental sciences to maximise development quality. Our work ensures appropriate strategies and studies are prepared to demonstrate to local authorities how proposed developments will be of high quality and generate acceptable impact on the surrounding environment.

Contact Us

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