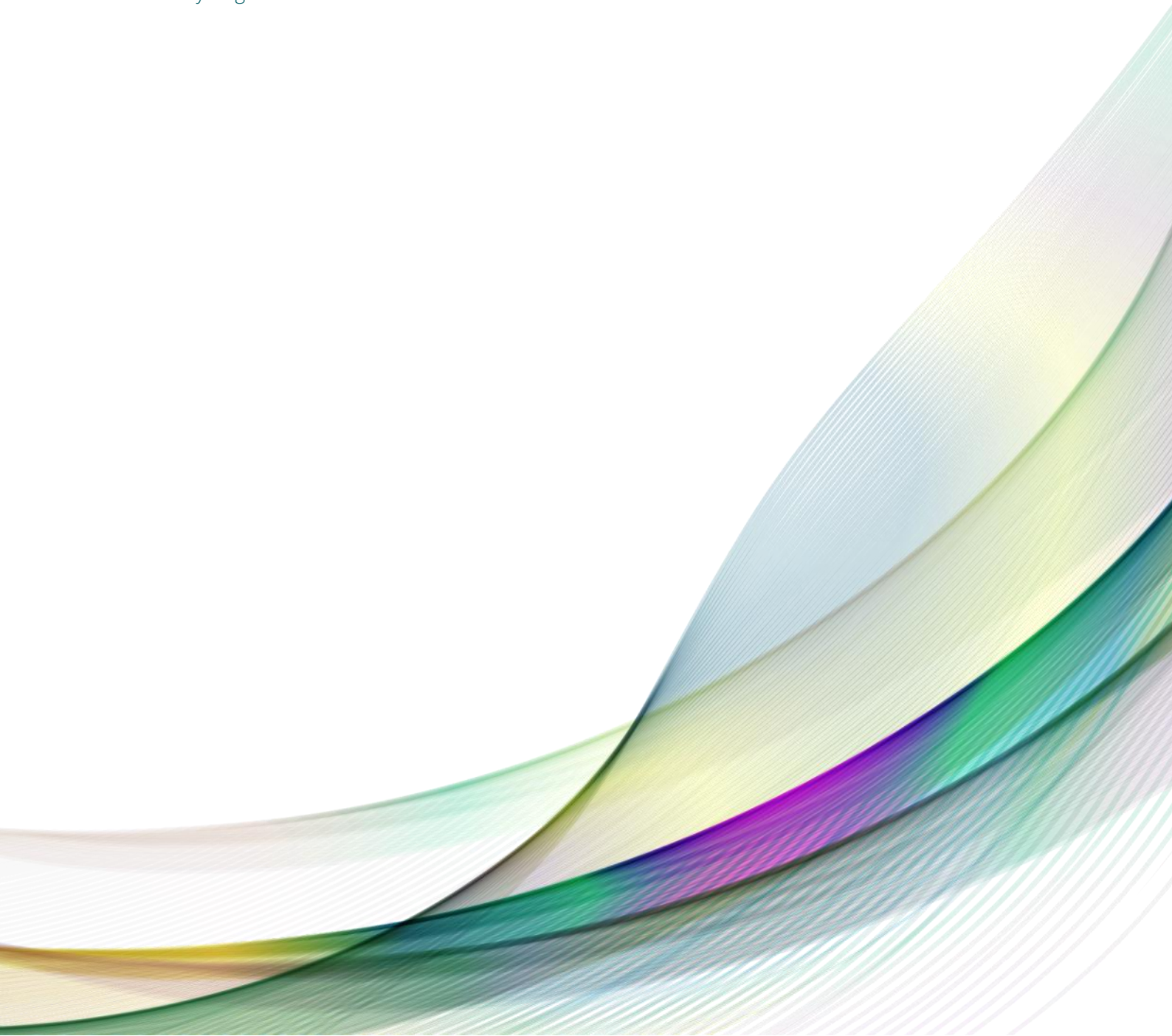




CELTIC RECYCLING

BAT Noise Assessment

Celtic Recycling



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1.0 PROJECT OVERVIEW

1.1 Project Summary

MACH has been appointed by Celtic Recycling to undertake an environmental noise assessment of the existing shredder on 23/10/2020.

An onsite noise survey has been carried out to assess the prevailing background noise levels at the nearest noise sensitive receptors. A calculation of specific noise levels at nearby noise sensitive receptors has been undertaken and compared to the background noise levels in line with BAT Reference Document for Waste Treatment.

1.2 Performance Standards

The table below outlines the various performance standards and guidance documents which have formed the basis of the acoustic design. Any standards which have been included in the table below, but are not marked mandatory, have been referred to for guidance only.

Document	Mandatory to demonstrate compliance with	
	National Planning Guidance	Employed British Standards Guidance
BAT 17 & BAT Ref for Waste Treatment		
BS 8223:2014	-	√
BS 7445	-	√
NPSE	√	-
NPPF	√	-

Table 1-1: Performance Standards

BS8233:2014 lists the internal ambient noise levels for night and day. These guidelines are backed by WHO, and state the noise levels appropriate in bedrooms and living rooms for sleeping and resting.

BS4142:2014 is a British standard which provides a procedure to assess the risk of complaint from new or existing industrial noise.

BS7445 provides several recommendations on how to carry out a repeatable noise survey.

1.2.1 Best Available Techniques for Controlling Noise and Vibration

Section 3.1.2.3 of BAT Reference Document for Waste Treatment

“The operation of shredder plants results in noise emissions, caused by the machinery and material-handling technology, as well as by the delivery of the shredder feed and the transportation of the output. Monitoring has been carried out in some Member States of both shredder operational/processing levels and idle, non-processing levels, and levels associated with the plant when the mill was shut down. Such information indicated that the mill is the main source of noise on the site even though other operations contribute significantly to the plant noise.”

The noise assessment conducted at Celtic Recycling generated noise data from all of the above-mentioned states of operation. Mach has provided an assessment of the copper shredder based on a comparison of existing noise levels at the nearest sensitive offices, the noise levels at the same receptors with the noise source active.

2.0 NOISE CLIMATE

2.1 Site Description

The facility at Celtic Recycling lies within Queensway Meadows Industrial Estate. Marked on Figure 2-1 are the locations of offices at Dimension 8, Stannah and Brammer.



Figure 2-1: Site Boundary (Red) and Nearest Noise Sensitive Receivers (Blue) and noise sources (yellow)

2.2 Nearest Noise Sensitive Receivers

The site is located adjacent to a busy road. There are no residential dwellings in the nearby area; hence the assessment has been based on the surrounding offices. Figure 2.1 illustrates the location of the copper shredder and associated fan unit, in relation to these offices

Type	Location	Distance from Site Boundary (m)
Office (Brammer)	North west	60
Office (Stannah)	North	105
Office (Dimension 8)	North east	60

Table 2-1: Nearby noise sensitive receivers

2.3 Measurement Positions

Measurement positions used throughout the survey are shown below, with long-term metering positions **blue**, and short-term metering positions **yellow**.

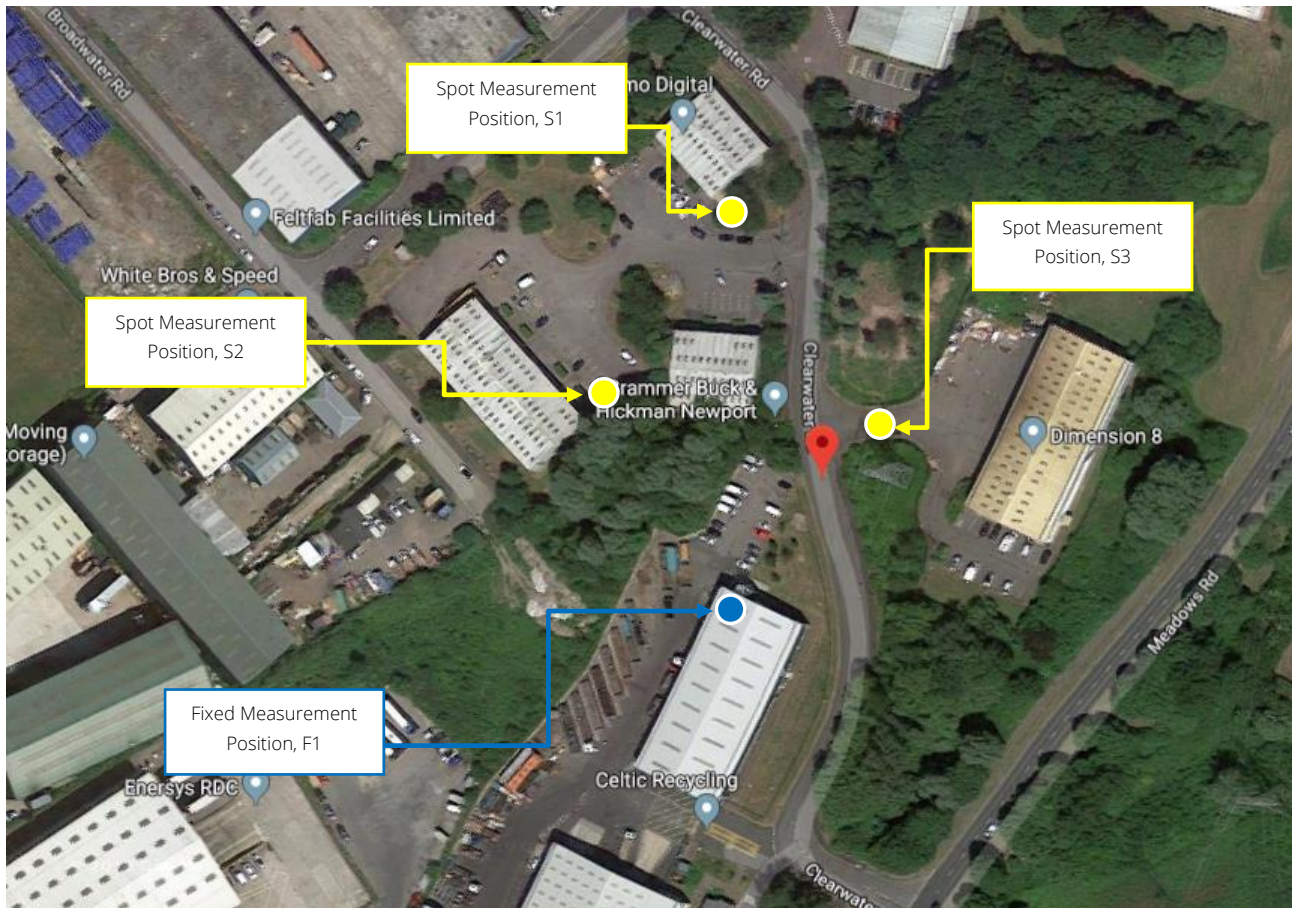


Figure 2-2: Measurement Positions, where blue are the fixed measurements and yellow the spot measurements.

2.4 Noise Sources

Noise Source	Noise Contribution	Description
Road Traffic Noise	Ambient	General road traffic noise from Meadows Road located to the east of the site.

Table 2-2: Brief description of noise sources

3.0 NOISE SURVEY

The following sections show the results from the noise survey carried out from 13:15 on 23/10/20 to 15:25 on 23/10/20. The positioning of the microphones is shown in Figure 2.2.

3.1 Fixed Position, F1

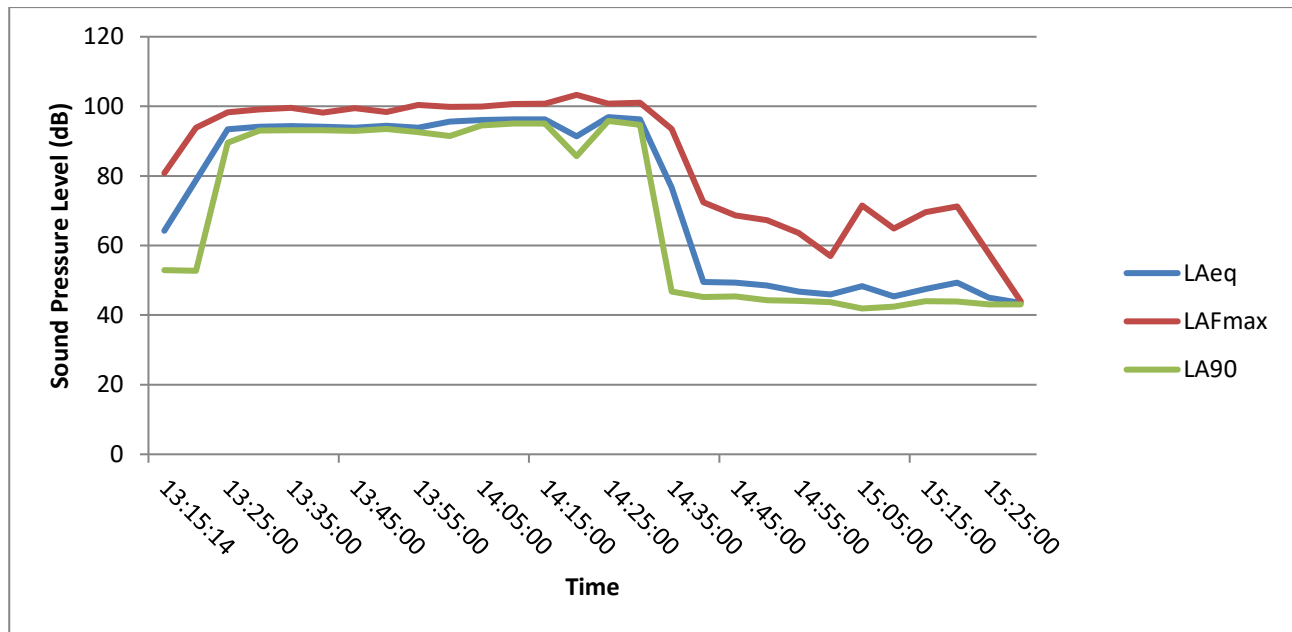


Figure 3-1: Fixed Position Results

3.2 Spot Measurements, S1, S2, S3

Position	Location	Time	L _{Aeq,T}	L _{A90}
Shredder Active				
S1	Stannah	13:35 – 13:50	52	50
S2	Brammer	14:00 – 14:15	52	49
S3	Dimension 8	14:20 – 14:35	54	52
Shredder Inactive				
S1	Stannah	14:45 – 15:00	52	48
S2	Brammer	15:01 – 15:15	54	48
S3	Dimension 8	15:16 – 15:30	49	47

Table 3-1: Spot measurement results

3.3 CadnaA Noise Modelling

A noise model has been created to predict the level of noise at the surrounding noise sensitive receivers due to noise from the shredder. Measurements taken from the shredder have been used in the noise model. The noise model has been produced in order to verify the contribution of the Shredder at the receptor locations, as noise from the source is below ambient noise levels and therefore cannot be measured accurately.

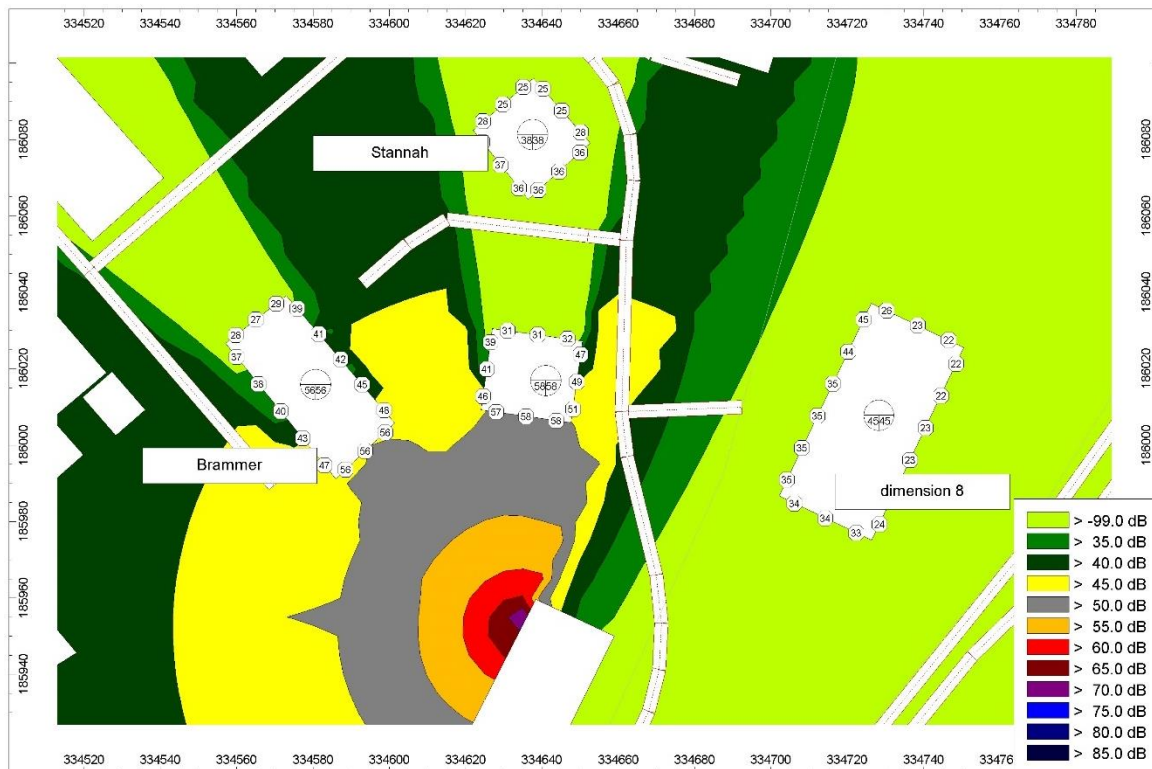


Figure 3-2: Shows the noise modelling, using noise levels measured on site.

The measurements of the shredder were taken inside the building, with the shutter doors open. The World Health Organisation allows for 10 - 15 dB of attenuation from an open window. As the shutter doors are large, in this case only 5 dB sound reduction has been assumed.

4.0 NOISE BREAK OUT

Spot measurements have been taken over a minimum of 15 minutes in three positions (see Figure 2-2). These values have been compared with the fixed measurement at the same time, see Table 4-1 below.

Time	LAeq			
	F1	S1	S2	S3
Shredder on				
13:35 – 13:50	93	52		
14:00 – 14:15	94		52	
14:20 – 14:35	92			52
Shredder off				
14:45 – 15:00	-	52		
15:01 – 15:15	-		54	
15:16 – 15:30	-			47

Table 4-1: Comparison of spot and fixed measurement results at the same time

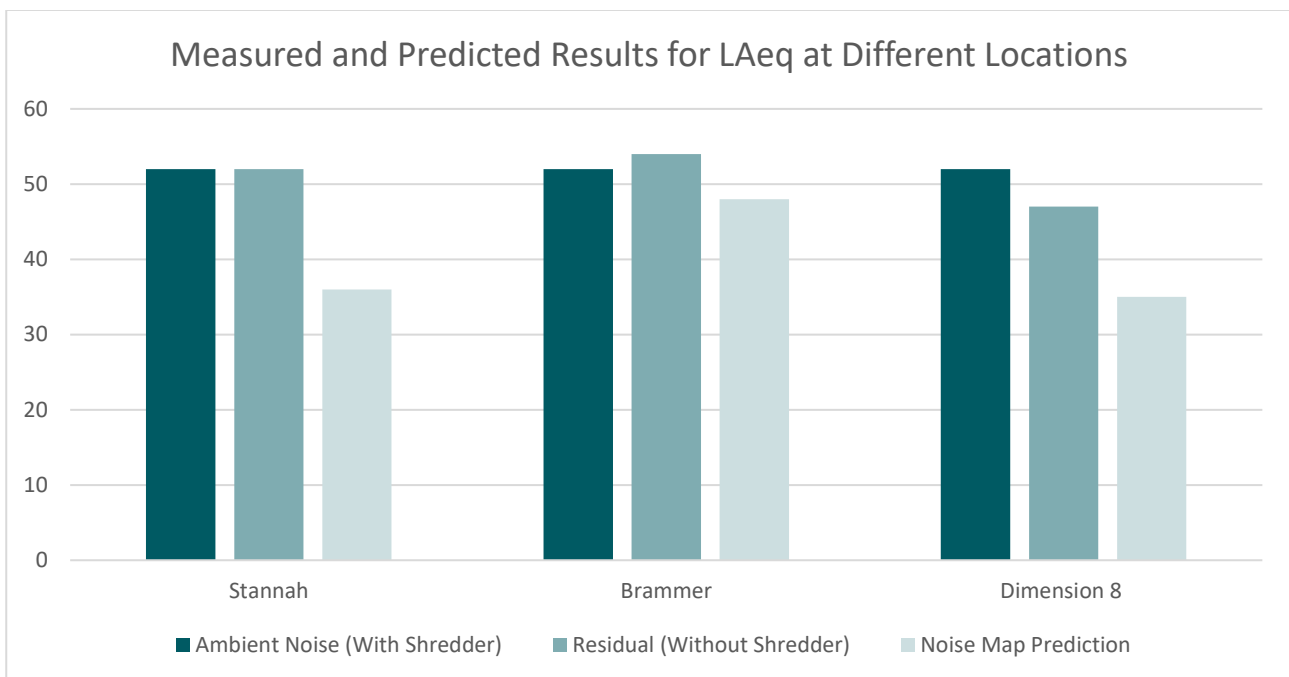


Figure 4-1: Comparing LAeq values, with the shredder on (blue), off (orange) and a prediction of the contribution of the shredder noise (light blue).

4.1 Assessment

There is a difference between noise levels when the shredder is operational and when it is not. There is a difference of +5 dB at the Dimension 8 offices, and +2 dB at the Stannah offices when the shredder is active. At the Brammer offices there is a decrease of -2 dB when the shredder is operational.

The noise mapping assessment shows that noise contribution from the shredder at the Dimension 8 and Stannah offices is predicted to be 35 dB and 36 dB respectively. This is due to a significant amount of shielding from surrounding buildings (See Figure 3-2).

In those positions where the noise levels increase when the shredder is operational, the predicted noise level from the shredder is 35/36 dB. Adding this to the existing residual noise levels (52 $L_{Aeq,T}$) would increase the level by less than 0.02 dB. Therefore, it is obvious that these fluctuations in noise level are due to fluctuation in road traffic noise in the area and not the shredder.

As previously mentioned, Meadows Road is the dominant source of noise on site. The variable-density of traffic throughout the day is likely to cause these fluctuations in residual noise levels

4.2 BS8233 maximum Noise Limit for Offices

BS 8233 suggests that the noise level within an executive office environment should not exceed 40 dB. The World Health Organisation states that an open window gives around 10–15 dB sound level reduction.

The worst-case noise level on any façade has been identified to be 48 dB $L_{Aeq,T}$ (Brammer Office). This is in line with the “low risk” category of the draft Acoustics Ventilation and Overheating Residential Guide created by the Association of Noise Consultants (see Appendix C).

Description	dB $L_{Aeq,T}$
Calculated External Noise Level at the facade	48
Open Window Attenuation	-13
Target	40
Resultant Internal Noise Level	35

Table 4-2: Resultant internal noise levels – open window assessment.

As shown in Table 4-2 above, the worst case internal noise level from the shredder is predicted to be 35 dB $L_{Aeq,T}$. This is in line with the BS8233 guidelines, for an executive office. This is therefore seen to be acceptable.

5.0 CONCLUSION

An environmental noise survey on site during the daytime of 23/10/20, and noise break out assessment have been conducted, and the following points can be concluded:

- Road traffic along Meadows Road was found to be the dominant noise source on site.
- The CadnaA noise map calculated the maximum noise contribution from the shredder unit at the nearest noise sensitive façade to be 48 dB.
- The worst case internal noise level from the shredder is predicted to be 35 dB $L_{Aeq,T}$, via an open window. This is in line with the BS8233 guidelines, for an executive office therefore allowing for natural ventilation within nearby offices when considering only the contribution from the shredder noise.
- It is shown that the risk of complaints from the shredder noise is low.

APPENDIX A - ENVIRONMENTAL NOISE SURVEY METHODOLOGY

A.1 BS 7445:2003

Environmental noise measurements were conducted in accordance with BS 7445 "Description and measurement of environmental noise".

A.2 Measurement Equipment

Item	Serial No.	Last Calibration	Certificate No.	Calibration Due
Norsonic Precision Sound Analyser Type 131	1313109	Jul-19	32423	Jul-21
Norsonic Type 1207 Pre-amplifier	12303	Jul-19	32423	Jul-21
Norsonic Type 1227 Microphone	170603	Jul-19	32422	Jul-21
Norsonic Sound Calibrator Type 1251	32090	Mar-20	140610	Mar-21

Table A.2: Subjective Summary of Noise Sources

The measurement equipment listed above was used during the survey, where all equipment complies with BS EN 60942:2003 i.e. a class 1 device

A.3 Meteorological Conditions

The weather conditions in Table 4 are suitable for the measurement of environmental noise in accordance with BS7445 *Description and Measurement of Environmental Noise*.

Date	Time (hh:mm)	Temperature (°C)	Humidity (%)	Pressure (mbar)	Wind Speed (m/s)	Wind Direction	Conditions
23/10/20	00:00	4-7	100	1003	4	SW	Fair.
	06:00	7-9	94	1002	6	SSW	Mostly Cloud.
	12:00	8-10	88	1002	8	WSW	Cloud.
	18:00	6-9	76	1006	7	W	Mostly Cloud.

Table A.3: Subjective Summary of Noise Sources

The above data has been taken from timeanddate.com (<https://www.timeanddate.com>).

A.4 Site Photographs

Location	Image
Fixed Position (F1)	

APPENDIX B - TERMINOLOGY

dB	Decibel. The unit of sound level.
dB(A)	A-weighted decibel. The A-weighting approximates the response of the human ear.
DnT,w	Weighted standardized level difference. A single number rating of the sound level difference between two rooms. DnT,w is typically used to measure the on-site sound insulation performance of a building element such as a wall, floor or ceiling.
Flanking	Transmission of sound energy through paths adjacent to the building element being considered. For example, sound may be transmitted around a wall by travelling up into the ceiling space and then down into the adjacent room.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4000Hz (4kHz). This is roughly equal to the range of frequencies on a piano.
Impact sound	Sound produced by an object impacting directly on a building structure, such as footfall noise or chairs scrapping on a floor.
LAeq	The equivalent continuous sound level. This is commonly referred to as the average noise level and is measured in dB(A).
LA90	The noise level exceeded for 90% of the measurement period, measured in dB(A). This is commonly referred to as the background noise level.
L'nT,w	Weighted, standardized impact sound pressure level. A single number rating of the impact sound insulation of a floor/ceiling when impacted on by a standard 'tapper' machine. L'nT,w is measured on site. The lower the L'nT,w, the better the acoustic performance.
Ln,w	Weighted normalised impact sound pressure level. A single number rating of the sound insulation of a floor.
NR	Noise Rating. A single number rating which is based on the sound level in the octave bands 31.5Hz – 8kHz inclusive, generally used to assess noise from mechanical services in buildings.
Octave band	Sound, which can occur over a range of frequencies, may be divided into octave bands for analysis. The audible frequency range is generally divided into 7 octave bands. The octave band frequencies are 63Hz, 125Hz, 250Hz, 1kHz, 2kHz and 4kHz.
Reverberation time (T60)	Reverberation time is used for assessing the acoustic qualities of a space. T60 is measured in seconds (s) and describes how quickly sound decays within a space.
Rw	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. Rw is measured in a laboratory. Rw is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete.
Sound absorption	When sound hits a surface, some of the sound energy is absorbed by the surface material. 'Sound absorption' refers to ability of a material to absorb sound.
Sound insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to ability of a material to stop sound travelling through it.
Structure-borne transmission	Transmission of sound energy as vibrations inside the structure of a building.

APPENDIX C - ACOUSTICS AND VENTILATION RISK LEVELS (UNDER CONSULTATION)

Table 3-2 Guidance for Level 1 assessment of noise from transport noise sources relating to overheating condition

External free-field noise level ^[Note 1]		Examples of Outcomes	Risk category for Level 1 assessment ^[Note 4]
$L_{Aeq,T}$ ^[Note 2] during 07:00 – 23:00	$L_{Aeq,8h}$ ^[Note 3] during 23:00 – 07:00		
≤ 52 dB	≤ 47 dB	Noise can be heard and causes small changes in behaviour and/or attitude, 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 environment inside the dwelling such that there is a perceived change in the quality of life.	Low
> 52 dB and ≤ 62 dB	> 47 dB and ≤ 55 dB	Increasing risk of adverse effect due to impact on reliable speech communication during daytime or sleep disturbance at night. Although noise levels at the lower end of this category will cause changes in behaviour, they may still be considered suitable. Noise levels at the upper end of this category will result in more significant changes in behaviour and are only likely to be considered suitable if they occur for limited periods.	Medium
> 62 dB	> 55 dB	The noise causes a material change in behaviour and/or attitude, 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.	High

Note 1 - The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships, such as those described in a DEFRA 2014 study [\[20\]](#).

Note 2 - A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines [\[21\]](#).

Note 3 - Regular individual noise events should also be considered. Refer to Appendix A of ProPG for further guidance.

Note 4 - The risk of an adverse effect occurring will also depend on how frequently and for what duration the mitigation of overheating is likely to result in increased internal noise levels.

APPENDIX D - NOISE POLICY STATEMENT FOR ENGLAND

The aim of the Noise Policy Statement for England (NPSE) is to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion. The NPSE applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

Noise Policy Vision: Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims: Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life

The Noise Policy Statement for England does not provide any specific guidance on noise levels for residential developments therefore it is seen that it is up to the discretion of the Local Planning Authority to decide on what is deemed acceptable.

APPENDIX E - GOVERNMENT GUIDANCE DOCUMENTATION – NOISE CONTROL.

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. The NPPF provides a framework within which local people and their council can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

With regards to noise the Framework states that 'Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts²⁷ on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts²⁷ on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;²⁸ and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

[27] The NPPF does make reference to The Noise Policy Statement for England, published by Defra in March 2010.