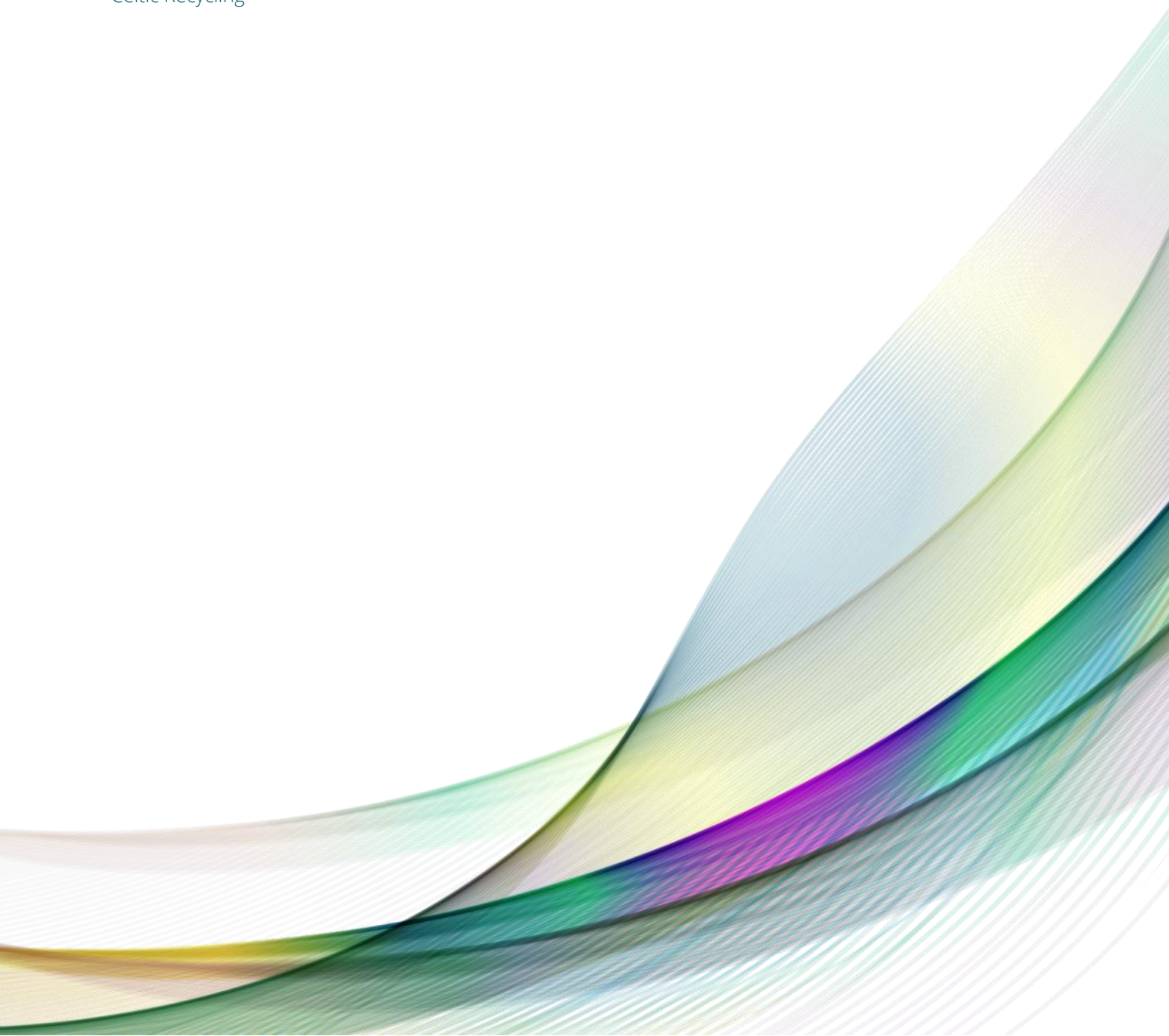
CELTIC RECYCLING

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 27/09/2019.

A 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 fairly 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: Nearing 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.

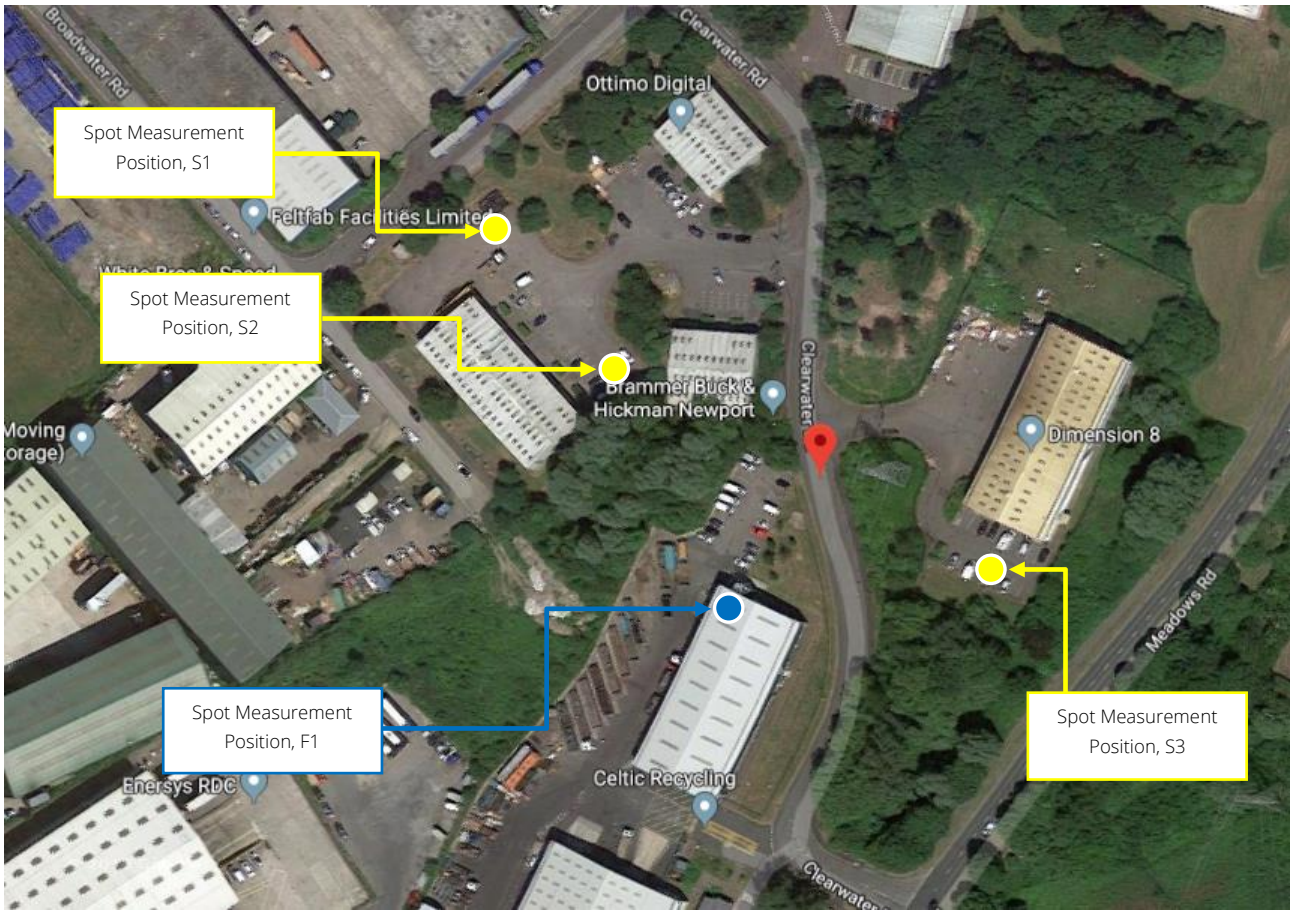

Figure 2-2: Measurement Positions, where blue are the fixed measurements and yellow the spot measurements.

2.4 Noise Sources

Noise Source	Noise Contribution	Description
Road Traffic Noise Ambience	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 ONSITE NOISE SURVEY

The following sections show the results from the onsite noise survey carried out from 11:55 on 27/09/19 to 14:50 on 27/09/19. The positioning of the microphones is shown in Figure 5.1.

3.1 Fixed Position

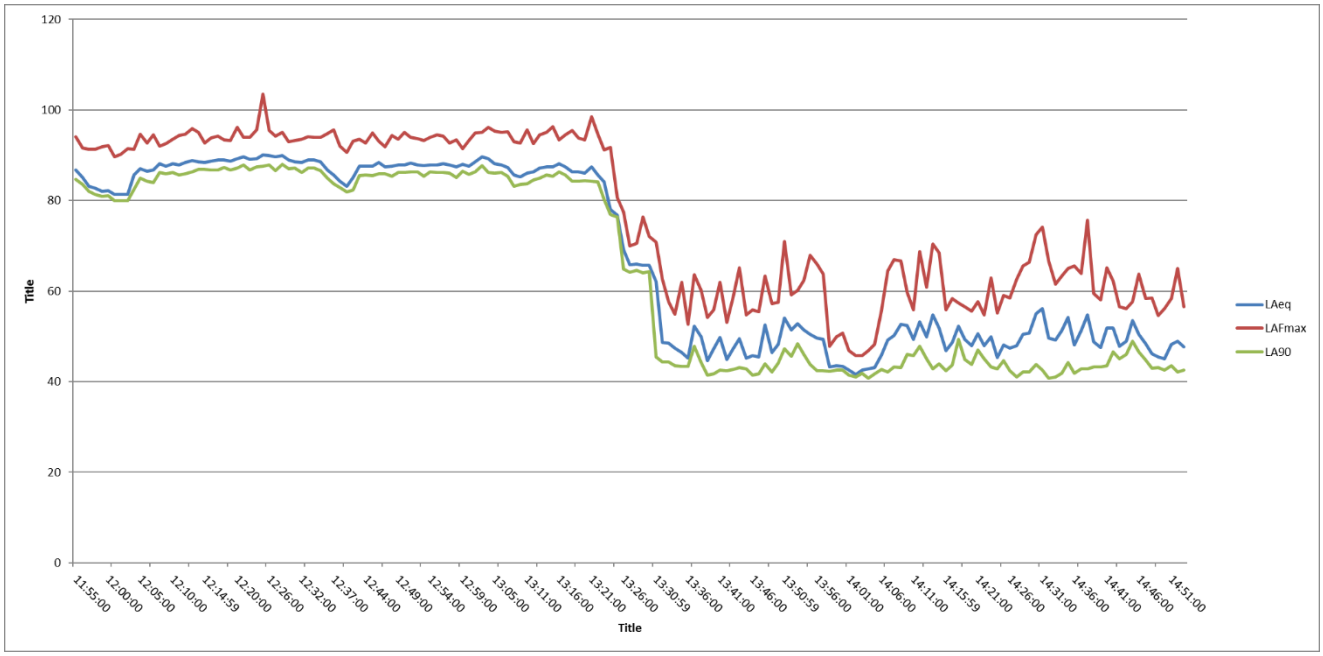

Figure 3-1: Fixed Position Results

3.2 Spot Measurements

Position	Time	$L_{Aeq,T}$	L_{Amax}	L_{A90}
Shredder active				
S1	12:13 – 12:34	63	68	54
S2	12:35 – 12:52	60	85	57
S3	12:58 - 13:14	66	76	61
Shredder inactive				
S1	13:34 – 13:51	60	69	58
S2	13:55 – 14:27	61	66	53
S3	14:31 – 14:47	62	65	56

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.

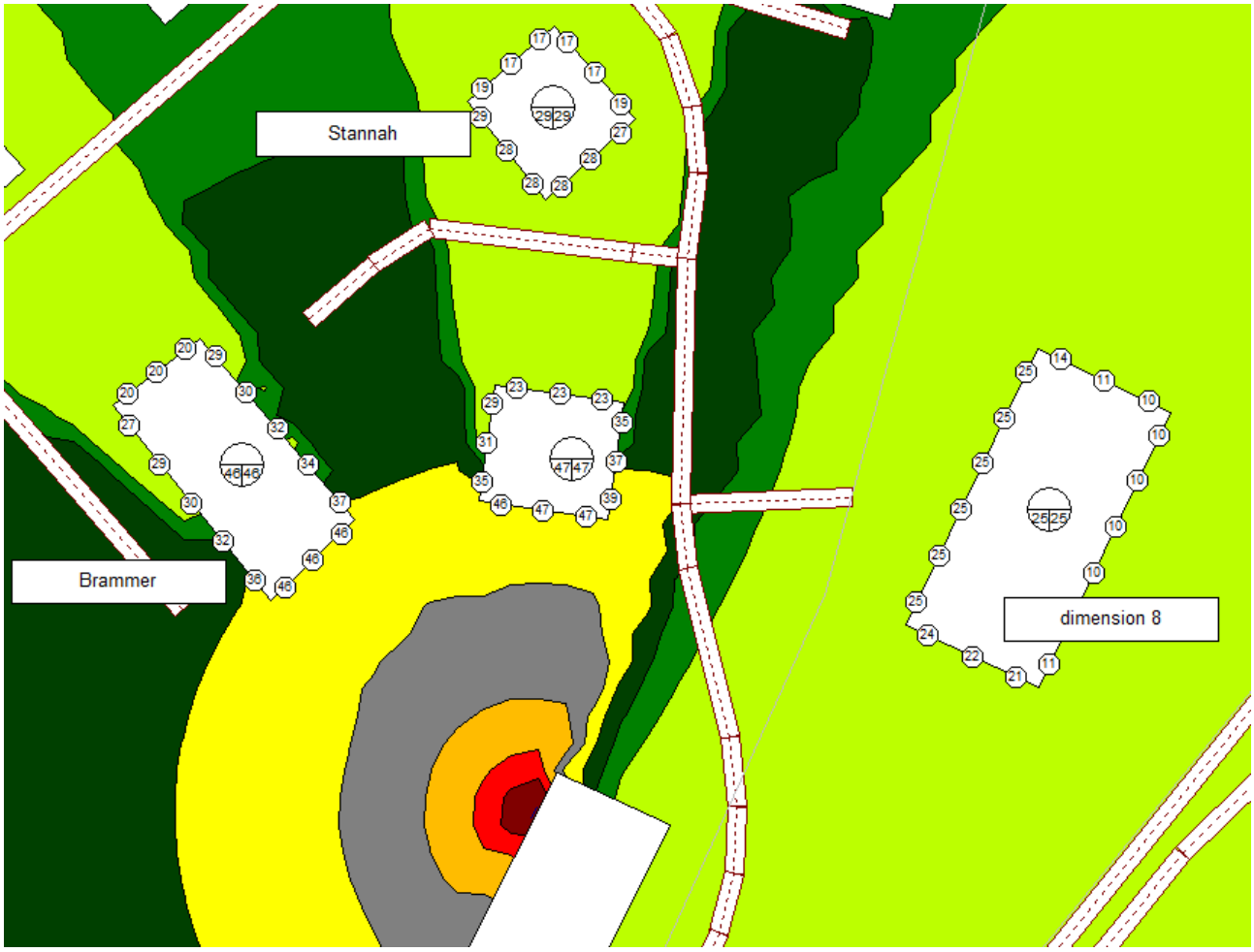

Figure 3-2: Shows the noise modelling, using noise levels measured on site.

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	LA_{90}			
	F1	S1	S2	S3
Shredder on				
12:13 – 12:34	87	63		
12:35 – 12:52	85		60	
12:58 - 13:14	86			66
Shredder off				
13:34 – 13:51	-	60		
13:55 – 14:27	-		61	
14:31 – 14:47	-			62

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

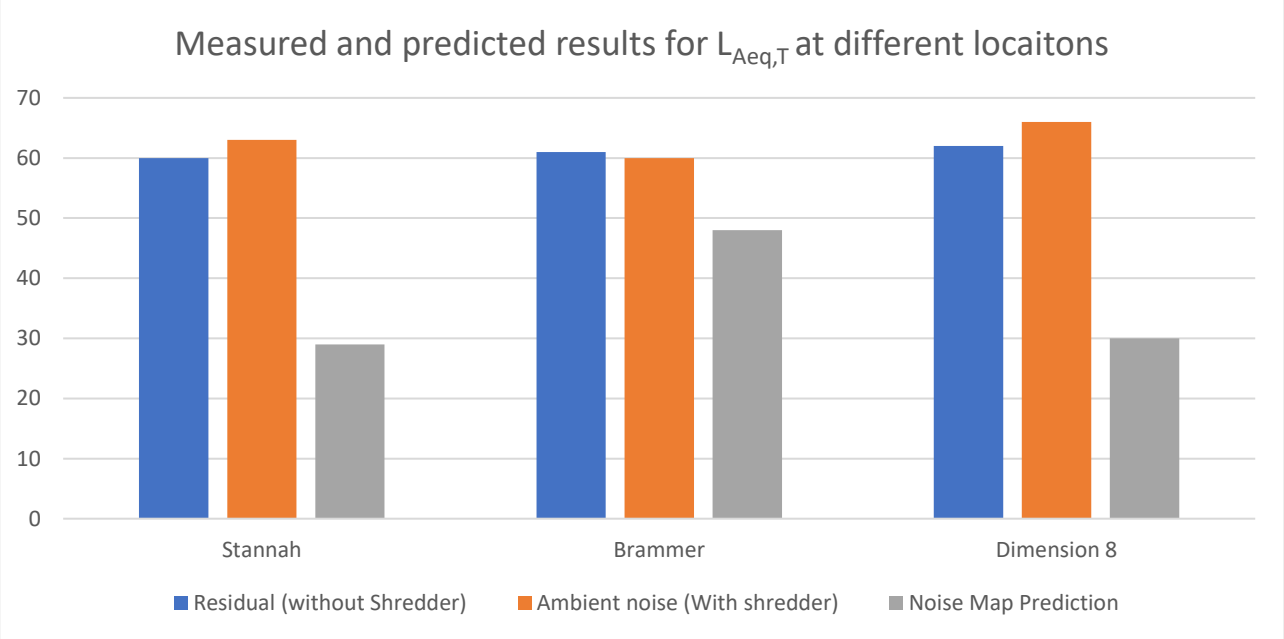

Figure 4-1: Comparing L_{Aeq} values, with the shredder on (orange), off (blue) and a prediction of the contribution of the shredder noise (grey).

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 +4 dB at the Dimension 8 offices, and +3 dB at the Stannah offices when the shredder is active. At the Brammer offices there is a decrease of -1 dB when the shredder is operational.

The noise mapping model shows that noise contribution from the shredder at the Dimension 8 and Stannah offices are predicted to be 30 dB and 29 dB respectively. This is due to a significant amount of shielding from surrounding buildings (See Figure 3-2).

So at the position where the noise mapping predicts that the noise level from the shredder would be highest (Dimension 8 offices), there is in fact a drop in noise levels when the shredder is turned on.

In those positions where the noise levels increase when the shredder is operational, the predicted noise level from the shredder is 30 dB. Adding this to the existing residual noise levels (60 $L_{Aeq,T}$) would increase the level by less than 0.01 dB. Therefore, it is obvious that these fluctuations in noise level are due to other noise sources in the area.

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 Heath 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 $L_{Aeq,T.}$. 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 D).

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 4-2Error! Reference source not found. above, the worst case internal noise level from the plant units is predicted to be 35 dB $L_{Aeq,T}$. This is in line with the BS8233 guidelines, for an executive office.

As the proposed noise source will be contributing to an already existing noise climate, which is around 60 – 62 dB $L_{Aeq,15mins}$ at the façade, the noise from the shredder should not be elevating the internal ambient noise level of the nearby offices.

5.0 CONCLUSION

An environmental noise survey on site during the day time of 27/09/19, 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 $L_{Aeq,T}$. 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

Name	Serial Number	Last Calibrated	Certificate Number	Calibration Due
Norsonic Precision Sound Analyser Type 118 STI	30562	Jul-19	32421	Jul-21
Norsonic Type 1206 Pre-amplifier	30249	Jul-19	U30899	Jul-21
GRAS 40AF Microphone	355487	Jul-19	32420	Jul-21
NTI Precision Sound Analyser XL2 TA	A2A-11002-E0	Dec-17	UCRT17/2147	Dec-19
NTI Pre-amplifier MA220	7183	Dec-17	UCRT17/2147	Dec-19
NTI Microphone Capsule MC230	8105	Dec-17	UCRT17/2147	Dec-19
Svantek Acoustic Calibrator SV33A	64138	Dec-18	266039	Dec-19

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
27/09/19	00:00	12-13	86	1003	12	SW	Cloud.
	06:00	13-14	86	1002	14	SSW	Cloud.
	12:00	13-16	81	1002	20	WSW	Cloud.
	18:00	12-13	88	1006	13	W	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 - BS8233:2014 GUIDELINES, INDOOR AMBIENT NOISE LEVELS

The Noise Policy Statement for England does not provide guidance on internal noise levels within residential buildings. As a result, the advised levels within BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings' have been adopted. BS8233 states that to achieve adequate sleeping and living conditions, background noise levels should be 30 dB L_{Aeq} or less within bedrooms at night, and 35 dB L_{Aeq} or less within Living rooms during the day. The advised levels are tabulated below.

Activity	Location	0700 - 2300	2300 - 0700
Resting	Living Room	35 dB $L_{Aeq, 16\ Hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16\ Hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq, 16\ Hour}$	30 dB $L_{Aeq, 8\ Hour}$

Table C.1: BS8233 internal noise levels

BS 8233: 2014 provides no definitive methodology for assessment of L_{Amax} levels. The standard simply states that a guideline value for the internal level may be set depending on the character of the noise source and number of events occurring. Due to the proximity of the proposed site to sources of road traffic noise, assessment of L_{Amax} is critical to ensuring that disturbance is avoided.

In order to provide an assessment of L_{Amax} levels, the recommendations of the World Health Organisation have been employed. The WHO state that in order to avoid sleep disturbance within bedrooms during the night, the internal sound pressure level should not exceed 45 dB L_{Amax} indoor sound pressure levels should not exceed approximately 45 dB LAmax more than 10-15 times per night.

APPENDIX D - 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 E - BS 4142:2014 NOISE LEVEL CORRECTIONS

BS 4142:2014 "Methods for rating and assessing industrial and commercial sound" describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions. The likelihood of complaints in response to a noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level.

BS 4142 states that one should 'obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level and consider the following:

a) Typically, the greater this difference, the greater the magnitude of the impact.
b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c) A difference of around + 5 dB is likely to be an indication of an adverse impact, depending on the context.
d) 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.

The aforementioned rating level is based upon the specific noise level of the noise source in question. A correction should be applied to the specific noise level to obtain an increased rating level if 'a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources. To summarise, BS4142 section 9.2 advises the following with regards to corrections for acoustic characteristics:

- Tonality – for sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.
- Impulsivity – A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level., Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.
- Other sound characteristics – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied
- Intermittency – When the specific sound has identifiable on/off conditions, if the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

APPENDIX F - 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 G - 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 impacts[27] on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts[27] 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.