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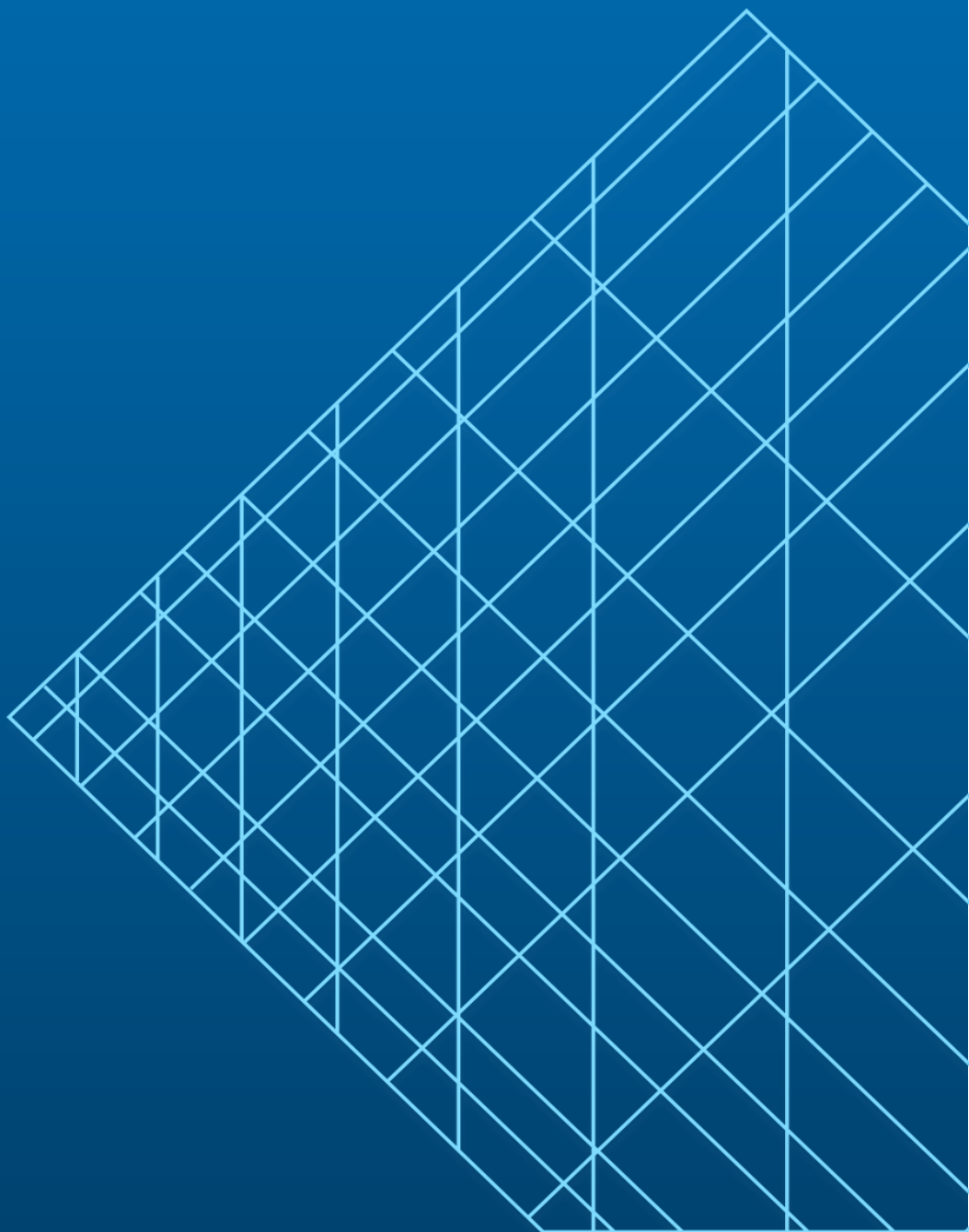
Noise Impact Assessment

S L Recycling
New Inn

5852/NIA4_Rev1



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Noise Impact Assessment

Project:	**S L Recycling**
Site Address:	Pont Y Felin Ind. Estate New Inn Pontypool NP4 0SH
HA Reference:	5852/NIA4_Rev1
Date:	13/01/2023
Client:	S L Recycling Ltd Pont Y Felin Industrial Estate New Inn Pontypool NP4 0SH
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ISSUE / REVISION

Rev	Date			
0	27 October 2022	**Filename**	22.5852_NIA4_Shredder	
		Description	First issue	
			Prepared by:	**Checked by:**
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		Signature		
1	13 January 2023	**Filename**	23.5852_NIA4_Rev1_Shredder	
		Description	Additional assessment to Pont Y Felin House	
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1. INTRODUCTION

A new metal shredding plant has been installed at SL Recycling's site on Pont Y Felin Ind. Estate in New Inn, Pontypool.

We understand an application to vary the permit to include the shredding of metal outside has been submitted.

A report detailing methodology and results of a week-long survey undertaken at the critical residential receivers to the east at the Coed Y Felin housing estate with the new shredder plant in operation has previously been submitted, however this focused on noise levels at first floor level to address concerns from the Local Planning Authority during the planning process.

Comments received from NRW included a request for the assessment to be repeated at ground floor level, 1.2-1.5m above local ground height in accordance with BS 4142:2014+A1:2019.

This report therefore includes a new assessment of the shredder plant to ground floor level at the critical receptors.

This revision 1 also includes an assessment to Pont Y Felin House.

2. CRITERIA

As stated in the latest Guidance 'Noise and vibration management: environmental permits' produced jointly by The Environment Agency, Scottish Environment Protection Agency (SEPA), Natural Resources Wales and Northern Ireland Environment Agency and published 23 July 2021, our assessment is based on BS 4142:2014+A1:2019.

2.1 British Standard 4142:2014 + A1:2019

British Standard 4142:2014 "Methods for rating and assessing industrial and commercial sound", provides current guidance for the assessment of industrial noise affecting residential receivers.

This standard describes a rating method comparing L_{Aeq} noise levels from the industrial source with pre-existing background L_{A90} levels at the residential receiver. It advises at a difference (industrial noise - background) of:

- +10dB or higher, likely to be an indication of a significant adverse impact, depending on the context.

- A difference of + 5dB, 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.

A sliding scale of penalties can be applied to industrial/commercial sound levels which have acoustically distinguishing characteristics, including tonality, impulsivity and intermittency.

Tonality – A penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

Impulsivity – A penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it clearly perceptible, and 9dB 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 3dB can be applied

Intermittency – If intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.

BS 4142:2014 states under section 11;

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

   Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

   Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/ or commercial nature is likely to be perceived and how people react to it.*

   NOTE 3 Consideration should be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*

   i) facade insulation treatment;
   ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
   iii) acoustic screening."

"

3. SOUND SENSITIVE RECEIVERS

In order to set environmental noise limits, it is first necessary to define the existing ambient and background noise climate at the agreed nearest Sound Sensitive Receivers (SSR's).

Figure 3.1 below shows the development site and the two closest existing SSRs.

Figure 3.1 – Site Plan Showing Nearest SSRs

Table 3.1 – Nearest Sound Sensitive Receivers (Distance to Nearest Boundary)

SSR	Description	Approx. Distance (m)
1	Dwellings on Coed Y Felin (new housing estate) to the east on opposite side of Pont-Y-Felin Road	65
1a	Pont Y Felin House on Pont Y Felin Lane	85 (to dwelling)
2	Dwellings on Parc Panteg to the west on opposite side of A4042 and rail line	330

Previous assessments and monitoring at the site established that dwellings on Parc Panteg beyond the A4042 and rail line are not critical receptors and therefore this assessment focuses on the nearest receptors at the Coed Y Felin housing estate and Ponty Y Felin Lane.

4. ENVIRONMENTAL NOISE SURVEY

4.1 Procedures

4.1.1 Attended Continuous Monitoring

Continuous noise monitoring was carried out from 1110-1500hrs on Monday 17th October 2022 at Positions 1 and 2.

Data including L_{Amax}, L_{Aeq} and background L_{A90} was logged at 1 minute intervals over the monitoring period, along with continuous audio and 100ms data to allow source identification and further detailed analysis of results.

The site plan below shows the site and monitoring position used;

Figure 4.1 – Site Plan Showing Monitoring Locations

Table 4.1 – Monitoring Location at Receivers

Position	Description
1	Located on pavement on opposite site of road to 24/25 Coed Y Felin. Measurements taken at 1.2m above local ground height.
2	Located in proximity to closest dwellings at Coed Y Felin, at the western side of attenuation pond. Measurements taken at 1.2m above local ground height.

The intervening ground is a mix of hard ground on the site and access road, with a small area of trees and grassed area before returning to hard ground at the Coed Y Felin housing estate.

Coed Y Felin is elevated above the SL Recycling site however scrap piles, buildings on site and boundary fencing (which is currently in place) provide an element of screening to the shredder.

The following plant was operational during our monitoring:

- HGVs/vans in and out of the yard offloading and being loaded
- Shredder being loaded by Liebherr LH40 grab
- Conveyors at output of shredder
- Fuchs MHL 350 grab sorting front of scrap pile
- Forklift
- Grab sorting through general waste at rear of site
- Shear not running (we understand it doesn't run simultaneous with shredder)

It is understood the shredder was operating at its normal running power and processing scrap metal of a type and size that is representative of its daily operation.

4.1.2 Source Sample Measurements

In addition to the above, source sample measurements were undertaken on site on Monday 17th October 2022 of the shredder in operation in order to predict back to the receivers if the specific noise fell within 3dB of the residual noise from the road traffic.

Measurements were taken at various distances from 15m back to 90m from the north of the shredder plant to aid calibration of a noise model if required. Measurements were carried out at a height of 1.2m above local ground height and were unscreened from the sound source being measured.

These were also carried out simultaneously with the off-site measurements at Position 1 and 2 for comparison.

4.2 Meteorological Conditions

Weather conditions including temperature, wind speed and direction were measured next to the noise monitoring equipment for the duration of the survey and logged at 5minute intervals using a Davis Vantage Pro2 weather station.

Results for each day are shown in weather history graphs in Figure B.1 of Appendix B.

To summarise;

- Wind speeds were generally below 1m/s with gusts all below 5m/s
- Wind direction was generally in a southerly direction
- There was no rainfall throughout the monitoring

4.3 Measurement Equipment

The following measurement equipment was used during the surveys:

Table 4.2 – Noise Monitoring Equipment List

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-08723-E0	29 October 2021	TCRT21/1759
	Preamplifier	MA220	1820	29 October 2021	TCRT21/1759
	Filters	XL2-TA	A2A-08723-E0	01 November 2021	TCRT21/1763
	Microphone Capsule	MC230	9381	29 October 2021	TCRT21/1759
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-10021-E0	17 August 2021	TCRT21/1568
	Preamplifier	MA220	5435	17 August 2021	TCRT21/1568
	Microphone Capsule	MC230	8547	17 August 2021	TCRT21/1568
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-14577-E0	23 June 2022	TCRT20/1313
	Preamplifier	MA220	7485	23 June 2022	TCRT20/1313
	Microphone Capsule	MC230	A15594	23 June 2022	TCRT20/1313
Larson Davis	Calibrator (94.00dB / 114.03dB @ 1kHz)	CAL200	19047	15 August 2022	44788-19047-CAL200
Lieca	Laser Measure	DISTO D2	1282650627	01 July 2018	1282650627

Measurement systems were calibrated before and after the surveys and no variation occurred.

Note: Copies of traceable calibration certificates for all equipment are available upon request.

4.4 Results

4.4.1 Continuous Monitoring at Positions 1 and 2

Time history graphs for monitoring undertaken at Positions 1 and 2 at Coed Y Felin are included in Figure B.2 and Figure B.3 of Appendix B respectively.

The site was shutdown between 1300-1400hrs and this was observed on site for the duration. The shredder was off and the grabs did not operate. During this period, the following background $L_{A90,1hr}$ sound levels and residual $L_{Aeq,1hr}$ levels have been determined at each off-site monitoring location:

Table 4.3 – Residual and Background Sound Levels during Shutdown

Position	Time	Residual $L_{Aeq,1hr}$ (dB)	Background $L_{A90,1hr}$ (dB)
1	1300-1400hrs	55.8	52.6
2	1300-1400hrs	56.6	51.5

The background and residual sound climate is controlled by road traffic on the busy surrounding road network.

Subjectively at the receivers off-site, it was difficult to determine the on/off periods of the shredder with the main sources identified amongst the road traffic-controlled climate being the impacts from handling of the scrap, scrap tips and activity from the adjacent steel fabrication business.

During periods of site activity 1100-1300hrs and 1400-1500hrs, $L_{Aeq,1hr}$ levels fell in the range 56-58dB at Position 1 and 57-58dB at Position 2 as shown below:

Table 4.4 – Ambient Sound Levels during Operation

Time	Position 1 $L_{Aeq,1hr}$ (dB)	Position 2 $L_{Aeq,1hr}$ (dB)
1100-1200hrs	57.6	58.4
1200-1300hrs	56.5	57.2
1400-1500hrs	56.2	56.7

4.4.2 Sample Measurements

Results of source sample measurements of the shredder are shown in the results table below:

Table 4.5 – Source Sample Measurements of Shredder On-Site

Description	Duration (secs)	Distance (m)	L_{Aeq} (dB)	$L_{Amax,F}$ (dB)
Grabber & Shredder Activity - 22m from Shredder Loader, 10m from Grabber Pile. Measurement Controlled by Shredder Noise.	600	22	83.1	94.2
Repeat of Previous Measurement - 15m from Shredder Loader, 5m from Grabber Pile.	600	15	86.6	97.2
Repeat of Previous Measurement	600	15	87.2	99.3
South of Shredder. 13m from Shredder Output Conveyor Belt & Pile.	340	13	81.5	88.9
Within Shredder Output Area. 13.7m from Shredder Unit.	301	13.7	89.7	96.4
On Mound Near Northern Site Boundary - Line of Sight to Shredder/Grabber Activity @ approx. 90m Distance	600	90	70.8	82.2
Grabber Activity - Shredder Not Operational. Same Measurement Position as File No. 001. (5m from Grabber Pile).	386	5	78.3	95.6
Repeat of Previous Measurement - Grabber Not Active, Shredder Operational	200	15	86.5	94

Octave band data is included in Table B.1 of Appendix B.

5. ADDITIONAL SURVEY AT PONTY Y FELIN LANE

Further to comments received from NRW, this revised report includes additional monitoring undertaken off-site adjacent to Pont Y Felin House on Pont Y Felin Lane to validate the noise model in this location as it was indicating marginally higher noise levels than at Coed Y Felin Estate which has been the focus of previous assessments.

5.1 Procedures

5.1.1 Attended Continuous Monitoring

Continuous noise monitoring was carried out from 1145-1300hrs on Monday 20th December 2022 at Position 3.

Data including L_{Amax}, L_{Aeq} and background L_{A90} was logged at 1 minute intervals over the monitoring period, along with continuous audio and 100ms data to allow source identification and further detailed analysis of results.

The site plan below shows the site and monitoring position used;

Figure 5.1 – Site Plan Showing Additional Monitoring Location

Table 5.1 – Monitoring Location at Receivers

Position	Description
3	Located in Pont Y Felin Lane approx.. 20m west of Pont Y Felin House. 1.2m above local ground height.

The intervening ground is a mix of hard ground on the site and access road, with an area of trees grass up to the boundary of Pont Y Felin House.

Pont Y Felin House is elevated above the SL Recycling site however scrap piles, buildings on site and boundary fencing (which is currently in place) provide an element of screening to the shredder.

The following plant was operational during our monitoring:

- HGVs/vans in and out of the yard offloading and being loaded
- Shredder being loaded by Liebherr LH40 grab
- Conveyors at output of shredder
- Fuchs MHL 350 grab sorting front of scrap pile
- Forklift
- Grab sorting through general waste at rear of site
- Shear not running (we understand it doesn't run simultaneous with shredder)

It is understood the shredder was operating at its normal running power and processing scrap metal of a type and size that is representative of its daily operation.

5.1.2 Source Sample Measurements

In addition to the above, a short source sample measurement was undertaken on the opposite side of the road directly outside the main entrance gate to the site (marked position 'x' on site plan in Figure 5.1 above.

A brief 10second measurement was taken of the continuous shredder plant noise in between car pass-bys at a height of 1.2m above local ground height to aid calibration of the noise map model

5.2 Meteorological Conditions

Weather conditions during the monitoring period were dry and calm with no movement in the trees.

5.3 Measurement Equipment

The following measurement equipment was used during the surveys:

Table 5.2 – Noise Monitoring Equipment List

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-10021-E0	17 August 2021	TCRT21/1568
	Preamplifier	MA220	5435	17 August 2021	TCRT21/1568
	Microphone Capsule	MC230	8547	17 August 2021	TCRT21/1568
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-19813-E0	04 November 2021	UK-21-096
	Preamplifier	MA220	10302	04 November 2021	UK-21-096
	Microphone Capsule	MC230A	A21824	04 November 2021	UK-21-096
Larson Davis	Calibrator (94.00dB / 114.03dB @ 1kHz)	CAL200	19047	15 August 2022	44788-19047-CAL200
Leica	Laser measure	DISTO D510	1081540163	14 May 2018	1081540163

Measurement systems were calibrated before and after the surveys and no variation occurred.

Note: Copies of traceable calibration certificates for all equipment are available upon request.

5.4 Results

5.4.1 Continuous Monitoring at Position 3

Time history graphs for monitoring undertaken at Positions 3 at Pont Y Felin are included in Figure B.4 of Appendix B.

The site was shut down between 1220-1245hrs and this was observed on site for the duration. The shredder was off and the grabs did not operate. During this period, the following background $L_{A90,25min}$ sound level and residual $L_{Aeq,25min}$ levels have been determined, for comparison with those measured at Positions 1 and 2 at Coed Y Felin previously :

Table 5.3 – Residual and Background Sound Levels during Shutdown

Position	Time	Residual $L_{Aeq,25min}$ (dB)	Background $L_{A90,25min}$ (dB)
3	1220-1245hrs	54.5	51.2

The background and residual sound climate is controlled by road traffic on the surrounding road network.

These levels are indicated in line with those measured at Positions 1 and 2 (55dB L_{Aeq} compared with 56-57dB L_{Aeq} at Positions 1-2 respectively) and background at 51dB compared with 52dB at Positions 1-2.

Note: A shorter measurement period was used to confirm levels were in line with previous measurements at Positions 1 and 2 to avoid having to shut down the site for longer periods.

Subjectively at the receiver off site, the on/off period of the shredder before/after shutdown was clearer than previously measured at Coed Y Felin Estate. A tonal element from the shredder noise was just perceptible amongst the road traffic noise along with impacts from handling of the scrap, scrap tips and activity from the adjacent steel fabrication business.

During periods of site activity 1145-1220hrs and 1245-1305hrs, L_{Aeq} levels were indicated at 57dB at Position 3 as shown below:

Table 5.4 – Ambient Sound Levels during Operation

Time	Position 1 L_{Aeq} (dB)
1145-1220hrs	57.2
1245-1305hrs	57.3

There are in line with measured levels at Position 1 and 2 previously (56-57dB, L_{Aeq}).

5.4.2 Continuous Monitoring at Position 3

Shredder noise measured directly outside the main entrance gate on the opposite side of the road was measured at 61dB $L_{Aeq,10sec}$ between car pass-bys.

6. NOISE MODELLING

With the residual level during the site shutdown being 56dB $L_{Aeq,1hr}$ at Position 1, 57dB $L_{Aeq,1hr}$ at Position 2 and 55dB $L_{Aeq,25min}$ at Position 3, the specific level is indicated to fall within 3dB of the residual.

A noise model has therefore been generated to estimate noise levels from the site at the nearest critical receptors.

Our analysis has used the proprietary Predictor (v2022.1) computer modelling software, in conjunction with procedures of ISO 9613.

This model allows noise levels from noise sources (including building facades) to be predicted over large distances and varying terrain. Attenuation is included accounting for distance, air absorption, ground absorption and screening losses from site topography/local structures.

Standard LiDAR DTM 1m data has been used for terrain modelling, along with site observations of specific features.

The analysis predicts resultant noise levels at the SSRs.

6.1 Source Plant Noise Data

Source noise data used in the model for the various items of plant and activities is detailed in Appendix C.

This is taken from measured levels at source on site as discussed in Section 4.4.2 and 5.4.2, previous measurements by Hunter Acoustics at scrap yards, source noise data from BS 5228 and in-house database figures.

6.2 Calibration of Model

In order to assess cumulative impact of the existing site and proposed new plant/activities, it is first necessary to model and calibrate the existing sources on site.

Source measurement data of existing plant on site, as well as off-site measurements have been used and model outputs have been compared against these in order to validate the model. These are shown in Table C.3 of Appendix C.

The model shows good agreement with measured source levels from the shredder and grab, all generally within 1dB with exception of the shredder at 90m towards Coed Y Felin, for which the prediction model is indicated higher (worst case and therefore robust) by 3dB.

The outcome of the noise modelling indicates overall site noise levels with the shredder operational at:

- 52dB $L_{Aeq,1hr.}$ at Position 1 at Coed Y Felin housing estate
- 51dB $L_{Aeq,1hr}$ at Position 2 at Coed Y Felin housing estate
- 56dB $L_{Aeq,1hr}$ at Position 3 in Pont Y Felin Lane (55dB at Pont Y Felin House)

The following table shows the addition of the predicted site noise with the residual road traffic noise as a check against the overall $L_{Aeq,1hr}$ noise levels measured with the site in operation:

Table 6.1 – Check of Predicted vs Measured Levels Off-site

Pos	Residual Traffic Noise Measured during Site Shutdown $L_{Aeq,1hr}$ (dB)	Predicted Site Noise with Shredder $L_{Aeq,1hr}$ (dB)	Predicted Total $L_{Aeq,1hr}$ (dB)	Measured Total $L_{Aeq,1hr}$ (dB)
1	56	52	57	56-58
2	57	51	58	57-58
3	55	55-56	58	57

The predicted levels therefore show good agreement with the levels measured off-site however the predicted levels are indicated marginally high at Pont Y Felin House compared to measured levels (by 1-2dB - a specific level of 54dB added to the measured residual of 55dB would equate to the total measured level of 57dB L_{Aeq}).

The model may therefore be marginally underestimating screening to this location however as discussed in the subsequent section, this is not likely to affect the overall outcome of the assessment at this location.

7. IMPACT ASSESSMENT

BS 4142:2014+A1:2019 assessments of the noise are included in Table D.1, Table D.2 and Table D.3 of Appendix D.

7.1 Acoustic Character Correction

Based on site observations at Coed Y Felin during this survey and numerous previous surveys at the site, a 6dB penalty is proposed for clearly perceptible impulsive sounds which form the main characteristic of the sound emanating from the site.

The noise from the engine noise from the shredder is not identifiable off-site when being turned on or off and therefore no intermittency or tonality penalty is included. The main characteristic is impulsivity.

At Pont Y Felin House / Position 3, a tone from the shredder was just perceptible and therefore an additional 2dB penalty has been included in the assessment to this location as well as the 6dB penalty for clearly perceptible impulsive sounds.

7.2 Outcome of Assessment

7.2.1 Coed Y Felin Housing Estate

The initial outcome of the assessment therefore indicates an excess over background of 5-6dB. BS 4142 states that a "*difference of + 5dB, likely to be an indication of an adverse impact, depending on the context"*.

We would advise the context in this instance is as follows:

- The overall noise climate is controlled by road traffic noise
- The receivers are new dwellings built adjacent to a well-established existing industrial estate where an element of industrial noise within the daytime noise climate can be expected (neighbouring steel fabricators and HGVs along the road network to the industrial estate).
- The recycling operations are carried out during reasonable daytime hours only (0800-1700hrs Mon-Fri and 0800-1200hrs Sat) with no Sunday or Bank Holiday operations.

Modifying the outcome of the assessment for context, we would advise that an adverse impact is less likely based on the significant road traffic masking noise at the receptor locations.

7.2.2 Pont Y Felin House

The initial outcome of the assessment therefore indicates an excess over background of 12dB. BS 4142 states that a "*difference of + 10dB, likely to be an indication of a significant adverse impact, depending on the context"*.

We would advise the context in this instance is as follows:

- The noise climate is contains significant road traffic noise contribution
- The receiver is located to a well-established existing industrial estate where an element of industrial noise within the daytime noise climate can be expected (neighbouring steel fabricators and HGVs along the road network to the industrial estate).
- The recycling operations are carried out during reasonable daytime hours only (0800-1700hrs Mon-Fri and 0800-1200hrs Sat) with no Sunday or Bank Holiday operations.

The outcome of the assessment is not modified for context in this instance and we would advise that a significant adverse impact is likely at this receiver. Additional mitigation measures should therefore be incorporated to protect this receiver location from shredder noise.

8. ADDITIONAL MITIGATION

Noise levels are indicated to be higher at Pont Y Felin House as there is less acoustic screening to the shredder in this direction.

A 6m high 3-sided barrier with an acoustically absorbent face has been included in the model, wrapping around the western/northern/eastern side of the shredder to provide additional acoustic screening to this location.

With this in place, the following levels are indicated at receivers:

Table 8.1 – Check of Predicted vs Measured Levels Off-site

Pos	Predicted Site Noise with 6m High Shredder Barrier in Place $L_{Aeq,1hr}$ (dB)
1	49
2	47
3	49-50

BS 4142:2014+A1:2019 assessments of the noise are included in Table D.4, Table D.5 and Table D.6 of Appendix D.

The outcome of the assessments range from 1-4dB excess over background and therefore it is considered that an adverse impact is less likely.

9. CONCLUSION

Further to comments made by NRW in relation to results of weeklong monitoring carried out at the Coed Y Felin housing estate to assist the permit application for the shredder at S L Recycling site on Pont Y Felin Ind. Estate, New Inn, Pontypool, NP4 0SH, this report includes an assessment to receptor heights of 1.2m.

A noise survey was conducted at two locations at the Coed Y Felin housing estate as well as onsite source sample measurements of the plant. The site was shutdown for a 1hr period to ascertain the residual and background sound climate at the receptors.

Further to comments from NRW, additional check measurements were undertaken at Pont Y Felin Lane adjacent to Pont Y Felin House.

The noise climate at the receptors is controlled by road traffic noise and therefore a noise map model has been carried out to predict levels of noise from the shredder and other site operations at the receptors.

The model has been validated, showing good agreement with both on-site and off-site measurements however the model is potentially marginally high at the Pont Y Felin location.

The initial outcome of a BS 4142:2014+A1:2019 assessment indicates an adverse impact depending on context at Coed Y Felin housing estate. The context is discussed in Section 7.2.

Taking the context into consideration, we would advise an adverse impact is indicated less likely based on the significant road traffic masking noise at the receptor locations.

A significant adverse impact is indicated however at Pont Y Felin House due to the position of the shredder and reduced acoustic screening in the direction of Pont Y Felin.

Additional attenuation measures are indicated to be required in the form of a minimum 6m high barrier with an acoustically absorbent face (plant side) wrapping around the western/northern/eastern sides of the shredder.

This has been included in a revised noise model which results in an excess over background of 1-4dB when assessed in accordance with BS 4142. An adverse impact is therefore indicated less likely with additional mitigation measures in place.

APPENDIX A - ACOUSTIC TERMINOLOGY

Human response to noise depends on a number of factors including loudness, frequency content and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'.

The following units have been used in this report:

dB(A)	The sound pressure level A-weighted to correspond with the frequency response of the human ear and therefore a persons' subjective response to frequency content.
L_{eq}	The equivalent continuous sound level is a notional steady state level which over a quoted time period would have the same acoustic energy content as the actual fluctuating noise measured over that period.
L_{max}	The highest instantaneous sound level recorded during the measurement period.
L_{10}	The sound level which is exceeded for 10% of the measurement period. i.e. The level exceeded for 6 minutes of a 1 hour measurement - used as a measure of background noise.
L_{90}	The sound level which is exceeded for 90% of the measurement period. i.e. The level exceeded for 54 minutes of a 1 hour measurement - used as a measure of background noise.
$L_{Ar,Tr}$	The 'rating' level, as described in BS 4142:2014 – the specific noise plus any adjustment for the characteristic features of the noise.
SSR	Sound sensitive receiver

APPENDIX B - DIAGRAMS, GRAPHS AND TABLES

Figure B.1 – Weather History for Monday, 17 October 2022

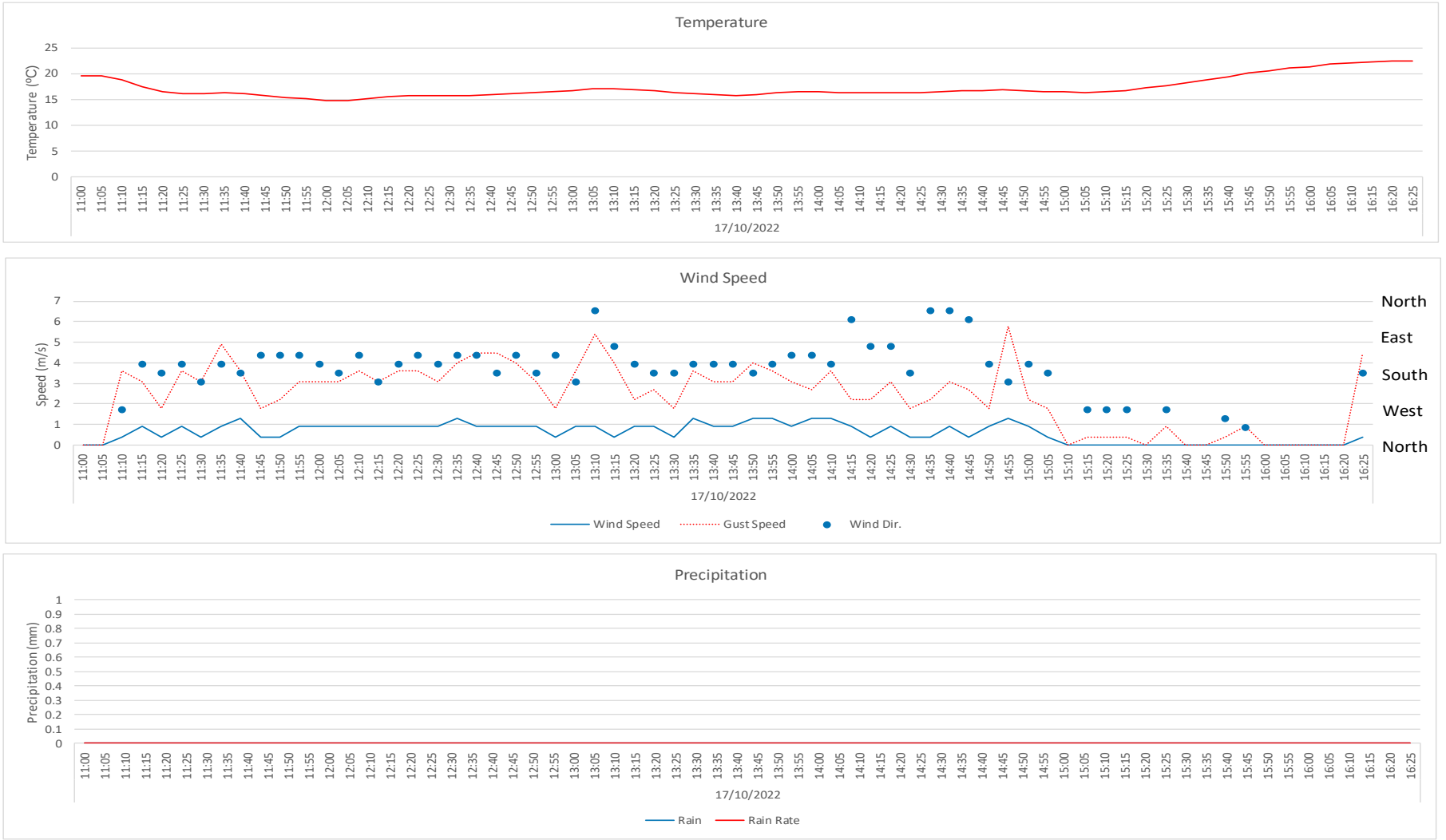


Figure B.2 – Time History at Position 1 (Monday, 17 October 2022)

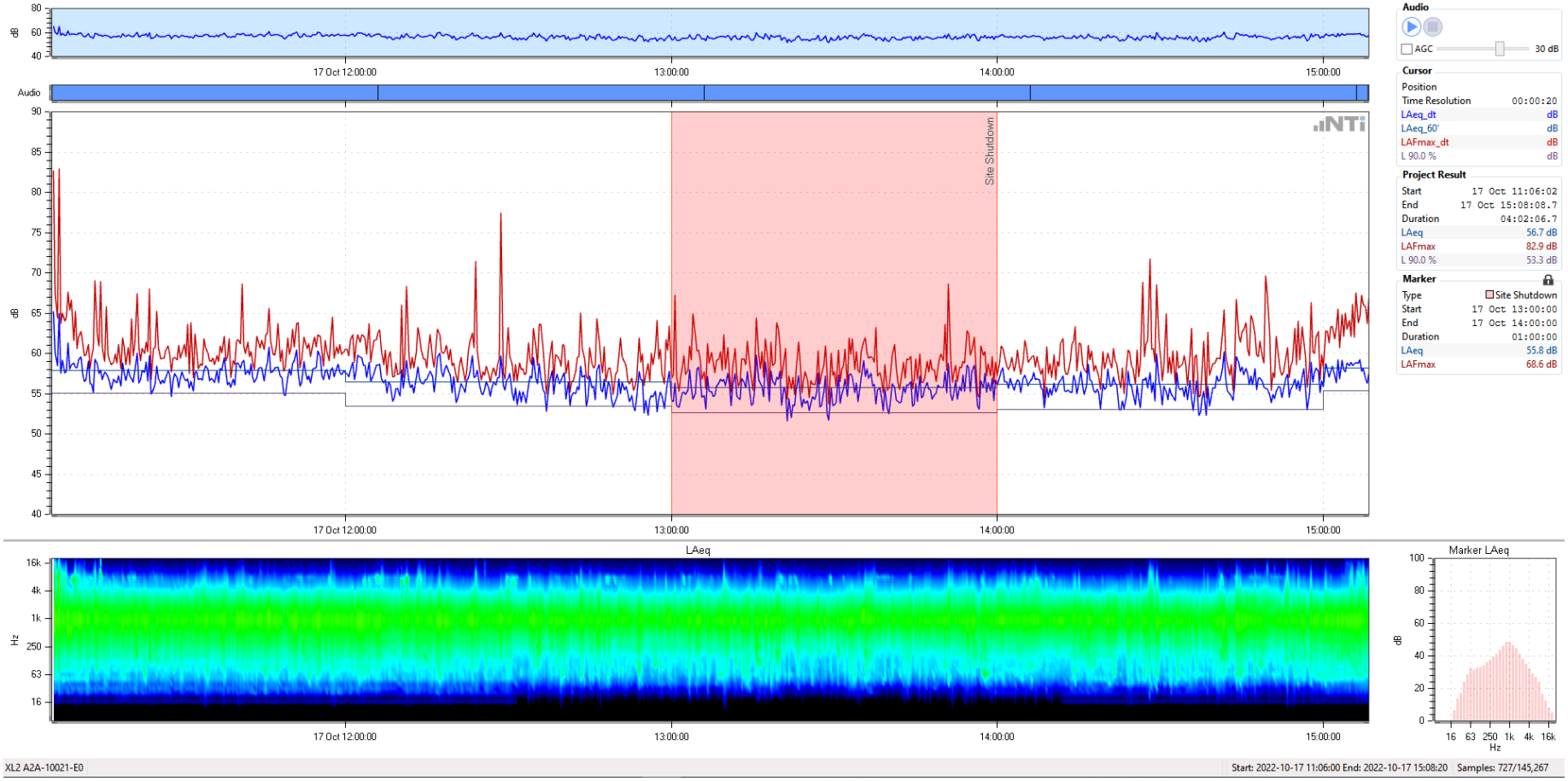


Figure B.3 – Time History at Position 2 (Monday, 17 October 2022)

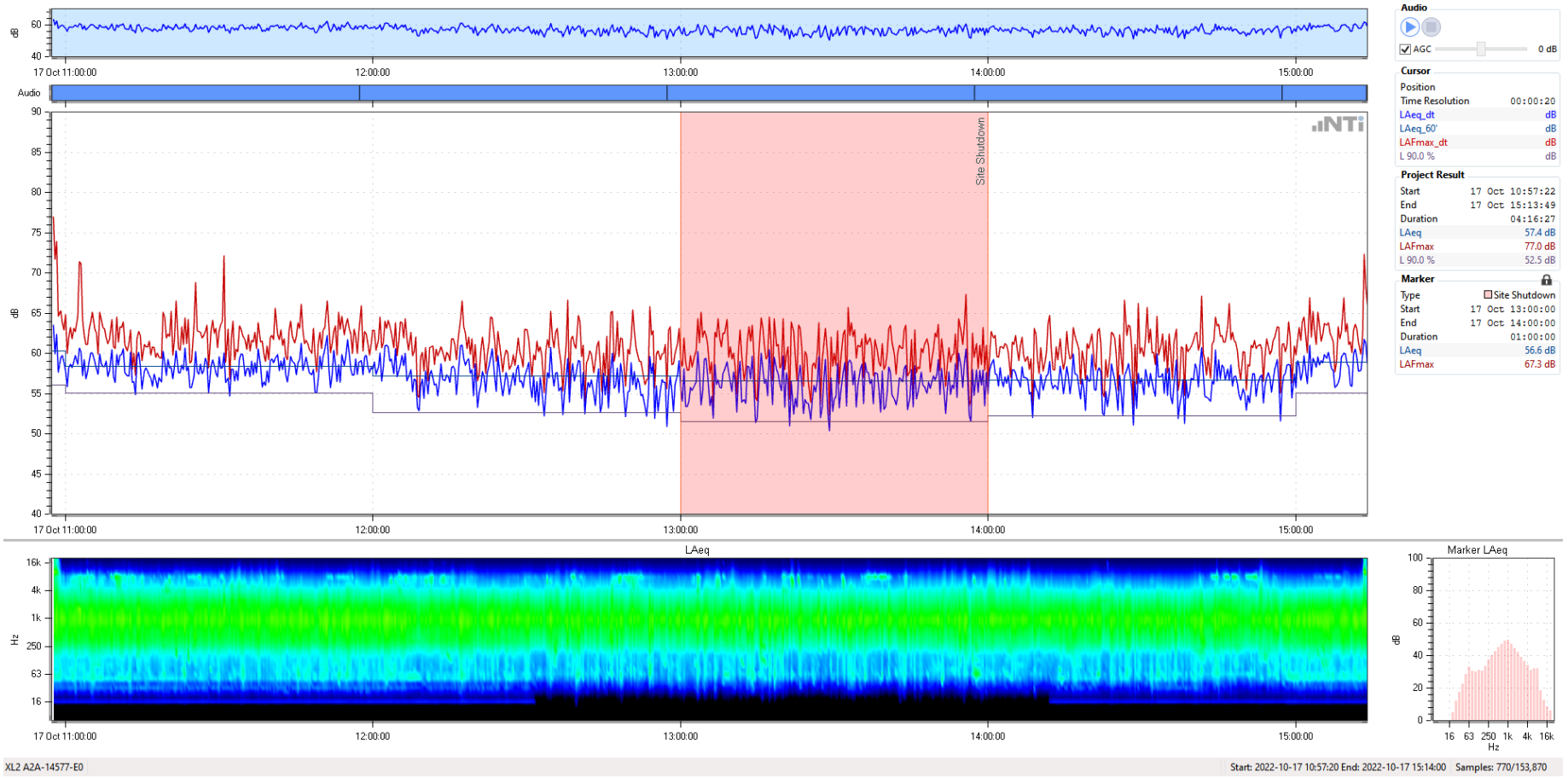


Table B.1 – Source Sample Measurement Results on Monday, 17 October 2022 (including Octave Band Data)

Description	Duration (secs)	Distance (m)	L_{Aeq} (dB)	$L_{Amax,F}$ (dB)	L_{eq} at Octave Band Centre Frequencies (dB)							
					63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Grabber & Shredder Activity - 22m from Shredder Loader, 10m from Grabber Pile. Measurement Controlled by Shredder Noise.	600	22	83.1	94.2	92.2	85.4	80.9	79.1	78.4	76.7	71.2	63.3
Repeat of Previous Measurement - 15m from Shredder Loader, 5m from Grabber Pile.	600	15	86.6	97.2	94.6	87.3	82.9	82.4	81.9	80.3	75.3	68.2
Repeat of Previous Measurement	600	15	87.2	99.3	95.3	87.4	82.6	82.5	82.6	81.2	76.5	69.0
South of Sredder. 13m from Shredder Output Conveyor Belt & Pile.	340	13	81.5	88.9	87.4	80.1	76.2	77.4	75.6	76.2	70.5	65.0
Within Shredder Output Area. 13.7m from Shredder Unit.	301	13.7	89.7	96.4	95.7	92.3	88.1	85.6	84.6	83.3	78.2	72.5
On Mound Near Site Boundary - Line of Sight to Shredder/Grabber Activity @ approx. 90m Distance	600	90	70.8	82.2	76.0	66.4	66.2	67.6	66.2	64.4	58.8	48.9
Grabber Activity - Shredder Not Operational. Same Measurement Position as File No. 001. (5m from Grabber Pile).	386	5	78.3	95.6	76.3	69.3	72.1	74.1	73.3	72.2	68.7	63.9
Repeat of Previous Measurement - Grabber Not Active, Shredder Operational	200	15	86.5	94	96.2	86.8	82.5	82.6	81.6	80.3	74.9	67.3

Figure B.4 – Time History at Position 3. Pont Y Felin (Tuesday, 20 December 2022)

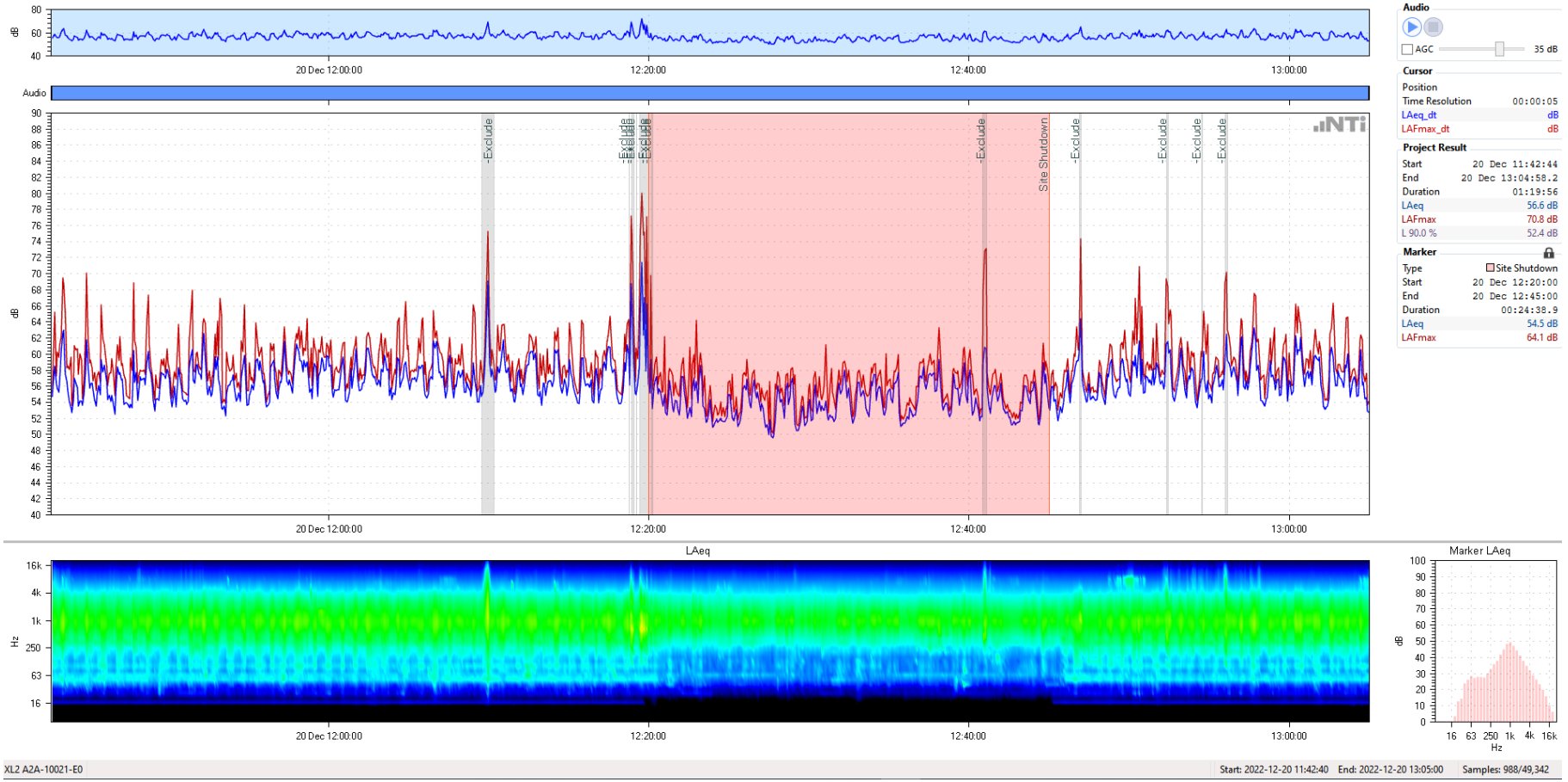


Table B.2 – Source Sample Measurement Results on Tuesday, 20 December 2022 (including Octave Band Data)

Description	Duration (secs)	Distance (m)	L_{Aeq} (dB)	$L_{Amax,F}$ (dB)	L_{eq} at Octave Band Centre Frequencies (dB)							
					63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Short sample measurement between car pass-bys outside main site gate on opposite side of road, shredder running and site operating as normal. Position x	10	-	61.0	62.7	71.6	62.6	56.0	56.6	57.3	54.3	48.3	41.6

APPENDIX C – NOISE MODELLING

C.1 Noise Model Input Data

Table C.1 – Mobile Plant Noise Data Used in Model

Plant Item / Activity	L_w at Octave Band Centre Frequencies, Hz (dB)								L_{wA}
	63	125	250	500	1000	2000	4000	8000	(dB)
HGV *	75.4	79.4	88.8	94.1	98.3	95.3	88.5	80.7	102
Forklift *	72.0	79.0	89.0	93.0	96.0	94.0	89.0	80.0	100

* *A-weighted spectra*

Table C.2 – Fixed Plant Noise Data Used in Model

Plant Item / Activity	L_w at Octave Band Centre Frequencies, Hz (dB)								L_{wA}
	63	125	250	500	1000	2000	4000	8000	(dB)
Shredder being loaded by grab	126.8	118.9	114.1	114.0	114.1	112.7	108.0	100.5	118.9
MHL Grab sorting front of pile	98.3	91.3	94.1	96.1	95.3	94.2	90.7	85.9	100.4
Scrap tip	102.0	103.7	103.3	103.4	103.8	104.1	103.5	101.3	110.4
Excavator sorting general waste *	73	80	90	96	98	94	88	80	102

* *A-weighted spectra*

C.2 Model Validation

Table C.3 – Model Validation for Major Sources

Name	Description	Co-ordinates X	Co-ordinates Y	Predicted $L_{Aeq,1hr}$ (dB)	Measured L_{Aeqr} (dB)	Delta (dB)
15m Cal	Shredder Calib 15m	330050.11	198713.67	87.2	87.2	0
22m Cal	Shredder Calib 22m	330049.64	198720.79	83.9	83.1	0.8
90m Cal	Shredder Calib 90m	330084.75	198778.36	73.7	70.8	2.9
Opp. Gate	Opposite main entrance gate	330130.63	198774.31	61.2	61.0	0.2
13m out	Shredder output end at 13m	330035.93	198673.78	81.9	81.5	0.4
5m Grab Cal	Grab sorting pile at 5m	330080.38	198713.22	79.7	78.3	1.4

C.3 Noise Model Scenarios

Table C.4 – Existing Daytime Modelled Scenario (Worst Case 1hr Period)

Activity	% On-time	Flow	Speed (km/h)	Source Height (m)
Shredder being loaded by grab	100	-	-	3.0
HGVs	-	10 in and out	20	1.0
MHL Grab sorting front of pile	100	-	-	3.0
Excavator sorting general waste	100	-	-	3.0
Scrap tips	16.7	-	-	1.0
Forklift (up and down site)	-	10	20	0.75

C.4 Noise Model 3D View

Figure C.1 – 3D Model of Existing Site

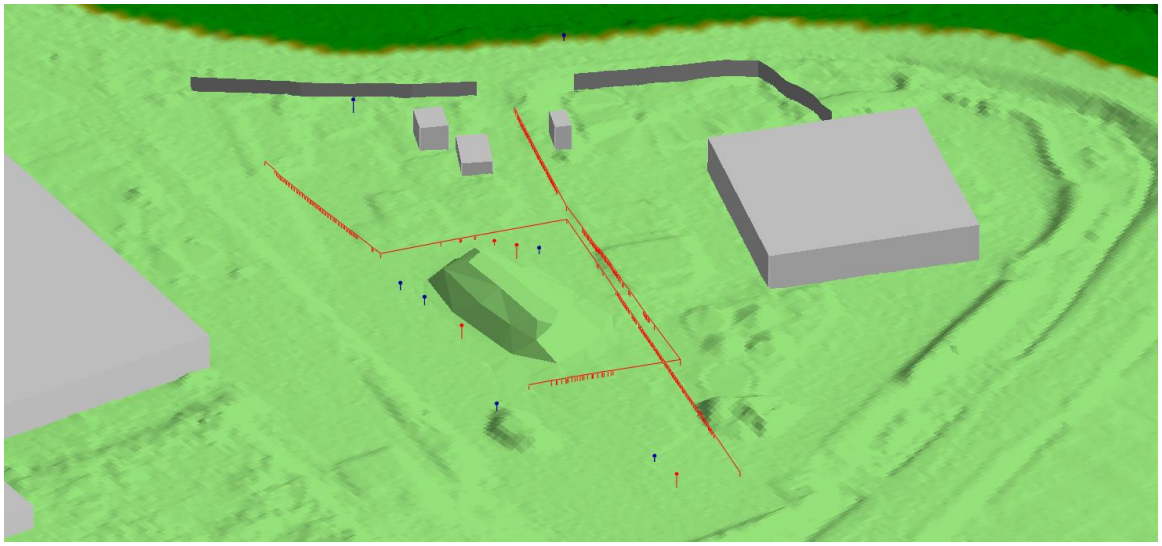
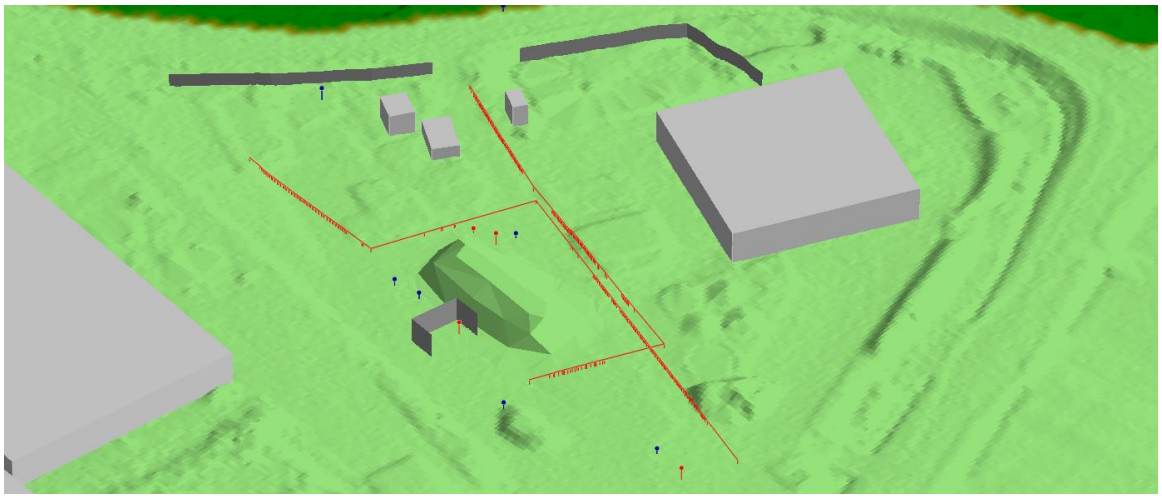


Figure C.2 – 3D Model of Site with 6m Shredder Barrier with Absorbent Inner Face



APPENDIX D – BS 4142:2014+A1:2019 ASSESSMENTS

Table D.1 – BS 4142:2014 Assessment at Position 1, Coed Y Felin

Results		Clause	Commentary
Predicted Level from Noise Model	L_{Aeq} = 52dB	7.3.2	
Residual sound level	L_{Aeq} = N/A	7.3.3	Working with predicted level
Background sound level (daytime)	$L_{A90(1300\text{-}1400hrs)}$ = 52dB	8.1.1 8.1.3 8.3	Background sound level measured at Position 1 with plant off
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq,1hr}$ = 52dB	7.3.4	
Acoustic feature correction	6dB	9.2	Impulses clearly perceptible from scrap handling
Rating Level	(52 + 6) = 58dB		
Background sound level (daytime)	$L_{A90(1200\text{-}1300hrs)}$ = 52dB	8.3	
Excess of rating over background sound level	(58 - 52) dB = 6dB	11	
Assessment indicates adverse impact depending on context		11	With a 6dB excess over background, BS 4142:2014 advises: "this is an indication of the specific sound source having an adverse impact, depending on the context". Context is discussed in Section 7.2
Uncertainty of assessment		10	Uncertainty in the predicted shredder noise is considered low due to the calibration of the noise model based on measured source levels and verified off-site.

Table D.2 – BS 4142:2014 Assessment at Position 2, Coed Y Felin

Results		Clause	Commentary
Predicted Level from Noise Model	L_{Aeq} = 51dB	7.3.2	
Residual sound level	L_{Aeq} = N/A	7.3.3	Working with predicted level
Background sound level (daytime)	$L_{A90(1300\text{-}1400hrs)}$ = 52dB	8.1.1 8.1.3 8.3	Background sound level measured at Position 2 with plant off
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq,1hr}$ = 52dB	7.3.4	
Acoustic feature correction	6dB	9.2	Impulses clearly perceptible from scrap handling
Rating Level	(51 + 6) = 57dB		
Background sound level (daytime)	$L_{A90(1200\text{-}1300hrs)}$ = 52dB	8.3	
Excess of rating over background sound level	(57 - 52) dB = 5dB	11	
Assessment indicates adverse impact depending on context		11	With a 5dB excess over background, BS 4142:2014 advises: "this is an indication of the specific sound source having an adverse impact, depending on the context". Context is discussed in Section 7.2
Uncertainty of assessment		10	Uncertainty in the predicted shredder noise is considered low due to the calibration of the noise model based on measured source levels and verified off-site.

Table D.3 – BS 4142:2014 Assessment at Pont Y Felin House

Results		Clause	Commentary
Predicted Level from Noise Model	L_{Aeq} = 55dB	7.3.2	
Residual sound level	L_{Aeq} = N/A	7.3.3	Working with predicted level
Background sound level (daytime)	$L_{A90(1220\text{-}1245hrs)}$ = 51dB	8.1.1 8.1.3 8.3	Background sound level measured at Position 3 with plant off
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq,1hr}$ = 55dB	7.3.4	
Acoustic feature correction	8dB	9.2	+6dB for impulses clearly perceptible from scrap handling, +2dB for tonality from shredder just audible at this location
Rating Level	(55 + 8) = 63dB		
Background sound level (daytime)	$L_{A90(1220\text{-}1245hrs)}$ = 51dB	8.3	
Excess of rating over background sound level	(63 - 51) dB = 12dB	11	
Assessment indicates significant adverse impact depending on context		11	With a 12dB excess over background, BS 4142:2014 advises: "this is an indication of the specific sound source having a significant adverse impact, depending on the context". Context is discussed in Section 7.2
Uncertainty of assessment		10	Uncertainty in the predicted shredder noise is considered low due to the calibration of the noise model based on measured source levels and verified off-site.

Table D.4 – BS 4142:2014 Assessment at Position 1, Coed Y Felin with Mitigation

Results		Clause	Commentary
Predicted Level from Noise Model with Mitigation	L_{Aeq} = 49dB	7.3.2	
Residual sound level	L_{Aeq} = N/A	7.3.3	Working with predicted level
Background sound level (daytime)	$L_{A90(1300\text{-}1400hrs)}$ = 52dB	8.1.1 8.1.3 8.3	Background sound level measured at Position 1 with plant off
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq,1hr}$ = 49dB	7.3.4	
Acoustic feature correction	6dB	9.2	Impulses clearly perceptible from scrap handling
Rating Level	(49 + 6) = 55dB		
Background sound level (daytime)	$L_{A90(1200\text{-}1300hrs)}$ = 52dB	8.3	
Excess of rating over background sound level	(55 - 52) dB = 3dB	11	
Assessment indicates adverse impact is less likely depending on context		11	With a 3dB excess over background, BS 4142:2014 advises an adverse impact is less likely, depending on the context.
Uncertainty of assessment		10	Uncertainty in the predicted shredder noise is considered low due to the calibration of the noise model based on measured source levels and verified off-site.

Table D.5 – BS 4142:2014 Assessment at Position 2, Coed Y Felin with Mitigation

Results		Clause	Commentary
Predicted Level from Noise Model with Mitigation	L_{Aeq} = 47dB	7.3.2	
Residual sound level	L_{Aeq} = N/A	7.3.3	Working with predicted level
Background sound level (daytime)	$L_{A90(1300\text{-}1400hrs)}$ = 52dB	8.1.1 8.1.3 8.3	Background sound level measured at Position 2 with plant off
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq,1hr}$ = 47dB	7.3.4	
Acoustic feature correction	6dB	9.2	Impulses clearly perceptible from scrap handling
Rating Level	(47 + 6) = 53dB		
Background sound level (daytime)	$L_{A90(1200\text{-}1300hrs)}$ = 52dB	8.3	
Excess of rating over background sound level	(53 - 52) dB = 1dB	11	
Assessment indicates adverse impact is less likely depending on context		11	With a 1dB excess over background, BS 4142:2014 advises an adverse impact is less likely, depending on the context.
Uncertainty of assessment		10	Uncertainty in the predicted shredder noise is considered low due to the calibration of the noise model based on measured source levels and verified off-site.

Table D.6 – BS 4142:2014 Assessment at Pont Y Felin House with Mitigation

Results		Clause	Commentary
Predicted Level from Noise Model with Mitigation	L_{Aeq} = 49dB	7.3.2	
Residual sound level	L_{Aeq} = N/A	7.3.3	Working with predicted level
Background sound level (daytime)	$L_{A90(1220\text{-}1245hrs)}$ = 51dB	8.1.1 8.1.3 8.3	Background sound level measured at Position 3 with plant off
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq,1hr}$ = 49dB	7.3.4	
Acoustic feature correction	6dB	9.2	+6dB for impulses clearly perceptible from scrap handling, At this reduced level, it is unlikely that the tonal component would attract a penalty (based on subjective assessment at Coed Y Felin currently)
Rating Level	(49 + 6) = 55dB		
Background sound level (daytime)	$L_{A90(1220\text{-}1245hrs)}$ = 51dB	8.3	
Excess of rating over background sound level	(55 - 51) dB = 4dB	11	
Assessment indicates adverse impact is less likely depending on context		11	With a 4dB excess over background, BS 4142:2014 advises an adverse impact is less likely, depending on the context.
Uncertainty of assessment		10	Uncertainty in the predicted shredder noise is considered low due to the calibration of the noise model based on measured source levels and verified off-site.