



Report No. 21080/EN

An Environmental Noise Survey undertaken at Hydro Aluminium,
Deeside, in accordance with BS4142: 2014+A1:2019

Client Name: Hydro Aluminium
Contact: Joel Priest
Survey Date: 16th and 18th June 2021
Report Date: 6th September 2021

Address: Bridge Road
Wrexham Industrial Estate
Wrexham
LL13 9PS

Consultant:

Daniel Cottam
BSc (Hons) Cert.Occ.Hyg. LFOH

Reviewed by:

Matthew Parkinson
BSc (Hons) MSc Cert.Occ.Hyg. LFOH

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Executive Summary

Cottam Parkinson Consulting (CPC) were commissioned to undertake an environmental noise survey at Hydro Aluminium Deeside, Wrexham. The survey was undertaken in accordance with the Company's IPPC Permit and BS4142: 2014+A1:2019.

Under the guidance given in BS4142, the results of the survey indicated that complaints would be likely during both the day and night time at the nearest residential property on The Oval. During the daytime the noise rating level was +8 dB over the background noise level and +9 dB during the night time.

It was determined that the operation of the newly installed pre-heater fans did not have an impact on the nearest property, as there was no increase in the average noise level when the fans were operating during the night time. Complaints were therefore unlikely.

Hydro should investigate ways of minimising the noise generated from loading the charger.

1 Introduction

Hydro Aluminium Deeside, Wrexham, operate an aluminium recycling facility, where scrap aluminium is recycled to form aluminium extrusion ingots. Mr Joel Priest, the Company's QHSE Manager, requested that Cottam Parkinson Consulting (CPC) Ltd undertake an annual environmental noise survey to comply with their IPPC Permit.

Section 3.4.3 "Noise and vibration" of the Permit states that, *"The operator shall carry out noise monitoring and assessment exercise on annual basis from the site at the nearest sensitive receptors during day and night as per BS4142:1997"*.

Since the previous survey conducted in December 2020, new pre-heater fans had been installed inside the factory. Further readings were requested to evaluate the impact of these fans, at the nearest property, during the night time. Any noise impact would be greater during the night when the background noise levels are lower.

In addition, the measurements taken were compared to a noise rating (NR) curve of 40 for the night time readings and NR curve of 50 for the daytime. NR curves are an alternative method of evaluating the background noise, based on un-weighted sound level measurements in octave frequency bands.

The night time measurements were performed on 16th June and into the early hours of 17th June 2021. The daytime measurements were undertaken on 18th June 2021 by Daniel Cottam of CPC.

2 British Standard BS4142: 2014+A1:2019

This standard, *Methods for rating and assessing industrial and commercial sound* has been updated to include a number of important changes. The new scope of the methodology is to assess the "likely impact" of commercial and industrial noise, and brings BS4142: 2014+A1:2019 in line with other guidance including the Noise Policy Statement for England and the National Policy Framework.

BS4142:2014 states that, for commercial or industrial noise with no distinguishable features:

- The louder the commercial/industrial noise is compared to the background noise, the greater the magnitude of the impact;
- If the commercial/industrial noise is 10 dB or more higher than the background noise level then this is an indication of a significant adverse impact (i.e. this is not normally acceptable);

- If the commercial/industrial noise is around 5 dB higher than the background noise level then this is an indication of an adverse impact (i.e. this should be avoided if possible);
- If the commercial/industrial noise is lower than the background noise level, this is an indication of a low impact (i.e. this is normally acceptable). The lower the commercial noise level is, the lower the likely impact.

Corrections for tonality, impulsivity, intermittency and other sound characteristics have been introduced and are detailed below:

Noise Characteristic	Perceptibility		
	Just Perceptible	Clearly Perceptible	Highly Perceptible
Tonality	+2	+4	+6
Impulsivity	+3	+6	+9
Intermittency	0	+3	+3
Other Sound	0	+3	+3

The standard also includes a new section on uncertainty, that requires the level of uncertainty to be taken into account and the level and effects reported. Although there have been changes to the previous standard, it is likely that the principles of the assessment will remain the same.

3 Measurement Procedure

The measurements were taken using a CEL 490C precision integrating 'real-time' sound level meter (SLM) serial number 035526, which complied with the Type 1 Standard. The SLM was calibrated both prior to and after monitoring to 114dB (1kHz) using a CEL-110/1 acoustic calibrator, serial number 064395.

The SLM was attached to a tripod at a height of 1½ metres and was positioned more than 3½ metres from any reflecting surface. A foam windshield was fitted to the microphone to prevent the effects of wind noise. Weather conditions, including wind speed and temperature were noted at all monitoring locations.

To perform the BS4142 calculation, daytime readings for the factory not operating were taken a distance away from the factory where the noise generated by Hydro Aluminium was not audible. This position was adjacent to The Oval and behind the garages off Bridgeway East. It was possible for Hydro Aluminium to shut down their factory operations for the night time assessment, to enable the background noise to be established.

4 Observations

4.1 Daytime

The noise was measured at approximately fifteen (15) metres from the boundary fence of the nearest property on The Oval. The weather was overcast with a gentle breeze (<3 m/s) and a temperature of 16°C.

During the assessment, the following activities were undertaken within the factory, that generated audible noise sources at the monitoring location:

- External fan noise / bag plants (constant noise);
- Loading the charger with scrap material, including bales and loose material (intermittent noise);
- Stripping the pit and straightening the logs on the lay down station (intermittent noise), and;
- Road traffic on Bridge Road (intermittent noise).

The loading of the charger generated sporadic crashing type noises of aluminium material impacting the sides and floor of the charger. The stripping of the pit generated faint 'chiming' type of noise as the aluminium logs were removed and straightened up on the lay down station. However, this noise was not as dominant or noticeable as the loading of the charger. In addition, there was occasional road traffic noise from Bridge Road.

4.2 Night Time

During the night measurements, the main regular audible noise was from Hydro's external fans serving the bag plant. There were also other noise sources from the factory, these included:

- Sirens from site vehicles (intermittent);
- Straightening of aluminium logs on the lay down station (intermittent);
- Bundles of aluminium, prime and loose material being loaded onto the charger (intermittent).

During the night time measurements, one set of readings was taken during the operation of the pre-heater fans only, located internally within the factory. These fans were not audible, at the monitoring location, when they were operational.

The weather during the night time measurements was overcast with no noticeable breeze/wind and a temperature of 15°C.

5 **Results**

5.1 **BS4142 Assessment (Factory)**

The full results are presented in Appendix 1 of this report.

Daytime readings:

Measured noise (Factory operating)	$L_{eq} (60 \text{ min}) = 49 \text{ dB(A)}$
Residual noise (Factory not operating)	$L_{eq} (60 \text{ min}) = 46 \text{ dB(A)}$

Calculated specific noise = 46 dB(A)

Night time readings:

Measured noise (Factory operating)	$L_{eq} (15 \text{ min}) = 44 \text{ dB(A)}$
Residual noise (Factory not operating)	$L_{eq} (15 \text{ min}) = 39 \text{ dB(A)}$

Calculated specific noise = 42 dB(A)

Specific Noise at the Nearest Property

The nearest property was one hundred and eighty five (185) metres from Hydro and the noise monitoring location was one hundred and seventy (170) metres from Hydro, therefore the noise will be reduced by 1 dB, thus giving:

Daytime specific noise:	45 dB(A)
Night time specific noise:	41 dB(A)

Table to show BS4142 calculation

	Day (dB(A))	Night (dB(A))
Specific noise (L_{eq})	45	41
Acoustic feature correction*	+5	+5
Rating level	50	46
Background noise level (L_{90})	42	37
BS4142 Difference	+8	+9
Likelihood of complaints	Likely	Likely

* this rating is calculated from the tonality and the intermittency of the noises.

5.2 BS4142 Assessment (Pre-Heater Fans Only)

The full results are presented Tables 3A and 4 in Appendix 1 of this report.

Night time readings:

Measured noise (Pre-heater fans operating)	$L_{eq} (5 \text{ min}) = 39 \text{ dB(A)}$
Residual noise (Pre-heater fans not operating)	$L_{eq} (15 \text{ min}) = 39 \text{ dB(A)}$

There was no increase in the average noise level at the monitoring location with just the pre-heater fans in operation during the night time. This was therefore a positive indication that there would be no disturbance and complaints would be unlikely at the nearest residential property.

5.3 Noise Rating (NR) Curves

The full results of the noise rating curve conformance are presented in Appendix 3.

During the daytime, the NR curve indicated a noise rating of 43 dB. This conformed to the NR curve of 50 dB.

During the night time, the NR curve indicated a noise rating of 40 dB. This conformed to the NR curve of 40 dB.

6 Conclusion and Discussion

The results of the BS 4142 assessment indicated that, at the nearest property on The Oval, the likelihood of complaints during both the daytime and night time would be likely. There was a difference of +8 dB over the background noise during the day time and a difference of +9 dB during the night. These results were similar to those recorded during the survey in December 2020 (+7 dB daytime and +10 dB night time).

There was no increase in the noise level and no audible noise generated by the operation of the newly installed pre-heater fans from Hydro's facility during the night time. Complaints would therefore be unlikely. These readings from the pre-heater fans were anticipated due to their positioning within the factory and not externally.

7 Recommendations

The most audible of noise sources during the survey was the loading of the charger with loose material. It would be beneficial for Hydro to investigate any alternative methods of loading the furnace with scrap aluminium, such that the use of the charger can be minimised.

Appendix 1

Results of Noise Measurements

The following tables show the noise measurements taken during the daytime, on 18th June 2021

Table 1A – Daytime readings (Factory in Operation)

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (60 min)	L ₉₀	L ₁₀	L _{Max}
08.36 – 09.36	49	47	51	66
Noise sources: Loading of the charger with loose material External fan noise / bag plants. Pushing material into the melter. Occasional traffic on Bridge Road.				

Table 1B – Daytime readings (Factory in Operation)

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (60 min)	L ₉₀	L ₁₀	L _{Max}
09.36 – 10.36	49	47	50	67
Noise sources: Loading of the charger with loose material External fan noise / bag plants. Occasional traffic on Bridge Road.				

Table 1C – Daytime readings (Factory in Operation)

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (60 min)	L ₉₀	L ₁₀	L _{Max}
10.36 11.36	49	47	51	61
Noise sources: Loading of the charger with bundles External fan noise / bag plants. Stripping the pit activity. Occasional traffic on Bridge Road.				

Table 2 – Daytime readings (Factory NOT in operation)

Position 2 – Behind disused garages on Bridgeway East opposite The Oval				
Time Period	L _{eq} (60 min)	L ₉₀	L ₁₀	L _{Max}
11.54 – 12.54	46	42	49	69
Noise sources: Road traffic on Bridge Road Occasional construction noise and clattering from the estate not associated with Hydro. Bird song				

All noise levels were measured in dB(A).

The following tables show the noise measurements taken during the night time, on 16th June 2021

Table 3A – Night time readings (Pre-Heater Fans in Operation only)

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (5 min)	L ₉₀	L ₁₀	L _{Max}
23.48 – 23.53	39	37	40	54
Noise sources: Distant factory noise from industrial estate. Distant road traffic. No audible noise detected from the operation of the pre-heater fans.				

Table 3B – Night time readings (Factory in Operation)

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (15 min)	L ₉₀	L ₁₀	L _{Max}
23.56 – 00.11	44	43	45	53
Noise sources: External fan noise / bag plants Small amount of vehicle movement in yard Distant road traffic				

Table 3C – Night time readings (Factory in Operation)

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (15 min)	L ₉₀	L ₁₀	L _{Max}
00.13 – 00.28	44	43	45	47
Noise sources: External fan noise / bag plants Small amount of vehicle movement in yard Logs being straightened on the lay down station, faint chiming noise				

Table 3D – Night time readings (Factory in Operation)

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (15 min)	L ₉₀	L ₁₀	L _{Max}
00.29 – 00.44	43	42	44	52
Noise sources: External fan noise / bag plants Small amount of vehicle movement in yard Logs being straightened on the lay down station, faint chiming noise. Skimmer in use (faint siren noise audible from skimmer)				

Table 3E – Night time readings (Factory in Operation)

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (15 min)	L ₉₀	L ₁₀	L _{Max}
00.45 – 00.59	43	43	44	54
Noise sources: External fan noise / bag plants Logs being straightened on the lay down station, faint chiming noise. Bundles and prime being loaded onto the charger				

Table 3F – Night time readings (Factory in Operation)

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (15 min)	L ₉₀	L ₁₀	L _{Max}
01.16 – 01.31	43	42	45	61
Noise sources: External fan noise / bag plants Loading the charger with loose aluminium material Logs being straightened on the lay down station, faint chiming noise.				

Table 4 – Night time readings (Factory NOT in operation)

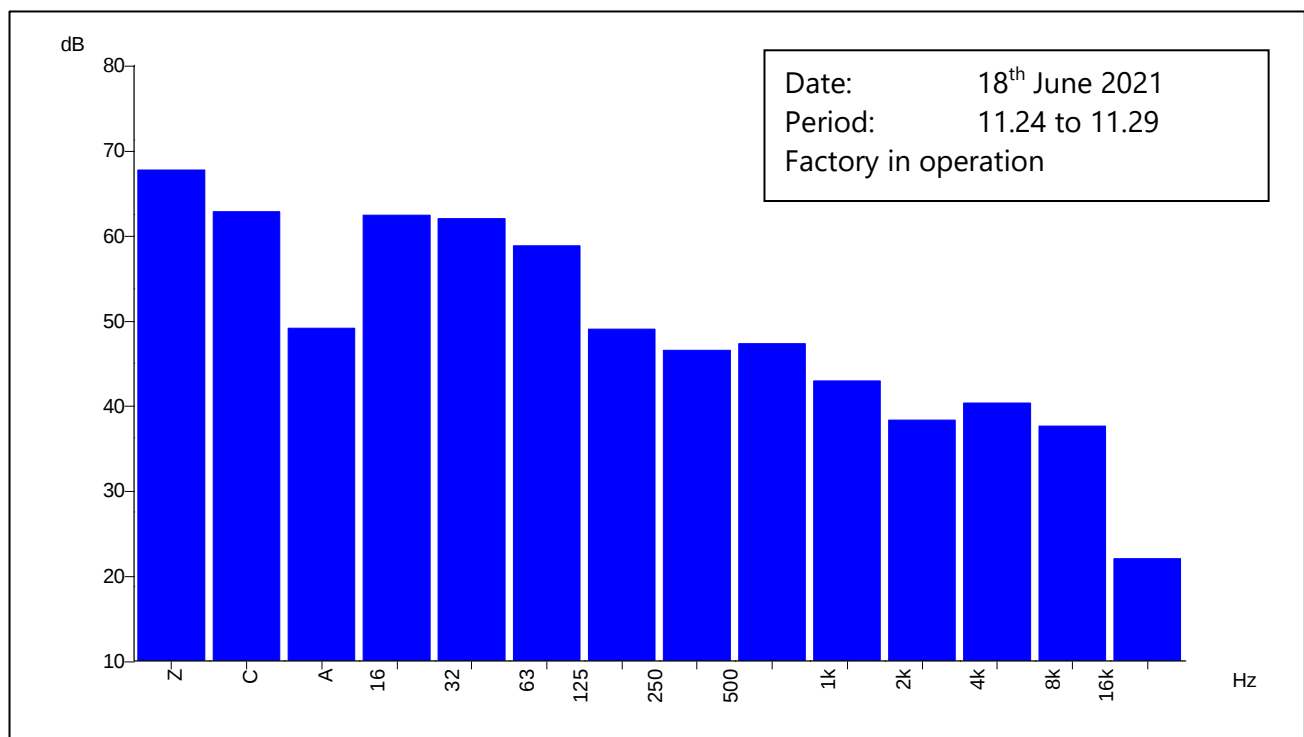
Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (15 min)	L ₉₀	L ₁₀	L _{Max}
23.29 – 23.44	39	37	40	51
Noise sources: Distant factory noise from industrial estate. Distant traffic noise				

All noise levels were measured in dB(A).

Appendix 2

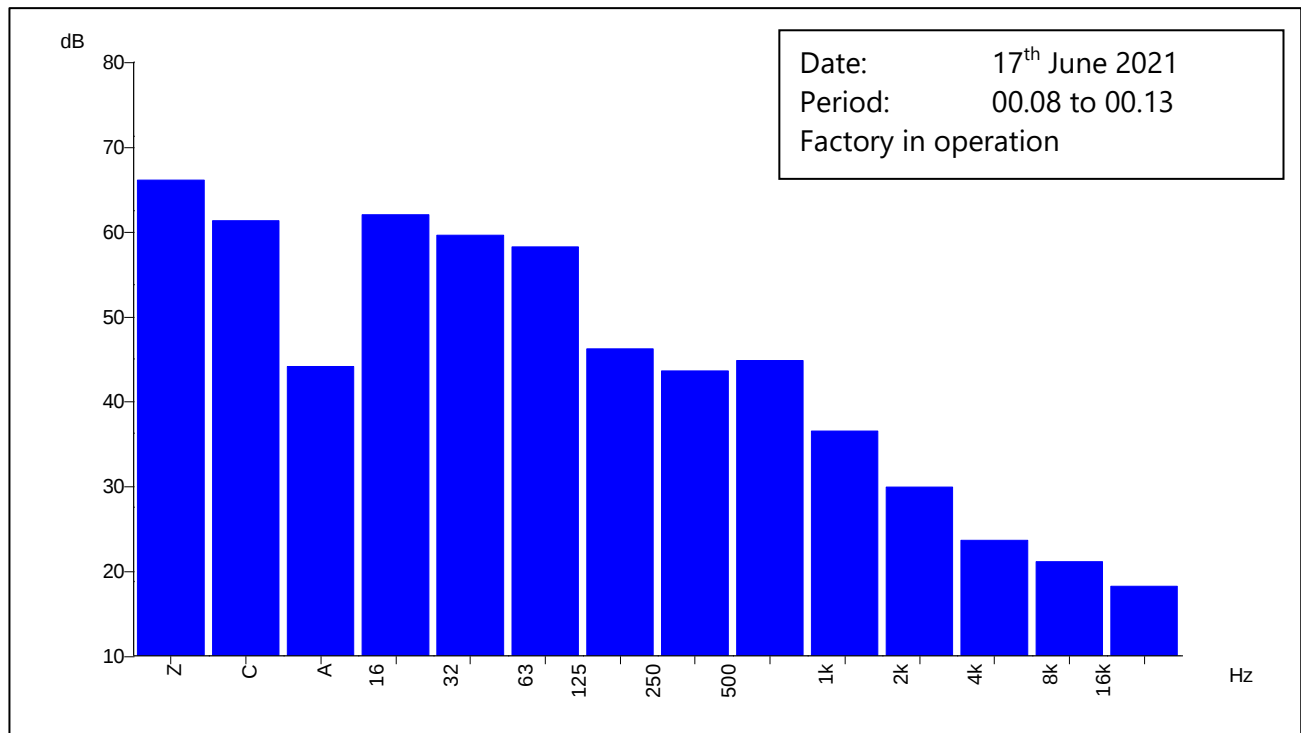
Octave Band Analysis

Figure 1 Octave Band Analysis undertaken at Hydro Aluminium Deeside, during the daytime, on 18th June 2021



OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
31.5	63	125	250	500	1k	2k	4k	8k
62	59	49	47	47	43	38	40	38

Figure 2 Octave Band Analysis undertaken at Hydro Aluminium Deeside, during the night time, on 17th June 2021

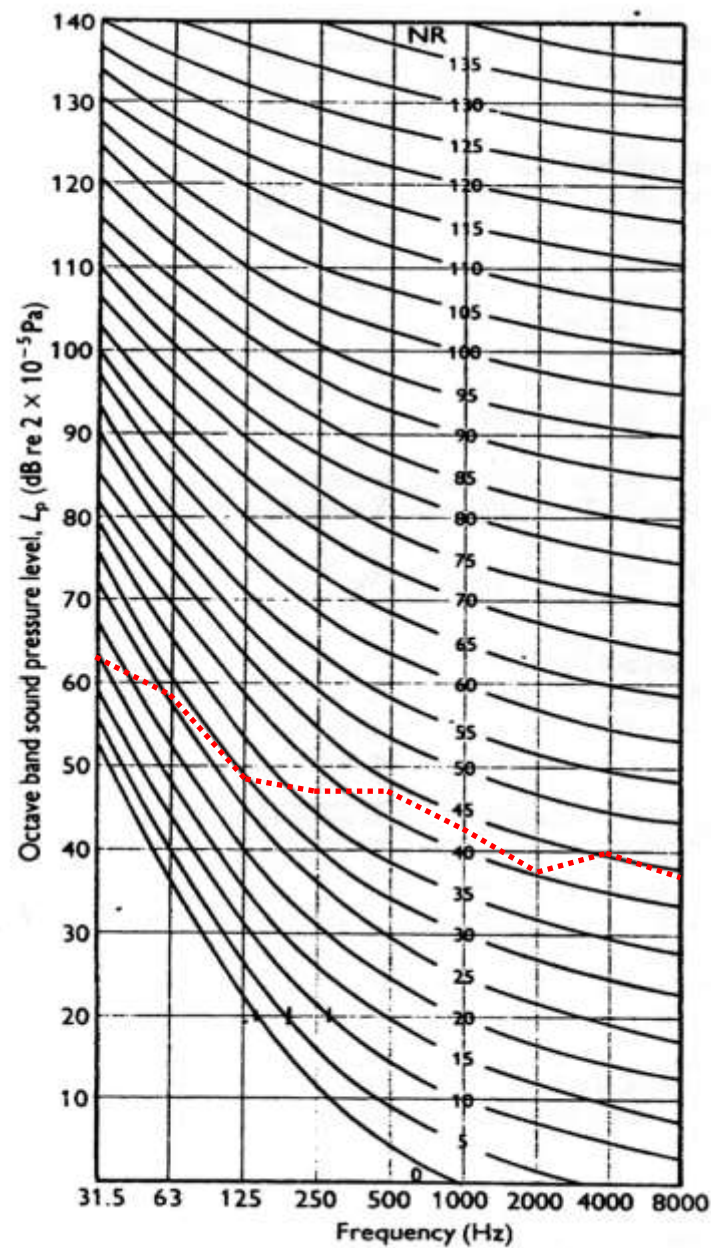


OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
31.5	63	125	250	500	1k	2k	4k	8k
60	58	46	44	45	37	30	24	21

Appendix 3

Noise Rating Curves

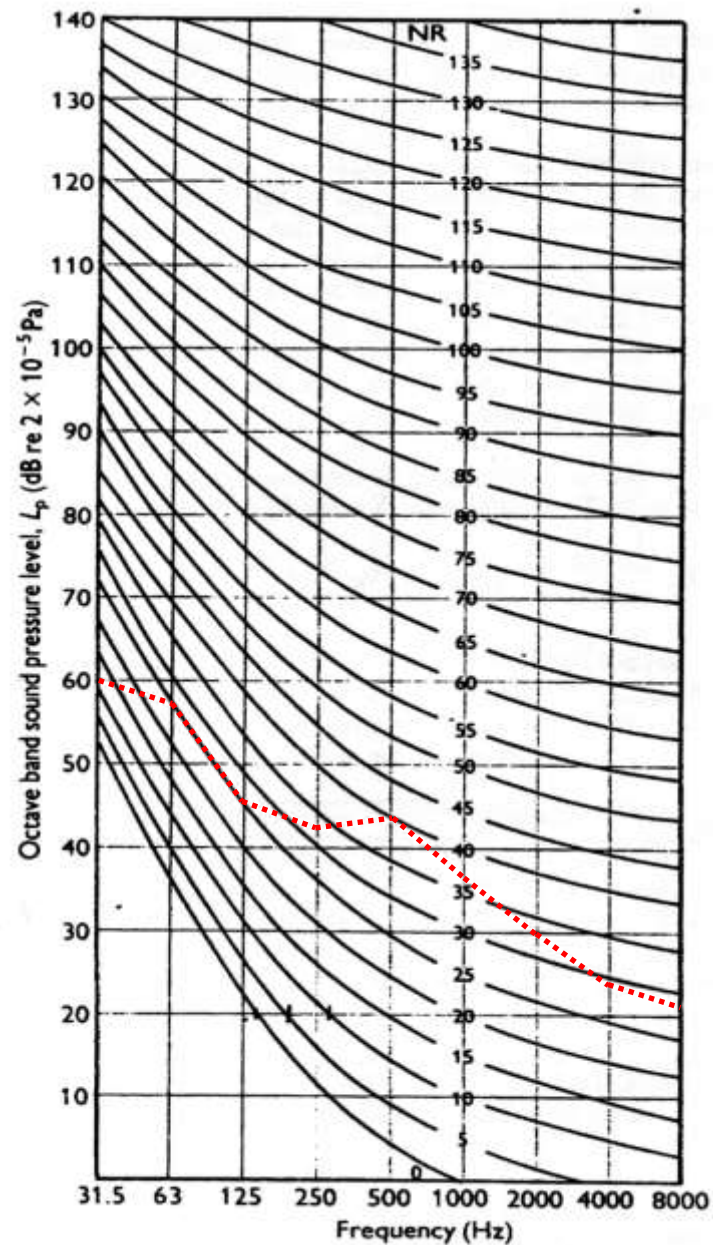
Figure 1 Noise Rating Diagram for the daytime readings with the factory in operation, on 18th June 2021



	OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
	31.5	63	125	250	500	1k	2k	4k	8k
NR 50	89.4	76.0	65.5	58.5	53.5	50.0	47.2	45.2	43.5
Results	62	59	49	47	47	43	38	40	38

Based on Figure 1 above, the estimated noise rating = 45 dB.

Figure 2 Noise Rating Diagram for the night time readings with the factory in operation, on 17th June 2021



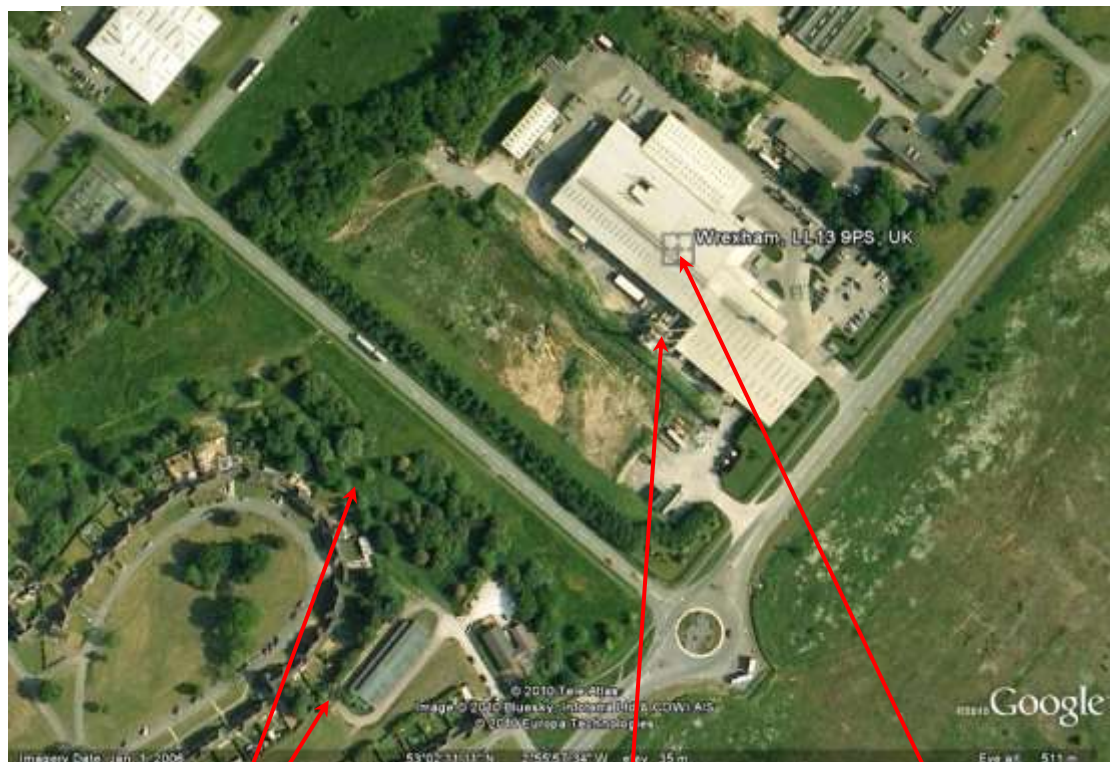
	OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
	31.5	63	125	250	500	1k	2k	4k	8k
NR 40	82.6	67.1	56.8	49.2	43.8	40.0	37.1	34.9	33.2
Results	60	58	46	42	43	37	30	24	21

Based on Figure 2 above, the estimated noise rating = 40 dB.

Appendix 4

Noise Monitoring Locations

Photograph showing the monitoring location and the facility



Noise Monitoring
Locations

External Fans / Bag
Plants

Hydro Aluminium
Deeside

Appendix 5

Acoustic Terminology

'A' Weighting

A frequency weighting curve used in sound level meters. The A – weighting curve is used to measure noise to replicate how the human ear would respond to the noise.

Specific Noise Level (L_{eq})

The equivalent continuous A – weighted sound pressure level at the assessment position produced by the specific noise source over a given time interval.

Ambient Noise

The total sound at a given position composed of sound from many sources near and far.

Residual Noise

The ambient noise remaining at the assessment position when the specific noise source is suppressed to a degree that it does not contribute to the ambient noise.

Background Noise Level (L_{90})

This is the 'A' weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of the time.

Calibration Data

Instrument

Calibration

CEL 490.C – Type 1
Integrating Sound Level Meter

Serial No. 035526
Calibrated 30/09/20

CEL 110/1
Acoustic Calibrator

Serial No. 064395
Calibrated 30/09/20