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REPORT NO. 15170/EN

An Environmental Noise Survey undertaken at Hydro Aluminium Deeside Limited, Wrexham, in accordance with BS4142:2014

Client

Hydro Aluminium Deeside Limited
Bridge Road
Wrexham Industrial Estate
Wrexham
LL13 9PS

FAO: Joel Priest

Date of Survey: 14 December 2015

Date of Report: 28 January 2016

Consultant	Reviewed by
	
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CONTENTS

		Page No.
	Executive Summary	3
1	Introduction	4
2	Applicable Standards	4
3	Measurement Procedure	4
4	Observations	6
5	Results	7
6	Conclusion and Discussion	8
7	Recommendations	8

APPENDICES

Appendix 1 – Results of Noise Measurements	9
Appendix 2 – Octave Band Analysis	12
Appendix 3 – Noise Rating Curves	15
Appendix 4 – Noise Monitoring Locations	18
Appendix 5 – Acoustic Terminology / Calibration Data	19

Executive Summary

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

Under the guidance given in BS4142, the results of the survey indicated that the likelihood of complaints, during both the day and night time, would be likely at the nearest residential property on The Oval. During the daytime, the noise rating level was +8 dB over the background noise level and the night time was +11 dB. Therefore the impact was of higher significance during the night time.

However, it was also considered that the rating penalty applied to the assessment for the loading of the charger (a clearly perceptible impulsive noise), may have a lesser impact, as there were large periods during the day when the charger was not loaded.

1 Introduction

Hydro Aluminium Deeside Ltd., Wrexham, operate an aluminium recycling facility, where scrap aluminium is recycled to form aluminium extrusion ingots. Mr Joel Priest, of Hydro Aluminium Ltd., 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".*

In addition, the measurements 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 day and night time assessments were performed on 14 December 2015 by Daniel Cottam of CPC.

2 Applicable Standards

BS4142:2014

This standard, *Methods for rating and assessing industrial and commercial sound* has recently 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 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 5 dB or more 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 new 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 490 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 and the calibrator were last calibrated on the 9 February 2015.

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, direction and temperature were noted at all monitoring locations.

In order to perform the BS4142 calculation, daytime and night readings for the factory not operating were taken a distance away from the factory where the noise generated by Hydro Aluminium was not audible. The position for the daytime readings was adjacent to The Oval and behind disused garages off Bridgeway East. The location for the night time readings was on a grassed area adjacent to houses on Bridge Road.

4 Observations

Daytime – 14/12/15

The noise was measured at approximately fifteen (15) metres from the boundary fence of the nearest property on The Oval.

Since the previous survey, the stripping the pit activity had been modified to reduce the tonal 'chiming' noise generated by the coming together of the aluminium logs. The modifications included an anti-twist plate, an insulated buffer and that they were no longer required to be turned through 90 degrees. As such only, there was very little 'chiming' noise audible at the work location.

The main noise was caused by the loading of the charger with scrap aluminium material, this caused a clearly perceptible impulsive type noise. The loading of the charger, however, sporadically throughout the day and was not a constant noise source. Typically the charger would be loaded approximately six times in an hour; however following this period there would be a cycle time of approximately three to four hours, before the charger would be loaded again.

A constant factory type 'hum' was also noticeable at the location; however, this was not just audible from Hydro's facility but appeared to emanate from other industrial premises on the estate. Persistent traffic noise was also noticeable on Bridge Road.

The weather was overcast, calm, with no noticeable breeze and a temperature of $6^{O}C$.

Night time – 14/12/15

The main noise source was the audible factory 'hum' coming from the facility. The loading of the charger with scrap aluminium did not occur during the monitoring period.

Other noise sources included other factory noise from the industrial estate and occasional, light traffic on Bridge Road. The weather was overcast, with no noticeable breeze and a temperature of $8^{O}C$.

5 Results

5.1 BS 4142 Assessment

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

Daytime readings:

Measured noise (Factory operating) $L_{eq\ (60\ min)}$ = 49 dB(A)
Residual noise (Factory not operating) $L_{eq\ (30\ min)}$ = 47 dB(A)

Calculated specific noise = 45 dB(A)

Night time readings:

Measured noise (Factory operating) $L_{eq\ (5\ min)}$ = 43 dB(A)
Residual noise (Factory not operating) $L_{eq\ (5\ min)}$ = 38 dB(A)

Calculated specific noise = 41 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: 44 dB(A)
Night time specific noise: 40 dB(A)

Table to show BS4142 calculation

	Day (dB(A))	Night (dB(A))
Specific noise (L_{eq})	44	40
Acoustic feature correction(1)	+6	+6
Rating level	50	46
Background noise level (L_{90})	42	35
BS4142 Difference	+8	+11
Likelihood of complaints	Likely	Likely

(1) For clearly perceptible impulsive noise

5.2 Noise Rating (NR) Curve

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 39 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 the daytime and night time would be likely, with a greater significance at night. The results indicated a difference of +8 dB and +11 dB over the background noise level during the day and night time respectively.

However, it is considered that should due to the sporadic, intermittent nature of the loading of the charger and there were large periods during the day when it is not loaded, it may not have such an impact as calculated in this assessment.

7 Recommendations

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 14 December 2015

Table 1 – 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}**
10.00 – 11.00	48	46	50	66
11.16 – 12.16	49	46	51	68
Noise sources – Hydro factory, aluminium crashing noises from loading of the charger and only very occasional chiming of aluminium logs (from stripping the pit) Traffic on Bridge Road was audible throughout the measurements.				

Table 2 – Daytime readings (Factory NOT in operation)

Position 2 – Behind disused garages on Bridgeway East opposite The Oval				
Time Period	**$L_{eq\ (30\ min)}$**	**L_{90}**	**L_{10}**	**L_{Max}**
12.56 – 13.26	47	43	50	61
13.27 – 13.57	48	42	49	65
Noise sources – Persistent traffic on Bridge Road				

All noise levels were measured in dB(A).

The following tables show the noise measurements taken during the night time, on 14 December 2015

Table 3 – Night time readings (Factory in operation)

Position 1 – On boundary of nearest property on The Oval				
Time Period	**$L_{eq\ (5\ min)}$**	**L_{90}**	**L_{10}**	**L_{Max}**
23.22 – 23.27	42	42	44	49
23.30 – 23.35	43	42	44	54
Noise sources: Hydro factory, and light traffic on Bridge Road.				

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

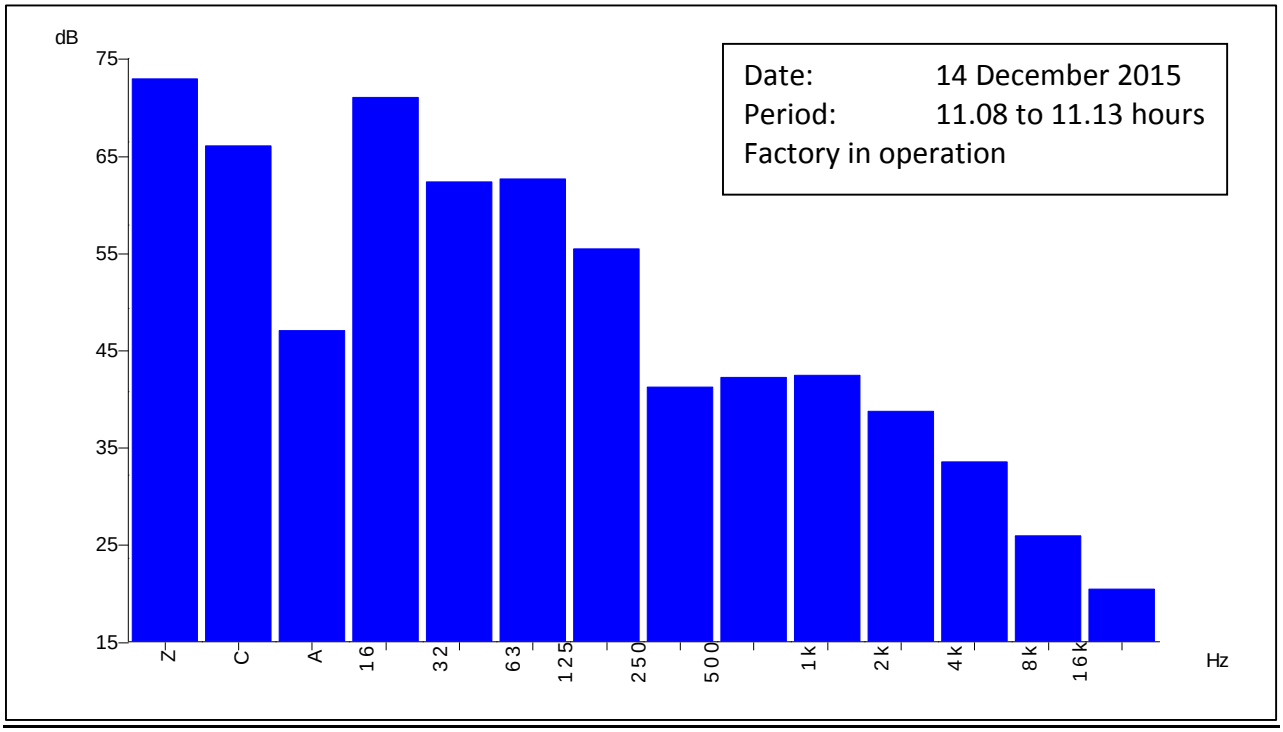
Position 3 – On grassed area, adjacent to houses on Bridge Road				
Time Period	**$L_{eq\ (5\ min)}$**	**L_{90}**	**L_{10}**	**L_{Max}**
23.49 – 23.54	38	35	40	54
Noise sources – Distant road traffic				

All noise levels were measured in dB(A).

APPENDIX 2

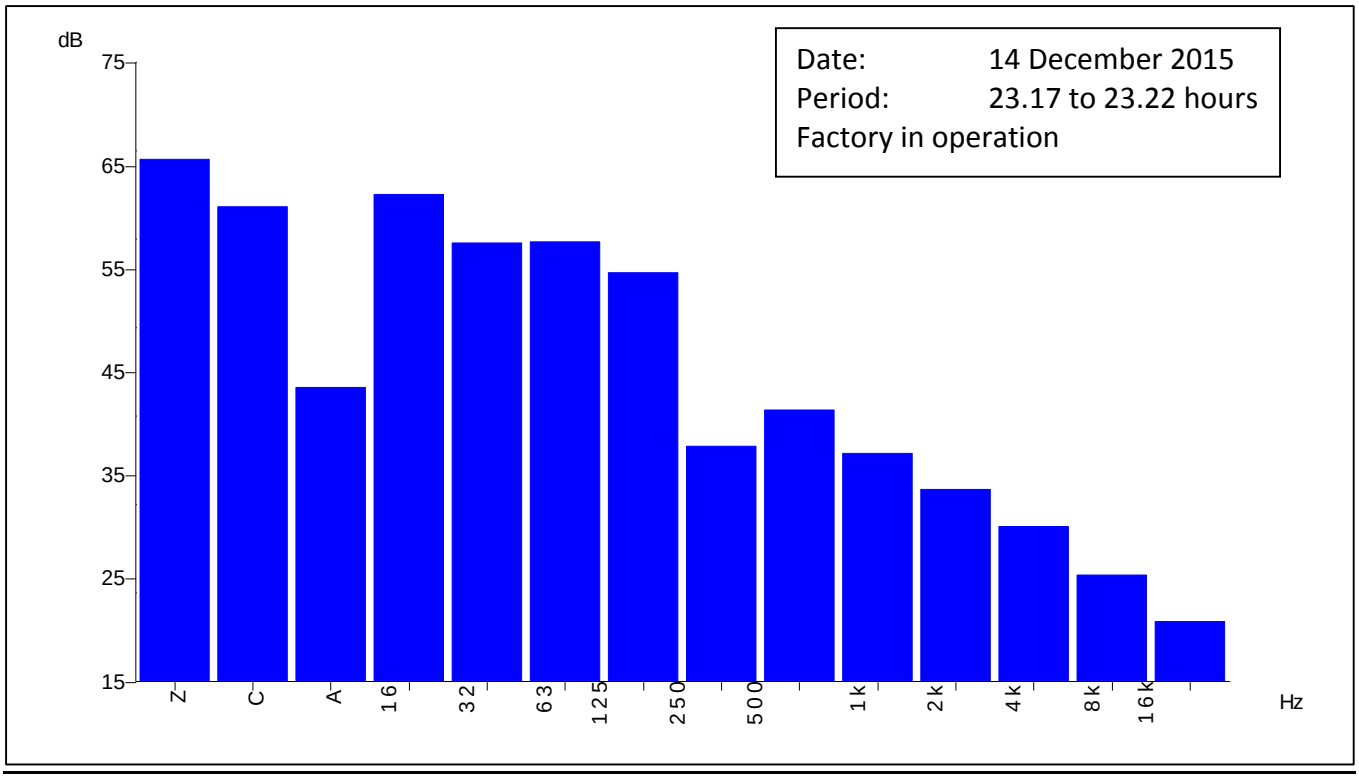
Octave Band Analysis

Figure 1 Octave Band Analysis undertaken at Hydro Aluminium Deeside, during the daytime, on 14 December 2015



OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
31.5	63	125	250	500	1k	2k	4k	8k
62.3	62.6	55.4	41.2	42.2	42.4	38.7	33.5	25.9

Figure 2 Octave Band Analysis undertaken at Hydro Aluminium Deeside, during the night time, on 14 December 2015

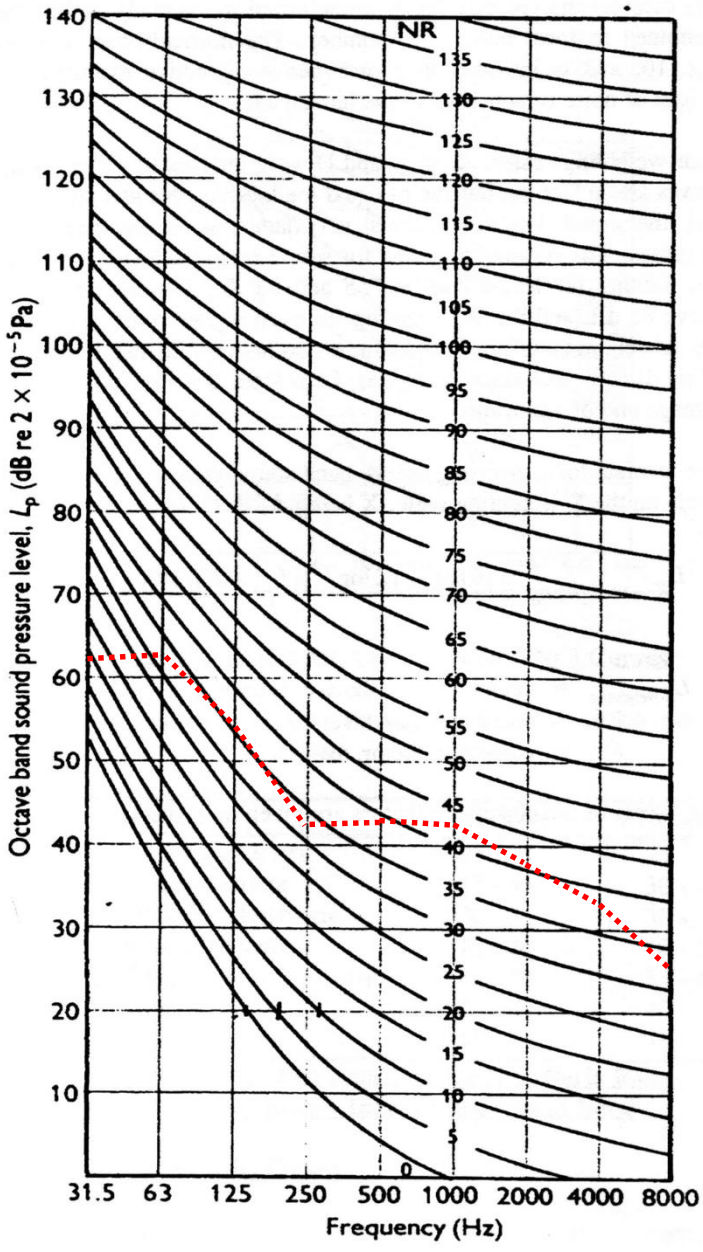


OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
31.5	63	125	250	500	1k	2k	4k	8k
57.5	57.6	54.6	37.8	41.3	37.1	33.6	30.0	25.3

APPENDIX 3

Noise Rating Curves

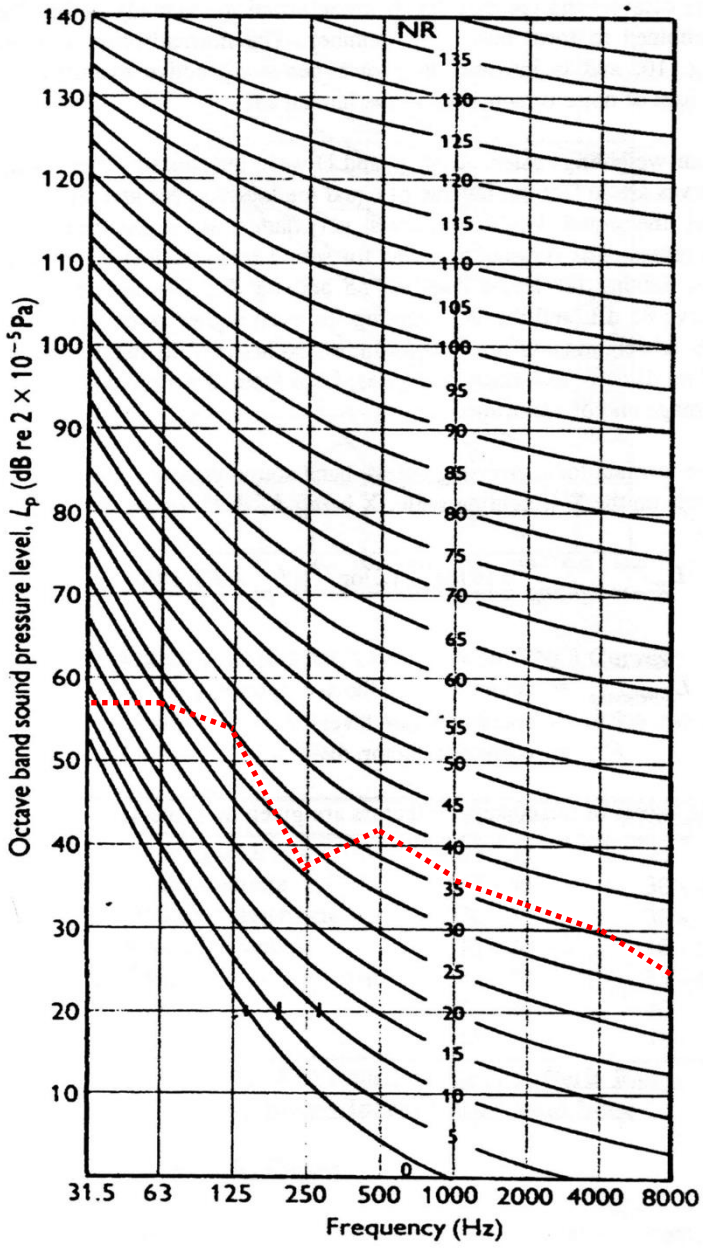
Figure 1 Noise Rating Diagram for the daytime readings with the factory in operation, on 14 December 2015



	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	**62.3**	**62.6**	**55.4**	**41.2**	**42.2**	**42.4**	**38.7**	**33.5**	**25.9**

Based on Figure 1 above, the estimated noise rating = 43 dB.

Figure 2 Noise Rating Diagram for the night time readings with the factory in operation, on 14 December 2015



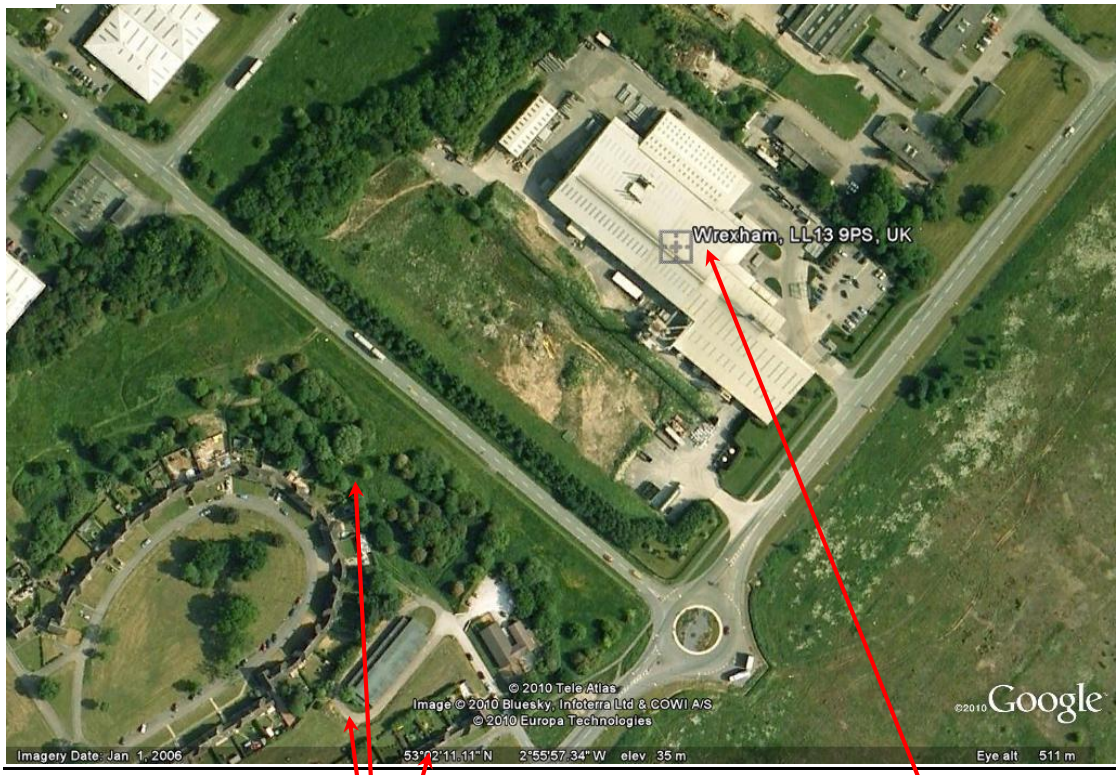
	OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
	31.5	63	125	250	500	1k	2k	4k	8k
NR 40	82.6	67.1	56.8	49.2	43.8	40.0	37.1	34.9	33.2
Results	**57.5**	**57.6**	**54.6**	**37.8**	**41.3**	**37.1**	**33.6**	**30.0**	**25.3**

Based on Figure 2 above, the estimated noise rating = 39 dB.

APPENDIX 4

Noise Monitoring Locations

Photograph showing the monitoring location and the facility



Hydro Aluminium Deeside Ltd.

Noise Monitoring Locations

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 09/02/15
CEL 110/1 Acoustic Calibrator	Serial No. 064395 Calibrated 09/02/15