

Report No. 16073/EN

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

Client Name: Hydro Aluminium
Contact: Joel Priest
Survey Date: 30th June & 5th July 2016
Report Date: 27th July 2016

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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 of marginal significance at the nearest residential property on The Oval.

During the daytime, the noise rating level was +4 dB over the background noise level and the night time was +7 dB. Therefore the impact was of higher significance during the night time.

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 30th June and 5th July 2016 by Daniel Cottam of CPC.

2 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 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 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 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 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 disused 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

Daytime – 30/06/16

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

The main distinguishable noise was caused by occasional loading of the charger with scrap aluminium material, this caused an impulsive type noise. The loading of the charger, however, was sporadic 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.

There was also a very light on infrequent 'chiming' type noise from the stripping of the pit and the positioning of the aluminium logs on the lay down station.

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. There was also persistent traffic noise from Bridge Road.

The weather was dry, partly cloudy, very little breeze (<1 m/s) and warm with a temperature of 17°C.

Night time – 05/07/16

The main noise source was a just audible factory 'hum' coming from the facility, a fan located on the bag plant operated for a brief period; however, this was not a significant or tonal type noise. The loading of the charger with scrap aluminium did occur; however, it was audible and just perceptible 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 clear, with no noticeable breeze and a temperature of 13°C.

It was reported that no complaints regarding the noise from the factory had been received by Hydro Aluminium Deeside in recent months.

5 **Results**

5.1 **BS4142 Assessment**

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)	$L_{eq} (45 \text{ min}) = 48 \text{ dB(A)}$

Calculated specific noise = 42 dB(A)

Night time readings:

Measured noise (Factory operating)	$L_{eq} (5 \text{ min}) = 42 \text{ dB(A)}$
Residual noise (Factory not operating)	$L_{eq} (5 \text{ min}) = 37 \text{ dB(A)}$

Calculated specific noise = 40 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:	41 dB(A)
Night time specific noise:	39 dB(A)

Table to show BS4142 calculation

	Day (dB(A))	Night (dB(A))
Specific noise (L_{eq})	41	39
Acoustic feature correction	+6	+3
Rating level	47	42
Background noise level (L_{90})	43	35
BS4142 Difference	+4	+7
Likelihood of complaints	Marginal	Marginal

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 40 dB. This conformed to the NR curve of 50 dB.

During the night time, the NR curve indicated a noise rating of 30 dB. This conformed to the NR curve of 40 dB.

6 Conclusion and Discussion

The results of the BS4142 assessment indicated that, at the nearest property on The Oval, the likelihood of complaints during the daytime and night time would be of marginal significance, however, with a greater significance at night.

The results indicated a difference of +4 dB over the background noise level during the day and +7 dB during night time.

It was also noted that the noise impact of the loading of the charger, during the night time, appeared less than during previous monitoring exercises.

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 30th June 2016

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}
09.00 – 10.00	45	42	48	63
10.09 – 11.09	49	45	50	66
Noise sources – Hydro factory, very occasional chiming of aluminium logs (from stripping the pit), and occasional crashing type noise from loading the charger. Persistent 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} (45 min)	L ₉₀	L ₁₀	L _{Max}
12.45 – 13.30	48	43	50	69
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 5th July 2016

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}
23.18 – 23.23	38	35	39	52
23.23 – 23.28	38	36	40	51
Noise sources: Very light, just audible chiming noise from the stripping of the pit and straightening the logs on the lay down station.				

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (5 min)	L ₉₀	L ₁₀	L _{Max}
23.28 – 23.33	39	36	42	50
Noise sources: Very light, just audible chiming noise from the stripping of the pit and light humming of fan noise from the bag plant.				

Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (5 min)	L ₉₀	L ₁₀	L _{Max}
23.33 – 23.38	42	40	44	53
Noise sources: Just perceptible noise from the loading of the charger and the pushing of the material into the furnace.				

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

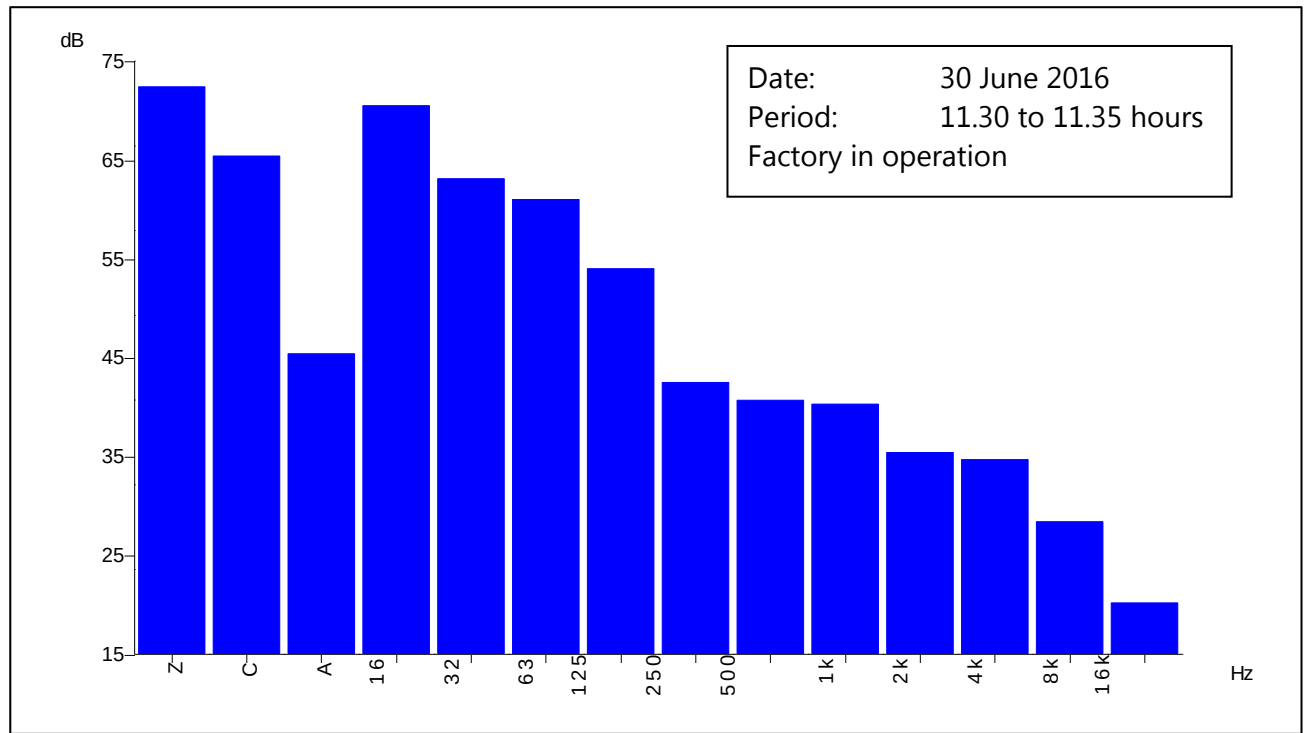
Position 1 – On boundary of nearest property on The Oval				
Time Period	L _{eq} (5 min)	L ₉₀	L ₁₀	L _{Max}
23.50 – 23.55	36	35	38	46
23.55 – 00.00	37	35	38	51
Noise sources – Distant road traffic				

All noise levels were measured in dB(A).

APPENDIX 2

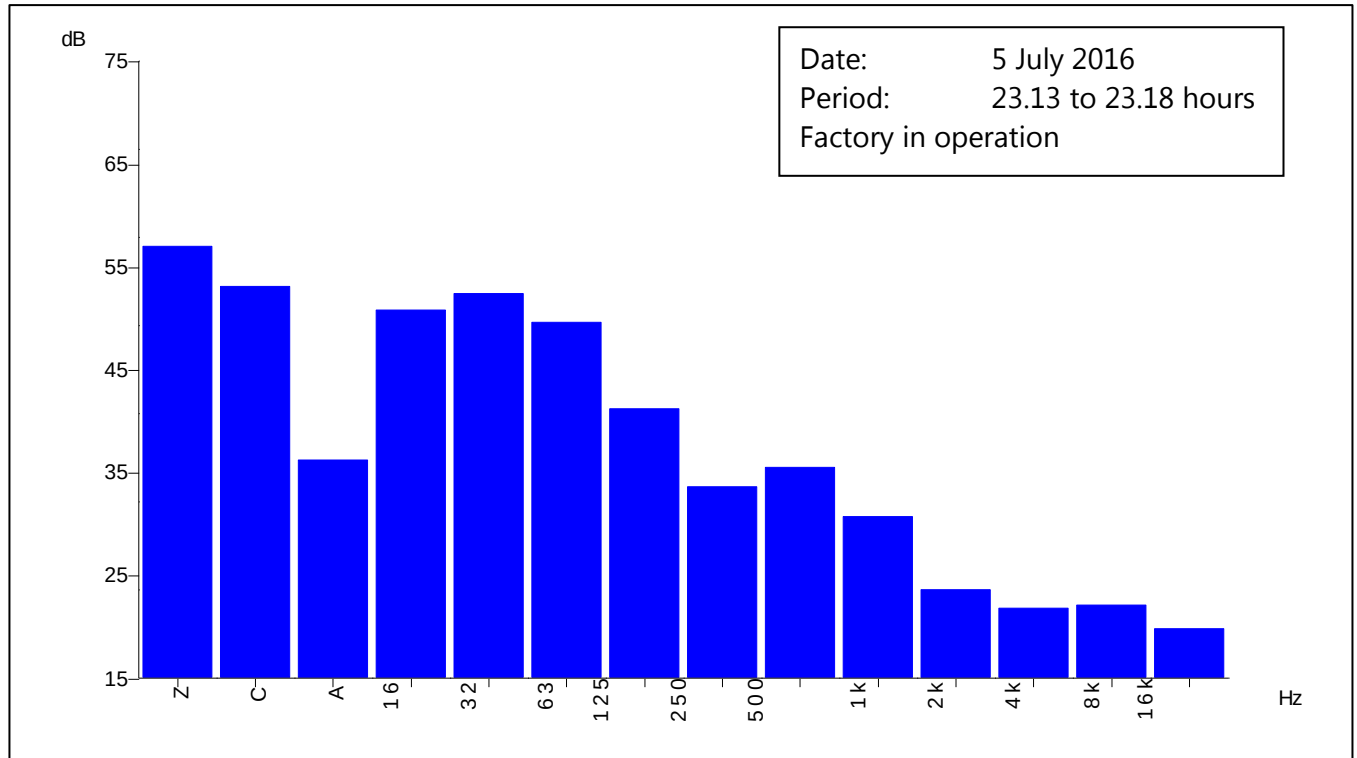
Octave Band Analysis

Figure 1 Octave Band Analysis undertaken at Hydro Aluminium Deeside, during the daytime, on 30th June 2016



OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
31.5	63	125	250	500	1k	2k	4k	8k
63.1	61.0	54.0	42.5	40.7	40.3	35.4	34.7	28.4

Figure 2 Octave Band Analysis undertaken at Hydro Aluminium Deeside, during the night time, on 5th July 2016

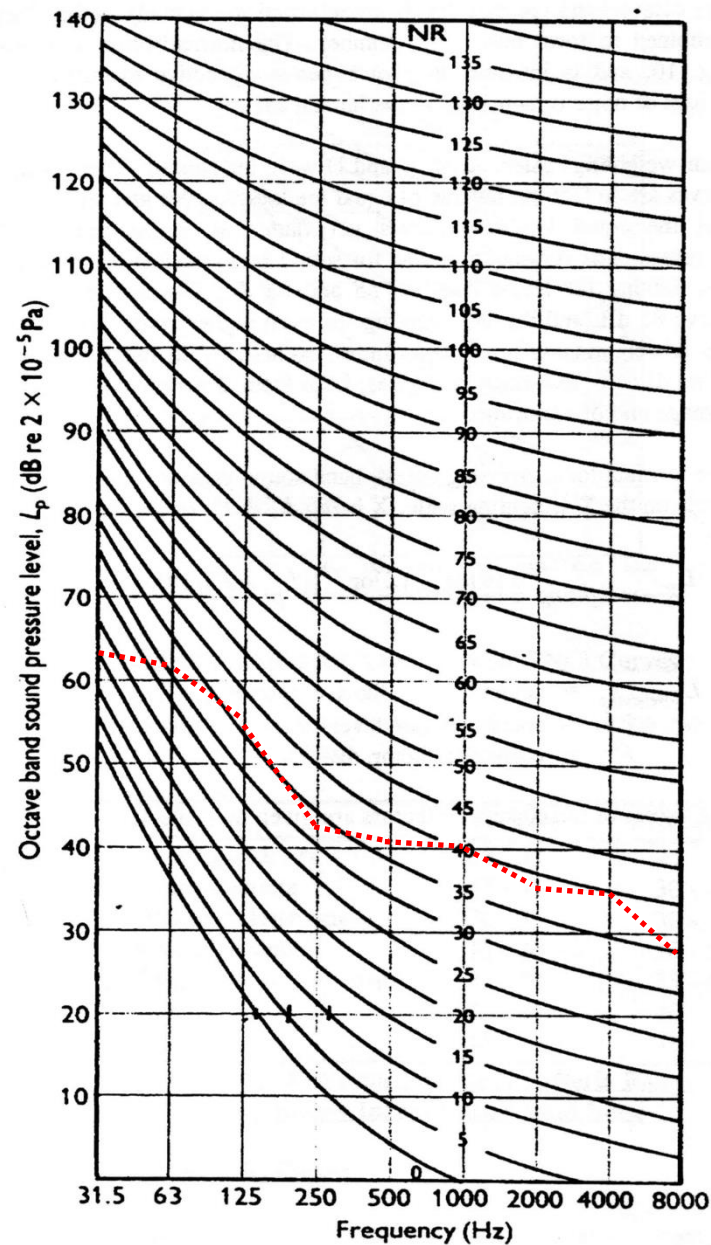


OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
31.5	63	125	250	500	1k	2k	4k	8k
52.4	49.6	41.2	33.6	35.5	30.7	23.6	21.8	22.1

APPENDIX 3

Noise Rating Curves

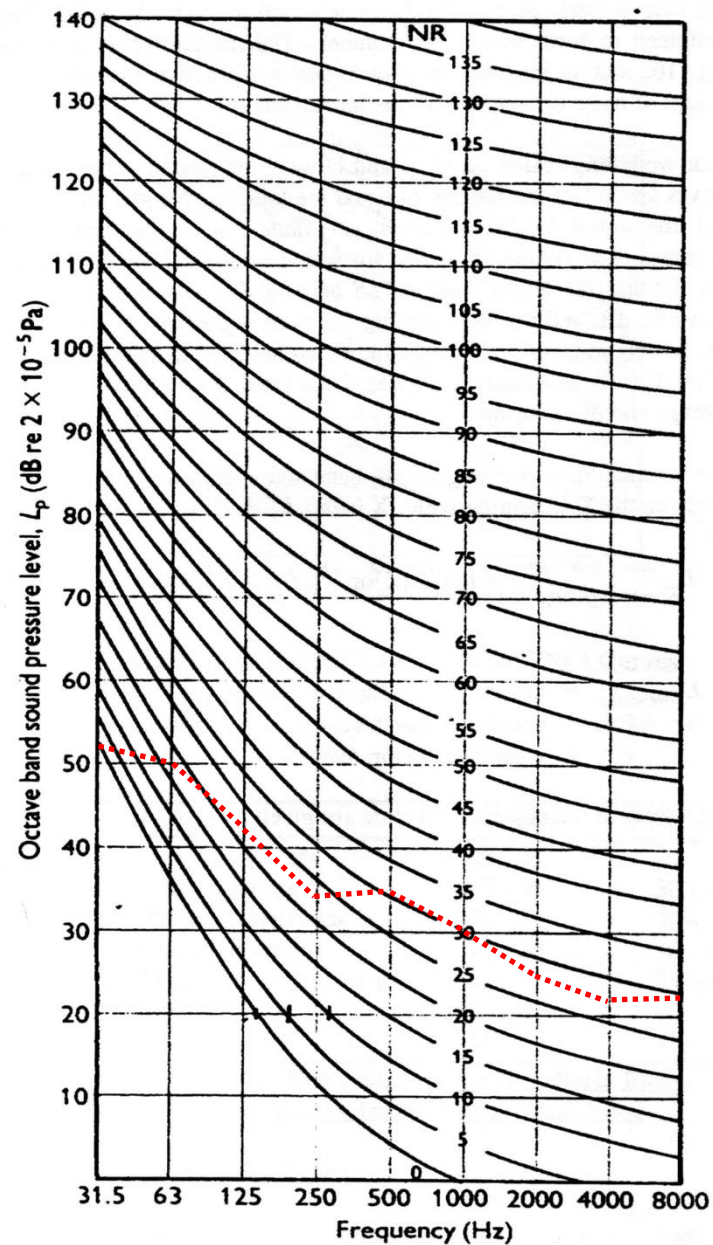
Figure 1 Noise Rating Diagram for the daytime readings with the factory in operation, on 30th June 2016



	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	63.1	61.0	54.0	42.5	40.7	40.3	35.4	34.7	28.4

Based on Figure 1 above, the estimated noise rating = 40 dB.

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



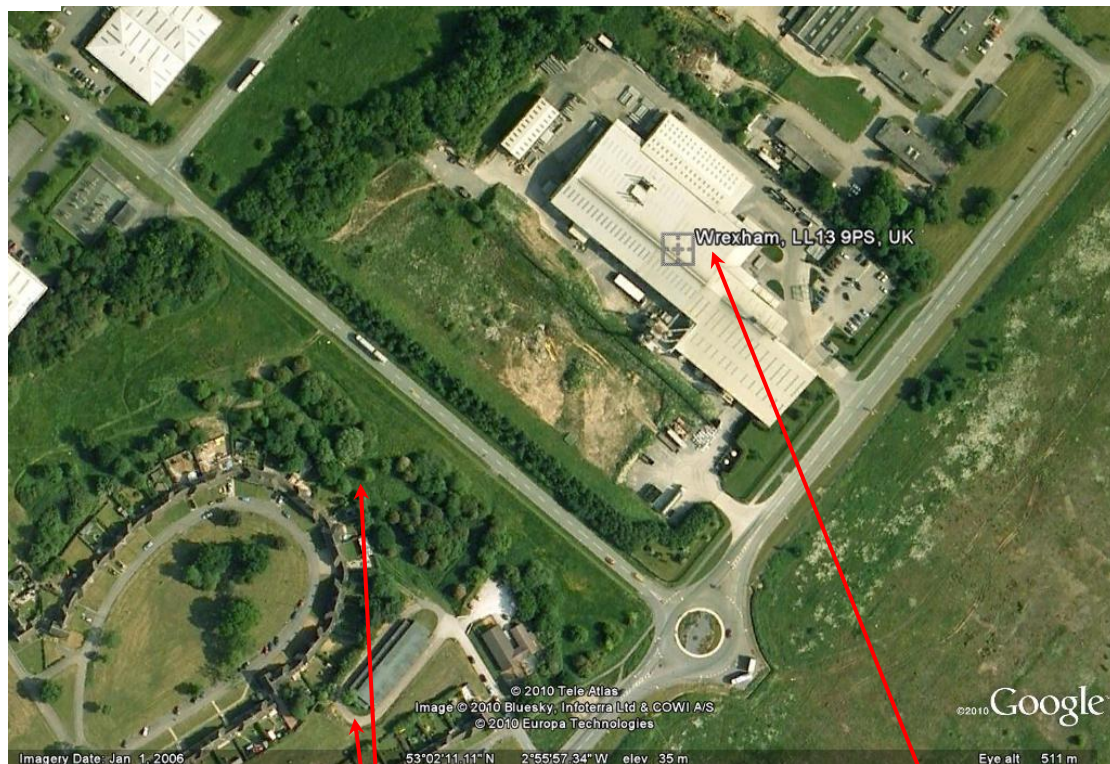
	OCTAVE BAND CENTRE FREQUENCIES, Hz / dB lin								
	31.5	63	125	250	500	1k	2k	4k	8k
NR 40	82.6	67.1	56.8	49.2	43.8	40.0	37.1	34.9	33.2
Results	52.4	49.6	41.2	33.6	35.5	30.7	23.6	21.8	22.1

Based on Figure 2 above, the estimated noise rating = 30 dB.

APPENDIX 4

Noise Monitoring Locations

Photograph showing the monitoring location and the facility



Noise Monitoring
Locations

Hydro Aluminium
Deeside Ltd.

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 22/03/16