



Project No: 07355

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## Noise Compliance Study, May 2018

### Weston Aluminium

### Weston, NSW

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## INTRODUCTION

This report provides the results and findings of a triennial compliance noise monitoring and modelling programme undertaken in May 2018 for Weston Aluminium (WA), Mitchell Avenue, Weston, NSW.

The assessment has been undertaken in accordance with the requirements of WA's Environmental Protection Licence (EPL) no. 6423 and conditions of Development Consent (DA-86-04-01-MOD 10 and 10397 of 1995-Mod 8). The methodology used in this programme is in keeping with discussions held previously with Office of Environment and Heritage (OEH) to most effectively determine compliance with the noise limits in the EPL.

Spectrum Acoustics has been involved in noise monitoring and management at WA since 2007 and developed the noise compliance modelling procedures detailed in this report in consultation, and approved by, EPA. Spectrum Acoustics personnel are suitably qualified to undertake the noise compliance reporting and are approved by the Department of Planning and Environment to undertake independent environmental noise audits.

## NOISE LIMITS

The noise limits applicable to WA's operations are detailed in **Table 1**.

TABLE 1 WESTON ALUMINIUM NOISE LIMITS			
Location	Day*	Evening*	Night*
Cnr Government & Tenth Streets	48 dB(A) Leq (15 min)	48 dB(A) Leq (15 min) 40 dB(A) Leq (evening)	47 dB(A) Leq (15 min) 35 dB(A) Leq (night) 57 dB(A) L1 (1 min)**
Northcote Street	44 dB(A) Leq (15 min)	44 dB(A) Leq (15 min)	44 dB(A) Leq (15 min) 40 dB(A) Leq (night) 57 dB(A) L1 (1 min)**
Mitchell & Railway Avenues	43 dB(A) Leq (15 min)	43 dB(A) Leq (15 min)	43 dB(A) Leq (15 min) 41 dB(A) Leq (night) 55 dB(A) L1 (1 min)**

\* For noise assessment purposes day is 7 am to 6 pm Monday to Saturday and 8 am to 6 pm Sundays and Public Holidays, evening is 6 pm to 10 pm Monday to Sunday and night is all other times.

\*\* The EPL document states noise levels as Leq (1 min) but it is considered the intent is to assess potential sleep disturbance impacts which are as L1 (1 min).

The EPL states that *“where amenity noise levels are lower than intrusive noise levels, both levels are in the licence conditions in order to ensure that intrusive noise impacts are controlled at all times”*.

## METHODOLOGY

A series of attended noise measurements of 15 minutes duration were made on Thursday 3<sup>rd</sup> May 2018 at residential locations representative of those in Table 1 (as shown in **Figure 1**), during the day, evening and night time periods. At these locations the noise from WA was audible and measurable. Further measurements were also made at each of the eastern and western boundaries of the WA site. At these locations noise emissions from WA dominated the acoustic environment.



**FIGURE 1 NOISE MONITORING LOCATIONS**

Noise emission levels were measured with a Brüel & Kjær Type 2250 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator prior to and at the completion of measurements.

Data from the site noise measurements was input into a noise model for the area and modelling was undertaken to determine EPL compliance for noise attributable to WA operations at residential receivers in the vicinity.

The production details for the monitoring period were supplied by WA. In summary, the two rotary furnaces were operating at typical production levels, and scrap was being prepared in the Yard throughout the measurement periods.

Supporting plant and equipment (e.g. crushing & sizing plant, metal reclaiming machine, baghouses, etc.) were all functional throughout the entire monitoring period.

The operational conditions and production rates for the monitoring period are, therefore, considered to be representative of normal operations at WA at the time.

Modelling was undertaken using ENM noise modelling software. Once the model was set up, and verified using the measured site data, it was used in point calculation mode to determine noise levels at an individual receiver in each residential receiver area (as per the EPL).

These receivers are considered to be the potentially most affected in each area (i.e. indicative of the worst case). The locations correspond approximately to the attended measurements locations.

Checking of model input parameters was achieved by modelling theoretical noise levels to the measurement points under the atmospheric conditions present at the time the measurements were undertaken.

Noise modelling was carried out under the following atmospheric conditions which are considered prevailing for the area at various times of the year.

- 1 Neutral Atmospheric (20°C, 70% R.H., no wind),
- 2 3°C/100m positive temperature gradient, 70% R.H. (indicative of night time only),
- 3 3m/s wind from the south east, 70% R.H., 20°C (summer), and
- 4 3m/s wind from the north west, 70% R.H., 20°C (winter)

## RESULTS

Attended noise measurements were made at the WA site boundaries and at 66 Northcote St., Cnr Government and Tenth Streets and in Mitchell Avenue, one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).



Where the noise from WA was audible and measureable the Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the plant and other significant noise sources to the overall noise levels.

Throughout each monitoring period the atmospheric conditions were taken from the Bureau of Meteorology’s met station at Cessnock. During the day the temperature was approximately 26° C with relative humidity at about 70%. The wind was from the north to north west at up to 4 m/s. During the evening and night the temperature dropped to around 18 to 20° C with relative humidity at 60%. Winds were from the west to south west at up to 2.5 m/s.

The results of the attended noise measurements at site boundary location are shown in **Table 2**.

TABLE 2 MEASURED SITE NOISE LEVELS - 3 MAY 2018	
Location (start time)	Leq dB(A)
Eastern Boundary (11.40 am)	60.1
Eastern Boundary (9.55 pm)	59.4
Western Boundary (12.00 pm)	59.8
Western Boundary (10.15 pm)	59.0

Results of the attended noise measurements at each off-site monitoring location are shown in **Table 3**.

The total measured Leq is shown. This was analysed with the Bruel & Kjaer “*Evaluator*” software to quantify the contributions of the various noise source(s) to the overall noise levels. The noise sources are listed in the comments column with the contribution of each shown in brackets.

The results in Table 3 show that noise from both local and distant traffic was a significant contributor the measurements at all monitoring locations at all times. The distant traffic noise is due to emissions from traffic travelling on the Hunter Expressway.

Noise from other industrial sources, not related to WA, also contributed to all measurements (shown as “industrial noise” in Table 3). This included manufacturing noises, hammering, grinding etc. which contributed to maximum noise events, and also constant noise from plant at other sites. The former noise sources were more significant at the Northcote Street and Mitchell Avenue monitoring locations whilst the latter were more significant at the Government and Tenth Street location.

TABLE 3 MEASURED RESIDENTIAL NOISE LEVELS - 3 MAY 2018				
Location	Time	dB(A),Leq	Wind speed/ direction	Identified Noise Sources
66 Northcote St	12:35 pm	55	4.0 m/s, NNW	Traffic (55), industrial noise (45), insects (34), <b>WA not measurable (est. 40)</b>
66 Northcote St	9:30 pm	51	1.9 m/s, SW	Traffic (50), distant traffic (43), industrial noise (42), <b>WA (41)</b>
66 Northcote St	10:35 pm	50	0.5 m/s, SE	Traffic (49), distant traffic (40), industrial noise (41), <b>WA (40)</b> , insects (37)
Cnr Government Road & Tenth St.	11:20 pm	58	4.0 m/s, NNW	Traffic (58), industrial noise (44), birds & insects (36), <b>WA not discernable<sup>1</sup></b>
Cnr Government Road & Tenth St.	8:45 pm	54	2.0 m/s, SW	Traffic (54), industrial noise (43), <b>WA not discernable<sup>1</sup></b>
Cnr Government Road & Tenth St.	10:55 pm	50	2.5 m/s, SW	Traffic (48), distant traffic (43), industrial noise (40), <b>WA not discernable<sup>1</sup></b>
Mitchell Ave.	12:55 pm	62	4.0 m/s, NNW	Traffic (62), industrial noise (50), <b>WA not measurable (est. 42)</b>
Mitchell Ave.	9:10 pm	60	2.5 m/s, WSW	Traffic (60), distant traffic (47), industrial noise (44), <b>WA not measurable (est. 38)</b> , insects (36)
Mitchell Ave.	11:15 pm	46	Calm	Distant traffic (41), industrial noise (43), <b>WA (41)</b> , insects (37)

1. See text

At the Northcote Street monitoring location industrial noise was audible throughout each monitoring period, although traffic noise dominated all of the measurements. During the day time measurement general industrial noise was audible throughout the measurement period. The level of noise from WA was estimated from the measurement during periods when noise from traffic and other industrial sources was low.

During the evening and night time monitoring periods the noise from WA was relatively constant and measureable during breaks in traffic.

At the monitoring location on the corner of Government Road and Tenth Street industrial noise was a significant contributor to all of the measured noise levels. At this location it was not possible to accurately discern the contribution of the various industrial noise sources to the overall. It was obvious during the monitoring that noise from sources closer to the monitoring location than WA was the most significant contributor to the industrial noise.

At the Mitchell Avenue monitoring location industrial noise was audible throughout each monitoring period, although traffic noise dominated all of the measurements. During the day time measurement general industrial noise was audible throughout the measurement period. The level of noise from WA was estimated from the measurement during periods when noise from traffic and other industrial sources was low.

During the evening and night time monitoring periods the noise from WA was relatively constant and measureable during breaks in local traffic. Noise from distant traffic on the Hunter Expressway was relatively constant throughout all monitoring periods.

The results in Table 3 show that the measured noise levels did not exceed the noise goals in the EPL at any of the monitoring locations in either of the day, evening or night time periods.

Results of the noise modelling for the measured night time operations are shown in **Table 4** for the various atmospheric conditions assessed.

TABLE 4 MODELLED NOISE LEVELS - MAY 2018 dB(A) Leq (15 min) - NIGHT				
Location	Neutral	Temp. Inversion	SE Wind	NW Wind
66 Northcote St	36	38	31	41
Mitchell Avenue	41	42	40	<b>44</b>
Government Rd.	34	35	36	30

The results in **Table 4** show that, based on the night time noise levels measured on the site, the theoretical noise levels (determined by modelling) will not exceed the 15 minute (Intrusiveness) Leq noise goals in the EPL for any time period with the exception of the Mitchell Avenue monitoring location under the modelled NW wind. A discussion in relation to this noise and monitoring location is included following **Table 5**.

The noise model was based on and verified against the noise levels measured at the site boundaries. A direct comparison between the modelled noise levels and the measured noise levels at the compliance locations is not considered viable due to the disparity in atmospheric conditions between actual and modelled conditions.

The noise modelling was carried out based on verification of the measured night time noise levels. During the night the noise was relatively steady state and did not include any noise from trucks arriving or departing the site (which can particularly influence measured levels at the western boundary, near the access road).

During the day the measured noise level at the eastern boundary included noise from fork lifts moving about the site and the unloading of a truck.

The measurements at the western boundary were made during periods where there was no movement of truck into or about the site.



Table 5 shows the results of the noise modelling under the measured day time noise levels. Only the north west and south east winds are considered as these are the potential worst case conditions.

TABLE 5 MODELLED NOISE LEVELS - MAY 2018 dB(A) Leq (15 min) - DAY		
Location	SE Wind	NW Wind
66 Northcote St	32	41
Mitchell Avenue	41	<b>45</b>
Government Rd	32	39

The results in Table 5 show that, based on the measured day time noise levels, the received noise could exceed the day time noise goal at the nearest nominate receiver location to the site in Mitchell Avenue.

The exceedance would be 2 dB(A). Section 4.2, of the Noise Policy for Industry (NPI) would indicate that such a residual noise impact would be regarded as negligible.

It is noted that the noise criteria for WA were developed a relatively long time ago and in the intervening period there has been considerable development along Mitchell Avenue. There are now only two residences in this area which appear to be associated with industrial premises. The remainder of blocks in this area are occupied by industrial and commercial premises. The area is zoned "light industrial" in the Cessnock LEP 2011.

The measured noise level during the day at the Mitchell Avenue monitoring location was 62 dB(A) with 50 dB(A) of industrial noise all of which is not related to emissions from WA. Under such circumstances the modelled worst case noise from WA would be 12 dB(A) below the existing Leq noise level and 5 dB(A) below the measured Leq level for industrial noise. Under such circumstances the noise from WA is not likely to be considered intrusive.

The EPL and Development Consent were granted based on the requirements of the NSW Industrial Noise Policy (INP). The INP has been superseded by the NPI. Transitional arrangements for the implementation of the NPI state that the INP will continue to apply where is it is referenced in existing statutory instruments except in relation to Section 4 (Modifying Factors), which will be transitioned to the NPI.

Data from those times where WA operations were audible were analysed using the "Evaluator" software. This analysis showed the noise did not contain any tonal or impulsive components as per definitions in the NPI.

The methodology for analysing the low frequency noise modifying factor correction in the NPI is shown in extract below.

Low-frequency noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10– 160 Hz	Measure/assess source contribution C- and A-weighted Leq,T levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: <ul style="list-style-type: none"> <li>• where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period</li> <li>• where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2- dB(A) positive adjustment applies for the daytime period.</li> </ul>	2 or 5 dB <sup>2</sup>	A difference of 15 dB or more between C- and A-weighted measurements identifies the potential for an unbalance spectrum and potential increased annoyance. The values in Table C2 are derived from Moorhouse (2011) for DEFRA fluctuating low-frequency noise criteria with corrections to reflect external assessment locations.
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**Table C2 : One-third octave low-frequency noise thresholds.**

Hz/dB(Z)	One-third octave LZeq,15min threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

The correction applies to the relevant industrial noise component only. There are many sources of low frequency noise in the acoustic environment of each receiver area (including noise from traffic and other industrial sources). In many cases the C minus A level is greater than 15 due to these other noises sources. In most instances the screening criteria will be the one third octave analysis. Should the industrial noise not comply with this then the C minus A analysis will be applied.

**Tables 6, 7 and 8** show the low frequency noise analysis for each of the monitoring locations where the industrial noise was measureable during the night time monitoring period. For the Government Road and Tenth Street location the analysis is for the entire measured industrial noise (as the noise from WA was not clearly discernible from the total overall measured industrial noise).

Table 6- Low Frequency Noise Analysis – 3 May 2018 – Northcote St.													
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Northcote St	<39	39.2	50.9	52.5	53.3	53.1	52.9	48.3	47.0	46.2	45.6	41.2	38.4
dB(Z) Criterion	92	89	86	77	69	61	54	50	50	48	48	46	44
Exceedance	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 7- Low Frequency Noise Analysis – 3 May 2018 – Mitchell Ave													
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Mitchell Ave	<42	42.8	51.4	54.9	58.7	54.9	52.6	49.0	48.2	45.7	42.3	42.8	41.6
dB(Z) Criterion	92	89	86	77	69	61	54	50	50	48	48	46	44
Exceedance	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 8- Low Frequency Noise Analysis – 3 May 2018 – Government Rd													
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Government Rd	<38	38.6	43.1	47.6	48.9	49.1	50.3	48.2	49.5	46.1	44.4	43.8	41.8
dB(Z) Criterion	92	89	86	77	69	61	54	50	50	48	48	46	44
Exceedance	0	0	0	0	0	0	0	0	0	0	0	0	0

The results in Tables 6, 7 and 8 show that there is no low frequency noise correction applicable to the noise emissions from WA.

Where it was measurable at night the noise from WA was relatively steady state and it was not possible to accurately measure any maximum noise events from WA at the monitoring locations (i.e. the L1 (1 min) contribution).

The measured night time site data was analysed for its L1 (1 min) component with the results shown in **Table 9**. Both of these measured L1 (1 min) levels represent impact noise.

TABLE 9 MEASURED L1 (1 min) NOISE LEVELS – 3 MAY 2018	
Location (start time)	L1 (1 min)
Eastern Boundary (9.55 pm)	66.6
Western Boundary (10.15 pm)	69.0

Based on the measured L1 (1 min) levels the modelled received noise is shown in **Table 10**.

TABLE 10 MODELLED NOISE LEVELS - MAY 2018 dB(A) L1 (1 min) - NIGHT			
Location	Temp Inversion	SE Wind	NW Wind
66 Northcote St	44	37	48
Mitchell Avenue	47	48	52
Government Rd	44	46	48

The results in Table 10 show that, under the modelled conditions, there will be no exceedance of the sleep disturbance criteria as a result of the measured noise emissions.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations.

It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing towards WA.

## CONCLUSIONS

The assessment of noise emissions from WA, on May 3, 2018, has been undertaken by measuring noise levels at the site and theoretically modelling these to nearby residential areas to determine compliance with requirements of the EPL.

Further attended noise monitoring was carried out at the residential locations detailed in the EPL to determine compliance where this was possible.

The results of the monitoring and modelling have shown that noise emissions from WA were compliant with regulatory requirements under the majority of the operational and atmospheric conditions assessed.

The only exception to this is a possible exceedance of the noise criterion at the Mitchell Avenue monitoring location under a north west wind. This exceedance was determined by noise modelling. The modelled noise would be 1 to 2 dB(A) higher than the noise criterion. Such an exceedance would, typically, be regarded as negligible.