

OneSteel Recycling Quarterly Noise Monitoring



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30-Sep-2016

Job No.: 60493017

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Quality Information

Document OneSteel Recycling Quarterly Noise Monitoring

Ref 60493017

Date 30-Sep-2016

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Reviewed by Gary Mace

Revision History


Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
0	30-Sep-2016	Final Report	Gary Mace EHS Team Leader	

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1.0 Introduction

1.1 Background

OneSteel Hexham has engaged AECOM Australia Pty Ltd to conduct noise monitoring at the location of the nearest residential receivers from the Hexham recycling plant.

The noise survey was conducted at Shamrock Street and St. Joseph's Retirement Village on 28 and 29 June 2016 in accordance with conditions in OneSteel Hexham's environment protection licence (EPL) No: 5345. Real time noise monitoring is also running at the St Joseph's Retirement Village and available data is reported.

Acoustic terminology used in this report is defined in **Appendix A**.

1.2 Site and monitoring locations

The OneSteel Recycling centre site is located at 107 Sparke Street, Hexham, NSW. The site is bounded by empty land and a branch of the South Channel of the Hunter River to the north and east, with Maitland Road located between the site and the river, by Ironbark Crook to the south and by the Hunter Rail line to the west.

Site noise is generally characterised as heavy vehicle traffic due to delivery trucks visiting the site, and the shredder.

The site operates from 6:00 am to 6:00 pm from Monday to Friday, however delivery trucks and the mill which contains the shredder operates between 7:00 am and 6:00 pm Monday to Saturday, in accordance with EPL condition L5.1. The site does not operate on Sunday.

Two monitoring locations were selected as being the worst affected receivers by site operational noise. The addresses are:

- R1 – Empty lot at 15 Shamrock Street, Hexham
- R2 – Calvary St Joseph's Retirement Community - 240 Maitland Rd, Sandgate.

Monitoring was conducted on 28 and 29 June 2016 at these two locations, with results detailed in **Table 1** of this report. Monitoring locations are shown in **Figure 1**.



Figure 1 OneSteel Site and Receiver Locations

2.0 Noise limits

2.1 EPL Conditions

EPL Condition L4 – Noise Limits are reproduced below:

L4.1 Noise from the premises must not exceed the limits specified in the table below:

Location	Noise Limit dB(A)			
	Day	Evening	Night	
	L _{Aeq} (15min)	L _{Aeq} (15min)	L _{Aeq} (15min)	L _{A1} (1min)
Any residence in Shamrock Street, Hexham, affected by noise from the premises	47	48	45	55
St Joseph's Retirement Village and any associated residence in Old Maitland Road, Hexham, affected by noise from the premises	53	42	41	56
Any operating industrial premises affected by noise from the premises	70	70	70	N/A

L4.2 The noise limits above comply when measured or computed at any point within one metre of the boundary of any affected residential premises.

L4.2 The noise limits above comply when measured or computed at any point within one metre of the boundary of any affected residential premises.

5dB(A) must be added to the measured level if the noise is substantially tonal or impulsive in character.

L4.3 Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays.

Evening is defined as the period from 6pm to 10pm.

Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

L4.4 A The noise emission limits identified in Condition L4.1 apply under the following meteorological conditions;

- a) Wind speeds up to 3m/s at 10 metres above ground level; and*
- b) Temperature inversion conditions of up to 3°C/100m.*

2.2 Industrial Noise Policy

In reference to determining compliance with noise conditions, the Industrial Noise Policy (INP) states the following:

When is a development in non-compliance with a noise condition?

A development will be deemed to be in non-compliance with a noise consent or licence condition if the monitored noise level is more than 2 dB above the statutory noise limit specified in the consent or licence condition. This may occur for two reasons:

- The noise from the development is excessive, in which case the development is truly not complying with its consent or licence condition.*
- The noise was increased by extreme, non-standard weather effects—in which case the development is not considered to be in non-compliance with its consent or licence condition. Non-standard weather effects can be considered to be present during monitoring if the cloud cover is*

less than 40 per cent and the wind speed (at 10 m height) is less than 1.0 m/s (represents an extremely adverse weather condition for noise)—during the period from 6 pm to 7 am in non-arid areas (see Section 9.2).

In this latter case, further monitoring at a later date is required to determine compliance under the meteorological conditions specified in the consent/licence condition.

3.0 Attended Monitoring

Attended measurements were conducted on 28 and 29 June 2016 at the two monitoring locations listed in Section 1.2 during the daytime (0700 – 1800) and evening (1800 – 2200). It should be noted that this is in line with the site operating hours, which are limited to Measurements were conducted at a height of 1.5m.

3.1 Instrumentation

Attended measurements were conducted using a Larson Davis SoundTrack LxT (Serial No. 0002705). This instrument has Class 1 characteristics as defined in AS IEC 61672.1-2004 “Electroacoustics - Sound Level Meters”. Measurements were conducted over 15-minute intervals.

Calibration of the instrument was confirmed with a Larson Davis CAL150 Sound Level Calibrator prior to, and at the completion of monitoring with a drift in calibration not exceeding ± 0.5 dB.

All equipment used for this assessment has current calibration certificates (i.e. calibrated in the last two years).

The sound level meter was set to ‘fast’ time weighting and programmed to store L_{10} , L_{Aeq} and L_{90} noise levels during each measurement period.

3.2 Weather Conditions

Weather conditions were within acceptable limits for noise monitoring during 28 and 29 June 2016. Skies were clear on the day and winds were calm, measuring at 1.5m/s during the monitoring period.

3.3 Site Operations

On the days of measurements the OneSteel Recycling was operating under normal conditions. Noise emission characteristics of the site are outlined in Section 1.2.

3.4 Results

Noise monitoring was conducted during both the daytime and evening periods, when the main noise sources on site were operational.

The results from the attended noise monitoring carried out on 28 and 29 June 2016 during the daytime and evening periods are presented in **Table 1**.

Table 1 Attended Daytime and evening monitoring results summary, dB(A)

Location	Date / Time	EPL limits $L_{Aeq(15m)}$ ins) dB(A)	Measured noise level, dB(A)		Description of noise environment
			L_{Aeq}	L_{A90}	
Day and Evening*					
R1 – 15 Shamrock Street, Hexham	29/06/16 12:40 (Day)	47	64	51	OneSteel Recycling operations are indiscernible above ambient noise. Ambient noise was influenced by passing trains along Hunter Rail Line to the west, road traffic along both Maitland Road to the west and truck deliveries travelling along Shamrock Road to the carpark to the north. Noise from natural surrounds, such as birds were also noted.
	28/06/16 20:26 (Evening)	48	62	51	
R2 – Calvary St Joseph's Retirement Community	29/06/16 11:45 (Day)	53	53	44	OneSteel Recycling operations are audible but not dominant. Ambient noise is dominated by passing trains along Hunter Rail Line to the west. Noise from natural surrounds, such as birds, was also noted. Traffic noise from Maitland road is audible.
	28/06/16 21:04 (Evening)	42	53	47	

The results in **Table 1** show that measured L_{Aeq} noise levels measured at R2 – Calvary St Joseph's Retirement Community are compliant with development EPL noise limits. Measured L_{Aeq} levels at R1 – 15 Shamrock Road exceeded EPL limits, however it was noted that noise from OneSteel Recycling was inaudible over ambient noise at this location.

4.0 Discussion

4.1 Influence of Extraneous Noise on Attended Measurements

Measurement results show that measured noise levels at Shamrock Street exceed EPL limits. This discrepancy is attributed to the large influence of road and rail traffic noise on the measured $L_{Aeq(15min)}$ levels at Shamrock Street.

4.2 Determination of Compliance

The influence of extraneous noise, i.e. road and rail traffic, makes it difficult to determine the noise contribution from the site in isolation, and therefore difficult to determine compliance with EPL limits.

Where direct measurement of noise contribution from an industrial facility is not possible due to persistent extraneous noise sources, the Environment Protection Authority's NSW Industrial Noise Policy (INP) makes an allowance for assessment by other methods.

Section 11.1.2 Notes on noise monitoring of the INP states:

Where existing noise levels are high:

When compliance is being measured it may be found that, in many cases, existing noise levels are higher than noise level from the source, making it difficult to separate out the source noise level. When this happens, it may not be feasible to measure compliance at the specified location, and other methods will be needed. In these cases, measurements may be taken closer to the source and then calculated back to the specified location. In doing this, take care to account for the 'near field', a region in which sound pressure levels do not decrease with distance in the normal way. Definitions of the

extent of this region are contained in many noise textbooks (for example, Bies and Hanson 1996). Any calculations should be done in accordance with the validation requirements set out in Section 6.2. Section 6.2 goes on to discuss assessment of large sites through the use of a computer noise model.

One of the notes attached to **Table 3** in the project approval conditions of the INP states:

'noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the INP'.

Determining compliance by prediction is therefore deemed to be appropriate in this instance.

5.0 On-Site Noise Measurements

Attended measurements were conducted on 22 July 2016 along the boundary of the site in order to quantify site noise emissions and predict noise levels at each assessment location in the absence of extraneous noise. Attended noise monitoring was conducted at the northern boundary of the site, which allowed closest access to noisy operations such as truck and excavator movements and the shredder operation. Measurements were conducted during typical noisy operation of the site, with trucks, excavators and the shredder operating on site. These operations have conservatively been assumed to occur throughout the daytime and evening period.

In order to predict resultant noise levels at each receiver from the OneSteel facility alone, a 'flat ground' model was used based on hemispherical spreading, conservatively assuming no topographical shielding, ground or air absorption, directivity or meteorological effects. Site boundary measurement locations are shown on Figure 2.

Figure 2 On-site measurement locations



Results from on-site monitoring are presented in **Table 2**. Predicted noise levels at each assessment location are presented in **Table 3**.

Table 2 On site measurement results – 22 July 2016

Location	Monitoring location	Time	Duration	Site operation	Measured noise level, L _{Aeq} dB(A)	
					L _{Aeq}	L _{A90}
Northern boundary of site	A	10:32	15 mins	Normal operations, trucks, excavators and shredder operating	71	68
	B	10:49	15 mins		74	63
	C	11:05	15 mins		74	59

Table 3 Predicted noise levels based on modelling

Location	Predicted noise impact, dB(A)	EPL noise limit, dB(A)		Comply
		Day	Evening	
R1 – 15 Shamrock Street, Hexham	46	47	48	Yes
R2 – Calvary St Joseph's Retirement Community	44	53	42	Yes*

* Refer to Section 2.2

Results show predicted noise contributions from site are below EPL limits at all locations.

6.0 Conclusion

Attended noise compliance monitoring at designated noise sensitive receivers has taken place in accordance with the requirements of OneSteel Hexham EPL (EPL 5345).

L_{Aeq} noise levels higher than the project EPL noise limits were measured at the majority of the designated receivers during the daytime and evening periods, however it was noted that extraneous noise sources, namely road traffic, contributed significantly to these noise levels.

Site noise from OneSteel recycling was indiscernible at Shamrock Street during the day and evening; however it was audible at St Joseph's retirement village during the day due to proximity to the site and site's activity during the day. L_{Aeq} levels were largely influenced by extraneous noise sources such as train and road traffic at both locations, whereas L_{A90} levels were influenced by traffic on nearby roads. Definitive compliance with EPL noise limits was, however, difficult to determine through direct measurement due to the influence of extraneous noise events.

Due to the difficulty in determining the contribution of the facility at the nominated receiver locations, an alternative method of determining compliance, in accordance with the INP was considered appropriate. In this case site boundary measurements were used to predict noise impacts at each assessment location.

Predicted noise levels indicate compliance with the EPA noise limits at all receiver locations, demonstrating compliance with EPL conditions.

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Appendix A

Glossary of acoustic terms

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The following is a brief description of acoustic terminology used in this report.

<i>Sound power level</i>	The total sound emitted by a source																						
<i>Sound pressure level</i>	The amount of sound at a specified point																						
<i>Decibel [dB]</i>	The measurement unit of sound																						
<i>A Weighted decibels [dB(A)]</i>	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB (A).																						
<i>Decibel scale</i>	<p>The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:</p> <table> <tr> <td>0dB(A)</td> <td>Threshold of human hearing</td> </tr> <tr> <td>30dB(A)</td> <td>A quiet country park</td> </tr> <tr> <td>40dB(A)</td> <td>Whisper in a library</td> </tr> <tr> <td>50dB(A)</td> <td>Open office space</td> </tr> <tr> <td>70dB(A)</td> <td>Inside a car on a freeway</td> </tr> <tr> <td>80dB(A)</td> <td>Outboard motor</td> </tr> <tr> <td>90dB(A)</td> <td>Heavy truck pass-by</td> </tr> <tr> <td>100dB(A)</td> <td>Jackhammer/Subway train</td> </tr> <tr> <td>110 dB(A)</td> <td>Rock Concert</td> </tr> <tr> <td>115dB(A)</td> <td>Limit of sound permitted in industry</td> </tr> <tr> <td>120dB(A)</td> <td>747 take off at 250 metres</td> </tr> </table>	0dB(A)	Threshold of human hearing	30dB(A)	A quiet country park	40dB(A)	Whisper in a library	50dB(A)	Open office space	70dB(A)	Inside a car on a freeway	80dB(A)	Outboard motor	90dB(A)	Heavy truck pass-by	100dB(A)	Jackhammer/Subway train	110 dB(A)	Rock Concert	115dB(A)	Limit of sound permitted in industry	120dB(A)	747 take off at 250 metres
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120dB(A)	747 take off at 250 metres																						
<i>Frequency [f]</i>	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.																						
<i>Equivalent continuous sound level [L_{eq}]</i>	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.																						
<i>L_{max}</i>	The maximum sound pressure level measured over the measurement period																						
<i>L_{min}</i>	The minimum sound pressure level measured over the measurement period																						
<i>L₁₀</i>	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L ₁₀ .																						
<i>L₉₀</i>	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L ₉₀ .																						

<i>Ambient noise</i>	The all-encompassing noise at a point composed of sound from all sources near and far.
<i>Background noise</i>	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L ₉₀ sound pressure level is used to quantify background noise.
<i>Traffic noise</i>	The total noise resulting from road traffic. The L _{eq} sound pressure level is used to quantify traffic noise.
<i>Day</i>	The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays.
<i>Evening</i>	The period from 1800 to 2200 h Monday to Sunday and Public Holidays.
<i>Night</i>	The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays.
<i>Assessment background level [ABL]</i>	The overall background level for each day, evening and night period for each day of the noise monitoring.
<i>Rating background level [RBL]</i>	The overall background level for each day, evening and night period for the entire length of noise monitoring.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 “Acoustics – Glossary of terms and related symbols”, the EPA’s NSW Industrial Noise Policy and the EPA’s NSW Road Noise Policy.