

Liberty Recycling Hexham Quarterly Noise Monitoring Report_Q2 2019

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1.0 Introduction

1.1 Background

Liberty Recycling Hexham (the site) has engaged AECOM Australia Pty Ltd to conduct quarterly noise monitoring at the location of the nearest residential receivers from the Hexham recycling plant. The Quarter 2 2019 noise monitoring survey was conducted at two offsite receivers and two site boundary locations on 26/6/19 to meet requirements stated in Liberty Hexham's environment protection licence (EPL) No: 5345.

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

1.2 Site

The site is located at 107 Sparke Street, Hexham NSW. The site is bounded by vacant land and the Hunter River to the north and east, with Maitland Road located between the site and the river. To the south is Ironbark Creek with the Hunter Rail line to the west.

Site noise is generally characterised as heavy vehicle traffic due to delivery trucks visiting the site as well as the industrial shredder and associated site operations (handling scrap metal, heavy machinery etc.).

The site is open from 6:00 am to 6:00 pm from Monday to Saturday; however delivery trucks and the mill area (which contains the shredder operations) operate 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.

2.0 Methodology

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 4 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 from site boundary noise levels is therefore deemed to be appropriate in this instance.

2.1 Boundary Noise Monitoring

Definitive compliance with EPL noise limits at the nominated receiver locations is difficult to determine through direct measurement due to the influence of extraneous noise sources during the day, evening and night time. Therefore in order to determine the noise contribution of the facility at the 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 receiver location. Boundary noise monitoring was carried out at two monitoring locations on the Northwest and Southeast of the site premises, in order to predict the noise levels at the EPL monitoring locations in the absence of external noise sources.

2.2 Instrumentation

Attended measurements were conducted using a Larson Davis SoundTrack LxT. 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 the monitoring 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 $L_{10(15\text{ min})}$, $L_{Aeq(15\text{ min})}$ and $L_{A90(15\text{ min})}$ noise levels during each measurement period.

3.0 EPL Conditions

EPL Condition L4 – Noise Limits is 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	
	$L_{Aeq(15\text{min})}$	$L_{Aeq(15\text{min})}$	$L_{Aeq(15\text{min})}$	$L_{A1(1\text{min})}$
Any residence in Shamrock Street, Hexham, affected by noise from the premises	47	48	45	55
St Joseph's Retirement Community 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.

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

a) Wind speeds up to 3 m/s at 10 metres above ground level; and

b) Temperature inversion conditions of up to 3°C/100m.

3.1 NSW Industrial Noise Policy

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

11.1.3 Non-compliance with noise conditions

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.

4.0 Monitoring

4.1 Attended Monitoring

Attended measurements were conducted on 26/6/19 at the monitoring locations listed in **Section 1.2** during the daytime (0700 – 1800), evening (1800 – 2200) and night time (2200 - 0700). Measurements were conducted at a height of 1.5m.

4.1.1 Weather Conditions

Weather conditions were within acceptable limits for noise monitoring with clear skies and calm winds on 26/6/19.

4.1.2 Site Operations

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

4.2 Monitoring Locations

The two EPL monitoring locations are:

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

These EPL locations were selected as the nearest residential receiver locations to the north and south of the site. The monitoring locations are shown in **Figure 1**.



Figure 1 Liberty Site and Receiver Locations

Due to external noise sources dominating at the EPL monitoring locations, attended noise measurements were also conducted on the north and south boundaries of the site during day, evening and night periods in order to quantify site noise emissions for the prediction of noise levels at each receiver location in the absence of extraneous noise. Attended noise monitoring was conducted at the north and south boundaries of the site as shown in **Figure 2**.



Figure 2 Site Boundary Measurement Locations

5.0 Results

5.1 Receiver Location Monitoring

Noise monitoring was conducted at the two defined receiver locations during the daytime when the primary noise sources on site were operational. Attended monitoring during the evening and night periods was performed at receiver locations as part of EPL requirements. The results from the attended noise monitoring carried on 26/6/19 are presented in **Table 1**.

Table 1 Quarter 2 2019 - Attended Noise Monitoring Results Summary

Location	Date / Time	EPL limits L _{Aeq} (15mins) dB(A)	Measured Noise Level, dB(A)		Description of Noise Environment
			L _{Aeq} (15 min)	L _{A90} (15 min)	
Day 7:00 am – 18:00 pm					
R1 – 15 Shamrock Street, Hexham	26/6/19 11:39	47	56	51	Noise from site occasionally audible Other noise sources include: <ul style="list-style-type: none"> • Heavy transport trucks; and • Traffic on Maitland Road. • Birds chirping
R2 – Calvary St Joseph's Retirement Community	26/6/19 12:07	53	49	45	Noise from site occasionally audible Other noise sources include: <ul style="list-style-type: none"> • Freight and passenger trains; • Traffic on Maitland Road; and • Birds chirping.
Evening 18:00 pm – 22:00 pm					
R1 – 15 Shamrock Street, Hexham	26/6/19 19:45	48	49*	47	Noise from site inaudible. Other noise sources include: <ul style="list-style-type: none"> • Heavy trucks; • Freight and passenger trains; • Insects and frogs; • Aircraft overhead • Traffic/ Roadworks on Maitland Rd
R2 – Calvary St Joseph's Retirement Community	26/6/19 20:32	42	45	42	Noise from site inaudible. Other noise sources include: <ul style="list-style-type: none"> • Traffic on Maitland Road; and • Insects.
Night 22:00 pm – 7:00 am					
R1 – 15 Shamrock Street, Hexham	26/6/19 23:12	45	48	42	Noise from site inaudible. Other noise sources include: <ul style="list-style-type: none"> • Heavy trucks; • Insects & Frogs; • Running water down drain • Traffic on Maitland Road; and • Passenger and freight trains.
R2 – Calvary St Joseph's Retirement Community	26/6/19 23:45	41	45	41	Noise from site inaudible. Other noise sources include: <ul style="list-style-type: none"> • Traffic on Maitland Road; • Trains in distance.

Bold values indicate measured noise level above EPL criteria

*Measured noise level within 2dB of statutory noise limit and compliant with EPL criteria

The results in **Table 1** show that the measured $L_{Aeq(15\text{ min})}$ noise level at R2 – Calvary St Joseph's Retirement Community is compliant with development EPL noise limits during the day-time. Measured $L_{Aeq(15\text{ min})}$ noise levels at R2 – Calvary St Joseph's Retirement Community were above EPL criteria for all other periods.

The measured $L_{Aeq(15\text{ min})}$ noise level at R1 – 15 Shamrock Street during the evening was measured within 2 dB of the EPL criteria and therefore deemed compliant under **Section 11.1.3** of the INP, as discussed in **Section 3.1** above. Measured $L_{Aeq(15\text{ min})}$ noise levels at R1 – 15 Shamrock Street were above the EPL criteria for all other periods.

It was noted that noise from Liberty Recycling was either barely audible or inaudible over ambient noise and the dominant noise was the road and train traffic at both locations during all periods.

In order to determine the noise contribution from the facility at the 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 for each receiver location.

5.2 Site Boundary Noise Measurements

Boundary noise measurements were conducted during daytime operation of the site, with trucks, excavators and the shredder operating on site, these measurements were also performed during evening and night time periods. Site operations have conservatively been assumed to occur throughout the daytime and evening period. Results from the site boundary monitoring carried out on 26/6/19 are presented in **Table 2**.

Table 2 Quarter 2 2019 – Site Boundary Measurement Results

Location	Time		Duration	Measured Noise Level, $L_{Aeq(15\text{ min})}$ and $L_{A90(15\text{ min})}$ dB(A)		Site Operation
				$L_{Aeq(15\text{ min})}$	$L_{A90(15\text{ min})}$	
Northwest boundary	Day	26/6/19 11:05	15 mins	71	65	Normal operations, trucks, excavators and shredder operating
	Evening	26/6/19 21:42	15 mins	52	46	Maintenance work
	Night	26/6/19 22:15	15 mins	49	41	Not operational
Southeast boundary	Day	26/6/19 10:40	15 mins	55	51	Normal operations, trucks, excavators and shredder operating
	Evening	26/6/19 21:20	15 mins	46	40	Maintenance work
	Night	26/6/19 22:37	15 mins	47	42	Not operational

5.3 Predicted Noise Levels

In order to predict resultant noise levels at each receiver from the Liberty 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. Calculated noise levels at each receiver location are presented in **Table 3**.

Table 3 Quarter 2 2019 – Calculated Noise Levels at the Receiver Locations

Receiver Location	Time	Calculated noise impact, dB(A)	EPL noise limit, dB(A)	Comply
R1 – 15 Shamrock Street, Hexham	Day	42	47	Yes
	Evening	33	48	Yes
	Night	30	45	Yes
R2 – Calvary St Joseph's Retirement Community	Day	45	53	Yes
	Evening	36	42	Yes
	Night	37	41	Yes

Calculated results show no non-compliances with EPL criteria are predicted at either receiver location for any of the monitoring periods.

6.0 Conclusion

Attended noise compliance monitoring at designated noise sensitive receivers has taken place in accordance with the requirements of Liberty Hexham EPL No: 5345.

Measurements at the R2 – Calvary St Joseph's Retirement Community during the day-time were below the relevant criteria. Evening measurements at R1 – 15 Shamrock Street were within 2 dB of the EPL criteria and therefore considered compliant.

Ambient $L_{Aeq(15\text{ min})}$ noise levels above the EPL noise limits were measured at both the designated receiver locations during the evening and night time monitoring periods, however it was noted that extraneous noise sources, namely road and rail traffic, contributed significantly to these noise levels.

Site noise from Liberty recycling was indiscernible at Shamrock Street and St Joseph's Retirement Community during evening and night periods. $L_{Aeq(15\text{ min})}$ levels were largely influenced by extraneous noise sources such as train and road traffic at both locations, whereas $L_{A90(15\text{ min})}$ levels were influenced by traffic on nearby roads.

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 receiver location.

As shown in **Table 3**, calculated noise levels demonstrate compliance with the EPL noise limits at both receiver locations during all monitoring periods.

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Appendix A

Glossary of Acoustic Terms

Appendix A Glossary of Acoustic Terms

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).																						
	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:																						
<i>Decibel scale</i>	<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_{Aeq}]</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>L_{A90(15 min)}</i>	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L _{A90 (15 min)} .
<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 _{A90 (15 min)} 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.

