

InfraBuild Recycling Hexham Quarterly Noise Monitoring Report_Q4 2019

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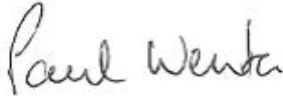
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1.0 Introduction

1.1 Background

InfraBuild 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 4 2019 noise monitoring survey was conducted at two offsite receivers and two site boundary locations on 17, 20 and 23 December 2019 to meet requirements stated in InfraBuild 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	
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{A1(1min)}$
Any residence in Shamrock Street, Hexham, affected by noise from the premises	47	48	45	55
St Joseph's Retirement 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 over the days 17, 20 and 23 December 2019 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 low to moderate winds on all days. Clear skies were present on 17 and 20 December while the sky was noted to be 100% overcast on 23 December.

4.1.2 Site Operations

On 17 and 20 December InfraBuild Recycling facility was operating under normal conditions. InfraBuild was not operating when measurements were taken on 23 December. 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 InfraBuild 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 maintenance shift and night period was performed at receiver locations as part of EPL requirements. The results from the attended noise monitoring carried out on 17 December 2019 are presented in **Table 1**.

Table 1 Quarter 4 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	17/12/19 12:16	47	57**	51	<ul style="list-style-type: none">• Site clearly audible with the mill a significant source• Highway traffic a significant source• Local traffic entering the service station and McDonalds• Birds
R2 – Calvary St Joseph's Retirement Community	17/12/19 13:06	53	51	48	<ul style="list-style-type: none">• Some site noise occasionally audible• Highway traffic the dominant source• Trees rustling• Birds
Evening (18:00 pm – 22:00 pm)					
R1 – 15 Shamrock Street, Hexham	17/12/19 20:55	48	50*	45	<ul style="list-style-type: none">• Site audible• Highway traffic the dominant source• Insects• Local traffic entering the services station and McDonalds
R2 – Calvary St Joseph's Retirement Community	17/12/19 20:33	42	50	44	<ul style="list-style-type: none">• Site inaudible• Highway traffic the dominant source• Passing train• Insects
Night (22:00 pm – 7:00 am)					
R1 – 15 Shamrock Street, Hexham	17/12/19 22:51	45	52	42	<ul style="list-style-type: none">• Site inaudible• Highway traffic the dominant source• Local traffic entering the service station and McDonalds• Birds and insects• Water spray/leak in adjacent field (hissing noise)• Passenger train

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)	
R2 – Calvary St Joseph's Retirement Community	17/12/19 23:15	41	45	40	<ul style="list-style-type: none"> • Site inaudible • Highway traffic the dominant source • Passing train • Birds and insects

Bold values indicate measured noise level above EPL criteria

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

** $L_{Aeq}(8min)$ of 53 dB achieved on 20 December before passing train distorted the result

The results in **Table 1** show that the measured $L_{Aeq}(15 min)$ noise level at R2 – Calvary St Joseph's Retirement Community is compliant with development EPL noise limit for the day-time period. The measured evening and night time results at the St Joseph's site were above the EPL criteria.

The measured $L_{Aeq}(15 min)$ noise level at R1 – 15 Shamrock Street during the evening period 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 $L_{Aeq}(15 min)$ noise levels at R1 – 15 Shamrock Street for the day and night time periods were above the EPL criteria.

In most cases highway traffic was noted to be the dominant noise source. 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 Monitoring

Boundary noise measurements were conducted during daytime operation of the site with material handlers 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 (normal operations) and evening period (primarily maintenance). Results from the site boundary monitoring carried out on 17 December 2019 are presented in **Table 2**.

Table 2 Quarter 4 2019 – Site Boundary Measurement Results

Location	Time		Measured Noise Level, L _{Aeq} (15 min) and L _{A90} (15 min) dB(A)		Site Operation
			L _{Aeq} (15 min)	L _{A90} (15 min)	
Northwest boundary	Day	17/12/19 11:38	78	76	<ul style="list-style-type: none"> Site operations dominant 4 x material handlers operating Loader moving scrap Trommel operating including material dropping into bays Tracks waiting to unload Passing train
	Evening	17/12/19 21:47	53	47	<ul style="list-style-type: none"> Highway traffic dominant Occasional siren from site Plant maintenance and hosing Passing train
	Night	17/12/19 22:07	48	44	<ul style="list-style-type: none"> Site barely audible Highway traffic dominant Passing coal train Continuous high pitched noise from mill Crickets
Southeast boundary	Day	17/12/19 11:10	58	53	<ul style="list-style-type: none"> Some HM yard activity (fork lifts, excavator) Mill barely audible Highway traffic audible at times Passing train Site noise from the non-ferrous area (tipping of product into bays)
	Evening	17/12/19 21:28	46	42	<ul style="list-style-type: none"> Site barely audible Highway traffic dominant Trains Crickets
	Night	17/12/19 22:27	43	40	<ul style="list-style-type: none"> Site barely inaudible Highway traffic dominant Crickets and insects

5.3 Predicted Noise Levels

In order to predict resultant noise levels at each receiver from the InfraBuild 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 4 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	55**	47	No
	Evening	29	48	Yes
	Night	24	45	Yes
R2 – Calvary St Joseph's Retirement Community	Day	48	53	Yes
	Evening	36	42	Yes
	Night	33	41	Yes

Bold values indicate measured noise level above EPL criteria

* Measured result at the receiver is compliant (within 2 dB) with EPA criteria

** Result not deemed to be representative. See discussion below.

With the exception of the Shamrock Street Day period result, calculated results show no non-compliances with EPL criteria are predicted at either receiver location for any of the monitoring periods.

Site activity during the daytime measurement period on the Northwest boundary was significant, with several items of mobile plant operational between the monitoring location and the mill (which for the calculation method is the primary noise source). This included a front loader, fork lift and trucks delivering raw material to the site. The variable distance of these mobile plant operating in close proximity to the monitoring location reduces the suitability of the calculation method with the calculated result not representative of actual conditions.

A repeat of this sampling performed on 20 December returned similar results, again with interference by mobile plant an issue. Measurements taken over an 8 minute period at Shamrock Street on 20 December returned an L_{Aeq} of 53dB, also above the criteria of 47dB. The site was again clearly audible on this occasion however there was still a considerable contribution from traffic and other extraneous sources.

5.4 Further Investigation

On 23 December while the plant was not operational, monitoring was again performed at the Shamrock Street location. The $L_{Aeq(15\text{ min})}$ for the period commencing 9:45am was 52dB, with an $L_{A90(15\text{ min})}$ of 47dB. The L_{A90} represents the sound pressure level exceeded for 90% of the measurement period. This period did not include any significant or out of the ordinary noise sources and is considered a fair representation of noise levels at the Shamrock Street location with the site not operational. The monitoring was paused for passing trains which would have increased the results considerably.

This reading of 52dB is comparable to the result of 53 dB measured on 20 December and implies that while the site may have contributed to the noise levels at Shamrock Street during monitoring performed on 17 and 20 December (the site was noted as being audible on both occasions) it is unlikely that the contribution was significant. It is also likely that achieving a compliant daytime result by measuring at the Shamrock Street receptor is unlikely regardless of the whether the site is audible or not.

Of note is that the EPL $L_{Aeq(15\text{ min})}$ limit for the Shamrock Street Day period (47 dB) is less than the Evening period (48 dB). This is not the case for the St Joseph's location where the Day limit (53 dB) is significantly higher than the Evening limit (42 dB).

6.0 Conclusion

Attended noise compliance monitoring at designated noise sensitive receivers has taken place in accordance with the requirements of InfraBuild 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 InfraBuild recycling was audible at Shamrock Street and St Joseph's Retirement Community during the day and during the evening period at Shamrock Street. The site was inaudible during both night time periods. $L_{Aeq(15 \text{ min})}$ levels at both locations were largely influenced by extraneous noise sources such as road and rail traffic as well as other ambient sources (e.g. birds, crickets).

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**, with the exception of the day time period at Shamrock Street where mobile plant caused the results to be deemed non-representative, calculated noise levels demonstrate compliance with the EPL noise limits at both receiver locations for the evening and night periods where measured $L_{Aeq(15 \text{ min})}$ results returned exceedances due to extraneous sources.

The results of receiver location monitoring performed at Shamrock Street during the day time period on 23 December while the site was not operational were found to be 5dB above the EPL criteria. It is considered unlikely that monitoring at this location will return a compliant result for the day time period due to the extraneous noise sources in the area. While the site may make a contribution to the noise levels at this location, no noise complaints have been received in the past 12 months.

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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>	<p>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).</p> <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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115dB(A)	Limit of sound permitted in industry																						
120dB(A)	747 take off at 250 metres																						
<i>Decibel scale</i>																							
<i>Frequency [f]</i>	<p>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.</p>																						
<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.																						
L_{max}	The maximum sound pressure level measured over the measurement period																						
L_{min}	The minimum sound pressure level measured over the measurement period																						
L_{10}	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.