

InfraBuild Recycling Hexham Quarterly Noise Monitoring Report

Quarter 3 - 2022

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Commercial-in-Confidence

InfraBuild Recycling Hexham Quarterly Noise Monitoring Report

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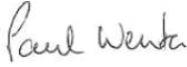
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1.0 Introduction

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 3 2022 noise monitoring survey was conducted at two offsite receivers and two site boundary locations during September 2022 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 Noise Policy for Industry (NPfI) makes an allowance for assessment by other methods.

Section 7.1.1 Options for noise monitoring of the NPfI states:

- *Direct measurement at alternative or intermediate location/s*

Where direct measurement of noise at a compliance location is not practical because of poor signal-to-noise ratios (that is, extraneous noise is louder than the noise under investigation), or where access to the location has been denied or is unavailable, measurements at intermediate locations between the source and the receiver location, where signal-to-noise ratios are higher, may be a viable option. For this approach to be effective there needs to be well-established theoretical and/or empirical relationships between the intermediate location and the receiver location in terms of noise exposure. Noise modelling may be one option to establish this relationship. The techniques under the above section 'Direct measurement at a receiver location' would also be relevant in terms of quantifying the level of noise from the source at the intermediate location(s). Where this technique is relied upon, it is the responsibility of the proponent to demonstrate a robust acoustic relationship between the compliance location and the intermediate location.

Section 7.1.1 goes on to discuss assessment using computer noise modelling. It states:

"The use of intermediate means of model validation or calibration can be a useful technique"

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 NPfI was considered appropriate. In this case site boundary measurements were used to predict noise impacts at each receiver location. Noise monitoring was carried out at two monitoring locations on the Northwest and Southeast boundary of the site 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.

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 $L_{A10(15 \text{ min})}$, $L_{Aeq(15 \text{ min})}$ 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. 5 dB(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 Noise Policy for Industry

In reference to determining compliance with noise conditions, the Noise Policy for Industry (NPfI) notes that where noise levels are less than 2 dB above noise limit then the exceedance can be considered negligible.

4.0 Monitoring

4.1 Attended Monitoring

Attended measurements were conducted during the daytime (0700 – 1800), evening (1800 – 2200) and night-time (2200 - 0700) on 19 September 2022 at the monitoring locations listed in **Section 1.2**. Measurements were conducted at a height of 1.5m.

4.1.1 Weather Conditions

Weather conditions were within acceptable limits for noise monitoring with conditions noted to be generally clear with light to moderate winds for all periods.

4.1.2 Site Operations

On the date monitoring was performed, the InfraBuild 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**.

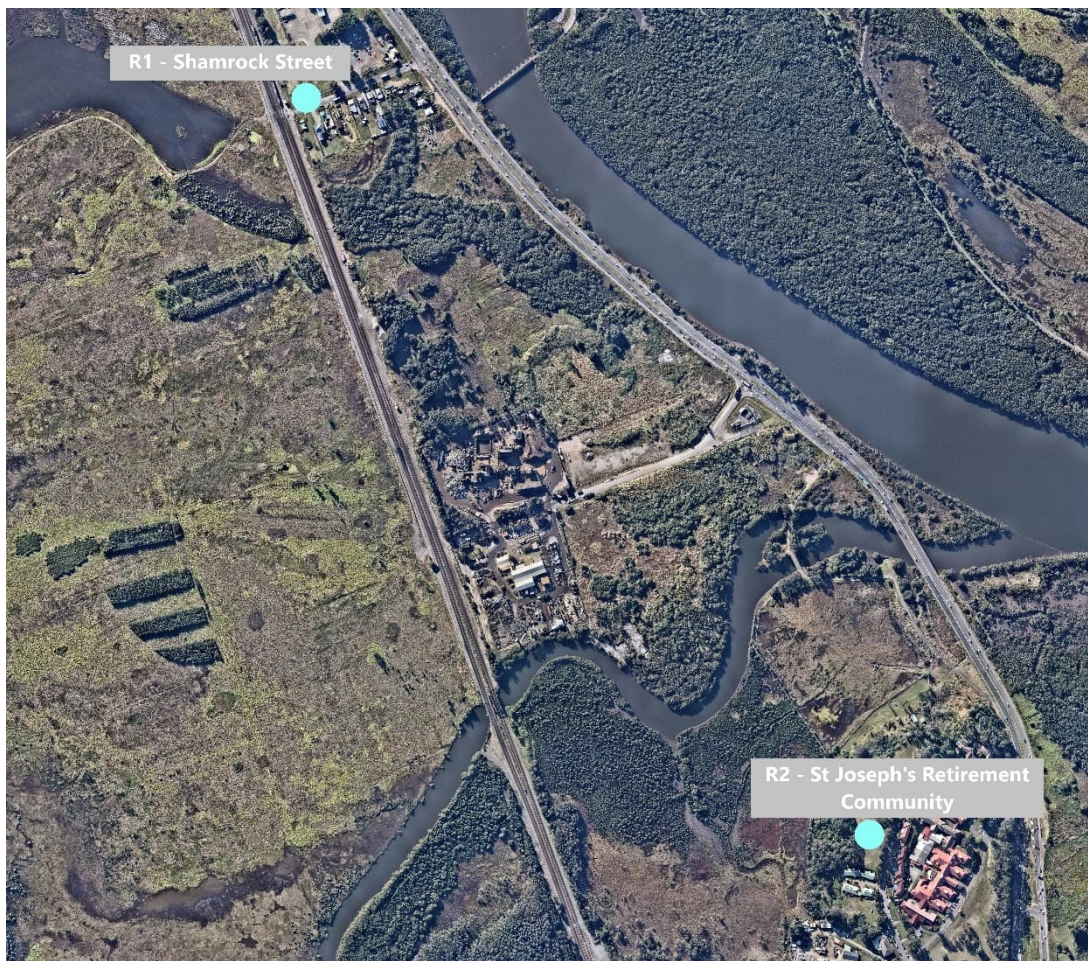


Figure 1 InfraBuild Site and Receiver Locations

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

Attended noise monitoring was conducted at the two defined receiver locations during the daytime when the primary noise sources on site were operational. Attended monitoring was also conducted 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 19 September 2022 are presented in **Table 1**.

Table 1 Quarter 3 2022 – Attended Noise Monitoring Results Summary

Location	Date / Time	EPL limits L _{Aeq(15min)} dB(A)	Measured Noise Level dB(A)		Description of Noise Environment
			L _{Aeq} (15 min)	L _{A90} (15 min)	
Day (07:00 – 18:00)					
R1 – 15 Shamrock Street, Hexham	19/9/22 13:13	47	56	52	<ul style="list-style-type: none"> Site in-audible over background noise Highway traffic dominant Wind chime on residents' property Monitoring paused for passing trains and heavy vehicles
R2 – Calvary St Joseph's Retirement Community	19/9/22 13:44	53	54*	51	<ul style="list-style-type: none"> Site audible at times Highway audible at times Works nearby (drilling & power washing) Birds and insects Rustling of trees in the wind Monitoring paused for passing trains
Evening (18:00 – 22:00)					
R1 – 15 Shamrock Street, Hexham	19/9/22 20:47	48	54	50	<ul style="list-style-type: none"> Site audible at times Highway traffic dominant Insects Monitoring paused for passing trains
R2 – Calvary St Joseph's Retirement Community	19/9/22 20:22	42	49	45	<ul style="list-style-type: none"> Site audible at times Highway traffic dominant Insects Monitoring paused for passing trains
Night (22:00 – 07:00)					
R1 – 15 Shamrock Street, Hexham	19/9/22 23:12	45	51	47	<ul style="list-style-type: none"> Site inaudible Highway traffic dominant Insects Monitoring paused for passing trains
R2 – Calvary St Joseph's Retirement Community	19/9/22 23:40	41	46	41	<ul style="list-style-type: none"> Site inaudible Highway traffic dominant Insects Monitoring paused for passing trains

Bold values indicate measured noise level above EPL limit

* Within 2 dB and considered compliant

The results in **Table 1** show that the measured $L_{Aeq(15\text{ min})}$ noise level at R2 – Calvary St Joseph's Retirement Community for the day-time period was within 2dB of the EPL criteria. The measured evening and night-time results at the St Joseph's site were above the EPL criteria. Measured $L_{Aeq(15\text{ min})}$ noise levels at R1 – 15 Shamrock Street for the day, evening and night-time periods were above the EPL criteria.

In most cases highway traffic was noted to be the dominant noise source or noted to be a significant source. To determine the noise contribution from the facility at the receiver locations, an alternative method of determining compliance, in accordance with the NPfl 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 19 and 29 September 2022 are presented in **Table 2**.

Table 2 Quarter 3 2022 – Site Boundary Measurement Results

Location	Date / Time		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	19/9/22 12:42	77.6	75.7	<ul style="list-style-type: none"> • Mill and trommel running (dominant) • 3 x material handlers moving waste (metal clanging audible) • Loader working nearby • Trucks idling
	Evening	19/9/22 21:40	53.4	45.8	<ul style="list-style-type: none"> • Some site activity around the mill • Some welding & grinding activities • Highway traffic audible
	Night	19/9/22 22:03	48.2	45.0	<ul style="list-style-type: none"> • Highway traffic dominant • Minimal noise from mill area • Minimal site activity, representative of night time conditions
Southeast Boundary	Day	19/9/22 12:17	63.7	53.9	<ul style="list-style-type: none"> • 2 x material handler operating in HM yard • Sheer and Forklift in HM audible • Mill audible • Trucks on site
	Evening	19/9/22 21:20	51.1	44.9	<ul style="list-style-type: none"> • Material handler in HM yard • Highway traffic audible, particularly trucks
	Night	19/9/22 22:25	42.5	38.7	<ul style="list-style-type: none"> • Minimal site activity • Highway traffic dominant • Passing trains audible

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, directivity or meteorological effects in accordance with *ISO 9613.2 Acoustics - Attenuation of sound during propagation outdoors – Part 2: General method of calculation*.

For calculating the sound pressure level at St Joseph's a 100% soft ground value has been employed recognising the heavily vegetated land between the site and receiver. A 20% soft ground value has been employed for the Shamrock Street location, noting the receiver is located at an elevation above the site.

Calculated noise levels at each receiver location are presented in **Table 3**.

Table 3 Quarter 3 2022 – 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	48	47	Yes*
	Evening	33	48	Yes
	Night	<30	45	Yes
R2 – Calvary St Joseph's Retirement Community	Day	42	53	Yes
	Evening	35	42	Yes
	Night	<30	41	Yes

* Under the NPfI, where noise levels are less than 2dB above the criteria the exceedance can be considered negligible.

The calculated results for Shamrock Street and Calvary St Joseph's Retirement Community show no non-compliances with the EPL noise limits during any time period.

In reference to determining compliance with noise conditions, the Noise Policy for Industry (NPfI) notes that where noise levels are less than 2 dB above noise limit then the exceedance can be considered negligible.

6.0 Conclusion

Attended noise compliance monitoring at designated noise sensitive receivers was conducted on 19 and 29 September 2022 in accordance with the requirements of InfraBuild Hexham EPL 5345.

Ambient $L_{Aeq(15\text{ min})}$ noise levels above the EPL noise limits were measured at both St Joseph's and Shamrock Street receivers for the day, evening and night-time periods, however it was noted that extraneous noise sources, primarily road traffic, contributed significantly to these noise levels.

Site noise from InfraBuild Recycling was audible at the St Joseph's Retirement Community receiver during the day and evening periods and inaudible during the night period with site noise audible at the Shamrock Street receiver during the evening and night periods and inaudible during the day period due to extraneous noise sources. $L_{Aeq(15\text{ min})}$ levels measured at the receiver locations were largely influenced by extraneous noise sources such as road traffic and other ambient sources.

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 NPfl, 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 the Shamrock Street and St Joseph's receiver locations for the daytime, evening and night periods. $L_{Aeq(15\text{ min})}$ results measured directly at the receiver locations returned exceedances due to extraneous sources.

Therefore, the environmental noise emissions are considered to be compliant with the EPL limits for the site for all three time periods.

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 border="0"> <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>	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_{Amax}</i>	The maximum sound pressure level measured over the measurement period.																						
<i>L_{Amin}</i>	The minimum sound pressure level measured over the measurement period.																						
<i>L_{A10}</i>	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L _{A10} .																						

<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 _{Aeq} 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 Noise Policy for Industry and the EPA’s NSW Road Noise Policy.