

## **Ambience Audio Services**

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**Noise Compliance Assessment  
JR Richards & Sons Composting Facility  
704 Armidale Road  
Grafton NSW 2460**

Prepared for

**Ecoteam Pty Ltd  
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02/08/2017

## Table of Contents

<b>1</b>	<b>INTRODUCTION .....</b>	<b>3</b>
<b>2</b>	<b>DESCRIPTION OF SITE AND OPERATIONS.....</b>	<b>3</b>
<b>3</b>	<b>NOISE CRITERIA.....</b>	<b>6</b>
<b>4</b>	<b>MEASUREMENT PROCEDURES .....</b>	<b>8</b>
4.1	Instrumentation .....	8
4.2	Measurement Method .....	8
<b>5</b>	<b>MEASUREMENT RESULTS.....</b>	<b>10</b>
<b>6</b>	<b>DISCUSSION OF RESULTS AND ASSESSMENT .....</b>	<b>15</b>
<b>7</b>	<b>SUMMARY .....</b>	<b>18</b>
<b>APPENDIX A</b>	<b>.....</b>	<b>19</b>
	Definitions of Terms .....	19
<b>APPENDIX B</b>	<b>.....</b>	<b>21</b>
	Comparison of Sound Pressure Levels.....	21
<b>APPENDIX C</b>	<b>.....</b>	<b>22</b>
	Weather Conditions During Noise Monitoring .....	22

## 1 INTRODUCTION

A noise compliance assessment was requested by Ecoteam Environmental Engineering Consultants for the composting facility at 704 Armidale Road Grafton operated by JR Richards & Sons. The request is in response for the composting facility to comply with condition R4.1 in the Environment Protection Licence (EPL 20137) issued to the composting facility by the New South Wales Environment Protection Authority.

Condition R4.1 is copied below:

### **R4 Other reporting conditions**

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the yearly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

1. an assessment of compliance with noise limits presented in Condition L4.1; and
2. an outline of any management actions taken within the monitoring period to address any exceedances of the limits contained in Condition L4.1.

This report assesses the measured noise levels of operations at the facility with the noise limits in Condition 4.1 of the EPL.

To assist with the interpretation of some of the terminology used in this report, Appendix A provides definitions of acoustic terms. Appendix B is a chart of everyday sound pressure levels.

## 2 DESCRIPTION OF SITE AND OPERATIONS

The composting facility at 704 Armidale Road Grafton is operated by JR Richards & Sons. The composting facility is part of the Grafton Regional Landfill site at 704 Armidale Road. Other operations conducted at the site include a recycling facility, general waste landfill, eWaste, scrap metal and concrete recycling, oil waste storage, household hazardous waste storage and vehicle weighbridge.

The topography is undulating and mainly cleared with natural and planted tree areas surrounding the central area of the site. The surrounding land use is rural with rural residential lots and small farms (mainly cattle). A cemetery is located approximately 550 metres to the east of the composting facility.

There are 3 residential dwellings within 800m of the composting facility and have been identified by the NSW EPA as receiver locations for noise monitoring for the composting facility.

## Location Map



Google Earth Image Date 24/09/2016

**Table 2.1 Closest Residential Receiver Locations**

Receiver	Address	Direction from Composting Facility	Distance from Shredder (m)	Distance from Compost Piles (m)
R1	694 Armidale Rd	NE	750	850
R2	765 Armidale Rd	East	550	550
R3	793 Armidale Rd	SE	700	650

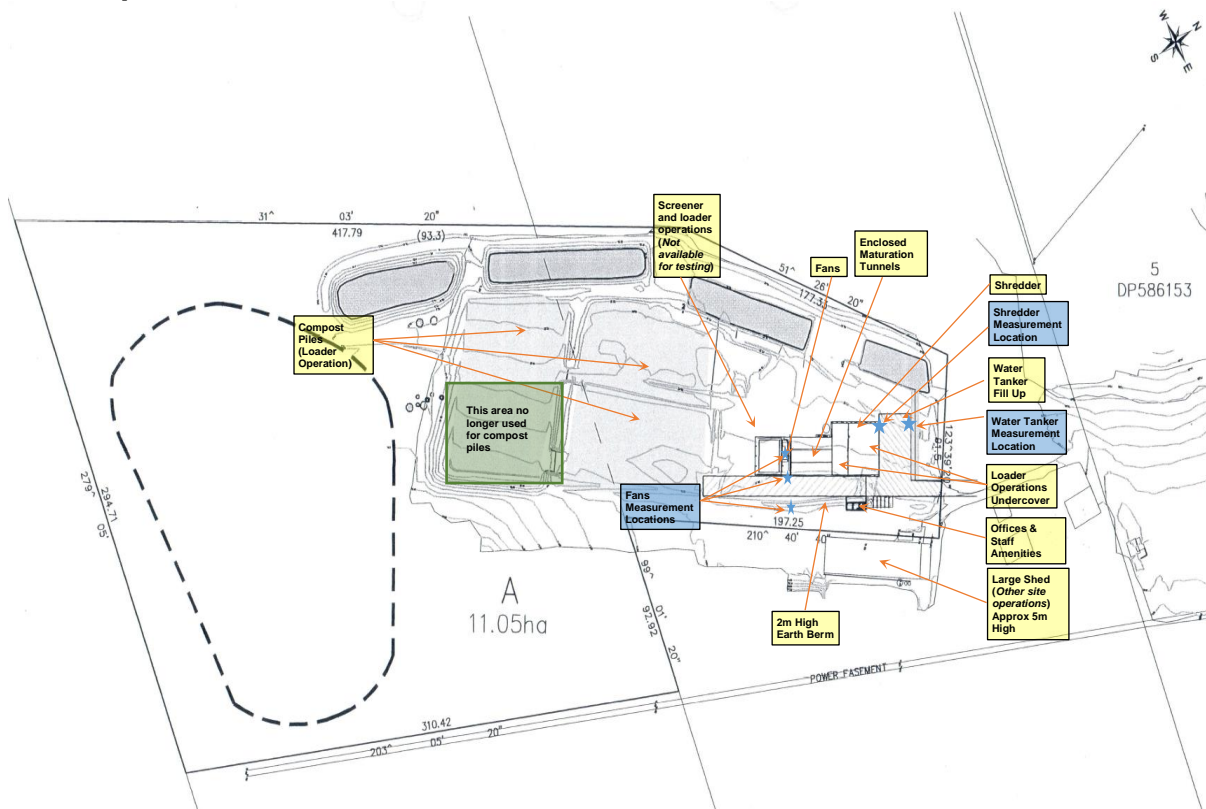
Processes and hours of operation are:

1. Shredding: 1 – 1 ½ hrs/day, generally occurs from 12pm – 3:30pm.
2. Turning and movement of compost in maturation pad: 1 – 3 hrs/day 7am - 10 am
3. Loading and unloading tunnels:
  - Loading tunnels - occurs while shredding.
  - Unloading – occurs once the tunnel finishes its process one tunnel per week during summer months and one tunnel per 2 weeks during winter months.
  - Unloading of tunnels done during 7 – 9 am.
4. Screening – occurs once in every 2-3 months depending on the requirement of the compost, occurs during 7- 9 am or after 11 am
5. Watering the roads for dust control – occurs during 7 - 9am or after 11am.
6. Sorting of green waste – 3 - 4 hrs/day after 11.30 am.
7. During the day, evening and night periods, the compost process and associated fans and blowers operates continuously.

All work involving machinery is conducted between the hours of 7am – 5pm Monday to Friday. Machinery operated at the composting facility includes:

Machine	Make/Model No	Unit No
Shredder	Jenz AZ 460 E	820
Front End Loader	Hyundai HL740-9 XTD	816
Pump Truck	INTERNATIONAL 1850D	763
Screener	Drum type screening machine T4	876

### Site Map





### 3 NOISE CRITERIA

The noise criteria and conditions for noise monitoring and noise compliance for the composting facility are specified in Conditions L4 and M8 of EPL 20137 issued by the NSW EPA. Conditions L4 and M8 are reproduced below. A variation to EPL 20137 was issued by the NSW EPA in the 17<sup>th</sup> of May 2017 and is copied below.

#### BACKGROUND

- A. J.R. & E.G. RICHARDS PTY LTD Trading as J.R. RICHARDS & SONS ("the licensee") is the holder of Environment Protection Licence No. 20137 ("the licence") issued under the *Protection of the Environment Operations Act 1997* ("the Act"). The licence authorises the carrying out of activities at 704 Armidale Road, GRAFTON, NSW, 2460 ("the premises").

#### VARIATION OF LICENCE NO. 20137

1. By this notice the EPA varies licence No. 20137. The attached licence document contains all variations that are made to the licence by this notice.
2. In summary the following variations have been made to the licence:
  - At condition L4.1 has been varied to state that noise emitted must be measured in accordance with section 11.1.2 of the NSW Industrial Noise Policy (NSW EPA, January 2000).
  - At condition M8.1, the requirement to complete evening and night noise monitoring has been removed.
  - At condition M8.2, the wording has been altered to include that the EPA may require licensee to conduct noise monitoring in accordance with the NSW Industrial Noise Policy if operations and/or management of the premises fans and biofilter change or noise complaints regarding operations at the premises are received

#### L4 Noise limits

- L4.1 Noise emitted from the premises must not exceed the noise emission criterion in the table below measured or computed in accordance with section 11.1.2 of NSW Industrial Noise Policy (NSW EPA, January 2000).
- L4.2 Noise emitted from the premises must not exceed the noise emission criterion in the table below measured or computed at 30m from the nearest residential dwellings from the north-east to south-east of the premises over a period of 15 minutes using "FAST" response on the sound level meter.

Time Period	Noise Emission Criterion	dB(A)
Day	LAeq (15 minute)	40
Evening	LAeq (15 minute)	35
Night	LAeq (15 minute)	35
Night	LA1 (1 minute)	45

- L4.3 For the purpose of condition L4.1:
- Day is defined as the period from 7:00am to 6:00pm Monday to Saturday and 8:00am to 6:00pm Sunday and Public Holidays.
  - Evening is defined as the period 6:00pm to 10:00pm.
  - Night is defined as the period from 10:00pm to 7:00am Monday to Saturday and 10:00pm to 8:00am Sunday and Public Holidays.
- L4.4 The noise limits set out in condition L4.1 apply under all meteorological conditions except for the following:
1. Wind speeds greater than 3 metres/second at 10 metres above ground level; or
  2. Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
  3. Stability category G temperature inversion conditions.
- L4.5 For the purposes of condition L4.3:
1. Data recorded by the meteorological station must be used to determine meteorological conditions; and
  2. Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.
- L4.6 To determine compliance with the noise limits in condition L4.1, the noise equipment must be located at:
1. the most affected point at a location where there is no dwelling at the location; or
  2. for LAeq(15 minute) noise limits:
    - approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
    - within 30 metres of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
    - within approximately 50 metres of the boundary of a National Park or a Nature Reserve; and or
  3. for LA1(1 minute) noise limits, the noise equipment must be located within 1 metre of a dwelling façade.
- L4.7 A non-compliance of condition L4.1 will still occur where noise generated from the premises is in excess of the appropriate limit is measured:
1. at a location other than an area prescribed by conditions L4.5; and/or
  2. at a point other than the most affected point at a location.
- L4.8 For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

## **M8 Noise monitoring**

- M8.1 To assess compliance with condition L4.1, noise monitoring must be undertaken in accordance with Conditions L4.5 and:
1. measured or computed at 30m from the nearest dwellings for north-east to south-east of the premises;
  2. occur annually in a reporting period;
  3. occur during each day as defined in the NSW Industrial Noise Policy for a minimum of 1.5 hours; and
  4. occur for three consecutive operating days.
- M8.2 Should operations and/or management of the premises fans and biofilter change or noise complaints regarding operations at the premises are received by the EPA or licensee, the EPA may require the licensee to conduct noise monitoring in accordance with the NSW Industrial Noise Policy. All noise complaints received by the licensee must be reported to the EPA immediately.

## 4 MEASUREMENT PROCEDURES

### 4.1 Instrumentation

**Table 4.1 Instrumentation for Noise Monitoring**

Instrument	Serial #	Calibration Date
SVAN 957	27526	February 2016
Brüel and Kjør Acoustical Calibrator model 4231	2263303	October 2016

The sound level meter (SLM) used during the noise survey conforms to Australian Standard 1259 "Acoustics - Sound Level Meters", (1990) as a type 1 precision sound level meter and has an accuracy suitable for both field and laboratory use.

The meter's calibrations were checked before and after the measurement periods with a Brüel and Kjør acoustical calibrator model 4231. No significant system drift occurred over the measurement periods.

The SLM and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates.

### 4.2 Measurement Method

Measurements were made in general accordance with procedures laid down in:

1. Australian Standard AS 1055.1-1997: '*Acoustics – Description and measurement of environmental noise - General procedures*'
2. The NSW Government Industrial Noise Policy (2000) EPA 00/1 (INP).

Operator attended measurements and unattended measurements were conducted at the composting facility and the 3 residential receiver locations for the period from 11am on the 25<sup>th</sup> to 1:30pm 27<sup>th</sup> of July 2017.

Attended measurements were conducted with the sound level meter mounted on a 1.4m high tripod. The sound level meter was set to record 1 second sampling periods with an "A" frequency weighting and Fast response.

The sound level meter was calibrated before and after each measurement period and showed no significant system drift. At the end of the monitoring periods, data was downloaded into Svan PC++ environmental noise software and Microsoft Excel software for analysis.

A portable weather monitor was used to observe weather conditions at the SLM during attended noise monitoring.

Attended noise monitoring was conducted at R1 at a vacant lot on the composting facility side of the residential dwelling. This location was chosen as it was on the composting side of the residential dwelling and avoided disturbing dogs at the residential dwelling.



Attended noise monitoring was conducted at receiver location R2 approximately 30m from the dwelling on the composting facility side. This location was slightly south of the dwelling and was chosen as there were fewer trees and was out of sight to dogs that were housed at the property that became agitated when people or vehicles were in sight on the property.

Attended noise monitoring was conducted at receiver location R3 approximately 20m from the dwelling on the composting side of the dwelling.

Where more than measurement was conducted for a particular operation or at a receiver location, the measurements are identified by a sequential number, e.g. M1 is measurement 1, M2 is measurement 2 and so forth.

## 5 MEASUREMENT RESULTS

Table 5.1 Receiver 1 2017 Measurements Summary												
Operation	Date	Start Time	Elapsed Time	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>	Temp	Hum.	Cloud Cover	Wind		Notes
		hh:mm:ss	hh:mm:ss	dBA	dBA	dBA	C	% RH		Dir	m/s	
Shredder + Loader M1	25 <sup>th</sup>	13:48:00	00:15:00	70.1	52.4	37.2	24	30	0/8		Calm	Traffic dominant, birds. Shredder and loader not audible.
Shredder + Loader M2	27 <sup>th</sup>	11:26:10	00:15:00	70.4	55.8	38.7	26	30	0/8		Calm	Traffic dominant, birds, land fill machinery reversing beeper audible occasionally. Shredder and loader not audible.
Shredder + Loader M3	27 <sup>th</sup>	11:41:10	00:15:00	71.7	31.7	38.4	26	28	0/8		Calm	Traffic dominant, birds, land fill machinery reversing beeper audible occasionally. Shredder and loader not audible.
Water Truck Filling	25 <sup>th</sup>	14:04:50	00:05:01	68.8	31.8	35.6	24	30	0/8		Calm	Traffic dominant, birds. Water truck filling not audible.

Table 5.2 Receiver 2 2017 Measurements Summary												
Operation	Date	Start Time	Elapsed Time	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>	Temp	Hum.	Cloud Cover	Wind		Notes
		hh:mm:ss	hh:mm:ss	dBA	dBA	dBA	C	% RH		Dir	m/s	
Loader working compost piles M1	25 <sup>th</sup>	14:18:36	00:15:00	69.0	52.3		25	30	0/8		Calm	Traffic dominant, birds. Loader not audible, Occasional reversing beeper from landfill machinery.
Loader working compost piles M2	26 <sup>th</sup>	10:57:40	00:15:00	67.6	53.2		23	43	0/8	NE	0.5 - 1.5	Traffic dominant, birds, distant overhead aircraft. Low frequency of loader audible when lull in traffic <37 dB(A).
Shredder + Loader M1	25 <sup>th</sup>	12:09:22	00:15:00	67.9	51.9		25	40	0/8	SE	0 - 0.5	Traffic dominant, birds. Shredder audible on peaks when no other noise sources 38 - 42 dB(A).
Shredder + Loader M2	26 <sup>th</sup>	10:15:36	00:15:00	74.4	54.0		23	41	0/8	NE	0.5 - 1.0	Traffic dominant, birds, distant overhead aircraft. Shredder just audible on peaks when no other noise sources 35-38 dB(A).
Shredder + Loader M3	26 <sup>th</sup>	10:31:06	00:15:00	68.2	53.7		23	43	0/8	N	0.5 - 1.5	Traffic dominant, birds. Shredder just audible on peaks when no other noise sources.
Shredder + Loader M4	27 <sup>th</sup>	12:02:24	00:15:00	65.6	51.5		25	30	0/8	NE	0.5 - 1.0	Traffic dominant, birds, barking dog. Shredder audible on peaks when no other noise sources 38-41 dB(A).
Shredder + Loader M5	27 <sup>th</sup>	12:17:24	00:15:00	64.3	51.0		25	30	0/8	E	0.5 - 1.0	Traffic dominant, birds. Shredder not audible during lulls in traffic.
Water Truck Filling	25 <sup>th</sup>	12:26:54	00:05:01	64.9	50.3		25	40	0/8	SE	0 - 0.5	Traffic dominant, birds. Water Truck filling not audible.

Table 5.3 Receiver 3 2017 Measurements Summary												
Operation	Date	Start Time	Elapsed Time	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>	Temp	Hum.	Cloud Cover	Wind		Notes
		hh:mm:ss	hh:mm:ss	dBA	dBA	dBA	C	% RH		Dir	m/s	
Loader working compost piles	26 <sup>th</sup>	11:18:42	00:15:00	73.8	53.1	39.7	24	32	0/8	N	1 - 2.5	Traffic dominant, birds, barking dog, distant barking dog, occasional reversing beeper from landfill machinery just audible, distant overhead aircraft. Low frequency of loader audible when no other noise sources <37dB(A).
Shredder + Loader M1	25 <sup>th</sup>	12:47:04	00:15:00	63.1	48.8	33.6	24	34	0/8	E	0.5 - 1.5	Traffic dominant, birds, occasional wind in trees, reversing beeper from landfill machinery just audible when no traffic.
Shredder + Loader M2	26 <sup>th</sup>	12:47:18	00:15:00	72.2	52.7	39.7	25	36	0/8	N	1.5 - 3	Traffic dominant, birds, barking dog, occasional reversing beeper from landfill machinery just audible, distant overhead aircraft, wind in trees. Occasional shredder noise just audible on extreme load.
Shredder + Loader M3	26 <sup>th</sup>	13:03:16	00:15:00	73.2	52.2	37.7	25	36	0/8	NNW	1.5 - 3	Traffic dominant, birds, barking dog, distant barking dog, occasional reversing beeper from landfill machinery just audible, distant overhead aircraft, wind in trees. Occasional shredder noise just audible on extreme load 38 - 42 dB(A) on peaks.
Shredder + Loader M4	27 <sup>th</sup>	12:38:04	00:15:00	73.1	51.0	32.1	24	30	0/8	E	0.5 - 1	Traffic dominant, birds. Shredder and loader just audible on peaks when no other noise sources.
Shredder + Loader M5	27 <sup>th</sup>	12:57:00	00:15:00	70.2	48.9	33.4	24	36	0/8	E	0.5 - 1	Traffic dominant, birds, distant overhead aircraft, recycling plant audible at times during lulls in traffic. Shredder just audible during lulls in traffic <35dB(A).
Water Truck Filling	25 <sup>th</sup>	12:38:42	00:05:02	65.5	48.4	33.1	24	30	34	SE	0.5 - 1	Traffic dominant, birds. Water truck filling not audible.

**Note** – Meteorological conditions were outside of the meteorological limits in Condition L4.3.

Table 5.4 Machinery Measurements 2017 Summary							
Operation	Date	Start Time	Filter	Elapsed Time	L <sub>max</sub>	L <sub>min</sub>	L <sub>eq</sub>
		hh:mm:ss		hh:mm:ss	dB	dB	dB
Loader working compost piles - 5-6m Rear of Loader	26 <sup>th</sup>	11:58:36	A	00:06:10	82.5	67.5	77.1
			C	00:06:10	97.8	86.1	92.7
Loader working compost piles - 20-25m Rear of Loader	26 <sup>th</sup>	12:05:34	A	00:08:34	70.2	50.8	63.6
			C	00:08:34	87.9	72.7	81
Loader spreading green waste near shredder 25 - 35m	27 <sup>th</sup>	10:57:38	A	00:11:18	74.3	54.9	66.2
			C	00:11:18	88.8	68.8	80.2
Shredder 8.5m, Loader 12 - 20m	25 <sup>th</sup>	11:34:42	A	00:05:02	91.4	71	77.3
			C	00:05:02	105.7	82.6	90.6
Water Truck Filling - 4m LHS	25 <sup>th</sup>	11:51:04	A	00:01:31	86.7	84.2	85
			C	00:01:31	92.3	90.4	91.4
Water Truck Filling - 4m RHS	25 <sup>th</sup>	11:53:16	A	00:01:31	82.2	80.1	81.1
			C	00:01:31	89.9	88	89

Table 5.5 Maturation Tunnel Fans and Bio filter - 25/07/2017					
	Start Time	L <sub>peak</sub>	L <sub>max</sub>	L <sub>min</sub>	L <sub>eq</sub>
	hh:mm:ss	dB(A)	dB(A)	dB(A)	dB(A)
Tunnel 2 - Normal Load 31%, Bio filter 19% - 3m from Bio filter	15:13:10	83.9	72.6	68.5	70.9
3 x Tunnels + Bio filter - Normal Load - 3m from Bio filter	15:15:10	100.8	80.3	68.9	71.9
3 x Tunnels + Bio filter - Extra Load - 3m from Bio filter M1	15:20:42	87.6	74.9	71.1	72.8
3 x Tunnels + Bio filter - Extra Load - 3m from Bio filter M2	15:22:42	86.6	74.1	71.1	72.8
3 x Tunnels + Bio filter - Extra Load - 10m from Tunnel 2 Fan	15:25:58	80.9	66.1	62.7	64.3
3 x Tunnels + Bio filter - Extra Load - 30m from Tunnel 2 Fan	15:28:30	76.5	58.3	49.5	51.4

Table 5.6 Maturation Tunnel Fans and Bio filter - 25/07/2017					
	Start Time	L <sub>peak</sub>	L <sub>max</sub>	L <sub>min</sub>	L <sub>eq</sub>
	hh:mm:ss	dB(C)	dB(C)	dB(C)	dB(C)
Tunnel 2 - Normal Load 31%, bio filter 19% - 3m from Bio filter	15:13:10	85.1	73.4	69.9	71.7
3 x Tunnels + bio filter - Normal Load - 3m from bio filter	15:15:10	98.1	81.4	69.9	72.5
3 x Tunnels + bio filter - Extra Load - 3m from bio filter M1	15:20:42	89.4	76.7	73.3	74.9
3 x Tunnels + bio filter - Extra Load - 3m from bio filter M2	15:22:42	89.1	76.2	73.4	74.8
3 x Tunnels + bio filter - Extra Load - 10m from Tunnel 2 Fan	15:25:58	85.6	74.4	68.5	70.7
3 x Tunnels + bio filter - Extra Load - 30m from Tunnel 2 Fan	15:28:30	76.8	65.2	59.1	61.8

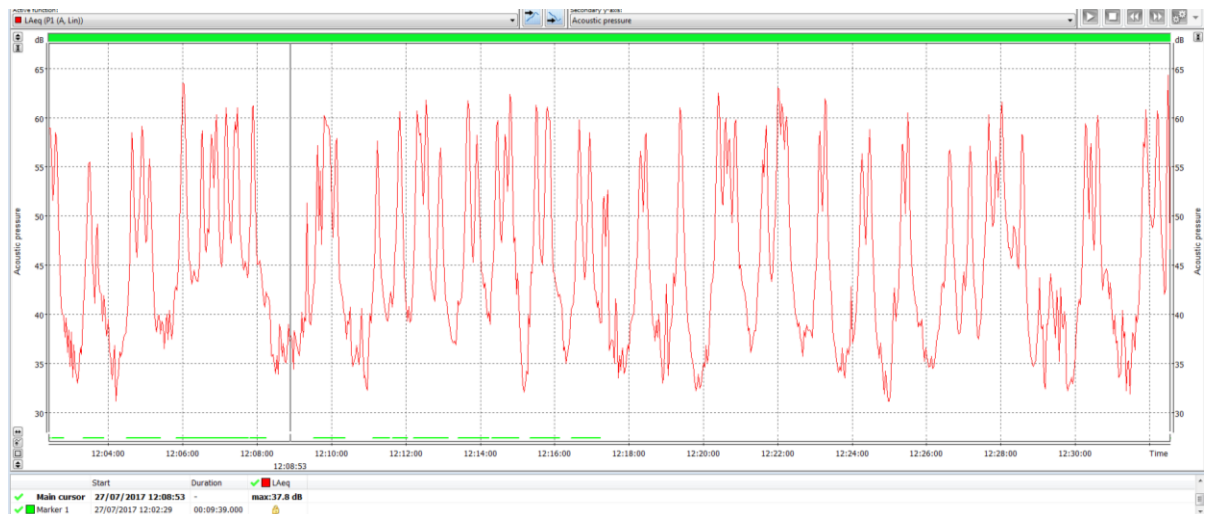
**Graph 5.1** Logged Noise Levels R1 Thursday 27/07/17 11:26am  
(30mins – 1 second samples)



Marker 1 at bottom of graph - Traffic Marker



**Graph 5.2 Logged Noise Levels R2 Thursday 27/07/17 12:02pm**  
*(30mins – 1 second samples)*



Marker 1 at bottom of graph - Traffic Marker  
 (Note only for first half of 30 minute measurement)

**Graph 5.3 Logged Noise Levels R3 Thursday 27/07/17 12:38pm**  
*(15mins – 1 second samples)*



Marker 1 at bottom of graph - Traffic Marker

## 6 DISCUSSION OF RESULTS AND ASSESSMENT

The time available each day to measure the shredder at the receiver locations was limited to the amount of material to be shredded each day. Generally there was approximately 1 – 1 ½ hours per day. Shredding is usually conducted between 12 noon and 3:30pm Monday to Friday. There is consistent traffic on Armidale Road for the day light hours with a peak period between 7:30am - 9:30am. Shredding for the noise monitoring was generally conducted outside of these times so that traffic noise was not as dominant and shredder noise could be observed during lulls in traffic flow.

There was no audible noise from the shredder, loader or water truck filling at Receiver 1.

At Receiver 2 and Receiver 3 the shredder was just audible during lulls in traffic with peaks of 38 – 42 dB(A) when no other noise sources present (traffic and birds).

Measurements of machinery and operations were conducted near the equipment under load conditions (Tables 5.4 – 5.6). The predicted noise level at receivers for spherical geometric spreading not taking into account topography, barriers, vegetation, air and ground absorption is given in Table 6.1 below.

Table 6.1 Calculated Receiver Noise Levels - Point Source Inverse Square Law								
Receiver		Fans 10m	Fans 30m	Water Truck Filling	Shredder	Loader (Sorting)	Loader (Compost) 6m	Loader (Compost) 25m
	Source SPL ( $L_{Aeq}$ )	64	51	85	77	66	77	64
	Source Distance (m)	10	30	4	8.5	30	6	25
R1	Receiver Distance (m)	750	750	750	750	750	850	850
	Receiver SPL ( $L_{Aeq}$ )	26	23	40	38	38	34	33
R2	Receiver Distance (m)	550	550	550	550	550	550	550
	Receiver SPL ( $L_{Aeq}$ )	29	26	42	41	41	38	37
R3	Receiver Distance (m)	700	700	700	700	700	650	650
	Receiver SPL ( $L_{Aeq}$ )	27	24	40	39	39	36	36

The maturation tunnel fans and bio filter fan were not audible or measureable at the receiver locations and are well below the evening and night time noise criteria of 35 dB(A)  $L_{eq,15min}$ .

The shredder is the one of the noisiest machines at the compost facility. The calculated noise level for spherical geometric spreading level at the receiver locations is 38 - 41 dB(A). The measured noise levels at the receiver locations are below this level and were not able to be accurately measured against the ambient environment.

The measured reduction at receiver locations compared with the calculated noise level is mainly attenuation due to trees, buildings and earth bunds. There is a large stand of planted trees approximately 150 metres wide between the shredder and the receivers. Receiver 2 is partly shielded by the offices and staff amenities approximately 35 metres to the east and a large shed approximately 5m high 60 metres to the east of the shredder. Receiver 3 is shielded by the rear wall of the shed that the shredder is in. There will also be some reduction due to atmospheric attenuation as the shredder has an increase in the frequency range between 800 and 2500Hz.

Dampening material has recently been added to the metal sides of the shredder and it appears that there has been an overall noise reduction since the 2015 measurements.

The low frequency of the loader turning the compost piles was audible at receiver locations 2 and 3 during lulls in traffic. The calculated noise level for spherical geometric spreading at the receiver locations 2 and 3 is 33 - 38 dB(A). There will be attenuation due to the large stand of trees and attenuation from the compost piles which are approximately 4m high when the loader is working behind the piles. The loader exhibited low frequency noise characteristics  $L_{Ceq}-L_{Aeq}$ , 16 to 17 decibels. This would increase the calculated noise level at the receiver locations by 5 decibels in accordance with Table 4.1 (Modifying Factor Corrections).

The loader was not audible at any of the receiver locations while sorting and loading the shredder. The calculated noise level for spherical geometric spreading at the receiver locations is 38 – 41 dB(A).

Measurement of the water truck filling at receiver locations was not audible. The calculated noise level for spherical geometric spreading at the receiver locations is 40 – 42 dB(A). Barriers such as the large sheds, and the large stand of trees will attenuate the noise level to receiver locations.

The water truck is used for dust suppression. During this operation the truck is driving at low speed and low revs and is not considered a noise impact at the receiver locations.

The screener is brought in on a needs by basis and is operated in the compost piles area near the filtration system at the end of the tunnels shed. The screener was not available for measuring. The measurements in 2015 indicated that the screener was not audible at the receiver locations.

The wind speed and Sigma Theta data (see *Appendix C*) from the meteorological station monitoring at the composting facility and a pocket weather meter near the receiver noise monitor were used to determine meteorological conditions during noise monitoring.

Condition L4.4 states:

L4.4 The noise limits set out in condition L4.1 apply under all meteorological conditions except for the following:

1. Wind speeds greater than 3 metres/second at 10 metres above ground level; or
2. Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
3. Stability category G temperature inversion conditions.

There were two 15 minute periods during the day time noise monitoring on the 26<sup>th</sup> where the wind speed at 10m was greater than 3m/s at the 10m height and 1 period where the stability class F and 2m/s and 26<sup>th</sup> were outside of the meteorological limits in Condition L4.3.

## 7 SUMMARY

A noise assessment was conducted to assess compliance of noise levels of the composting facility at 704 Armidale Road operated by JR Richards and Sons.

Acoustic field measurements were conducted on-site with calibrated noise monitoring equipment to determine noise source characteristics and assess the noise levels at 3 residential receiver locations with the noise limits as specified in the Environment Protection Licence (EPL 20137) issued to the composting facility by the New South Wales Environment Protection Authority.

Measurement data at the residential receivers was limited due to limited resource of material to be shredded and traffic noise on Armidale Road. Consistent traffic on Armidale Road was the dominant noise source during monitoring.

There was no audible industrial noise from the composting facility at Receiver R1.

The water truck filling was not audible at any of the 3 receiver locations.

The data available for R2 and R3 indicates that the noise level from the shredder is below 40 dB(A)  $L_{eq,15min}$  at these receiver locations. It was observed and measured that occasional peaks from thicker pieces of timber going through the shredder were 38 - 42 dB(A) at receivers 2 and 3. Generally the shredder noise levels were either not audible or not distinguishable from the background levels when there was no traffic or other noise sources present.

Low frequency noise from the loader turning compost piles when under load (pushing into pile for pick up) was audible at receivers 2 and 3 during lulls in traffic and observed to be below 37dB(A).

The screener is brought in on a needs by basis every 2-3 months. The screener was not available on this occasion for noise monitoring. Results from 2015 indicate that the screener is not audible at any of the 3 receiver locations.

The noise levels of the operations at the composting facility at 704 Armidale Road operated by JR Richards & Sons are compliant with the Environment Protection Licence (EPL 20137) issued to the composting facility by the New South Wales Environment Protection Authority.

Garry Hall



Acoustic Consultant  
Ambience Audio Services



## APPENDIX A Definitions of Terms

**Sound pressure level ( $L_p$ ):** A measurable quantity of the size or amplitude of the pressure fluctuations (sound waves) above and below normal atmospheric pressure compared to a reference pressure. Sound pressure levels are measured in decibels whereas sound pressure is measured in pascals ( $N/m^2$ ).

**Decibels (dB):** a ratio of energy flows. When used for sound measurement, it is the ratio between a measured quantity of sound pressure and an agreed reference sound pressure. The dB scale is logarithmic and uses the threshold of hearing of  $20 \mu Pa$  (micro pascals) as the reference pressure. This reference level is defined as 0 dB.

**Frequency (Hz):** The number of pressure variations per second (cycles per second) is called the **frequency** of sound and is measured in **Hertz (Hz)**. The rumble of distant thunder has a low frequency, while a whistle has a high frequency. The normal range of hearing for a healthy young person extends from approximately 20Hz up to 20 000 Hz (20 kHz) while the range from the lowest to highest note on a piano is approximately 27.5 Hz to 4.2 kHz.

**Spectral characteristics:** The frequency content of noise.

**“A” frequency weighting:** The method of frequency weighting the electrical signal within a noise-measuring instrument to give a very approximate simulate to the human perception of loudness. The symbols for the noise parameters often include the letter “A” (e.g.,  $L_{Aeq}$ , dBA) to indicate that frequency weighting has been included in the measurement.

**Fast, Slow and Impulse time weightings:** Standardised root-mean-square (rms) averaging times to help define fluctuating noise levels. Impulsive noises have high peak levels with a very short duration (e.g., gunshot), or a sequence of such peaks. The ‘Slow’ time weighting averages the fluctuations over a one second time base whilst the ‘Fast’ time weighting averages the fluctuations over a one-eighth of a second time base. Environmental assessment standards usually specify the time weighting (**F**, **S**, or **I**) to be used.

**$L_{Aeq}$ :** The A-weighted equivalent continuous noise level. A widely used noise descriptor which provides an average of the energy of a constant level of noise which is the same as the varying noise signal being measured. The time in minutes, which the measurement was sampled, is indicated with a subscripted number e.g.  $L_{Aeq, 15 \text{ minute}}$  is a 15-minute sample.

**$L_{AN}$ :** The A-weighted sound pressure level that is exceeded for N per cent of the time over which a given sound is measured. e.g.  $L_{A90}$  is the A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured.

$L_{A90}$  is commonly used to describe the **background noise level** for community noise assessments.

**Ambient noise:** The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.

**Extraneous noise:** Noise resulting from activities that are not typical of the area. A typical activities may include construction, and traffic generated by holiday periods and by events such as concerts or sporting events. Normal daily traffic is not to be considered extraneous.

**Background noise:** The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the **L<sub>A90</sub>** descriptor, fast time weighting.

**Intrusive Noise:** Refers to noise that intrudes above the background level by more than 5 decibels.

**Noise limits:** Enforceable noise levels that appear in consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.

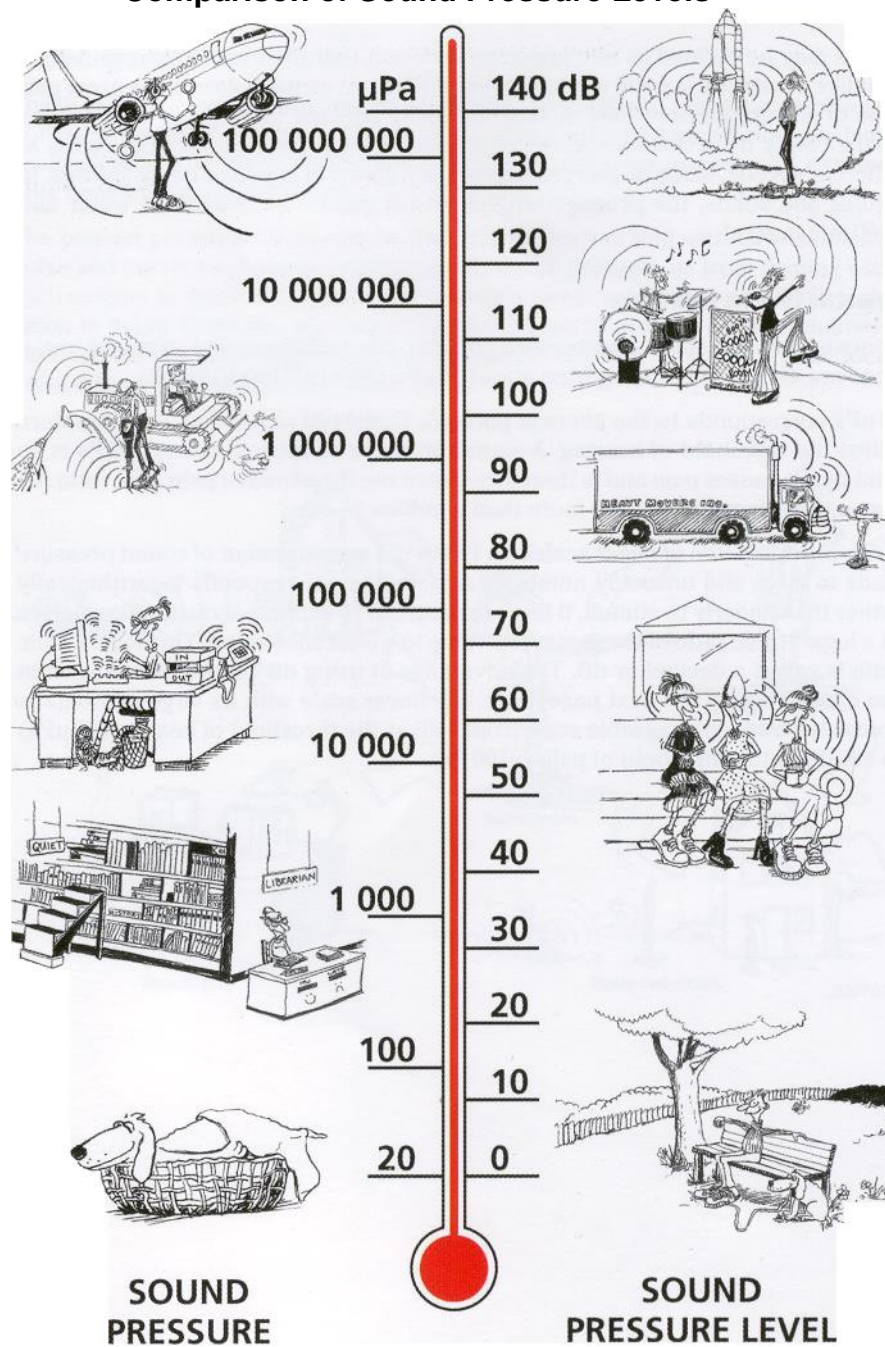
**References:**

*Measuring Sound* Brüel and Kjær Sound & Vibration Measurements A/S  
September 1984

*Environmental Noise* Brüel and Kjær Sound & Vibration Measurements A/S  
2000, 2001

*New South Wales Industrial Noise Policy* NSW Environment Protection  
Authority January 2000

## APPENDIX B Comparison of Sound Pressure Levels



Our hearing covers a wide range of sound pressures – a ratio of over a million to one. The dB scale makes the numbers manageable.

Reproduced from

*Environmental Noise* Brüel and Kjær Sound & Vibration Measurements A/S  
2000, 2001

**APPENDIX C**  
**Weather Conditions During Noise Monitoring**  
**Data from Permanent Weather Station at Composting Facility**

Time	Sigma Theta[Sigma ma]	Wind Direction[°]	Wind Speed[m/s]	Temperature[°C]
25/07/2017				
9:00:00 AM	3.4	255.0	1.2	10.9
9:15:00 AM	2.2	265.0	1.2	11.8
9:30:00 AM	5.1	237.0	1.7	12.6
9:45:00 AM	3.5	233.0	2.1	13.4
10:00:00 AM	6.1	246.0	1.7	14.0
10:15:00 AM	6.0	246.0	2.1	14.5
10:30:00 AM	4.2	235.0	2.0	15.4
10:45:00 AM	6.2	238.0	1.8	16.2
11:00:00 AM	4.6	264.0	1.8	16.7
11:15:00 AM	10.5	235.0	1.5	17.4
11:30:00 AM	29.3	208.0	1.3	18.0
11:45:00 AM	18.3	73.0	1.0	18.8
12:00:00 PM	46.6	183.0	0.6	19.6
12:15:00 PM	6.3	127.0	1.0	19.6
12:30:00 PM	12.1	91.0	1.3	19.7
12:45:00 PM	44.0	130.0	1.8	19.6
1:00:00 PM	36.2	79.0	2.0	19.6
1:15:00 PM	7.7	92.0	1.4	19.7
1:30:00 PM	7.9	55.0	2.2	19.7
1:45:00 PM	41.7	132.0	1.7	19.9
2:00:00 PM	35.7	133.0	1.0	20.5
2:15:00 PM	12.1	117.0	1.4	20.4
2:30:00 PM	70.0	112.0	1.7	20.3
2:45:00 PM	43.4	192.0	1.3	20.6
3:00:00 PM	52.3	191.0	1.4	20.5
3:15:00 PM	43.2	94.0	1.5	20.4
3:30:00 PM	7.2	51.0	1.6	20.2
3:45:00 PM	20.4	109.0	1.8	20.1
4:00:00 PM	33.5	105.0	1.5	20.0
4:15:00 PM	24.8	107.0	1.1	19.9
4:30:00 PM	13.0	52.0	0.8	19.9

Time	Sigma Theta[Sigma]	Wind Direction[°]	Wind Speed[m/s]	Temperature[°C]
26/07/2017				
9:00:00 AM	4.6	299.0	1.8	13.4
9:15:00 AM	4.1	286.0	1.8	14.2
9:30:00 AM	5.3	267.0	1.8	14.9
9:45:00 AM	3.7	274.0	1.9	16.3
10:00:00 AM	3.0	275.0	2.9	17.9
10:15:00 AM	4.3	299.0	2.0	19.1
10:30:00 AM	20.0	240.0	1.9	20.0
10:45:00 AM	22.7	241.0	2.0	19.9
11:00:00 AM	8.6	299.0	2.9	20.7
11:15:00 AM	4.1	313.0	3.5	20.5
11:30:00 AM	3.3	317.0	3.0	21.0
11:45:00 AM	3.9	308.0	3.7	21.3
12:00:00 PM	6.5	303.0	3.1	21.5
12:15:00 PM	4.6	298.0	3.2	21.6
12:30:00 PM	32.5	250.0	2.6	21.8
12:45:00 PM	15.4	310.0	3.2	22.2
1:00:00 PM	4.5	297.0	3.3	22.8
1:15:00 PM	5.7	287.0	3.8	23.0
1:30:00 PM	8.2	293.0	2.7	23.5
1:45:00 PM	8.8	292.0	2.4	24.0
2:00:00 PM	12.6	272.0	3.0	24.0
2:15:00 PM	50.4	287.0	2.6	24.2
2:30:00 PM	18.1	293.0	3.4	24.3
2:45:00 PM	16.6	269.0	3.6	24.6
3:00:00 PM	3.1	270.0	5.2	24.9
3:15:00 PM	1.9	269.0	4.0	25.0
3:30:00 PM	8.2	276.0	5.5	24.8
3:45:00 PM	2.3	267.0	4.5	24.6
4:00:00 PM	4.8	271.0	4.4	24.5
4:15:00 PM	4.9	278.0	3.7	24.3
4:30:00 PM	3.1	284.0	2.6	24.1



Time	Sigma Theta[Sigma]	Wind Direction[°]	Wind Speed[m/s]	Temperature[°C]
27/07/2017				
9:00:00 AM	2.2	220.0	1.2	12.8
9:15:00 AM	6.3	229.0	1.7	13.7
9:30:00 AM	4.1	229.0	1.7	14.4
9:45:00 AM	3.5	247.0	2.1	15.2
10:00:00 AM	5.7	258.0	2.1	15.9
10:15:00 AM	3.4	265.0	1.5	16.3
10:30:00 AM	12.3	220.0	1.7	17.0
10:45:00 AM	9.0	148.0	1.9	17.4
11:00:00 AM	8.3	156.0	2.0	17.6
11:15:00 AM	9.3	141.0	2.0	18.1
11:30:00 AM	8.3	144.0	1.8	18.1
11:45:00 AM	6.7	179.0	1.8	18.3
12:00:00 PM	8.9	201.0	1.8	18.6
12:15:00 PM	29.7	96.0	1.4	19.3
12:30:00 PM	13.3	109.0	1.8	18.9
12:45:00 PM	44.9	165.0	1.4	19.5
1:00:00 PM	12.6	56.0	2.3	19.1
1:15:00 PM	42.8	203.0	1.6	19.5
1:30:00 PM	40.9	197.0	1.0	20.0
1:45:00 PM	54.6	90.0	1.7	19.9
2:00:00 PM	12.6	58.0	2.0	19.7
2:15:00 PM	13.4	78.0	1.3	19.9
2:30:00 PM	16.4	64.0	1.5	20.1
2:45:00 PM	15.9	275.0	1.9	20.0
3:00:00 PM	35.6	177.0	1.3	20.4
3:15:00 PM	48.2	133.0	2.2	19.9
3:30:00 PM	12.8	80.0	2.4	19.6
3:45:00 PM	7.7	58.0	2.9	19.1
4:00:00 PM	6.6	84.0	2.6	19.0
4:15:00 PM	2.8	84.0	2.2	18.8
4:30:00 PM	2.0	79.0	2.2	18.5