

Ambience Audio Services

_____Acoustic Measurement and Analysis

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

Prepared for

**Ecoteam Pty Ltd
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Lismore NSW 2480**

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21/09/2014

Table of Contents

1	INTRODUCTION	3
2	DESCRIPTION OF SITE AND OPERATIONS	3
3	NOISE CRITERIA.....	6
4	MEASUREMENT PROCEDURES	7
4.1	Instrumentation	7
4.2	Measurement Method	8
5	MEASUREMENT RESULTS	10
6	DISCUSSION OF RESULTS AND ASSESSMENT	18
7	SUMMARY	21
APPENDIX A	22
	Definitions of Terms	22
APPENDIX B	24
	Comparison of Sound Pressure Levels.....	24
APPENDIX C	25
	Weather Conditions During Noise Monitoring	25

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. 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 Pty Ltd. 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.

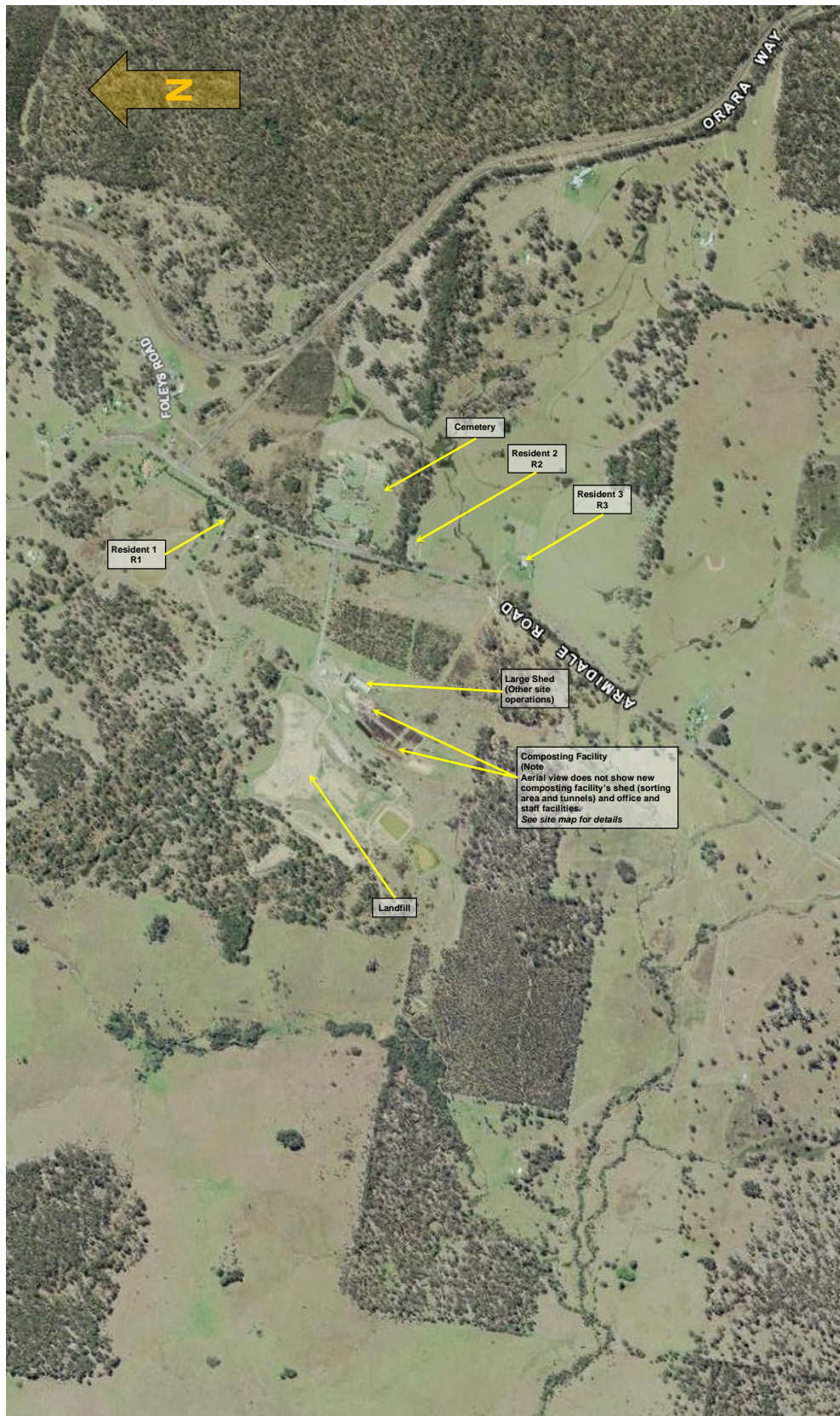
The topography is undulating and mainly cleared with natural and planted tree areas surrounding the central area of the site. The surrounding land use is rural with rural residential lots and small farms (mainly cattle). A cemetery is located approximately 550 metres to the east of the composting facility.

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.

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

Location Map



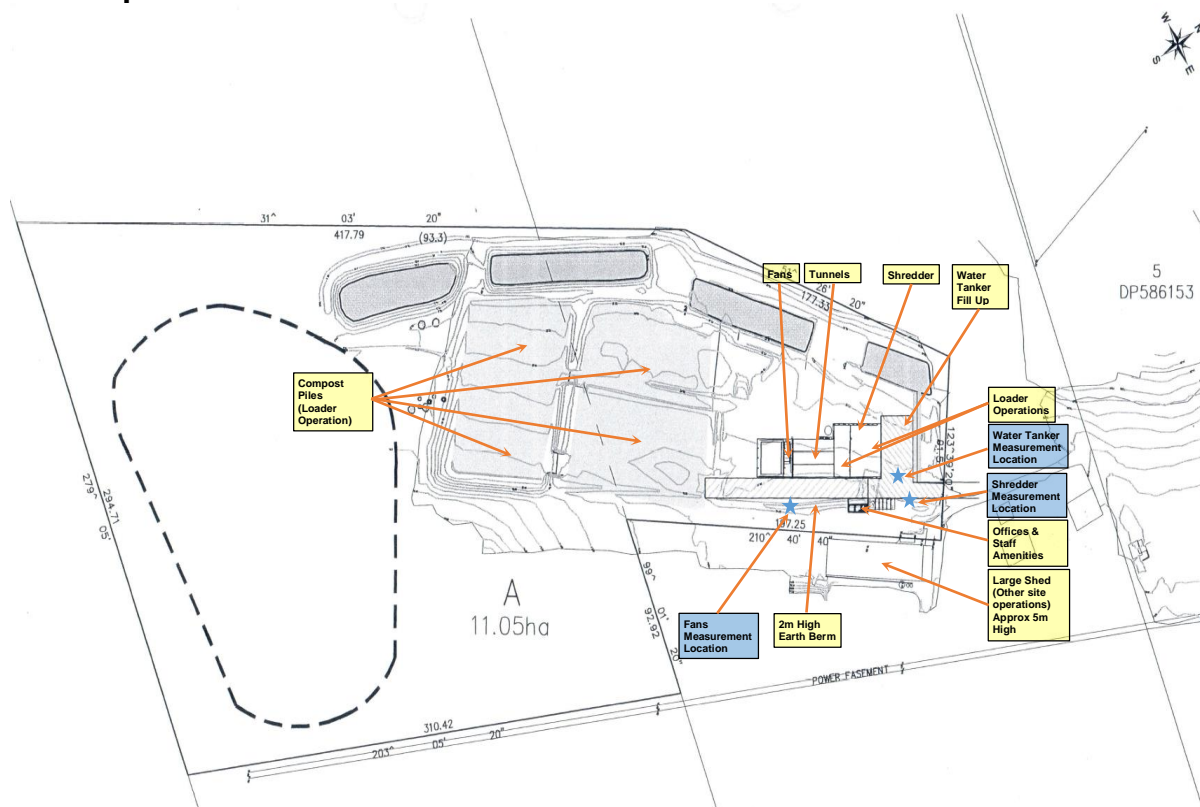
Processes and hours of operation are:

1. Shredding: 2 – 3 hrs/day, occur from 9 am and Friday afternoon.
2. Movement of compost in maturation pad: 1 – 3 hrs/day mostly after 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 depend 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 and 7am – 12pm Saturdays. 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	(not available for testing)	

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.

L4 Noise limits

- L4.1 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

- L4.2 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.

- L4.3 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.

- L4.4 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.

- L4.5 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.

- L4.6 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.
- L4.7 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 Other monitoring and recording conditions

- 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 from north-east to south-east of the premises;
 2. occur annually in a reporting period;
 3. occur during each day, evening and night period as defined in the NSW Industrial Noise Policy for a minimum of 1.5 hours during the day, 30 minutes during the evening and 1 hour during the night; and
 4. occur for three consecutive operating days.

4 MEASUREMENT PROCEDURES

4.1 Instrumentation

Table 4.1 Instrumentation for Noise Monitoring

Instrument	Serial #	Calibration Date
Brüel and Kjær 2250L Sound Level Meter	2602785	December 2013
Brüel and Kjær 2250L Sound Level Meter	3006868	June 2014
Brüel and Kjær 2250 Sound Level Meter	2449940	April 2014
Brüel and Kjær Acoustical Calibrator model 4231	2263303	December 2013

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

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

The SLM's and calibrator have been checked, adjusted and aligned to conform to the Brüel and Kjær 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 6pm 18th August to 11:30am 21st August 2014.

Attended measurements were conducted with the sound level meter mounted on a 1.2m high tripod. Embedded sound recordings and markers were used to identify acoustic events during the recording to assist in later analysis of the data. The sound level meters were set to record 1 second sampling periods with an 'A' frequency weighting and Fast response.

Unattended noise measurements were conducted with a Bruel & Kjaer outdoor microphone kit fitted to the microphone and placed on a 1.5m high tripod. A remote cable was connected to the microphone and the sound level meter was operated approximately 10m from the microphone. The sound level meters were set to record 15 minute sampling periods with an 'A' frequency weighting and Fast response.

The sound level meters were calibrated before and after each measurement period and showed no significant system drift. At the end of the monitoring periods, data was downloaded into Bruel & Kjaer 7815 Noise Explorer environmental noise software and Microsoft Excel software for analysis.

Meteorological data from the permanent wether station at the composting facility was used to determine weather conditions during unattended noise monitoring. A Kestrel 4500 pocket weather tracker was used to record weather conditions at the SLM during attended noise monitoring.

Monitoring at R1 was conducted with attended monitoring as this location was closer to Armidale Road and the noise logger did not have sound recording. Markers were used to identify acoustic events (mainly vehicles) during the recording to assist in later analysis of the data. The monitoring was conducted approximately 30m from the residential dwelling in the direction of the composting facility.

A noise logger with sound recording was located at each of the receiver locations R2 and R3 to continuously monitor noise levels over a 3 day period.

The unattended noise logger at R2 was initially located on the eastern boundary of the property (approx 25 – 30m from dwelling) as there was welding, hammering and grinding activity in the nearby shed. The noise logger was relocated to a location 25m from the residential dwelling on the composting facility side (western) of the residential dwelling the next morning as the resident indicated that there would be no more activity from the shed during the monitoring period.

It was observed that the composting facility operations were barely audible and indistinguishable from the background noise (mainly vehicles on Armidale Road) at receiver location R3. The noise logger was relocated at 2pm on the second day to the composting facility to measure noise levels of the shredder during day time operation and the fans during night time operation. During several visits to R3 while the composting facility was operating the composting operations were not audible due to traffic on Armidale Road and upwind conditions of the composting facility.

5 MEASUREMENT RESULTS

Table 5.1 Measured Noise Levels at R1 - Evening and Night Attended (15min)									
Date	Start time	L _{AFmax}	L _{Aeq}	L _{AF10}	L _{AF90}	Wind		Cloud Cover	Notes
		dB(A)	dB(A)	dB(A)	dB(A)	Dir	Speed (near SLM) m/s		
18-Aug	09:21:09 PM	69.9	49.0	48.2	37.3	NW	1.5 - 2.5	0/8	Intermittent road traffic, wind in trees, no audible industrial noise
	09:36:31 PM	66.6	47.4	45.2	31.2	NW	1 - 2	0/8	Intermittent road traffic, wind in trees, distant over head aircraft, no audible industrial noise
	10:12:51 PM	63.0	46.2	45.4	36.7	NW	1 - 2.5	0/8	Intermittent road traffic, wind in trees, distant over head aircraft, no audible industrial noise
	10:27:51 PM	65.1	44.9	44.5	36.5			0/8	Intermittent road traffic, wind in trees, no audible industrial noise
	10:42:51 PM	64.9	42.4	41.3	34.7			0/8	Intermittent road traffic, wind in trees, no audible industrial noise
	10:57:51 PM	67.2	45.4	43.2	33.0			0/8	Intermittent road traffic, wind in trees, no audible industrial noise
19-Aug	09:25:44 PM	67.9	47.3	47.8	26.4		< 0.5	0/8	Intermittent road traffic, distant over head aircraft, no audible industrial noise
	09:40:44 PM	68.1	47.9	49.4	24.6				Intermittent road traffic, distant over head aircraft, train, no audible industrial noise
	10:15:44 PM	65.5	44.3	43.1	25.7		< 0.5	0/8	Intermittent road traffic, distant over head aircraft, no audible industrial noise
	10:30:44 PM	63.9	46.6	47.7	25.0				Intermittent road traffic, no audible industrial noise
	10:45:44 PM	63.8	46.5	48.2	24.4				Intermittent road traffic, no audible industrial noise
	11:00:44 PM	62.1	40.1	38.7	24.2				Intermittent road traffic, no audible industrial noise
20-Aug	09:13:53 PM	70.9	46.6	44.5	27.0		< 0.5	8/8	Intermittent road traffic, distant over head aircraft, horse feeding nearby, no audible industrial noise
	09:28:53 PM	66.6	47.2	46.7	26.7				
	09:43:53 PM	64.5	43.7	40.7	26.6				
	10:13:05 PM	64.2	44.8	42.3	22.6		< 0.5	8/8	Intermittent road traffic, train, no audible industrial noise
	10:28:05 PM	72.6	48.9	44.3	22.8				Intermittent road traffic, no audible industrial noise
	10:43:05 PM	59.6	36.9	33.0	22.8				Intermittent road traffic, no audible industrial noise
	10:58:05 PM	66.0	43.7	39.6	22.8				Intermittent road traffic, no audible industrial noise

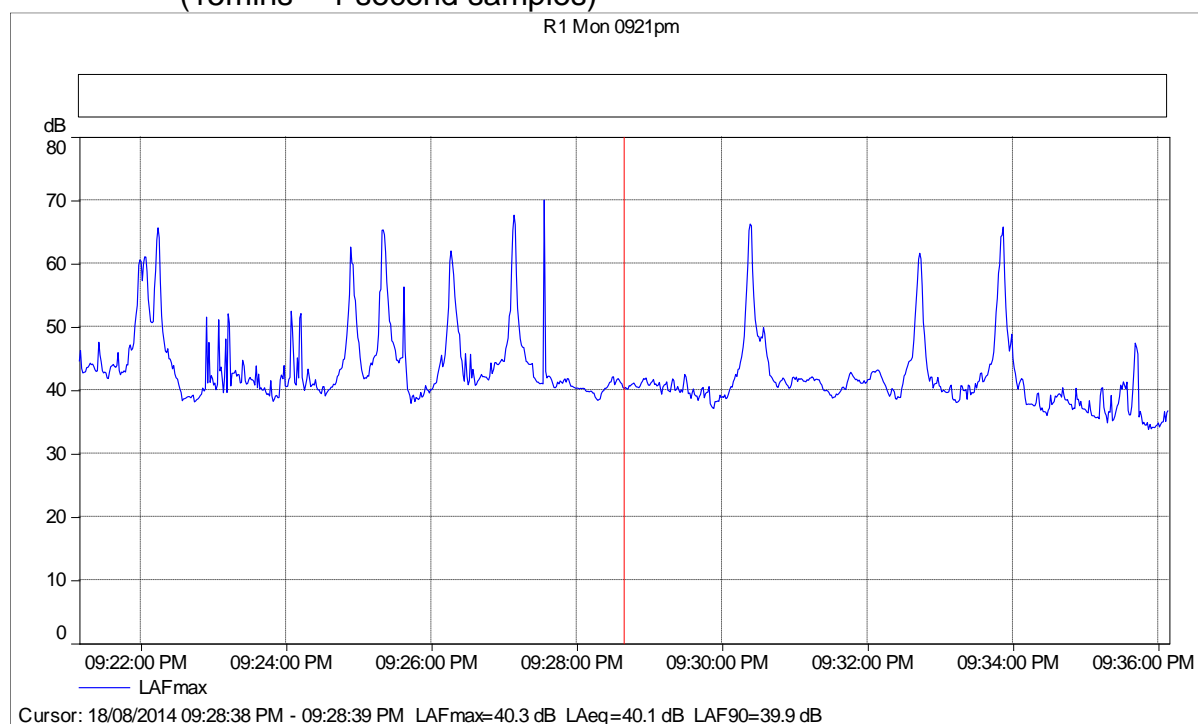
Table 5.2 Water Truck Filling at 30m 19/08/14					
Start Time	Duration (mins:secs)	L _{eq} (dBA)	L _{Almax} (dBA)	L _{AFmax} (dBA)	L _{Ceq} -L _{Aeq} (dB)
9:51am	8:39	73.9	77.8	76.9	5.6

Table 5.3 Shredder Measurements at 45m							
Date	Start Time	Duration (mins)	L _{eq} (dBA)	Range (dBA)	L _{Almax} (dBA)	L _{AFmax} (dBA)	L _{Ceq} -L _{Aeq} (dB)
20-Aug	9:39am	15	70.4	65 - 90	91.1	90.2	13.2
	10:04am	30	70.0	65 - 90	91.7	89.7	11.9
21-Aug	7:20am	20	77.4	65 - 90	90.5	88.6	14.9
	10:46am	30	75.3	65 - 87	86.7	83.6	11.5

Table 5.4 Loader Outside Tunnels at 20m 19/08/14					
Start Time	Duration (mins:secs)	L _{eq} (dBA)	L _{Almax} (dBA)	L _{AFmax} (dBA)	L _{Ceq} -L _{Aeq} (dB)
11:17am	3:00	69.9	81.7	83.3	15.7

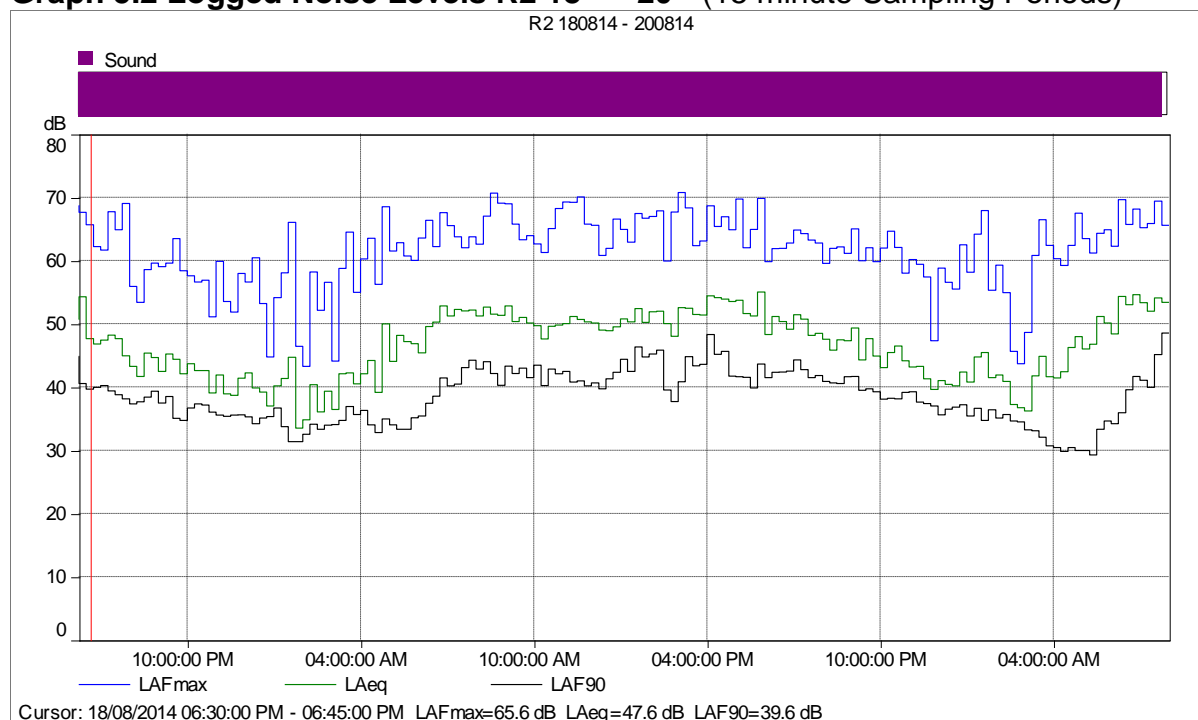
Table 5.5 Loader Working Compost Piles at 20m 19/08/14					
Start Time	Duration (mins:secs)	L _{eq} (dBA)	L _{Almax} (dBA)	L _{AFmax} (dBA)	L _{Ceq} -L _{Aeq} (dB)
11:51am	4:47	68.1	77.5	78.3	16.8
11:56am	2:00	66.4	74.5	75.4	17.9
12:04pm	1:00	69.3	77.5	78.6	16.1
12:06pm	2:00	67.0	75.4	76.5	17.2

Graph 5.1 Logged Noise Levels R1 Monday 9:21pm
(15mins – 1 second samples)



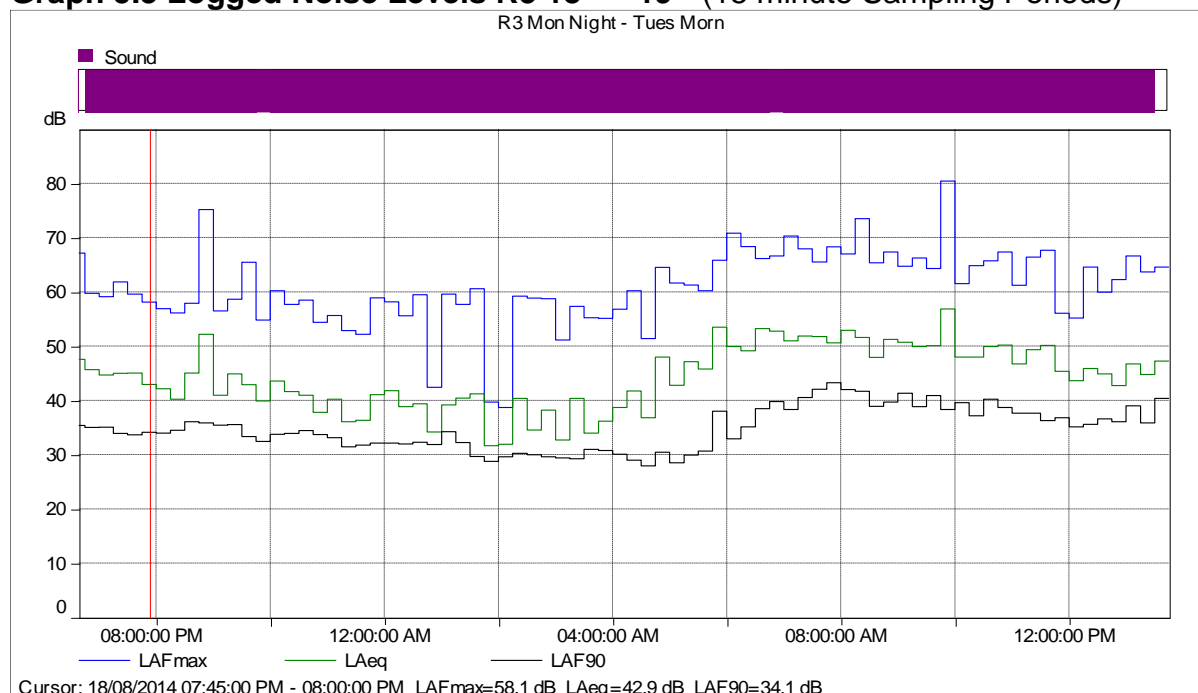
Notes: Intermittent road traffic, wind in trees, no audible industrial noise
Peaks are road traffic.

Graph 5.2 Logged Noise Levels R2 18th – 20th (15 minute Sampling Periods)



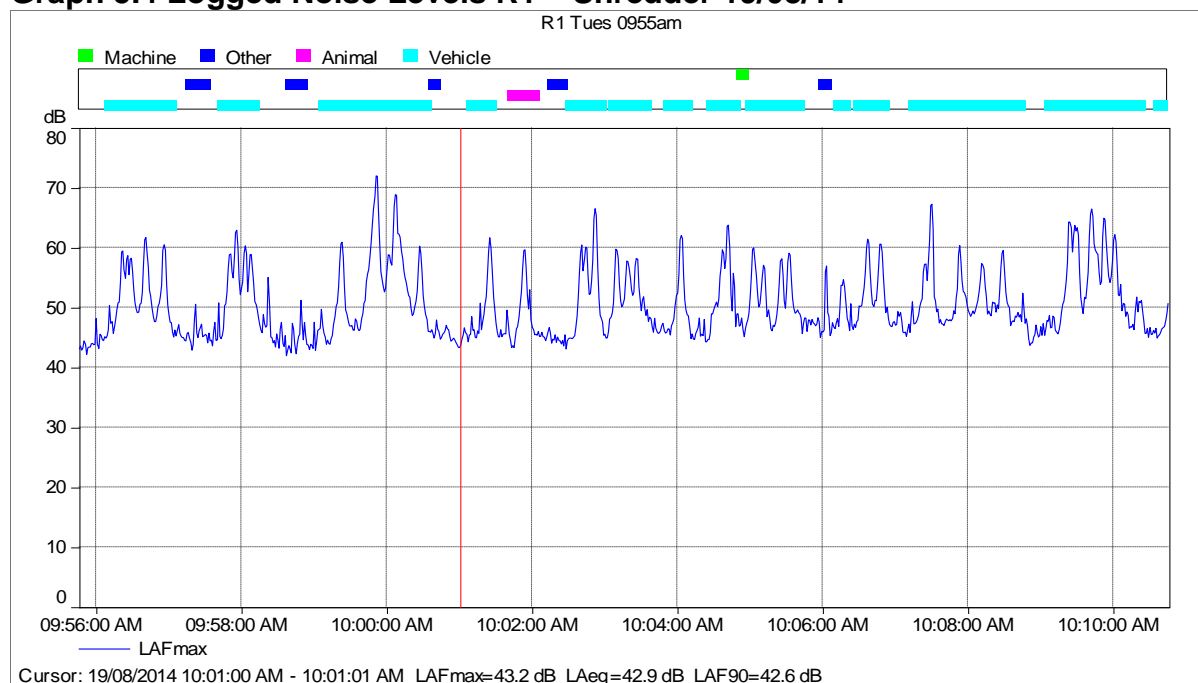
Notes: Road traffic dominant noise source 6:30am – 10pm. Bird activity early morning and afternoon. Loader not audible at this location. Shredder audible when no traffic. Shredder generally 35 – 38, occasional peaks 45 – 50 dB(A).

Graph 5.3 Logged Noise Levels R3 18th – 19th (15 minute Sampling Periods)



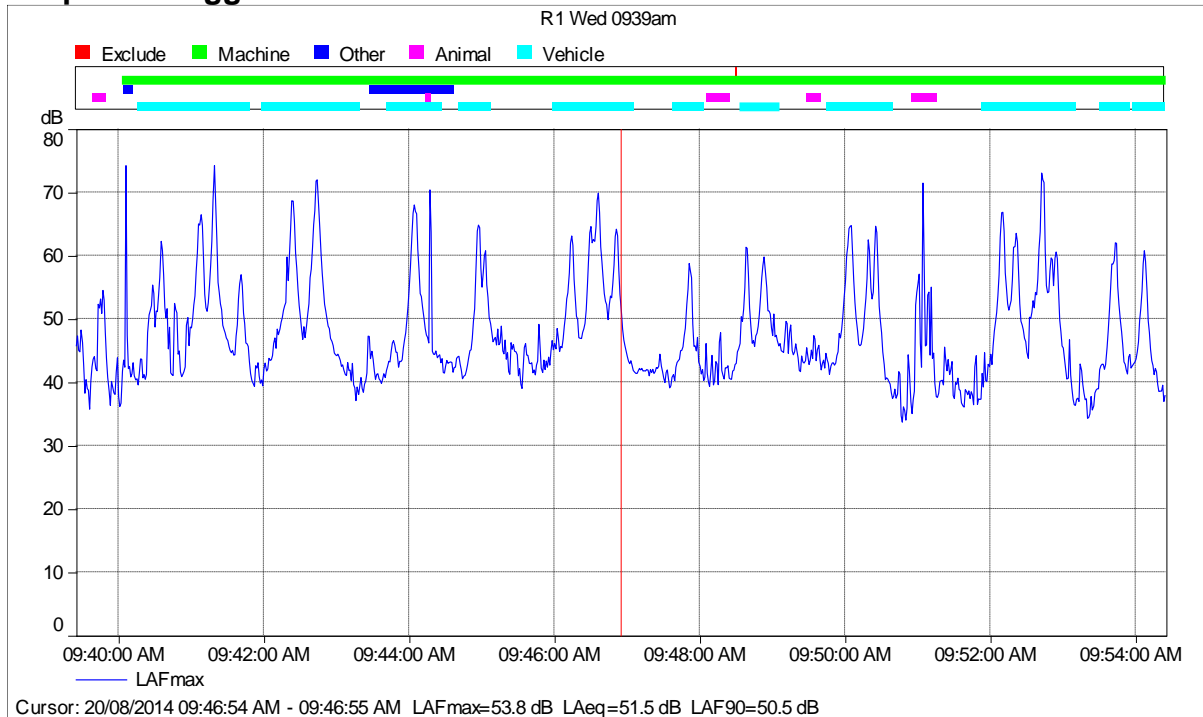
Notes: Road traffic dominant noise source 6:30am – 10pm. Bird activity early morning. Loader and shredder not audible at this location due to traffic and wind. Logger relocated Tues 1.30pm to composting facility to measure fans and shredder operations.

Graph 5.4 Logged Noise Levels R1 – Shredder 19/08/14



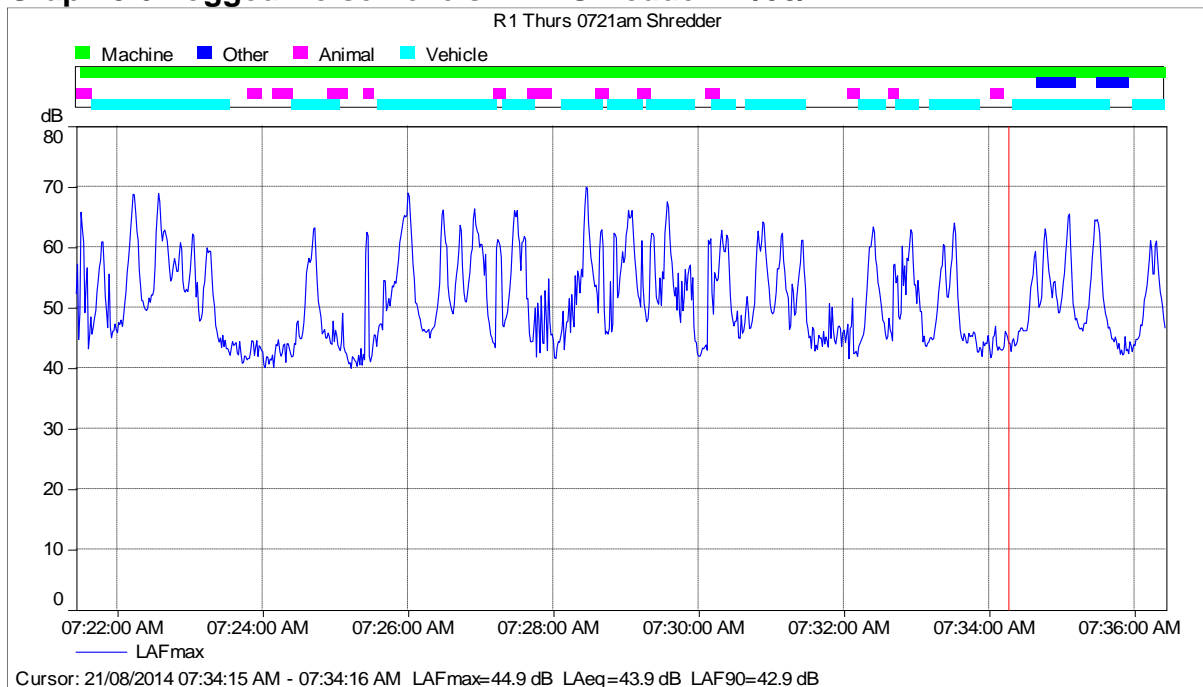
Notes: Road traffic dominant noise source. Wind in trees. Loader not audible. Shredder just audible when no traffic. Occasional peaks 46 – 48 dB(A). Wind: Near SLM - SW-W 1-3 m/s, Meteorological Data – SW-W 3.5-4 m/s. Downwind condition. Wind speed exceeds criteria.

Graph 5.5 Logged Noise Levels R1 – Shredder 20/08/14



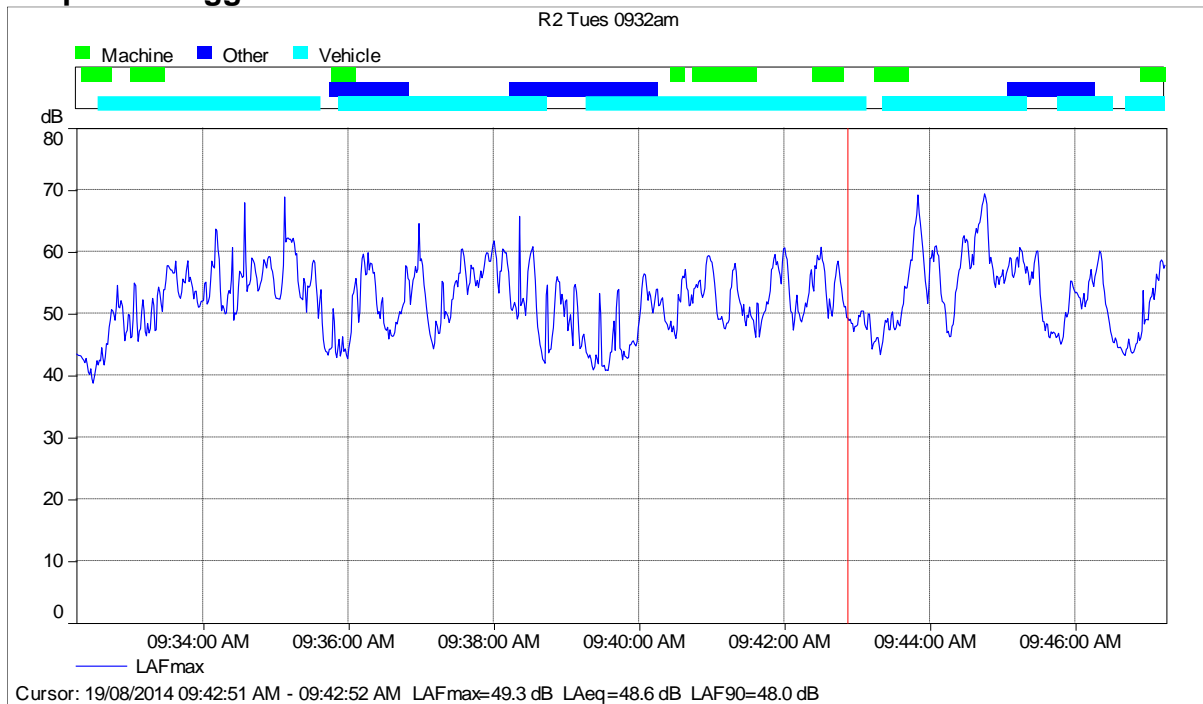
Notes: Road traffic dominant noise source. Loader not audible. Shredder just audible when no traffic – not measureable with background. Occasional peaks 45 - 50 dB(A). Wind: - Near SLM <0.5m/s, Meteorological Data - S 1.5-2.5 m/s.

Graph 5.6 Logged Noise Levels R1 – Shredder 21/08/14



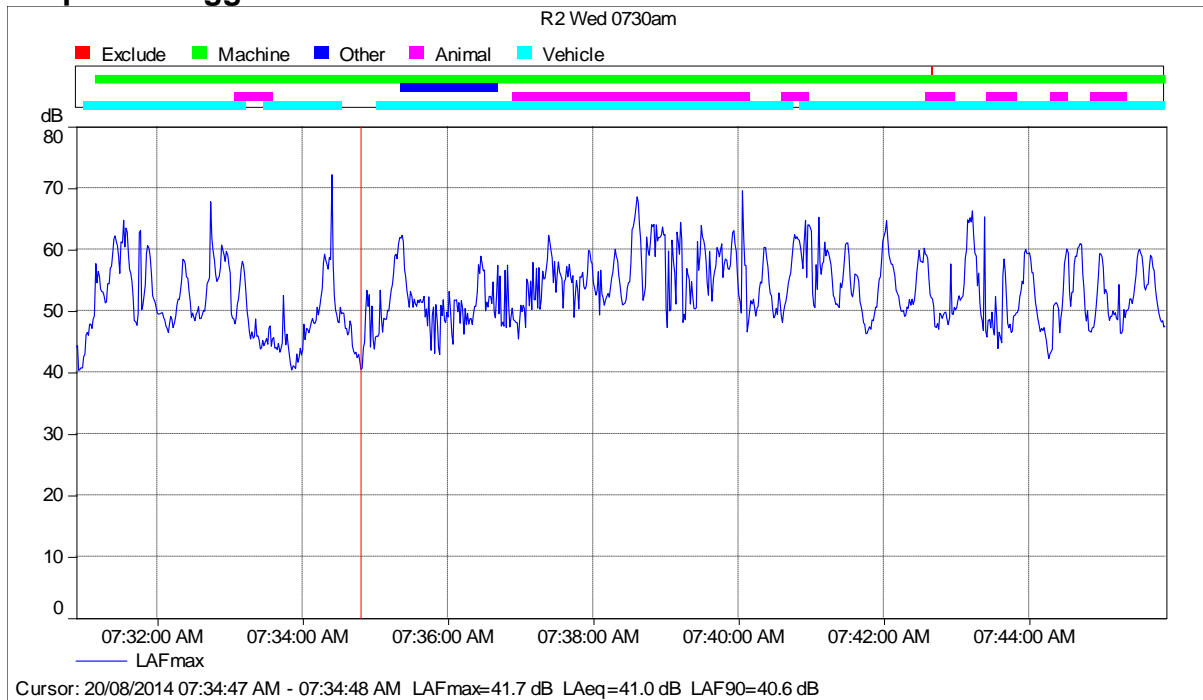
Notes: Road traffic dominant noise source. Loader not audible. Shredder just audible when no traffic - not measureable with background. Occasional peaks 45 – 50 dB(A). Wind: - Near SLM - S 1.5-2.5 m/s, Meteorological Data – SSW 1.5-2 m/s.

Graph 5.7 Logged Noise Levels R2 – Shredder 19/08/14



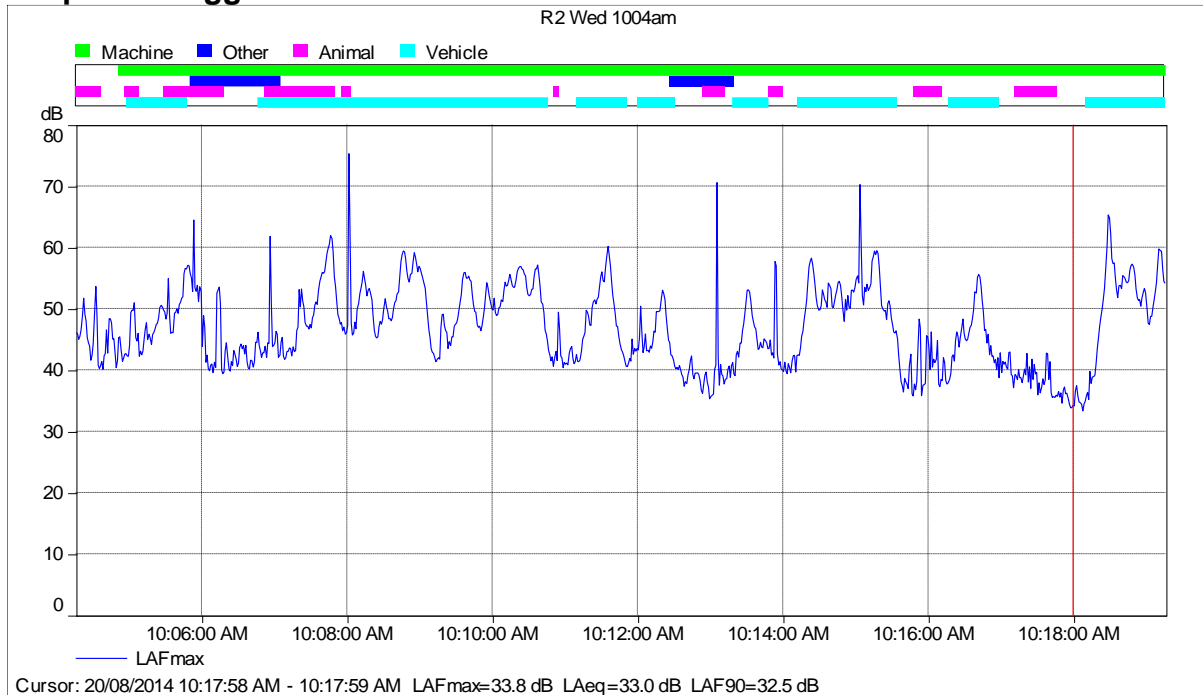
Notes: Road traffic dominant noise source. Loader not audible. Shredder just audible when no traffic - not measureable with background. Occasional peaks 45 – 50 dB(A). Wind: - Near SLM - S SSW 1.5-2, Meteorological Data – SW 3.5-4 m/s. Wind speed exceeds criteria.

Graph 5.8 Logged Noise Levels R2 – Shredder 20/08/14



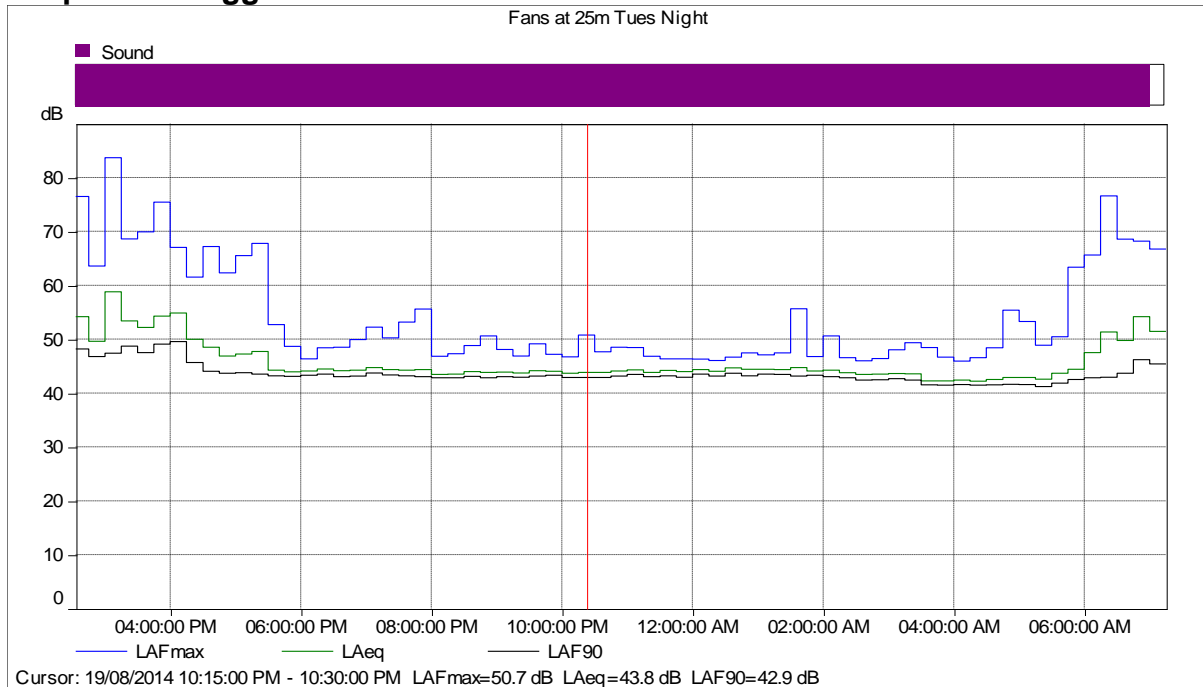
Notes: Road traffic dominant noise source. Loader not audible. Shredder just audible when no traffic - not measureable with background. Occasional peaks < 45 dB(A). Wind: - Near SLM - S 0.5 m/s, Meteorological Data – S-SW 0.5-1 m/s.

Graph 5.9 Logged Noise Levels R2 – Shredder 20/08/14



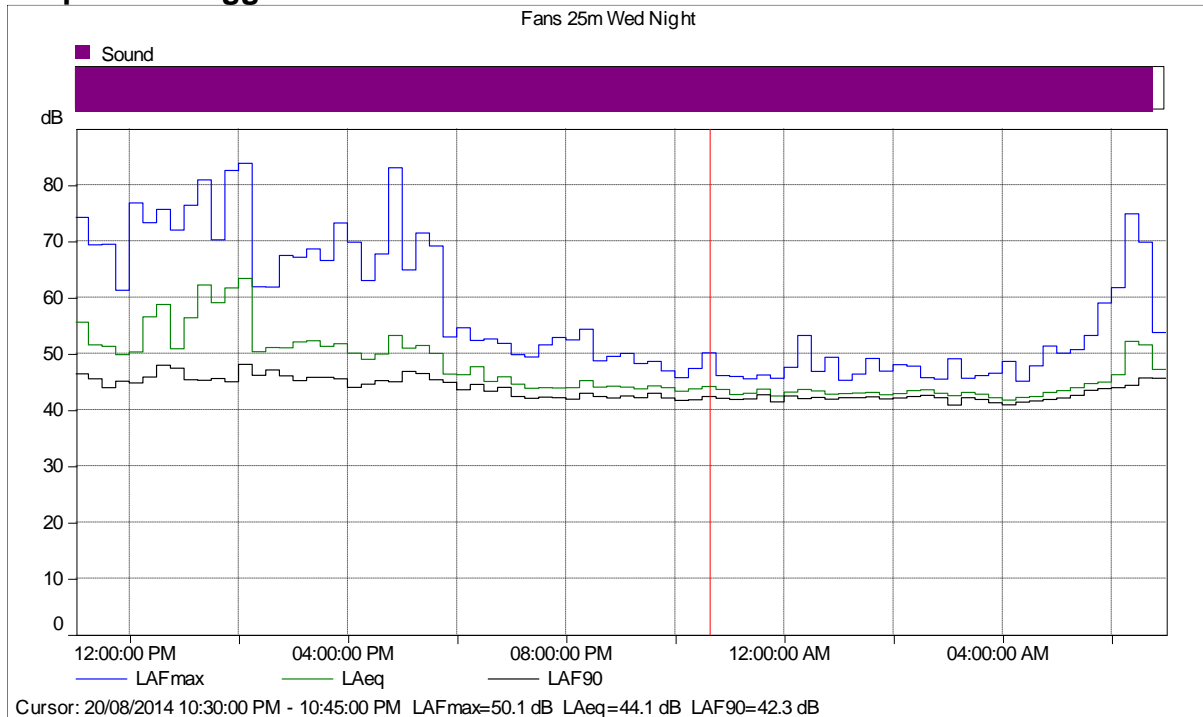
Notes: Road traffic dominant noise source. Loader not audible. Shredder just audible when no traffic - not measureable with background. When no traffic - shredder estimated to be <35 dB(A). Occasional peaks < 45 dB(A). Wind: - Near SLM - S 0.5- 1 m/s, Meteorological Data – S 1-2 m/s.

Graph 5.10 Logged Noise Levels 25m from Fans 19/08/14



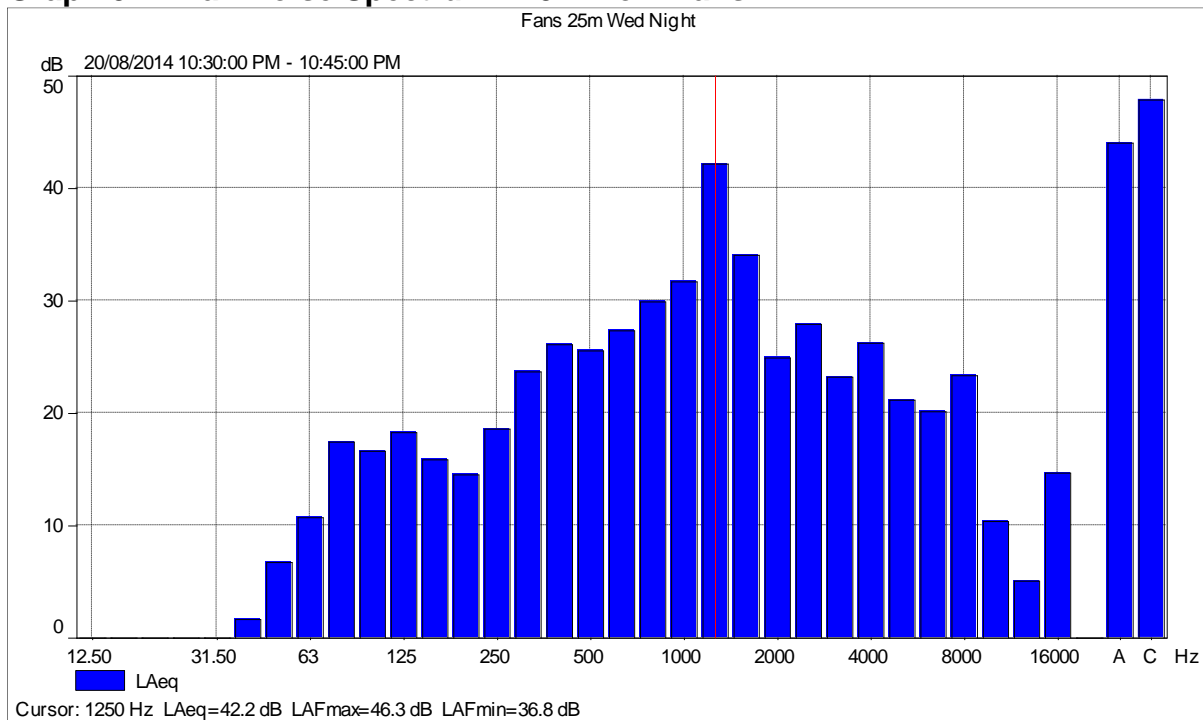
Notes: Fan noise level consistent – approx. 44dB(A) at 25m. Tonality observed at 1250Hz see *fan spectrum graph*.

Graph 5.11 Logged Noise Levels 25m from Fans 20/08/14



Notes: Fan noise level consistent – approx. 44dB(A) at 25m. Tonality observed at 1250Hz see *fan spectrum graph*.

Graph 5.12 Fan Noise Spectrum - 25m from Fans



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 hour per day. Shredding is usually conducted between 9am – 10am/10:30am each day. 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.

No audible industrial noise was observed during the attended evening and night time measurements at R1. On the nights of the 19th and 20th, a listening test was conducted at the driveways to R2 and R3. No industrial noise was audible so no attended measurements were conducted at these locations.

The results of the noise logger located 25m from the fans on the nights of the 19th and 20th, indicate that noise levels are consistently 44 dB(A) $L_{eq,15min}$. The calculated point source noise levels (no allowance for attenuation due to topography or barriers – buildings, trees) of the fans at the receiver locations is less than 18 dB(A). See *Table 6.1*. The fans exhibited a tonality noise characteristic when assessed in accordance with Table 4.1 (Modifying Factor Corrections) of the NSW Industrial Noise Policy. The 1250Hz 1/3 octave frequency band was 8 – 10 decibels higher than the adjacent bands. This would increase the calculated noise level by 5 decibels to 19 – 22 dB(A) at the receiver locations which is well below the evening and night time noise criteria of 35 dB(A) $L_{eq,15min}$. There would also be attenuation from the large stand of trees between the fans and the receivers.

Based on the listening observations and calculations, no attended noise monitoring was conducted at receiver locations R2 and R3 for the evening and night time periods. Monitoring was conducted at R1 for observation purposes.

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

Table 6.1 Calculated Receiver Noise Levels - Point Source Inverse Square Law						
Receiver		Fans	Water Truck Filling	Shredder	Loader (Tunnel)	Loader (Compost)
	Source SPL	44	74	77	70	69
	Source Distance	25	30	45	20	20
R1	Receiver Distance	750	750	750	750	850
	Receiver SPL	14	46	53	39	36
R2	Receiver Distance	550	550	550	550	550
	Receiver SPL	17	49	55	41	40
R3	Receiver Distance	700	700	700	700	650
	Receiver SPL	15	47	53	39	39

The shredder is the noisiest machine at the compost facility. The calculated noise level for spherical geometric spreading level at the receiver locations is 53 – 55 dB(A). The measured noise levels at the receiver locations are well below this level and were not able to be accurately measured against the ambient environment.

It was estimated from observations during traffic lulls that the average noise level of the shredder is approximately 35 – 38 dB(A) at R1 and approximately 35 dB(A) at R2 under neutral meteorological conditions.

It was observed at locations R1 and R2 that there were occasional peaks of 45 – 50 dB(A). Discussions with the plant operator indicated that the occasional increased noise levels were due to larger pieces of timber being shredded.

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.

The loader was not audible at receiver locations 1 and 2 while turning the compost piles (R3 was not monitored during this process). The calculated noise level for spherical geometric spreading at the receiver locations is 36 – 40 dB(A). The loader exhibited low frequency noise characteristic. This would increase the calculated noise level at the receiver locations by 5 decibels in accordance with Table 4.1 (Modifying Factor Corrections). There will be attenuation due to the large stand of trees and attenuation from the compost piles which are approximately 4m high.

The loader was not audible at any of the receiver locations while loading the shredder. The calculated noise level for spherical geometric spreading at the receiver locations is 39 – 41 dB(A) – similar to the loader working outside tunnels. The loader exhibited low frequency noise characteristic. This would increase the calculated noise level at the receiver locations by 5 decibels in accordance with Table 4.1 (Modifying Factor Corrections). 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 attenuation at all receiver locations due to the large stand of trees.

Measurement of the water truck filling at receiver locations was not conducted. The water truck filling (pump noise) is approximately 6 – 7 decibels lower than the shredder which was just audible at receiver locations 1 and 2 when there was no traffic. 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.

A screener is used every 2 – 3 months. The screener is brought in on a needs by basis and is operated in the compost piles area. The screener was not available for noise monitoring. According to the composting facility Supervisor, the screener is not loud as it is only processing “soft material” as opposed to hard materials such as rocks in quarry applications. It is recommended that the screener be operated behind existing compost piles (approx. 4m high) to reduce any noise impact to the receiver locations.

Condition L4.3 states:

L4.3 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.

The wind speed and Sigma Theta data from the meteorological station at the composting facility were used to determine meteorological conditions during noise monitoring (see *Appendix D*). Generally there was excessive wind for the evening and night of the 18th and the day time period for the 19th. The Sigma Theta criteria for temperature inversion was not met during the monitoring period.

Downwind conditions of less than 3m/s may increase noise levels at the receiver locations by approximately up to 5 decibels. This would increase the estimated level at Receiver 1 to 40 – 43 dB(A) and Receiver 2 to 40 dB(A) $L_{eq,15min}$. Section 11.1.3 of the NSW INP states: “A development will deemed to be in non-compliance with a noise consent or licence condition if the monitored noise level is more than 2dB above the statutory noise limit specified in the consent or licence condition”.

Based on the measurements and observations, the noise level was not exceeded at the residential receivers during noise monitoring but may exceed the 2dB non-compliance threshold at Receiver 1 under downwind conditions by 1 decibel.

It is recommended if possible that noise monitoring be conducted in mid-May when wind conditions tend to be calmer and a greater tendency for dry conditions.

It is recommended that during compliance noise monitoring that the shredding be conducted later in the day when there are more traffic lulls and some material stockpiled to enable extended monitoring periods at the receiver locations. Analysis of the data for the unattended noise loggers at R2 and R3 indicated that between 11am and 2pm there are more lulls in the traffic flow on Armidale Road.

It is also recommended that the screener be available for noise monitoring during the compliance monitoring period.

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 Pty Ltd.

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, wind conditions and traffic noise on Armidale Road.

Consistent traffic on Armidale Road was the dominant noise source during monitoring.

The loader was not audible at the receiver locations.

The shredder was audible at receiver locations R1 and R2 when there was no road traffic. The shredder noise levels were not distinguishable from the background levels. It is estimated that the noise level at R1 is 35 – 38 dB(A) $L_{eq,15min}$, 35 dB(A) $L_{eq,15min}$ at R2 and less than 35 dB(A) $L_{eq,15min}$ at R3 under neutral meteorological conditions.

It is estimated that the water truck filling is less than 30 dB(A) $L_{eq,15min}$ at receivers R2 and R3 and less than 33 $L_{eq,15min}$ at R1.

The fans were not audible at the receiver locations during the evening and night time periods.

The screener was not available for noise monitoring and it is recommended that the screener be available for noise monitoring.

Based on the measurements and observations, the noise level was not exceeded at the residential receivers during noise monitoring but may exceed the 2dB non-compliance threshold at Receiver 1 under downwind conditions by 1 decibel.

It is recommended that noise monitoring be conducted in mid-May when wind conditions are calmer and a greater tendency for drier conditions.

It is also recommended that noise monitoring during the evening and night time periods is not required unless there is a change in the operation of the fans.

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., gun shot), 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_{A90}** 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:

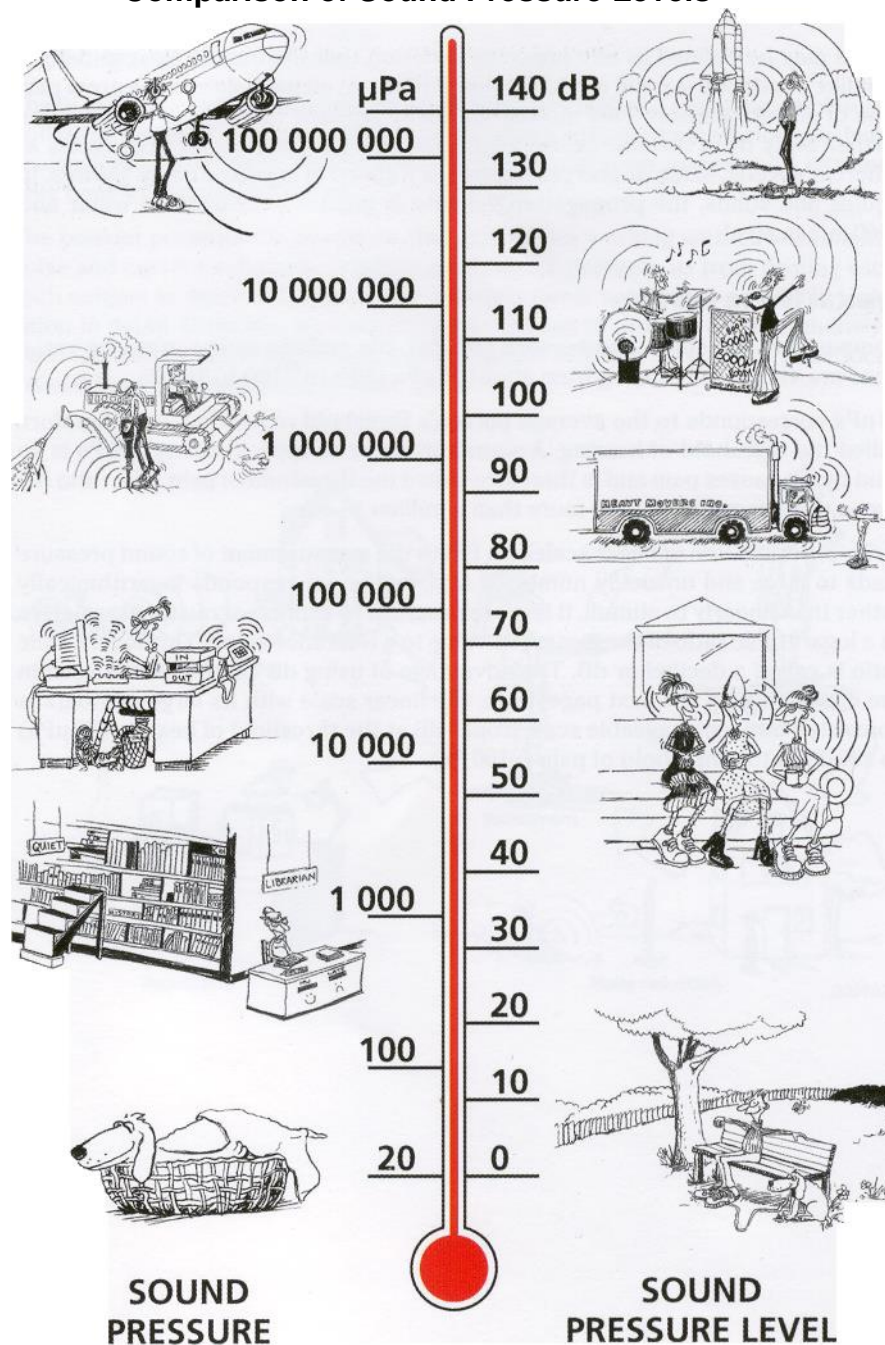
Measuring Sound Brüel and Kjær Sound & Vibration Measurements A/S
September 1984

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

Timestamp	Humidity [%RH]	Temperature [°C]	Wind Direction [°]	Wind Speed [m/s]	Sigma Theta [Sigma]
18/08/2014 18:00	48.1	16.8	289	3	15.06
18/08/2014 18:15	49.4	16.6	263	2.2	11.84
18/08/2014 18:30	49.9	16.5	276	3.7	14.08
18/08/2014 18:45	50.6	16.4	269	3.5	16.16
18/08/2014 19:00	48.9	16.7	243	5.5	14.85
18/08/2014 19:15	49.7	16.5	252	4	12.8
18/08/2014 19:30	50.8	16.2	233	3.3	13.86
18/08/2014 19:45	51.4	16	263	3.1	16.01
18/08/2014 20:00	51.2	16	269	3.7	14.18
18/08/2014 20:15	52.9	15.7	296	4.1	16.51
18/08/2014 20:30	52.9	15.7	274	3	15.23
18/08/2014 20:45	52.3	15.9	253	5	14.44
18/08/2014 21:00	52.9	15.8	286	5.8	12.05
18/08/2014 21:15	53	15.8	276	4.1	12.48
18/08/2014 21:30	53.3	15.7	277	3.1	13.46
18/08/2014 21:45	52.7	15.9	280	2.4	19.35
18/08/2014 22:00	54.1	15.5	265	2.8	18.5
18/08/2014 22:15	53.3	15.8	288	3.5	16.35
18/08/2014 22:30	53.1	15.9	271	6.5	15.28
18/08/2014 22:45	51.4	16.3	259	6.1	14.52
18/08/2014 23:00	52.3	16.1	255	2.1	17.32
18/08/2014 23:15	52.7	16.1	274	3.7	15.21
18/08/2014 23:30	53.2	16	259	3.1	17.54
18/08/2014 23:45	53.4	15.9	225	2.4	20.54
19/08/2014 0:00	54	15.8	266	1.9	15.85
19/08/2014 0:15	53.6	15.9	256	2.6	13.07
19/08/2014 0:30	53.2	16	278	2.8	14.23
19/08/2014 0:45	53.9	15.8	278	2.7	11.86
19/08/2014 1:00	54.1	15.8	299	3	11.78
19/08/2014 1:15	52	16.3	276	4.1	10.82
19/08/2014 1:30	52.4	16.1	302	2	15.13
19/08/2014 1:45	52.4	16.1	242	1.3	19.25
19/08/2014 2:00	53.9	15.7	269	2.9	15.83
19/08/2014 2:15	53.6	15.8	251	2.8	16.09
19/08/2014 2:30	54.6	15.5	268	3	13.35
19/08/2014 2:45	54.4	15.5	253	3.2	11.37
19/08/2014 3:00	54	15.5	243	3.4	13.41
19/08/2014 3:15	51.6	15.9	245	4.1	11.59
19/08/2014 3:30	50.9	16.1	250	6.4	10.51
19/08/2014 3:45	49.6	16.3	254	5.1	10.78
19/08/2014 4:00	49.9	16.1	241	5.5	10.92
19/08/2014 4:15	49.8	16.1	260	3.7	13.64
19/08/2014 4:30	48.8	16.1	244	2.9	14.88
19/08/2014 4:45	49.6	16	228	3.7	12.45
19/08/2014 5:00	48.8	16	246	4.6	12.12
19/08/2014 5:15	49.6	15.8	228	3.3	12.02
19/08/2014 5:30	49.5	15.8	230	3.2	12.7
19/08/2014 5:45	48.6	15.9	240	3.7	15.67

Timestamp	Humidity [%RH]	Temperature [°C]	Wind Direction [°]	Wind Speed [m/s]	Sigma Theta [Sigma]
19/08/2014 6:00	49.6	15.6	245	2.5	10.69
19/08/2014 6:15	48.9	15.7	268	4	13.42
19/08/2014 6:30	49.8	15.6	243	4.5	11.88
19/08/2014 6:45	49.1	15.7	234	2.2	12.99
19/08/2014 7:00	48.3	15.9	262	2.1	14.57
19/08/2014 7:15	48.2	16.1	252	4	11.13
19/08/2014 7:30	48.1	16.2	260	3.2	17.2
19/08/2014 7:45	47.9	16.4	243	5.2	13.11
19/08/2014 8:00	47.1	16.9	252	4.6	13.8
19/08/2014 8:15	46.5	17.3	247	2.5	16.79
19/08/2014 8:30	45.5	17.6	219	3	15.09
19/08/2014 8:45	44.1	17.8	257	6.5	14.18
19/08/2014 9:00	42.6	18	261	4.8	14.79
19/08/2014 9:15	42.6	18.3	229	6.8	14.67
19/08/2014 9:30	42.2	18.8	235	4.1	15.58
19/08/2014 9:45	40.9	19.2	231	3.5	14.4
19/08/2014 10:00	39.7	19.5	273	3.6	17.59
19/08/2014 10:15	40.5	19.5	234	4.2	18.1
19/08/2014 10:30	38.6	19.8	245	7.3	15.05
19/08/2014 10:45	39.6	20.3	253	4.3	15.76
19/08/2014 11:00	37.8	20.5	239	3.8	17.14
19/08/2014 11:15	38.3	20.7	227	3.6	19.8
19/08/2014 11:30	36.5	21.4	240	5.3	27.84
19/08/2014 11:45	36.4	21.7	233	4.1	23.2
19/08/2014 12:00	34.4	22	231	7.8	25.26
19/08/2014 12:15	36.9	21.1	205	2.8	14.97
19/08/2014 12:30	36.6	21.2	210	2.7	21.71
19/08/2014 12:45	35.9	21.6	158	4.4	26.31
19/08/2014 13:00	37.1	21.3	208	2.2	16.03
19/08/2014 13:15	37.2	21	192	2	23.34
19/08/2014 13:30	37.6	21	208	2.3	20.77
19/08/2014 13:45	38	20.7	169	4.5	21.28
19/08/2014 14:00	39	20.7	99	2.3	14.92
19/08/2014 14:15	39.4	20.2	157	8.4	19.87
19/08/2014 14:30	42.7	19.8	205	4.1	17.46
19/08/2014 14:45	49.7	19.4	154	2.5	21.38
19/08/2014 15:00	47.1	19.8	165	2.3	24.48
19/08/2014 15:15	53.7	18.4	212	6.1	24.18
19/08/2014 15:30	66.2	16.4	228	3.3	9.09
19/08/2014 15:45	68.3	16.1	199	4.1	19.59
19/08/2014 16:00	73.7	15.5	241	1.9	11.51
19/08/2014 16:15	75.9	15.3	246	1.1	14.19
19/08/2014 16:30	80.2	15.1	275	1.3	13.36
19/08/2014 16:45	80	15.2	269	0.9	15.02
19/08/2014 17:00	80.6	15.1	237	2.2	17.31
19/08/2014 17:15	76	15.5	233	1.8	9.14
19/08/2014 17:30	74.7	15.5	245	2.3	9.91
19/08/2014 17:45	76.7	15.2	230	2	9.83

Timestamp	Humidity [%RH]	Temperature [°C]	Wind Direction [°]	Wind Speed [m/s]	Sigma Theta [Sigma]
19/08/2014 18:00	76.9	15.2	261	1.4	9.82
19/08/2014 18:15	78.4	15	232	0.7	24.77
19/08/2014 18:30	79.8	14.8	223	1.5	28.95
19/08/2014 18:45	81.5	14.6	274	1	28.18
19/08/2014 19:00	82.1	14.4	256	1	18.22
19/08/2014 19:15	85.2	14	256	1.5	9.82
19/08/2014 19:30	83.5	14.2	257	1.3	7.47
19/08/2014 19:45	84.5	14	257	1.3	7.48
19/08/2014 20:00	85.3	13.7	220	2	9.58
19/08/2014 20:15	80.7	14.3	235	1.8	9.26
19/08/2014 20:30	82.9	13.9	232	1.7	9.95
19/08/2014 20:45	82.6	13.8	254	1.6	8.52
19/08/2014 21:00	82.8	13.7	245	1	8.53
19/08/2014 21:15	81.9	13.7	235	1.7	5.88
19/08/2014 21:30	80.2	13.6	235	1.1	6.95
19/08/2014 21:45	77.9	13.6	238	0.9	6.85
19/08/2014 22:00	79.1	13.4	238	1.9	9.89
19/08/2014 22:15	76.7	13.3	226	2.1	6.25
19/08/2014 22:30	75.2	13.5	230	3.2	7.84
19/08/2014 22:45	81.7	12.7	243	1.4	8.33
19/08/2014 23:00	81.5	12.6	251	1.3	7.84
19/08/2014 23:15	83	12.2	264	1.6	7.92
19/08/2014 23:30	84.1	12	264	1.3	7.62
19/08/2014 23:45	81.2	12.2	258	1.3	8.86
20/08/2014 0:00	81.1	12.1	224	2.2	11.23
20/08/2014 0:15	82.4	11.7	228	1.2	8.57
20/08/2014 0:30	80.2	11.8	243	1.2	15
20/08/2014 0:45	80.3	11.8	270	1.6	10.24
20/08/2014 1:00	81.1	11.6	245	1.3	9.05
20/08/2014 1:15	80.6	11.6	235	1.6	10.77
20/08/2014 1:30	82.6	11.2	224	1.6	7
20/08/2014 1:45	83.9	10.9	252	1	10.62
20/08/2014 2:00	82.9	10.9	233	1.2	7.79
20/08/2014 2:15	81.9	10.8	235	0.8	7.69
20/08/2014 2:30	84.2	10.3	273	0.9	10.3
20/08/2014 2:45	81.1	10.7	271	1	6.81
20/08/2014 3:00	84.1	10.2	255	1.9	17.55
20/08/2014 3:15	84.2	10.1	237	1.3	7.13
20/08/2014 3:30	82.9	10.2	229	1.5	8.76
20/08/2014 3:45	79.5	10.4	243	1.9	10.52
20/08/2014 4:00	77.8	10.6	244	1.9	8.99
20/08/2014 4:15	78.4	10.3	251	2.2	7.63
20/08/2014 4:30	77.7	10.4	250	0.8	10.12
20/08/2014 4:45	78.1	10.3	248	2.5	10.72
20/08/2014 5:00	78.1	10.2	236	1.2	14.4
20/08/2014 5:15	79	9.9	247	0.7	9.97
20/08/2014 5:30	79.5	9.8	256	1.3	21.98
20/08/2014 5:45	81.4	9.5	226	0.9	16.23

Timestamp	Humidity [%RH]	Temperature [°C]	Wind Direction [°]	Wind Speed [m/s]	Sigma Theta [Sigma]
20/08/2014 6:00	82.1	9.3	214	1.2	14.07
20/08/2014 6:15	84.9	8.8	171	1.3	22.67
20/08/2014 6:30	84.5	9	239	0.8	16.73
20/08/2014 6:45	84.6	9.2	241	0.9	29.8
20/08/2014 7:00	78.9	10.2	213	1.1	17.57
20/08/2014 7:15	75.6	10.8	245	0.6	23.66
20/08/2014 7:30	74.3	11.2	211	1	12.07
20/08/2014 7:45	73.7	11.7	239	1	17.43
20/08/2014 8:00	72.4	12.5	220	1.1	12.41
20/08/2014 8:15	71.3	13.2	212	1.6	15.11
20/08/2014 8:30	66.2	14	232	1.9	14.29
20/08/2014 8:45	65	14.8	249	2.5	10.79
20/08/2014 9:00	59.1	15.6	222	2.9	12.05
20/08/2014 9:15	59.5	16.3	273	2.3	15.96
20/08/2014 9:30	54.3	17	202	2.7	16.56
20/08/2014 9:45	54.4	17.3	204	2.5	20.88
20/08/2014 10:00	51.9	18	178	1.5	43.71
20/08/2014 10:15	52.7	18.6	204	1.2	40.78
20/08/2014 10:30	50.2	18.8	185	1.8	58.08
20/08/2014 10:45	46	18.7	142	4.6	25.56
20/08/2014 11:00	45.1	19.1	126	4.2	21.97
20/08/2014 11:15	42.5	19.6	126	6	20.99
20/08/2014 11:30	43.3	20	157	4.8	28.46
20/08/2014 11:45	41.9	20	201	1.7	29.01
20/08/2014 12:00	41.6	19.8	168	2.6	30.28
20/08/2014 12:15	41.4	20.5	232	3.1	39.56
20/08/2014 12:30	41.1	20.1	220	4.6	27.5
20/08/2014 12:45	41	20	205	3.8	29.73
20/08/2014 13:00	39.7	20.1	177	3.5	30.13
20/08/2014 13:15	38	21.1	151	1.3	34.41
20/08/2014 13:30	37.6	20.5	162	2.2	28.02
20/08/2014 13:45	37.7	20.6	165	1.9	20.03
20/08/2014 14:00	39	20.7	162	1.5	24.93
20/08/2014 14:15	37.3	21.1	181	2.6	30.97
20/08/2014 14:30	38.3	20.6	115	2.5	24.1
20/08/2014 14:45	37.6	21.5	172	1.4	23.71
20/08/2014 15:00	35.8	21.4	176	2.4	31.01
20/08/2014 15:15	36.9	20.8	163	3.1	30.19
20/08/2014 15:30	42.3	20.5	106	5	31.63
20/08/2014 15:45	46.1	19.5	109	3.1	24.61
20/08/2014 16:00	46.1	19.5	141	2.3	28.31
20/08/2014 16:15	45.5	19.9	111	1.3	26.81
20/08/2014 16:30	50.8	18.7	84	1.5	28.32
20/08/2014 16:45	54.3	18.2	136	3.7	25.93
20/08/2014 17:00	55.8	17.8	113	0.7	29.51
20/08/2014 17:15	56.5	17.4	133	1.9	25.08
20/08/2014 17:30	57.2	17.1	110	3.2	20.96
20/08/2014 17:45	58.5	16.8	150	1.1	24.39

Timestamp	Humidity [%RH]	Temperature [°C]	Wind Direction [°]	Wind Speed [m/s]	Sigma Theta [Sigma]
20/08/2014 18:00	57.8	16.7	139	3.7	15.38
20/08/2014 18:15	57.6	16.5	136	4.8	23.69
20/08/2014 18:30	56.8	16.5	151	1.6	18.87
20/08/2014 18:45	56.5	16.4	133	3.2	22.56
20/08/2014 19:00	57	16.2	164	2.8	14.78
20/08/2014 19:15	58.4	15.9	150	2.1	19.34
20/08/2014 19:30	57.1	15.9	150	2.7	14.92
20/08/2014 19:45	56.9	15.7	174	2.1	12.93
20/08/2014 20:00	56.7	15.6	168	1.9	16.81
20/08/2014 20:15	57.4	15.3	140	1.9	22.38
20/08/2014 20:30	56.1	15.3	140	2.6	29.29
20/08/2014 20:45	55.7	15.2	124	2	19.37
20/08/2014 21:00	56.2	15	150	2.5	16.74
20/08/2014 21:15	56.5	14.8	166	1.7	15.15
20/08/2014 21:30	56.6	14.8	183	2	13.35
20/08/2014 21:45	56.4	14.7	175	1.5	10.68
20/08/2014 22:00	56.8	14.5	182	1.8	14.29
20/08/2014 22:15	57.1	14.4	179	1	23.45
20/08/2014 22:30	57.9	14.4	190	0.4	17.16
20/08/2014 22:45	58.2	14.3	206	0.4	19.37
20/08/2014 23:00	61.9	13.6	251	0.7	21.72
20/08/2014 23:15	63.8	13.2	269	1	5.51
20/08/2014 23:30	63.3	13.3	251	1.3	10.91
20/08/2014 23:45	65	13.3	213	1.1	13.06
21/08/2014 0:00	66.8	13.1	246	0.8	43.6
21/08/2014 0:15	68.8	12.9	261	0.4	20.58
21/08/2014 0:30	67.2	13	276	0.5	28.45
21/08/2014 0:45	69.6	13	279	0.5	13.19
21/08/2014 1:00	69.5	12.8	244	0.8	13.24
21/08/2014 1:15	67.6	12.8	233	1.6	10.9
21/08/2014 1:30	68.5	12.7	243	1.3	8.35
21/08/2014 1:45	69.3	12.7	263	1.3	7.69
21/08/2014 2:00	69.9	12.5	255	1	6.27
21/08/2014 2:15	70.2	12.5	251	1	8.29
21/08/2014 2:30	68	12.9	233	0.6	14.48
21/08/2014 2:45	67.6	12.9	253	0.9	11.9
21/08/2014 3:00	67.6	12.9	237	1.6	9.43
21/08/2014 3:15	67.6	13	231	1.8	5.73
21/08/2014 3:30	68	13	237	2	5.59
21/08/2014 3:45	68.1	12.9	234	1.4	8.15
21/08/2014 4:00	67.7	13	232	1.5	7.12
21/08/2014 4:15	67.4	13.1	245	1.5	9.39
21/08/2014 4:30	67.3	13.1	243	1.8	10.58
21/08/2014 4:45	65.7	13.3	198	1.1	11.14
21/08/2014 5:00	65.5	13.3	236	1.8	7.47
21/08/2014 5:15	65.6	13.4	233	0.6	9.03
21/08/2014 5:30	64.3	13.5	229	1.8	9.09
21/08/2014 5:45	65.5	13.3	243	1.4	9.48

Timestamp	Humidity [%RH]	Temperature [°C]	Wind Direction [°]	Wind Speed [m/s]	Sigma Theta [Sigma]
21/08/2014 6:00	66.8	13.1	230	1.7	9.19
21/08/2014 6:15	67.7	13.1	228	1.3	5.07
21/08/2014 6:30	68.8	13	222	1.4	5.14
21/08/2014 6:45	68.7	13	233	1.2	7.31
21/08/2014 7:00	69	13	250	1.1	5.92
21/08/2014 7:15	71.6	13.1	241	1.4	5.53
21/08/2014 7:30	68.1	13.7	212	1.7	7.25
21/08/2014 7:45	60	14.9	226	2.2	14.51
21/08/2014 8:00	57.5	15.6	177	1.7	18.1
21/08/2014 8:15	57.1	15.5	181	2.6	19.9
21/08/2014 8:30	56.5	15.9	162	2.8	20.78
21/08/2014 8:45	56	16.2	179	2.6	23.16
21/08/2014 9:00	54.7	16.1	178	5.3	19.55
21/08/2014 9:15	54.8	16.3	188	2.1	14.35
21/08/2014 9:30	54.4	16.8	162	2	22
21/08/2014 9:45	53.1	17.5	158	2.6	23.64
21/08/2014 10:00	51.7	17.7	136	2.8	29.33
21/08/2014 10:15	49.8	18.4	200	2.2	19.02
21/08/2014 10:30	51.4	17.9	132	2.6	21.11
21/08/2014 10:45	51.5	18.3	100	0.5	23.06
21/08/2014 11:00	51.7	18.1	160	2.4	17.99