

# **CRAIG HILL ACOUSTICS**

Acoustic Consultants

QLD & NSW

**Noise Compliance Assessment**

**JR Richards Composting Facility**

**704 Armidale Road**

**Grafton NSW 2460**


Tuesday, October 11, 2016

## DOCUMENT CONTROL PAGE

### Noise Impact Assessment

704 Armidale Road Grafton NSW 2460

Reference: 111016/1

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## 1.0 INTRODUCTION

A noise compliance assessment was requested by JR Richards for the composting facility at 704 Armidale Road Grafton.

The request is in response for the composting facility to comply with condition R4.1 in the Environment Protection License (EPL 20137) issued to the composting facility by the New South Wales Environment Protection Authority.

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, Waste, scrap metal and concrete recycling, oil waste storage, household hazardous waste storage and vehicle weighbridge.

### General Operations

Shredding: 1 – 3½ hrs/day, generally occurs from 12:00pm – 3:30pm.

Movement of compost in maturation pad: 1 – 3 hrs/day mostly after 10 am

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. 7 – 9 am.

Screening – occurs once in every 2-3 months depend on the requirement of the compost, occurs during 7- 9 am or after 11 am

Watering the roads for dust control – occurs during 7 - 9am or after 11am.

Sorting of green waste – 3 - 4 hrs/day after 11.30 am.

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
Screeener	Drum type screening machine T4	876

## 2.0 SURROUNDINGS

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.

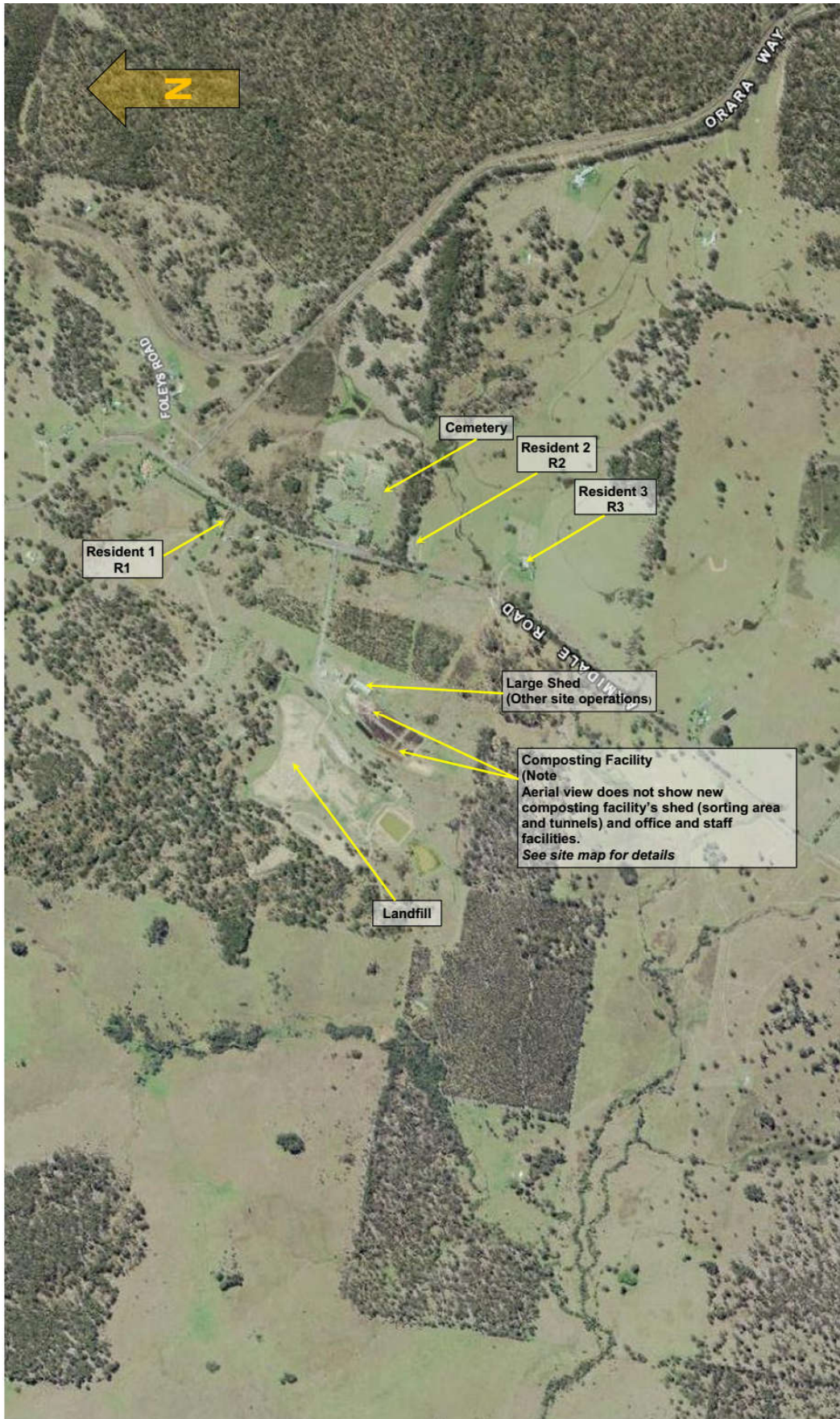
There are 3 residential dwellings within 800m of the composting facility and have been identified by the NSW EPA as receiver locations for noise monitoring for the composting facility.

### Closest Residential Receiver Locations

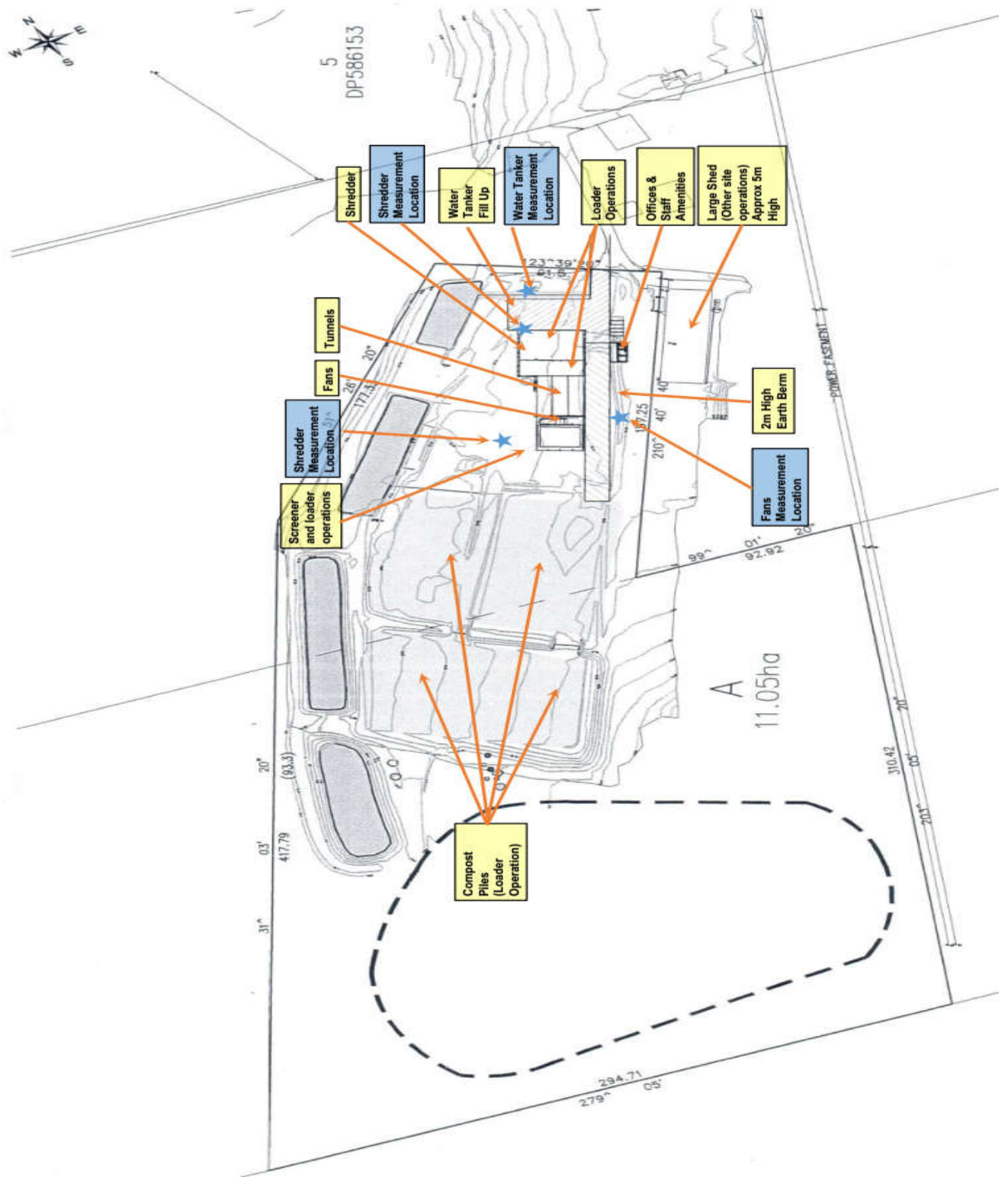
Table 2.1

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



### 3.0 SITE MAP



## 4.0 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.

## 5.0 MEASUREMENTS

### 5.1 Equipment

The following equipment was utilised during the test assessments:

Svantec Type 1, Sound and Vibration Analyser Model 949 Serial No 6023. calibrated May 2016.

BSWA Sound Level Calibrator Serial No 490190. calibrated May 2016.

The above equipment complies with the requirements of Australian Standards 1259.2 1990, Sound Level Meters, Part 2 Integrating – Averaging, as required by the Australian Standards. Equipment was calibrated before the tests and checked after and found to be within the acceptable drift.

The above equipment complies with the requirements in **IEC 61672**.

### 5.2 Measurement Methods

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 were conducted at the 3 residential receiver locations for the period from the 28-30<sup>th</sup> September 2016.

Attended measurements were conducted with the sound level meter mounted on a 1.2m high tripod.

The sound level meters were 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.

Meteorological data from the permanent weather station at the composting facility was used to determine weather conditions during unattended noise monitoring.

Monitoring located approximately 30m from the dwellings.

## 6.0 RESULTS

Table 6.1

Date	Start time	LA1	LAeq	LA90	Wind	Wind direction	Cloud Cover	notes
28 <sup>th</sup>								
<b>Station 1</b>								Intermittent traffic, distant dogs, no audible industrial noise 12:00-13:00 screening  13:00-15:15 shredding/spreading
day	12:00	61	53	44	3.4	313	0%	
	12:15	64	54	42	1.8	17	0%	
	12:30	65	52	43	1.9	303	0%	
	12:45	66	50	44	1.7	2	0%	
	13:00	60	53	41	1.8	45	0%	
	13:15	62	50	45	4	58	0%	
<b>Evening</b>	18:00	69	44	40	1	64	0%	Intermittent traffic, distant dogs, no audible industrial noise
	18:15	69	44	39	0.7	112	0%	
<b>night</b>	22:00	66	46	28	0.8	240	0%	Intermittent traffic, distant dogs, no audible industrial noise
	22:15	66	46	29	0.7	226	0%	
	22:30	66	46	30	0.7	229	0%	
	22:45	66	46	26	0.8	240	0%	
<b>Station 2</b>								Intermittent traffic, distant dogs, no audible industrial noise 13:00-15:15 shredding/spreading
day	13:35	64	49	40	2.8	26	0%	
	13:50	66	48	40	1.4	32	0%	
	14:05	65	48	42	4.4	92	0%	
	14:20	63	47	43	3.6	113	0%	
	14:35	62	48	44	6.4	95	0%	
	14:50	65	48	42	2.8	80	0%	
<b>Evening</b>	18:35	69	44	35	0.5	41	0%	Intermittent traffic, distant dogs, no audible industrial noise
	18:50	69	45	34	0.3	28	0%	
<b>night</b>	23:05	66	42	28	0.3	201	0%	Intermittent traffic, distant dogs, no audible industrial noise
	23:20	66	42	26	0.7	188	0%	
	23:35	66	44	28	0.6	214	0%	
	23:50	66	43	26	0.5	254	0%	
<b>Station 3</b>								Intermittent traffic, distant dogs, no audible industrial noise 13:00-15:15 shredding/spreading
day	15:10	70	50	42	3.2	60	0%	
	15:25	69	49	41	2.7	76	0%	
	15:40	66	48	40	2.5	55	0%	
	15:55	67	49	45	4.7	72	0%	
	16:10	65	46	42	2.3	97	0%	
	16:25	62	45	41	1.9	95	0%	
<b>Evening</b>	19:10	69	44	32	0.5	331	0%	Intermittent traffic, distant dogs, no audible industrial noise
	19:25	69	44	32	0.8	292	0%	
<b>Night</b>	0:10	66	43	28	0.7	191	0%	Intermittent traffic, distant dogs, no audible industrial noise
	0:25	61	44	26	0.8	162	0%	
	0:40	61	42	26	0.3	245	0%	
	0:55	66	43	26	0.4	272	0%	

Table 6.2

Measured Noise Levels - dB(A) fast response 15 mins								
Date/period	Start time	LA1	LAeq	LA90	Wind	Wind direction	Cloud Cover	Notes
29 <sup>th</sup>								
<b>Station 1</b>								Intermittent traffic, distant dogs, no audible industrial noise  11:00-12:30 Loading compost
day	12:00	62	54	45	5.3	303	50%	
	12:15	64	55	44	4.8	316	50%	
	12:30	66	48	40	2	326	50%	
	12:45	67	54	45	7.7	3	50%	
	13:00	68	52	45	5.1	350	50%	
	13:15	65	48	40	2.3	6	50%	
<b>Evening</b>	18:00	60	45	35	3.8	347	50%	Intermittent traffic, distant dogs, no audible industrial noise
	18:15	61	44	35	5.2	347	50%	
<b>night</b>	22:00	62	39	30	2.8	37	50%	Intermittent traffic, distant dogs, no audible industrial noise
	22:15	65	38	32	1.9	1	50%	
	22:30	60	38	32	1.3	350	50%	
	22:45	61	36	34	1.9	342	50%	
<b>Station 2</b>								Intermittent traffic, distant dogs, no audible industrial noise  13:30-15:00 shredding/spreading
day	13:35	64	49	44	4	1	50%	
	13:50	66	47	43	2.6	15	50%	
	14:05	61	49	44	4	18	50%	
	14:20	62	50	46	6.6	297	50%	
	14:35	64	48	45	5.7	302	50%	
	14:50	63	46	43	3	350	50%	
<b>Evening</b>	18:35	59	44	36	4.1	350	50%	Intermittent traffic, distant dogs, no audible industrial noise
	18:50	61	44	34	3	315	50%	
<b>night</b>	23:05	60	35	33	2.6	291	50%	Intermittent traffic, distant dogs, no audible industrial noise
	23:20	61	34	30	2.7	294	50%	
	23:35	60	38	33	6.9	275	50%	
	23:50	55	36	30	3.3	300	50%	
<b>Station 3</b>								Intermittent traffic, distant dogs, no audible industrial noise
day	15:10	65	46	39	1.6	27	50%	
	15:25	64	52	46	4.7	350	50%	
	15:40	61	48	44	3.1	356	50%	
	15:55	67	49	43	2.7	10	50%	
	16:10	68	49	42	2.8	326	50%	
	16:25	60	50	46	3.7	330	50%	
<b>Evening</b>	19:10	55	42	34	4.4	332	50%	Intermittent traffic, distant dogs, no audible industrial noise
	19:25	57	42	34	3.5	34	50%	
<b>Night</b>	0:10	60	43	32	3.6	283	50%	Intermittent traffic, distant dogs, no audible industrial noise
	0:25	60	45	34	5.7	291	50%	
	0:40	57	42	30	3.2	254	50%	
	0:55	57	42	29	3	322	50%	

Table 6.3

Measured Noise Levels - dB(A) fast response 15 mins								
Date/Period	Start time	LA1	LAeq	LA90	Wind	Wind direction	Cloud Cover	Notes
30 <sup>th</sup>								
<b>Station 1</b>								
day	10:00	64	55	43	4.2	262	90%	Intermittent traffic, birds, distant dogs, no audible industrial noise apart from occasional bang from shredder but not measureable above background
	10:15	62	54	44	5.6	282	90%	
	10:30	61	52	42	6.5	212	90%	
	10:45	62	51	41	9.6	251	90%	
	11:00	61	50	41	4.3	228	90%	
	11:15	63	52	40	7.5	283	90%	09:00-10:30 Screening/spreading 11:00-15:30 spreading/shredding
<b>Evening</b>								
	18:00	63	45	35	3.5	265	90%	Intermittent traffic, distant dogs, no industrial noise
	18:15	62	44	35	3.3	270	90%	
<b>night</b>								
	22:00	67	44	28	1.8	1	90%	Intermittent traffic, distant dogs, no audible industrial noise
	22:15	62	45	38	1.8	355	90%	
	22:30	63	44	32	1	11	90%	
	22:45	62	43	33	1.3	20	90%	
<b>Station 2</b>								
day	11:35	61	49	44	5.2	279	90%	Intermittent traffic, birds, distant dogs, no audible industrial noise apart from occasional bang from shredder but not measureable above background
	11:50	62	50	43	4.8	254	90%	
	12:05	66	47	42	5.4	250	90%	
	12:20	65	48	41	7.2	308	90%	
	12:35	61	46	42	4.5	236	90%	
	12:50	60	47	42	5.6	280	90%	11:00-15:30 spreading/shredding
<b>Evening</b>								
	18:35	64	46	34	0.8	310	90%	Intermittent traffic, distant dogs, no industrial noise
	18:50	62	45	34	3.3	311	90%	
<b>night</b>								
	23:05	64	44	34	1.6	41	90%	Intermittent traffic, distant dogs, no audible industrial noise
	23:20	62	45	33	1.7	19	90%	
	23:35	63	46	33	1.1	23	90%	
	23:50	62	45	32	1.3	35	90%	
<b>Station 3</b>								
day	13:10	62	47	43	5.2	279	90%	Intermittent traffic, birds, distant dogs, no audible industrial noise apart from occasional bang from shredder but not measureable above background
	13:25	60	45	44	4.8	254	90%	
	13:40	61	46	42	5.4	250	90%	
	13:55	60	45	41	7.2	308	90%	
	14:10	60	44	40	4.5	236	90%	
	14:25	62	43	40	5.6	280	90%	11:00-15:30 spreading/shredding
<b>Evening</b>								
	19:10	63	46	33	3.3	303	90%	Intermittent traffic, distant dogs, no industrial noise
	19:25	63	46	34	1.8	286	90%	
<b>Night</b>								
	0:10	64	45	29	0.8	32	90%	Intermittent traffic, distant dogs, no audible industrial noise
	0:25	62	46	28	1.4	33	90%	
	0:40	60	47	29	0.6	4	90%	
	0:55	59	44	27	2.2	346	90%	

## 7.0 SUMMARY OF ACTIVITIES

Table 7.1

Date	Time	Activity	Observations
28/09/2016	11.00am - 11.30 am	shredding/spreading	No industrial noise audible Traffic dominant, barking dogs, birds.
	12.00noon - 1.00pm	screening	
	1.00 pm - 3.15pm	shredding/spreading	
29/09/2016	7.00am-9.55am	screening /shredding	No industrial noise audible Traffic dominant, barking dogs, birds.
	10.00-10.35am	spreading	
	11.00 - 12.30	Loading compost	
	12.30 - 3.00	shredding/spreading	
30/09/2016	7.00am-8.00am	turning compost	Shredder occasional audible bang R2 and R3 when no other noise sources. Not measureable above background. Traffic dominant, barking dogs, birds.
	8.00 - 9.00 am	loading compost	
	9.00 - 10.30 am	Screening/spreading	
	11.00am - 3.30 pm	spreading/shredding	

## 8.0 CONCLUSIONS AND SUMMARY

### Daytime

Shredding is the noisiest activity at the compost facility and was not audible at receivers R1-R3 apart from the occasional bang at R2 & R3 in downwind conditions. The bangs were the result of occasional larger pieces of wood going through the shredder were not measureable above background.

The loader was not audible or measureable above background at receivers R1-R3.

The screener was not audible or measureable above background at receivers R1-R3.

Fans not audible or measureable above background at receivers R1-R3.

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 – 3 hours per day. Shredding is usually conducted between 12 noon and 3:30pm Monday to Friday.

Traffic on Armidale Road was generally steady during shredding times and made it difficult to identify noise from the occasional bang (caused by larger pieces in shredder) above background measurements.

### Evening and Night period

The only activity on site during evening and night periods are the fans.

There was no audible or measureable industrial noise from the composting facility at Receivers R1- R3.

Fans not audible or measureable above background at receivers R1-R3.

No audible industrial noise was observed during the attended evening and night time measurements at R1- R3.

Sigma Theta criteria for temperature inversion was not met during the monitoring period.

It is 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.

### Comments on future testing

As the main activities involving shredding and screening only occur over a few hours at a time monitoring over a three day period could be reduced to one day in light SW or NW breeze for a worst case scenario to ensure compliance.

## **APPENDIX A Definitions of Terms**

Sound pressure level ( $L_p$ )

Decibels (dB): 20  $\mu$ Pa (micro pascals) as the reference pressure.

Frequency (Hz):

Spectral characteristics: The frequency content of noise.

LAeq: The A-weighted equivalent continuous noise level. LAeq, 15 minute is a 15-minute sample.

LAN: 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.

LA90 is the A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured.

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 LA90 descriptor, fast time weighting.

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



**APPENDIX B**

Weather conditions during noise monitoring  
Data from permanent weather station at composting facility

Data was saved using Vista Data Vision				
Time	Temp[°C]	Wind Speed[m/s]	Wind Direction[°]	Sigma Theta[Sigma]
28/09/2016 12:00	21.6	3.4	313	64.99
28/09/2016 12:15	21.1	1.8	17	37.23
28/09/2016 12:30	21.6	1.9	303	31.17
28/09/2016 12:45	22.2	1.7	2	29.63
28/09/2016 13:00	21.8	1.8	45	25.39
28/09/2016 13:15	22.1	4	58	27.49
28/09/2016 13:30	23	2.8	26	38.43
28/09/2016 13:45	22.2	1.4	32	20.12
28/09/2016 14:00	22.6	4.4	92	60.57
28/09/2016 14:15	22.1	3.6	113	28.28
28/09/2016 14:30	21.6	6.4	95	23.64
28/09/2016 14:45	21.8	1.6	80	22
28/09/2016 15:00	21.9	2.1	86	25.1
28/09/2016 15:15	21.5	3.2	60	29.73
28/09/2016 15:30	20.7	2.7	76	17.13
28/09/2016 15:45	20.8	2.5	55	29.32
28/09/2016 16:00	20.6	4.7	72	22.19
28/09/2016 16:15	20	2.3	97	19.99
28/09/2016 16:30	19.8	1.9	95	26.06
28/09/2016 16:45	19.7	3.2	53	24.54
28/09/2016 17:00	19.3	2	81	23.14
28/09/2016 17:15	18.9	1.6	124	23.98
28/09/2016 17:30	18.5	1.2	91	18.97
28/09/2016 17:45	18	1.5	82	25.23
28/09/2016 18:00	17.6	1	64	24.69
28/09/2016 18:15	17.1	0.7	112	19.19
28/09/2016 18:30	16.9	0.5	41	22.69
28/09/2016 18:45	16.2	0.3	28	18.64
28/09/2016 19:00	15.9	0.5	331	31.18
28/09/2016 19:15	15.5	0.8	292	25.29
28/09/2016 19:30	15.2	0.5	237	18.38
28/09/2016 19:45	15.1	0.1	230	12.64
28/09/2016 20:00	15.1	0.5	227	22.57
28/09/2016 20:15	14.7	0.2	111	82.9
28/09/2016 20:30	14.3	0.2	150	63.42
28/09/2016 20:45	14.3	0.5	233	45.98
28/09/2016 21:00	14.1	0.2	213	59.01
28/09/2016 21:15	14.2	0.2	223	37.06
28/09/2016 21:30	14	0.6	267	16.89
28/09/2016 21:45	14.1	0.5	255	13.14
28/09/2016 22:00	14.2	0.8	240	10.04

Time	Temp[°C]	Wind Speed[m/s]	Wind Direction[°]	Sigma Theta[Sigma]
28/09/2016 22:15	14.1	0.7	226	15.75
28/09/2016 22:30	13.9	0.7	229	39.21
28/09/2016 22:45	13.8	0.9	218	6.88
28/09/2016 23:00	13.8	0.3	201	28.88
28/09/2016 23:15	13.7	0.7	188	18.46
28/09/2016 23:30	13.7	0.6	214	28.91
28/09/2016 23:45	13.6	0.5	254	15.39
29/09/2016 0:00	13.5	0.7	258	12.4
29/09/2016 0:15	13.6	0.7	191	27.45
29/09/2016 0:30	13.5	0.8	162	19.3
29/09/2016 0:45	13.2	0.3	245	20.39
29/09/2016 1:00	13.2	0.4	272	32.27
29/09/2016 1:15	13	1	229	22.58
29/09/2016 1:30	13	0.7	239	11.33
29/09/2016 1:45	13	0.4	247	12.81
29/09/2016 2:00	12.9	0.3	284	14.01
29/09/2016 2:15	12.8	0.3	43	60.54
29/09/2016 2:30	12.6	0.4	80	43
29/09/2016 2:45	12.5	0.4	314	72.08
29/09/2016 3:00	12.2	0.7	249	20.41
29/09/2016 3:15	12.4	0.3	348	92.81
29/09/2016 3:30	12.3	0.7	245	87.93
29/09/2016 3:45	12.3	1.4	53	77.86
29/09/2016 4:00	12.4	0	46	96.25
29/09/2016 4:15	12.4	0	229	105.78
29/09/2016 4:30	12.3	0.3	88	54.31
29/09/2016 4:45	12.2	0.5	13	72.09
29/09/2016 5:00	12.4	0.3	259	118.6
29/09/2016 5:15	12.3	0.6	117	58.06
29/09/2016 5:30	12.2	0.4	320	41.75
29/09/2016 5:45	12.3	0.2	147	58.24
29/09/2016 6:00	12.3	0.6	201	33.11
29/09/2016 6:15	12	1.5	216	23.8
29/09/2016 6:30	12.2	1.4	241	8.52
29/09/2016 6:45	12.5	0.1	237	26.6
29/09/2016 7:00	12.8	0.5	156	68.88
29/09/2016 7:15	13.1	0.4	167	23.81
29/09/2016 7:30	13.7	0.4	92	45.73
29/09/2016 7:45	14.5	0.4	197	75.81
29/09/2016 8:00	14.9	0.8	288	48.95
29/09/2016 8:15	15.4	1.3	218	28.1
29/09/2016 8:30	15.8	0.5	244	13.49
29/09/2016 8:45	16.9	1.1	19	72.3
29/09/2016 9:00	17.5	1.4	337	37.97
29/09/2016 9:15	17.5	2.8	322	29.26
29/09/2016 9:30	17.8	2.3	291	21.78
29/09/2016 9:45	17.8	2	310	30.3

Time	Temp[°C]	Wind Speed[m/s]	Wind Direction[°]	Sigma Theta[Sigma]
29/09/2016 10:00	17.7	3.6	340	16.09
29/09/2016 10:15	18.3	3.2	23	35.02
29/09/2016 10:30	18.5	2.9	67	18.23
29/09/2016 10:45	19.5	2.4	2	27.38
29/09/2016 11:00	20.3	3.6	49	30.67
29/09/2016 11:15	21.5	3.4	13	21.99
29/09/2016 11:30	21.9	3.3	57	34.02
29/09/2016 11:45	23.4	3.4	352	27.76
29/09/2016 12:00	24.5	5.3	303	34.16
29/09/2016 12:15	24.2	4.8	316	22.17
29/09/2016 12:30	25.1	2	326	24.2
29/09/2016 12:45	24.9	7.7	3	26.1
29/09/2016 13:00	24.6	5.1	350	27.48
29/09/2016 13:15	22.9	2.3	6	23.29
29/09/2016 13:30	23	4	1	24.69
29/09/2016 13:45	22.6	2.6	15	23.52
29/09/2016 14:00	22.7	4	18	23.74
29/09/2016 14:15	22.1	6.6	297	24.87
29/09/2016 14:30	22.9	5.7	302	18.05
29/09/2016 14:45	22.2	3	350	22.88
29/09/2016 15:00	22.2	4.3	2	23.92
29/09/2016 15:15	22.2	1.6	27	24.35
29/09/2016 15:30	21.8	4.7	350	23.98
29/09/2016 15:45	21.6	3.1	356	24.14
29/09/2016 16:00	21.1	2.7	10	24.15
29/09/2016 16:15	21	2.8	326	23.44
29/09/2016 16:30	21	3.7	330	26.15
29/09/2016 16:45	20.7	3.5	16	25.4
29/09/2016 17:00	20.9	1.6	320	23.77
29/09/2016 17:15	21.3	1.6	358	21.32
29/09/2016 17:30	21.2	6.1	10	24.27
29/09/2016 17:45	21	3.4	329	25.56
29/09/2016 18:00	21	3.8	347	25.27
29/09/2016 18:15	20.8	5.2	347	28.62
29/09/2016 18:30	20.6	4.1	350	24.27
29/09/2016 18:45	20.6	3	315	26.54
29/09/2016 19:00	20.5	4.4	328	23.4
29/09/2016 19:15	20.5	4.4	332	24.7
29/09/2016 19:30	20.3	3.5	34	22.34
29/09/2016 19:45	20	5.8	33	24.72
29/09/2016 20:00	19.8	3.4	336	24.76
29/09/2016 20:15	19.6	3.2	3	25.46
29/09/2016 20:30	19.4	3.8	345	23.11
29/09/2016 20:45	18.4	2.1	17	24.78
29/09/2016 21:00	17.9	2.1	40	16.65
29/09/2016 21:15	17.9	1.2	55	19.22
29/09/2016 21:30	18.2	0.9	321	48.75

Time	Temp[°C]	Wind Speed[m/s]	Wind Direction[°]	Sigma Theta[Sigma]
29/09/2016 21:45	18.1	1.5	2	28.38
29/09/2016 22:00	17.6	2.8	37	17.42
29/09/2016 22:15	17.3	1.9	1	15.59
29/09/2016 22:30	17.1	1.3	350	21.12
29/09/2016 22:45	17.4	1.9	342	17.33
29/09/2016 23:00	17.9	2.6	291	17.08
29/09/2016 23:15	17.9	2.7	294	20.03
29/09/2016 23:30	18.2	6.9	275	13.47
29/09/2016 23:45	19	3.3	300	15.71
30/09/2016 0:00	18.6	3.1	292	17.2
30/09/2016 0:15	18.6	3.6	283	16.62
30/09/2016 0:30	18.9	5.7	291	19.86
30/09/2016 0:45	18.7	3.2	254	16.18
30/09/2016 1:00	18.5	3	322	19.43
30/09/2016 1:15	18.2	2.9	269	19.8
30/09/2016 1:30	17.9	3.5	233	13.75
30/09/2016 1:45	17.6	2.5	277	13.38
30/09/2016 2:00	17.6	7	270	20.01
30/09/2016 2:15	17.5	4.4	247	14.25
30/09/2016 2:30	16.7	1.5	265	18.91
30/09/2016 2:45	16.5	2.3	304	13.54
30/09/2016 3:00	16.5	4.3	261	21.04
30/09/2016 3:15	16.3	2.2	260	17.16
30/09/2016 3:30	16.7	3.2	247	13.01
30/09/2016 3:45	16.3	2.1	229	10.93
30/09/2016 4:00	16.3	1.3	272	15.42
30/09/2016 4:15	15.7	1.5	5	67.67
30/09/2016 4:30	16.4	2	285	31.71
30/09/2016 4:45	16	2.5	253	12.42
30/09/2016 5:00	16.1	2.3	255	11.97
30/09/2016 5:15	15.9	1.6	274	12.31
30/09/2016 5:30	15.5	2.1	271	13.94
30/09/2016 5:45	15.5	2.1	286	17.92
30/09/2016 6:00	15.8	3.9	285	16.68
30/09/2016 6:15	16.1	1.9	284	21.24
30/09/2016 6:30	16.1	2.5	292	29.08
30/09/2016 6:45	16.2	3.6	253	20.37
30/09/2016 7:00	16.7	1.5	295	23.61
30/09/2016 7:15	17.3	2	319	32.16
30/09/2016 7:30	17.5	4.9	240	26.47
30/09/2016 7:45	17.3	5.5	250	18.36
30/09/2016 8:00	18	5.7	297	21.67
30/09/2016 8:15	17.7	4.2	292	22.21
30/09/2016 8:30	18	2	358	18.05
30/09/2016 8:45	18.4	4.6	275	24.84
30/09/2016 9:00	19	5	269	23.47
30/09/2016 9:15	19.2	4	297	27.17

Time	Temp[°C]	Wind Speed[m/s]	Wind Direction[°]	Sigma Theta[Sigma]
30/09/2016 9:30	19.2	5.6	291	16.71
30/09/2016 9:45	19.6	5	251	21.09
30/09/2016 10:00	19.3	4.2	262	20.83
30/09/2016 10:15	20	5.6	282	21.01
30/09/2016 10:30	20.1	6.5	212	25.09
30/09/2016 10:45	20.5	9.6	251	20.69
30/09/2016 11:00	21.1	4.3	228	21.28
30/09/2016 11:15	20.6	7.5	283	26.43
30/09/2016 11:30	20.9	5.2	279	19.68
30/09/2016 11:45	21.2	4.8	254	15.9
30/09/2016 12:00	21.3	5.4	250	17.22
30/09/2016 12:15	21.7	7.2	308	17.14
30/09/2016 12:30	21.8	4.5	236	18.93
30/09/2016 12:45	21.3	5.6	280	13.56
30/09/2016 13:00	21.8	7.6	276	20.19
30/09/2016 13:15	21.4	8.1	273	22.18
30/09/2016 13:30	21.3	7.3	235	13.41
30/09/2016 13:45	21.2	7	242	14.78
30/09/2016 14:00	21.1	8.3	252	12.73
30/09/2016 14:15	21.1	6.3	255	14.88
30/09/2016 14:30	21.1	7.4	249	16.09
30/09/2016 14:45	20.9	6.7	265	14.41
30/09/2016 15:00	20.8	8.8	276	15.68
30/09/2016 15:15	20.7	12.1	253	16.98
30/09/2016 15:30	20.5	5.9	213	15.03
30/09/2016 15:45	20.2	11.2	259	17.89
30/09/2016 16:00	20.5	6.5	294	17.27
30/09/2016 16:15	19.8	11	255	18.55
30/09/2016 16:30	19.8	7.2	263	14.27
30/09/2016 16:45	19.9	3.4	280	16.85
30/09/2016 17:00	19.6	1.4	280	17.36
30/09/2016 17:15	19.2	6.2	246	16.23
30/09/2016 17:30	18.8	4.5	264	17.07
30/09/2016 17:45	18.6	3.4	254	14.65
30/09/2016 18:00	18.3	3.5	265	14.37
30/09/2016 18:15	18	3.3	270	16.94
30/09/2016 18:30	17.6	0.8	310	20.83
30/09/2016 18:45	17.5	3.3	311	27.25
30/09/2016 19:00	17.4	2.3	304	17.19
30/09/2016 19:15	17.1	3.3	303	10.87
30/09/2016 19:30	17.2	1.8	286	16.68
30/09/2016 19:45	17	1.7	289	12.26
30/09/2016 20:00	17.1	2.6	293	14.64
30/09/2016 20:15	16.5	2.5	290	17.32
30/09/2016 20:30	16.9	1.4	304	17.53
30/09/2016 20:45	16.9	2.9	303	15.96
30/09/2016 21:00	16.7	1.8	294	12.09

Time	Temp[°C]	Wind Speed[m/s]	Wind Direction[°]	Sigma Theta[Sigma]
30/09/2016 21:15	16.3	1.3	2	19.56
30/09/2016 21:30	16.4	2.6	301	20.29
30/09/2016 21:45	16.2	2.1	295	15.57
30/09/2016 22:00	16.2	1.8	1	20.64
30/09/2016 22:15	16.1	1.8	355	21.42
30/09/2016 22:30	16.1	1	11	23.49
30/09/2016 22:45	16.1	1.3	20	24.63
30/09/2016 23:00	14.8	1.6	41	14.85
30/09/2016 23:15	14.5	1.7	19	11.08
30/09/2016 23:30	14.3	1.1	23	10.35
30/09/2016 23:45	13.9	1.3	35	21.91
1/10/2016 0:00	14.3	0.5	43	24.59
1/10/2016 0:15	14.4	0.8	32	56.97
1/10/2016 0:30	15.2	1.4	33	20.17
1/10/2016 0:45	14.6	0.6	4	30.27
1/10/2016 1:00	15.6	2.2	346	18.31
1/10/2016 1:15	14.3	0.1	292	11.93
1/10/2016 1:30	14.9	1.4	351	28.26
1/10/2016 1:45	15.6	1.9	355	10.63
1/10/2016 2:00	14.2	1.2	358	14.38
1/10/2016 2:15	13.9	2.5	354	11.28
1/10/2016 2:30	13.8	1.4	10	14.25
1/10/2016 2:45	13.5	1	7	12.65
1/10/2016 3:00	13.6	2.8	19	14.09
1/10/2016 3:15	14.1	2.7	349	17.78
1/10/2016 3:30	12.7	3.5	329	14.02
1/10/2016 3:45	13.1	2.4	1	15.33
1/10/2016 4:00	13.5	0.9	350	14.34
1/10/2016 4:15	13.7	1.2	339	14.62
1/10/2016 4:30	13.7	2.7	327	15.27
1/10/2016 4:45	13.7	2.4	7	13.93
1/10/2016 5:00	13.5	1.5	315	19.67
1/10/2016 5:15	12.9	0.8	25	17.1
1/10/2016 5:30	11.4	0.8	62	68.3
1/10/2016 5:45	12	0.2	62	20.24
1/10/2016 6:00	12	0.4	63	44.63
1/10/2016 6:15	12.2	0.4	170	56.46
1/10/2016 6:30	12.1	0.5	158	76.04
1/10/2016 6:45	11.9	1.1	74	46.38
1/10/2016 7:00	13.7	0.6	250	73.89
1/10/2016 7:15	14.3	0.6	257	36.64
1/10/2016 7:30	15.8	1	299	36.4
1/10/2016 7:45	17.1	3	287	20.53
1/10/2016 8:00	17.4	3.1	309	14.82
1/10/2016 8:15	17.7	3.3	343	21.81
1/10/2016 8:30	17.8	5.1	296	21.14
1/10/2016 8:45	18.2	3.2	304	32.35

Time	Temp[°C]	Wind Speed[m/s]	Wind Direction[°]	Sigma Theta[Sigma]
1/10/2016 9:00	18.7	4.4	281	24.04
1/10/2016 9:15	19.1	3.1	324	28.35
1/10/2016 9:30	19.8	1.7	14	23.46
1/10/2016 9:45	19.5	2.4	341	32.57
1/10/2016 10:00	21	1.3	253	28.48
1/10/2016 10:15	20.8	4.1	322	29.79
1/10/2016 10:30	21.5	3	290	22.92
1/10/2016 10:45	22	4.6	293	17.21
1/10/2016 11:00	22.1	3.9	330	21.89
1/10/2016 11:15	22.3	3.6	349	30.7
1/10/2016 11:30	22.7	2.9	330	28.33
1/10/2016 11:45	23.7	3.6	298	27.34
1/10/2016 12:00	24.3	6	257	30
1/10/2016 12:15	24.7	2	272	18.95
1/10/2016 12:30	24.5	5.5	288	18.13
1/10/2016 12:45	24.6	8	267	19.89
1/10/2016 13:00	24.9	9	294	19.5
1/10/2016 13:15	24.5	8	238	18.67
1/10/2016 13:30	25.1	9.5	313	15.82
1/10/2016 13:45	25.2	7.2	256	19.39
1/10/2016 14:00	24.9	13	269	16.08
1/10/2016 14:15	24.9	4.6	284	14.23
1/10/2016 14:30	25.1	3.4	281	14.48
1/10/2016 14:45	25	7.4	272	16.94
1/10/2016 15:00	24.9	5.7	314	17.07
1/10/2016 15:15	24.8	8.2	280	15.66
1/10/2016 15:30	25.2	5.7	279	17.67
1/10/2016 15:45	24.8	6.6	269	14.95
1/10/2016 16:00	24.7	6.2	250	14.54
1/10/2016 16:15	24.4	10.9	267	17.63
1/10/2016 16:30	24.2	6.7	244	16.06
1/10/2016 16:45	23.9	5.7	268	14.21
1/10/2016 17:00	23.6	4.8	215	16.13
1/10/2016 17:15	23.2	8.2	272	16.81
1/10/2016 17:30	22.8	6.5	274	14.67
1/10/2016 17:45	22.4	3.8	283	15.94
1/10/2016 18:00	22.1	3.4	271	18.19
1/10/2016 18:15	21.7	2.3	259	20.95
1/10/2016 18:30	21.2	1.7	288	19.68
1/10/2016 18:45	21.1	1.8	292	10.05
1/10/2016 19:00	20.7	1.8	293	18.14
1/10/2016 19:15	20.6	3.8	260	16.19
1/10/2016 19:30	20.2	2.4	258	11.86
1/10/2016 19:45	20.2	3.2	260	11.74
1/10/2016 20:00	20.1	4.5	276	16.95
1/10/2016 20:15	20.3	2.1	302	16.32
1/10/2016 20:30	20.2	1.7	317	16.37

Time	Temp[°C]	Wind Speed[m/s]	Wind Direction[°]	Sigma Theta[Sigma]
1/10/2016 20:45	20	3.5	276	13.99
1/10/2016 21:00	19.8	2.2	268	10.43
1/10/2016 21:15	19.7	1.5	263	9.67
1/10/2016 21:30	19.6	1.7	284	11.67
1/10/2016 21:45	19.5	1.6	255	18.17
1/10/2016 22:00	18.9	0.6	309	28.88
1/10/2016 22:15	18.8	1.1	288	36.07
1/10/2016 22:30	18.6	1.7	253	25.61
1/10/2016 22:45	18.5	2.5	243	10.46
1/10/2016 23:00	18.3	3	254	9.43
1/10/2016 23:15	18.1	1.7	250	9.82
1/10/2016 23:30	17.9	1.1	308	25.25
1/10/2016 23:45	17.3	0.7	319	24.36