aurecon

Project: Kerosene Vale Ash Repository Stage 2

Ongoing operational noise measurements

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1. Introduction

Aurecon was engaged by EnergyAustralia NSW to carry out ongoing operational noise monitoring for the Kerosene Vale Stage 2 Ash Repository (KVAR) located in Wallerawang, NSW. The noise measurements were carried out on Sunday 19th October and Monday 20th October 2014, during the early morning and evening periods as per the requirements outlined in the KVAR Stage 2 Operations, Operational Noise and Vibration Management Plan (ONVMP).

1.1 Site details

The project site consists of an Ash Repository which services the nearby Wallerawang Power Station (WPS). The major noise emissions associated with the Stage 2 KVAR works are:

- Unloading of ash from trucks at the repository.
- Placement and handling of ash at the repository site.
- Operation of trucks on the private haulage road; this includes trucks leaving WPS loaded with ash (travelling north) and returning from the repository empty (travelling south).

Figure 1 shows the site layout and location of sensitive receivers relative to the major noise sources including WPS as well as major roads in the area. Table 1 outlines the most affected sensitive receivers and their distance to the haulage road.

Table 1: Representative noise measurement locations

Representative sensitive receiver	Distance to haulage road (meters)*
60 Skelly Road	300
10 Skelly Road	270
21 Neubeck Street	145

Note * - distance relates to the property boundary or a point 30 m from the dwelling location

It should be noted that coal supply trucks also utilise the private haulage road. Their noise impacts are not considered to be part of the Stage 2 KVAR works and thus their noise impact is outside the scope of this report. On site it is extremely difficult to visually distinguish between coal supply trucks and ash trucks, therefore, for the purpose of prediction of noise emissions from ash trucks alone, EnergyAustralia NSW provides truck movement numbers during the assessment periods.

Figure 1 | Site details

2. Noise criteria

The applicable operational noise criteria are outlined in the Project Approval, Application No. 07_0005. The criteria are summarised in condition 2.15 as follows:

> *2.15 The cumulative operational noise from the ash placement area and ash haulage activity shall not exceed a* $L_{Aeq\ (15\ minute)}$ ***of 40 dBA*** *at the nearest most affected sensitive receiver during normal operating hours as defined in condition 2.8.*
>
> *This criterion applies under the following meteorological conditions:*
>
> *a) Wind speeds up to 3 m/s at 10 meters above ground; and/or*
> *b) Temperature inversion conditions of up to 3°C/100 m and source to receiver gradient winds of up to 2 m/s at 10 m above ground level*

Normal operating hours in accordance with Conditions 2.8 are 7:00 am to 10:00 pm Monday to Sunday.

3. Noise measurements

3.1 Measurement methodology

Two types of measurements were carried out at the site: ambient noise measurements and sound exposure level measurements. The measurements were carried out on Sunday 19th October and Monday 20th October 2014, during the early morning and evening periods, when the noise impacts are likely to be the most significant.

The ambient compliance noise measurements were conducted using a Larson Davis 831 Type 1 sound level meter which was set to 'A' frequency weighting, 'F' time weighting, and was fitted with an approved windshield. Measurements were typically taken at a height of 1.2 metres and at least 3.5 metres from any reflecting structure other than the ground.

The measurement period at each location consisted of 15 minutes. A Larson Davis CAL200 was utilised to calibrate all sound level meters before and after each series of measurements with no significant calibration drift noted.

The weather during the noise logging ranged from overcast to sunny conditions, and wind speeds less than 3m/s at ground level. Measurements were generally taken in accordance with the Australian Standard *AS 1055 1997: Acoustics – Description and measurement of environmental noise*.

Meteorological data was referenced from Blackmans Flat Weather station for the duration of noise survey to establish stability conditions and wind speeds at 10 metres above ground level.

The Sound Exposure Level (SEL) measurements were also carried out using the Larson Davis 831 Type 1 sound level meter. SEL is the equivalent one second A-weighted sound level which would produce the same sound energy as the actual event. The measurement was commenced when the truck was observed to pass a consistent location and stopped when the end of the truck passed a second consistent location. The reference locations were identified where the truck could be visually observed.

During both types of measurements no rain periods were experienced. Minimal wind was induced on the microphone with light breeze periods being significantly below the 3 m/s threshold.

3.2 Measurement locations

The measurement locations were chosen to represent the three most affected sensitive receivers as outlined in the Operational Noise and Vibration Management Plan (ONVMP). The three most affected receivers prior to commencement of the measurements were identified based on the information in the Stage 2 Kerosene Vale Ash Repository operational noise review.

Due to the increased background noise level at each of the three monitoring locations it was difficult to assess individual truck noise events. A fourth noise monitoring location identified as Location D and shown in Appendix C, was selected closer to the haulage route to measure individual truck pass-by events. Table 2 and Figure 2 outline the noise measurement locations.

Table 2: Representative noise measurement locations

Measurement location	Measurement distance to haulage road (meters)	Representative sensitive receiver
A	300	60 Skelly Road
B	270	10 Skelly Road
C	145	21 Neubeck Street
D	80	-

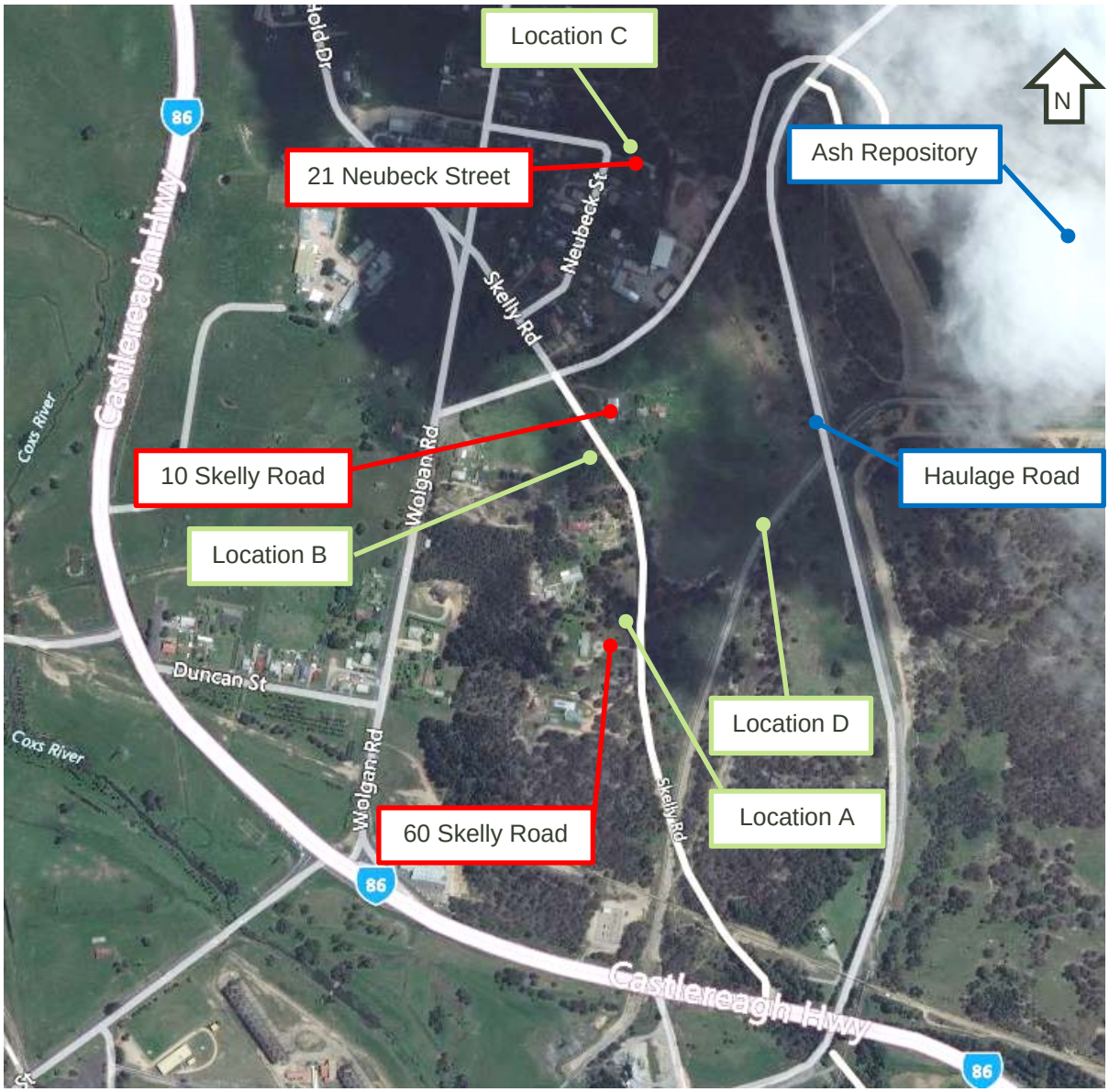


Figure 2 | Noise measurement locations

3.3 Operating and meteorological conditions

EnergyAustralia NSW has provided the following information regarding the operations during the noise survey.

- The ash silos normally operate at approximately 85% capacity.
- No trucks were operating during any of the measurement periods.

The meteorological conditions applicable to the noise survey period are based on meteorological data provided at 15 minute intervals from the Mt Piper weather station. This data is shown in Appendix D.

3.4 Results

3.4.1 Noise measurements

The results from the 15 minute ambient noise measurements at each of the measurement locations are shown in Table 3.

Noise measurements were conducted on Sunday 19th October and Monday 20th October 2014.

Table 3: Noise measurement results (15 minute)

Location	Date of measurement	Time	Sound pressure level (dBA)					Number of truck Pass-bys and direction of travel[1]		
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	North	South	Total
60 Skelly Road (A)	19/10/2014	9:02	41	65	33	39	34	0	0	0
		19:09	44	78	36	43	38	0	0	0
	20/10/2014	7:21	47	66	40	48	43	0	0	0
		19:48	41	60	34	42	37	0	0	0
10 Skelly Road (B)	19/10/2014	8:45	45	66	34	47	36	0	0	0
		18:52	42	58	37	43	39	0	0	0
	20/10/2014	7:04	50	67	44	51	46	0	0	0
		19:31	50	72	36	49	42	0	0	0
21 Neubeck Street (C)	19/10/2014	8:24	44	65	31	45	35	0	0	0
		18:33	43	58	37	45	39	0	0	0
	20/10/2014	6:44	48	67	43	49	45	0	0	0
		19:12	43	67	31	45	33	0	0	0

Note : 1 - Truck counts include ash trucks and light commercial trucks.

The measured $L_{Aeq\ (15\ min)}$ is generally in excess of the assessment criteria of $L_{Aeq\ (15\ min)}$ of 40 dBA. The high background noise levels at many of the measured locations were not contributed by KVAR operations. This is due to high noise levels associated with local noise events such as bird noise and traffic noise levels from surrounding roads.

3.4.2 SEL measurements

The individual truck pass-by noise event (SEL) measurements at Location D (approximately 80 meters from the haulage road) were conducted on 7th November 2011, 21st April 2013 and 31st March 2014. The results are summarised in Table 4. The number of actual truck pass-bys counted during the daytime survey are also summarised in Table 4. These will be used to predict the noise impact from the truck movement on the sensitive receivers. Based on the visual site inspection the grade (slope) of the haulage road rises from south to north. The trucks moving in the northerly direction on the haulage road appear to rev the engine more compared to the trucks moving in the opposite direction and thereby producing a marginally higher SEL as evident in the results summarised in Table 4.

Table 4: SEL noise measurement results at Location D

Date	Truck travelling direction	Average event duration (sec)	Average SEL (dBA)	No. of valid truck event measurements
7/11/2011	South	28.9	68	8
	North	18.1	70	9
21/04/2013	South	24.0	67	5
	North	19.5	70	7
31/04/2014	South	27.7	69	2
	North	28.3	70	2

4. Noise assessment

General observation regarding the ambient noise environment, as well as the truck movements and ash repository operations are described as follows. Operational noise from the KVAR site and the truck movements was inaudible at the noise sensitive receiver locations during all the attended noise measurements and no ash trucks were visible on the haul road.

The noise levels at all locations were affected by ambient noise sources such as bird/insects, domestic animals and domestic noise. Background noise was dominated by the intermittent traffic noise from nearby Castlereagh Highway and Wolgan Road.

4.1.1 Location A (60 Skelly Road)

The background noise contributions at Location A were predominantly from the traffic noise from Castlereagh Highway and distant traffic. Faint traffic noise from Wolgan Road was also audible. The haulage road was clearly visible from this location and no trucks were noticed on the haulage road. Noise from birds and insects also contributed to the ambient noise at this location.

The background noise level (L_{A90}) was observed to be generally consistent for 3 measurements conducted at this location except for 20/10/2014 morning measurements which was dominated by traffic noise from Castlereagh Highway.

4.1.2 Location B (10 Skelly Road)

The background noise contributions at Location B were predominantly from birds/ insects/ animals and traffic on Wolgan Road and Skelly Road. Traffic noise from Wolgan Road and Skelly Road was clearly audible at this location. The haulage road was clearly visible from this measuring location and no truck movement was noticed during the two day survey.

Even in the absence of truck pass-bys, background noise measurements on the morning of 20/10/2014 was relatively high due to traffic noise at Wolgan Road.

4.1.3 Location C (21 Neubeck Street)

The background noise contributions at Location C were predominantly from birds/insects/animals and distant traffic. Traffic noise from Wolgan Road was clearly audible and substantially contributed to the ambient noise levels. A faint hum was audible during all the measurements originating from Blackmans Flat direction, possibly from Mt Piper Power Station or the nearby mining area.

The haulage road was not clearly visible from this location because of an earth mound and heavy vegetation blocking the line of sight; however no truck engine noise was audible during the entire survey. Background noise (L_{A90}) during the Monday morning measurement was observed to be higher than rest of the measurements, predominantly due to heavy traffic on the Wolgan Road and nearby roads.

4.1.4 Location D

The noise data collected at Location D (Figure 2 and Appendix C) measured the SEL of individual truck pass-by events on 07/11/2011, 22/04/2013 and 31/04/2014. This location is closest to the truck haulage road and as such, each truck pass-by was the dominant noise source (clearly audible above other ambient noise sources) during these monitoring events.

5. Analysis and recommendations

5.1 Data analysis

As can be observed from the summary of noise survey presented above, the existing ambient noise levels $L_{Aeq\ (15\ min)}$ exceed the assessment criteria of $L_{Aeq\ (15\ min)}$ of 40 dBA on most of the occasions. The background noise (L_{A90}) from the various noise sources only exceeded the noise criteria of 40dBA on four occasions.

As there were no evident truck movements during the entire noise survey, the operational noise emissions from the Stage 2 KVAR is considered compliant with the Conditions of Approval.

6. Conclusion

Aurecon conducted ongoing operational noise monitoring for the Stage 2 KVAR located in Wallerawang, NSW. The noise measurements were carried out at the three most affected sensitive receiver locations on Sunday 19th October and Monday 20th October 2014.

The assessment criteria are outlined in the Project Approval, Application No. 07_0005, with a criterion of $L_{Aeq\ (15\ minute)}$ of 40 dBA from all ash haulage and placement associated operational noise emissions at the nearest sensitive receivers.

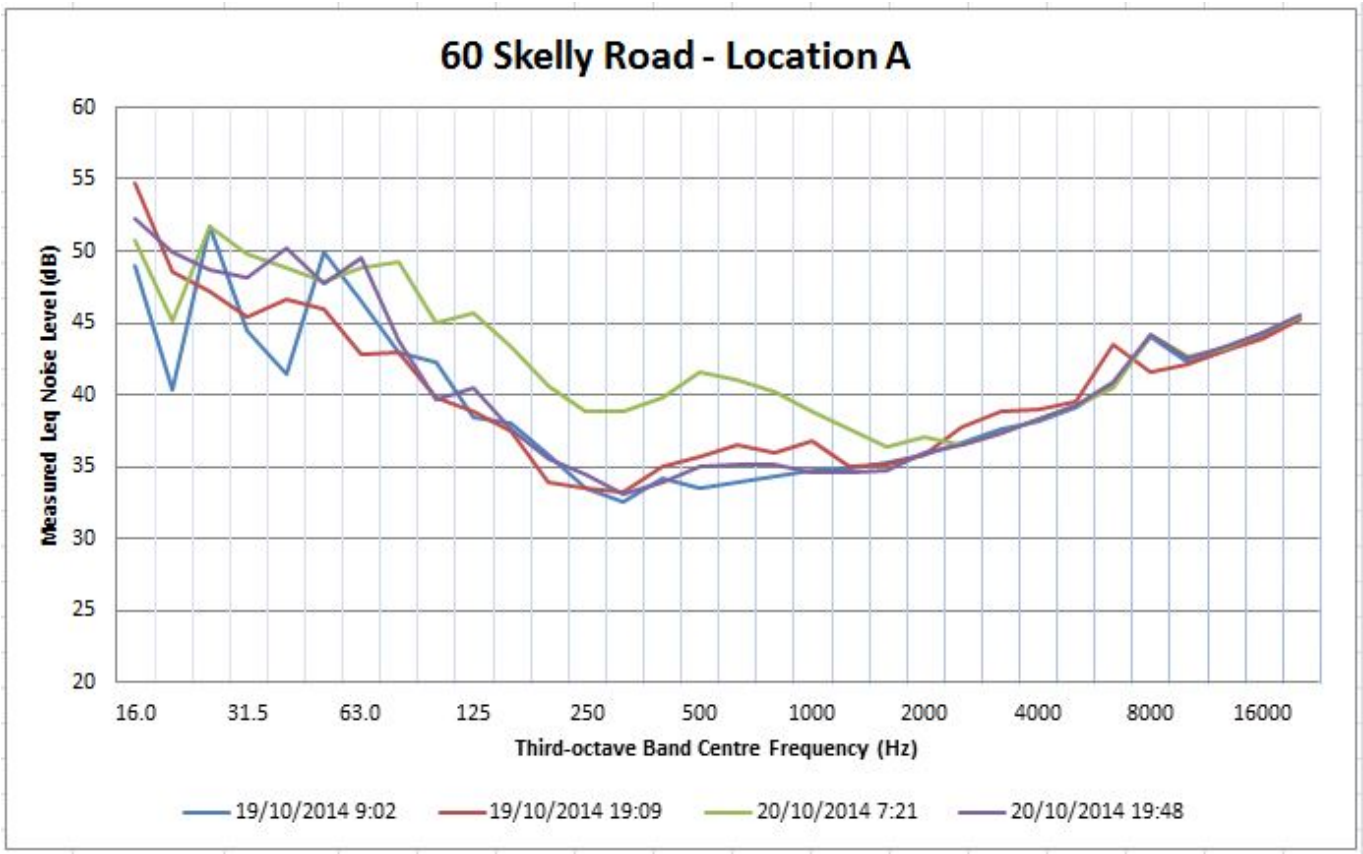
The primary contributor to the background and ambient noise levels at all survey locations was the traffic noise on the nearby roads. No ash truck movements were noticed during the entire noise survey, thus the operational noise emissions from the Stage 2 KVAR are considered compliant with the Conditions of Approval.

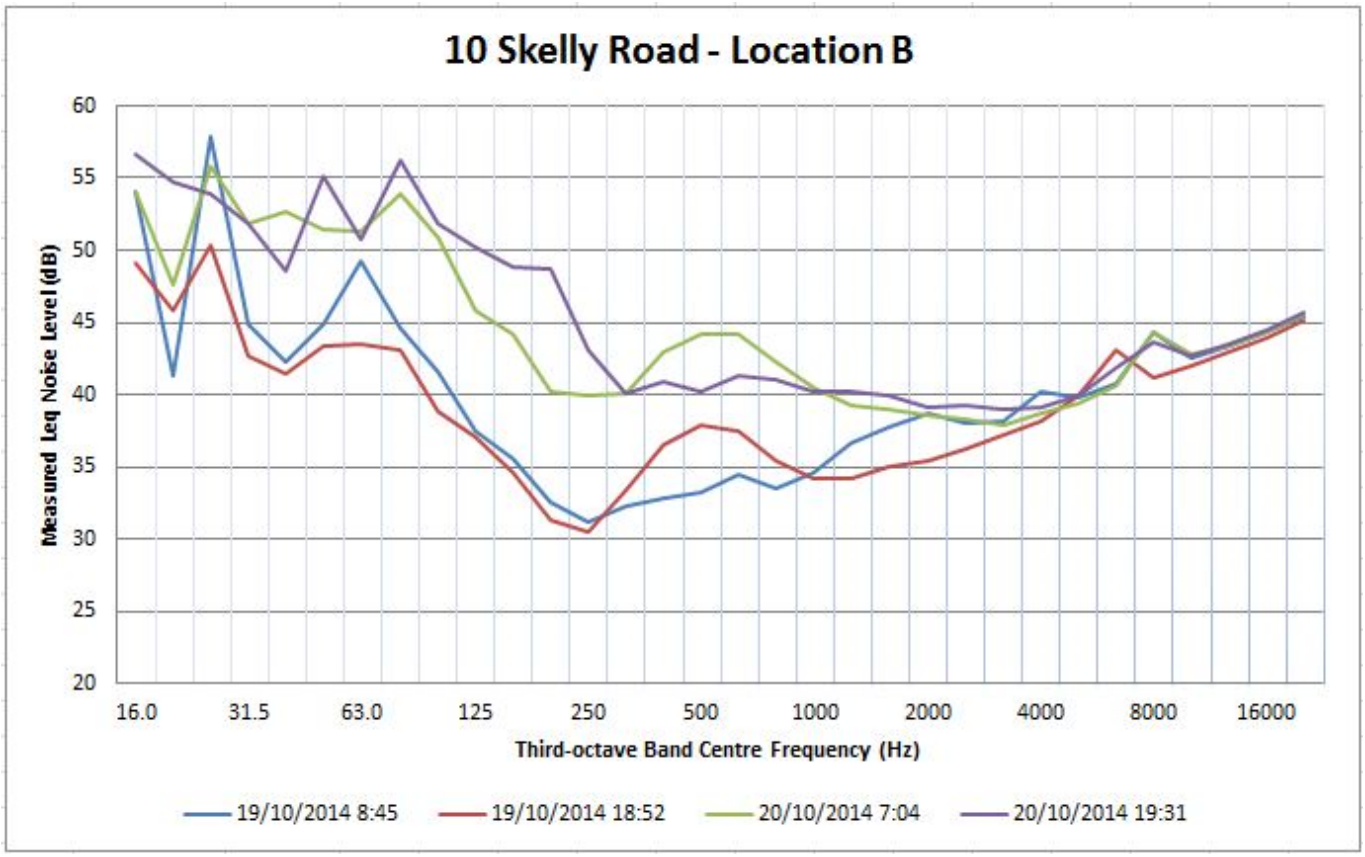
7. References

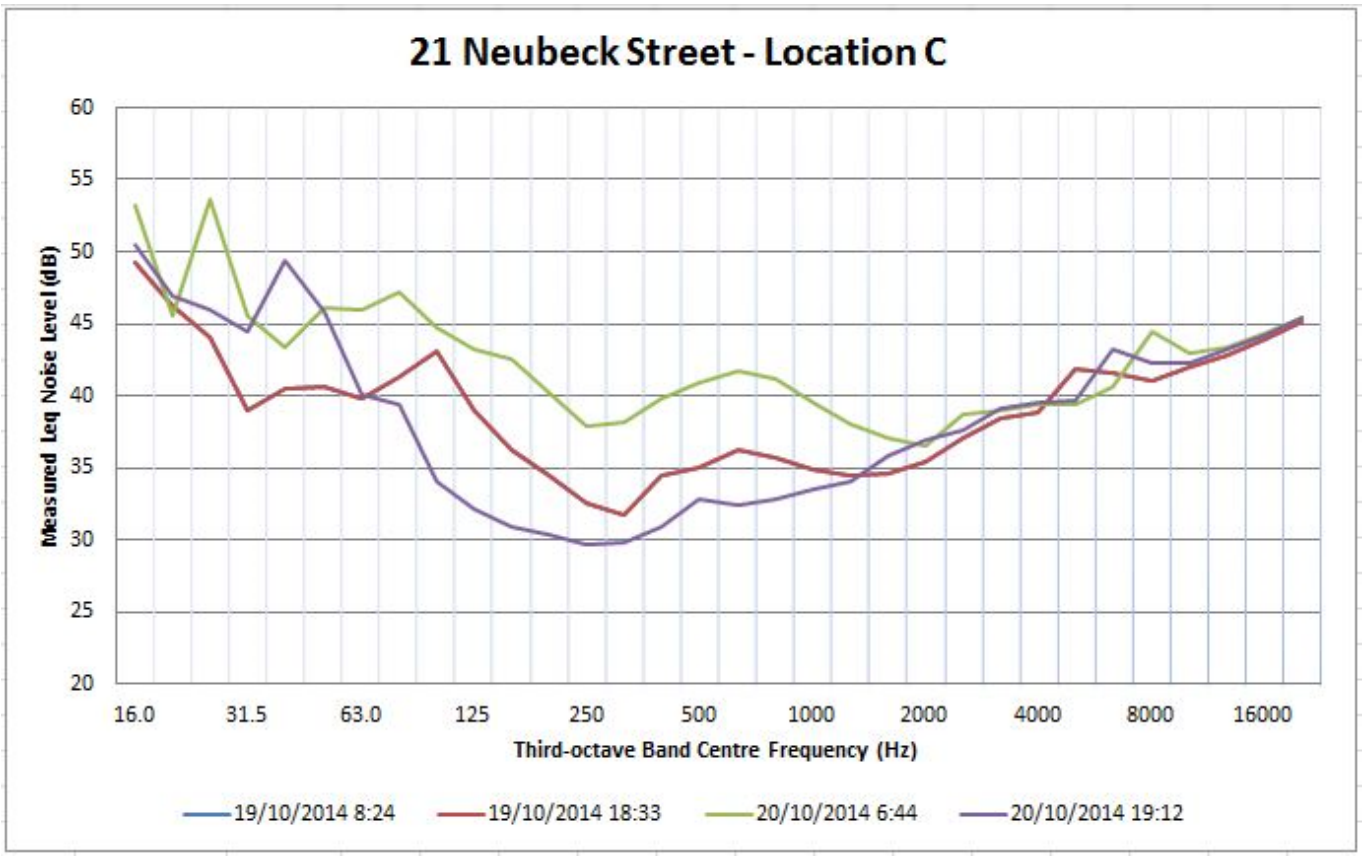
- Kerosene Vale Stage 2 Ash Repository, Operational Environmental Management Plan (OEMP), Parsons Brinckerhoff, April 2009, which includes:
  - Appendix A: KVAR Stage 2 Operations, Operational Noise and Vibration Management Plan (ONVMP), Parsons Brinckerhoff, April 2009
- Project Approval (PA), Application: No 07_0005, Delta Electricity, 26 November 2008, Department of Planning
- Stage 2 Kerosene Vale Ash Repository operational noise review, Parsons Brinckerhoff, September 2009.
- Office of Environment & Heritage (OEH) *Interim Construction Noise Guideline (ICNG).*
- Office of Environment & Heritage (OEH) *Industrial Noise Policy (INP)*.
- Australian Standard *AS 1055 1997: Acoustics – Description and measurement of environmental noise*.

Appendix A

Measured noise spectra


60 Skelly Road - Location A
Measured Leq Noise Level (dB)
60
55
50
45
40
35
30
25
20
16.0
31.5
63.0
125
250
500
1000
2000
4000
8000
16000
Third-octave Band Centre Frequency (Hz)
19/10/2014 9:02
19/10/2014 19:09
20/10/2014 7:21
20/10/2014 19:48


10 Skelly Road - Location B
Measured Leq Noise Level (dB)
60
55
50
45
40
35
30
25
20
16.0
31.5
63.0
125
250
500
1000
2000
4000
8000
16000
Third-octave Band Centre Frequency (Hz)
19/10/2014 8:45
19/10/2014 18:52
20/10/2014 7:04
20/10/2014 19:31


21 Neubeck Street - Location C
Measured Leq Noise Level (dB)
60
55
50
45
40
35
30
25
20
16.0
31.5
63.0
125
250
500
1000
2000
4000
8000
16000
Third-octave Band Centre Frequency (Hz)
19/10/2014 8:24
19/10/2014 18:33
20/10/2014 6:44
20/10/2014 19:12

Appendix B

Glossary of terms

Term	Definition
Sound Pressure Level	Sound or noise is the sensation produced at the ear by very small fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range (from 20 microPascals to 60 Pascals). A scale that compresses this range to a more manageable size and that is best matched to subjective response is the logarithmic scale, rather than a linear scale.
Sound Pressure Level (Lp)	Is defined as: $L_P = 10 \log_{10}\left(\frac{p^2}{p_{ref}^2}\right) dB$ In the above equation, p is the sound pressure fluctuation (above or below atmospheric pressure), and p_{ref} is 20 microPascals (2×10^{-5} Pa), the approximate threshold of hearing. To avoid a scale which is too compressed, a factor of 10 is included, giving rise to the decibel, or dB for short.
A-Weighted Decibel (dB(A)) & Loudness	In some circumstances, the sound pressure level is expressed as C-Weighted decibels, instead of the more common A-Weighted. The C-Weighting filter is designed to replicate the response of the human ear above 85 dB, and places a greater weighting on low frequency noise.
L_{Aeq}	The time averaged C-weighted sound pressure level for a time interval, as defined in AS1055.1. It is generally described as the equivalent continuous C-weighted sound pressure level that has the same mean square pressure level as a sound that varies over time. It can be considered as the average sound pressure level over the measurement period.
L_{Ceq}	The time averaged C-weighted sound pressure level for a time interval, as defined in AS1055.1. It is generally described as the equivalent continuous C-weighted sound pressure level that has the same mean square pressure level as a sound that varies over time. It can be considered as the average sound pressure level over the measurement period.
L_{An}	The sound level, which, for a specified time interval, in relation to an investigation of a noise, means the A-weighted sound pressure level that is equalled or exceeded for n% of the interval. Commonly used percentages are 1, 10, 90 & 99%.
L_{Cpk}	The peak C-weighted sound pressure level for a time interval.

Term	Definition
$L_{Cmax,T}$	The average maximum C-weighted sound pressure level, which, for the specified time interval, means the C-weighted sound pressure level during the interval obtained by using the fast time weighting and arithmetically averaging the maximum sound levels of the noise during the interval. Under certain conditions the 10th percentile noise level, $L_{C10,T}$, can represent the average maximum C-weighted sound pressure level.
L_{A10}	A-weighted noise level which is exceeded for only 10% of the measuring period. It is usually used as the descriptor for intrusive noise level and represents ambient road traffic noise in general.
L_{A90}	A-weighted noise level which is exceeded for 90% of the measuring period. It is usually used as the descriptor for background noise level during the measurement period.
L_{Amin}	Minimum A-weighted noise level detected during the measuring period. It refers to the minimum background noise detected.
Octave	Frequency bands allow a representation of the spectrum associated with a particular noise. They are an octave wide, meaning that the highest frequency in the band is just twice the lowest frequency, with all intermediate frequencies included and all other frequencies excluded. Each octave band is described by its centre frequency.
Maximum Exposure Time (Hours)	The maximum possible time a person can be safely exposed to a specific noise level (L_{Aeq}).
Sound Exposure Level (SEL)	Sound exposure level abbreviated as SEL and L_{AE}, is the total noise energy produced from a single noise event. The Sound Exposure Level is a metric used to describe the amount of noise from an event such as an individual aircraft flyover. It is computed from measured dBA sound levels. The Sound Exposure Level is the integration of all the acoustic energy contained within the event.

Appendix C
Site photograph

Figure 3 | Location D

Appendix D
Weather data

Table 5: Meteorological conditions during noise survey

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg)	Temp (°C)	Relative huimidity (%)
19/10/2014	0:00	0.0	1.3	257	5.2	100%
19/10/2014	0:15	0.0	1.2	246	5.1	101%
19/10/2014	0:30	0.0	0.7	224	4.8	100%
19/10/2014	0:45	0.0	1.4	252	4.4	101%
19/10/2014	1:00	0.0	1.3	235	4.6	101%
19/10/2014	1:15	0.0	0.8	255	4.3	102%
19/10/2014	1:30	0.0	0.7	250	4.1	102%
19/10/2014	1:45	0.0	0.3	245	4.0	102%
19/10/2014	2:00	0.0	0.9	228	3.9	102%
19/10/2014	2:15	0.0	1.1	256	4.0	103%
19/10/2014	2:30	0.0	0.8	241	3.8	102%
19/10/2014	2:45	0.0	0.5	257	3.6	102%
19/10/2014	3:00	0.0	1.2	242	3.6	103%
19/10/2014	3:15	0.0	0.3	247	3.8	103%
19/10/2014	3:30	0.0	0.7	259	3.4	103%
19/10/2014	3:45	0.0	0.5	227	3.5	103%
19/10/2014	4:00	0.0	0.2	296	3.2	103%
19/10/2014	4:15	0.0	0.4	235	3.1	103%
19/10/2014	4:30	0.0	0.4	245	3.0	103%
19/10/2014	4:45	0.0	0.9	257	3.0	103%
19/10/2014	5:00	0.0	0.6	247	2.8	103%
19/10/2014	5:15	0.0	0.7	254	3.1	104%
19/10/2014	5:30	0.0	1.2	220	3.2	104%
19/10/2014	5:45	0.0	1.4	230	4.1	104%
19/10/2014	6:00	0.0	0.6	245	5.1	104%

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg)	Temp (°C)	Relative huimidity (%)
19/10/2014	6:15	0.0	0.2	154	5.8	104%
19/10/2014	6:30	0.0	0.7	30	6.6	103%
19/10/2014	6:45	0.0	0.5	54	8.6	101%
19/10/2014	7:00	0.0	0.2	81	11.5	90%
19/10/2014	7:15	0.0	0.7	37	12.6	81%
19/10/2014	7:30	0.0	1.3	57	13.8	74%
19/10/2014	7:45	0.0	1.9	153	14.4	65%
19/10/2014	8:00	0.0	2.2	308	15.5	60%
19/10/2014	8:15	0.0	1.8	201	16.5	57%
19/10/2014	8:30	0.0	2.1	61	16.4	56%
19/10/2014	8:45	0.0	1.7	65	16.9	55%
19/10/2014	9:00	0.0	2.0	48	17.6	54%
19/10/2014	9:15	0.0	1.6	268	18.3	48%
19/10/2014	9:30	0.0	1.4	198	19.3	44%
19/10/2014	9:45	0.0	2.5	216	20.1	33%
19/10/2014	10:00	0.0	1.8	198	21.0	27%
19/10/2014	10:15	0.0	2.1	247	21.0	26%
19/10/2014	10:30	0.0	1.9	211	20.8	27%
19/10/2014	10:45	0.0	2.4	213	21.9	28%
19/10/2014	11:00	0.0	1.7	165	22.4	27%
19/10/2014	11:15	0.0	2.8	119	21.5	38%
19/10/2014	11:30	0.0	2.8	158	21.8	42%
19/10/2014	11:45	0.0	2.8	176	21.8	42%
19/10/2014	12:00	0.0	2.6	210	21.6	41%
19/10/2014	12:15	0.0	2.5	70	22.2	41%
19/10/2014	12:30	0.0	2.9	222	22.6	40%
19/10/2014	12:45	0.0	2.4	171	22.5	39%
19/10/2014	13:00	0.0	2.9	132	22.6	39%
19/10/2014	13:15	0.0	2.6	219	22.9	38%
19/10/2014	13:30	0.0	2.6	140	22.8	37%
19/10/2014	13:45	0.0	3.4	266	23.2	36%
19/10/2014	14:00	0.0	2.0	229	23.7	36%
19/10/2014	14:15	0.0	3.2	209	24.9	32%
19/10/2014	14:30	0.0	3.3	202	25.0	30%
19/10/2014	14:45	0.0	3.2	211	25.5	27%
19/10/2014	15:00	0.0	2.9	219	25.4	27%

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg)	Temp (°C)	Relative huimidity (%)
19/10/2014	15:15	0.0	2.3	233	24.4	28%
19/10/2014	15:30	0.0	2.9	227	23.8	30%
19/10/2014	15:45	0.0	3.3	218	23.8	31%
19/10/2014	16:00	0.0	3.1	211	24.0	31%
19/10/2014	16:15	0.0	3.2	216	24.3	30%
19/10/2014	16:30	0.0	3.1	227	23.8	32%
19/10/2014	16:45	0.0	2.6	225	22.2	36%
19/10/2014	17:00	0.0	2.1	232	20.9	42%
19/10/2014	17:15	0.0	1.9	226	20.6	45%
19/10/2014	17:30	0.0	1.7	233	20.8	45%
19/10/2014	17:45	0.0	1.5	253	19.3	53%
19/10/2014	18:00	0.0	1.1	222	17.6	61%
19/10/2014	18:15	0.0	1.1	209	16.4	64%
19/10/2014	18:30	0.0	1.0	211	15.3	69%
19/10/2014	18:45	0.0	0.6	196	14.7	71%
19/10/2014	19:00	0.0	0.8	187	13.9	75%
19/10/2014	19:15	0.0	0.5	206	13.2	77%
19/10/2014	19:30	0.0	0.5	266	13.1	77%
19/10/2014	19:45	0.0	1.0	236	12.5	81%
19/10/2014	20:00	0.0	1.1	255	12.0	82%
19/10/2014	20:15	0.0	1.3	256	12.0	82%
19/10/2014	20:30	0.0	1.4	244	11.5	85%
19/10/2014	20:45	0.0	1.3	244	11.2	85%
19/10/2014	21:00	0.0	1.4	242	10.9	86%
19/10/2014	21:15	0.0	1.3	248	10.6	87%
19/10/2014	21:30	0.0	1.3	245	10.3	88%
19/10/2014	21:45	0.0	1.2	257	10.2	88%
19/10/2014	22:00	0.0	1.1	248	10.0	89%
19/10/2014	22:15	0.0	1.2	249	9.5	91%
19/10/2014	22:30	0.0	1.3	240	9.4	92%
19/10/2014	22:45	0.0	1.2	251	9.3	92%
19/10/2014	23:00	0.0	1.2	248	9.1	94%
19/10/2014	23:15	0.0	1.2	239	9.3	94%
19/10/2014	23:30	0.0	1.2	252	9.5	94%
19/10/2014	23:45	0.0	1.3	231	9.3	94%
20/10/2014	0:00	0.0	1.1	247	9.2	95%

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg)	Temp (°C)	Relative huimidity (%)
20/10/2014	0:15	0.0	0.9	258	9.1	95%
20/10/2014	0:30	0.0	1.3	241	9.1	96%
20/10/2014	0:45	0.0	1.3	241	9.3	95%
20/10/2014	1:00	0.0	1.3	243	9.1	95%
20/10/2014	1:15	0.0	1.3	235	9.0	95%
20/10/2014	1:30	0.0	1.2	254	8.9	96%
20/10/2014	1:45	0.0	0.9	230	8.7	95%
20/10/2014	2:00	0.0	1.0	255	8.4	96%
20/10/2014	2:15	0.0	0.9	260	8.1	96%
20/10/2014	2:30	0.0	0.8	259	8.1	96%
20/10/2014	2:45	0.0	1.0	257	7.9	96%
20/10/2014	3:00	0.0	1.4	235	7.9	95%
20/10/2014	3:15	0.0	1.0	267	8.2	94%
20/10/2014	3:30	0.0	1.3	235	7.9	95%
20/10/2014	3:45	0.0	1.5	240	8.0	95%
20/10/2014	4:00	0.0	0.6	246	8.2	94%
20/10/2014	4:15	0.0	1.2	236	8.4	94%
20/10/2014	4:30	0.0	1.4	250	9.0	90%
20/10/2014	4:45	0.0	1.1	242	8.5	93%
20/10/2014	5:00	0.0	1.2	245	8.4	92%
20/10/2014	5:15	0.0	1.3	257	8.3	92%
20/10/2014	5:30	0.0	1.3	239	8.4	92%
20/10/2014	5:45	0.0	1.1	235	9.2	89%
20/10/2014	6:00	0.0	0.5	188	10.2	86%
20/10/2014	6:15	0.0	0.5	155	11.5	81%
20/10/2014	6:30	0.0	1.4	35	13.6	74%
20/10/2014	6:45	0.0	1.8	133	15.8	66%
20/10/2014	7:00	0.0	1.4	115	18.7	55%
20/10/2014	7:15	0.0	1.5	137	18.7	54%
20/10/2014	7:30	0.0	2.3	169	20.1	48%
20/10/2014	7:45	0.0	2.6	171	20.5	50%
20/10/2014	8:00	0.0	3.1	134	20.0	51%
20/10/2014	8:15	0.0	2.5	128	19.7	51%
20/10/2014	8:30	0.0	2.4	119	20.3	51%
20/10/2014	8:45	0.0	2.9	133	20.2	54%
20/10/2014	9:00	0.0	3.8	128	19.3	62%

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg)	Temp (°C)	Relative huimidity (%)
20/10/2014	9:15	0.0	3.8	119	17.9	67%
20/10/2014	9:30	0.0	4.0	120	17.6	68%
20/10/2014	9:45	0.0	3.7	121	17.4	68%
20/10/2014	10:00	0.0	3.8	127	17.5	67%
20/10/2014	10:15	0.0	4.3	128	17.1	69%
20/10/2014	10:30	0.0	3.5	124	16.9	70%
20/10/2014	10:45	0.0	3.2	123	16.8	70%
20/10/2014	11:00	0.0	3.6	127	16.0	73%
20/10/2014	11:15	0.0	3.5	127	16.5	72%
20/10/2014	11:30	0.0	3.4	132	16.6	72%
20/10/2014	11:45	0.0	3.8	132	16.4	72%
20/10/2014	12:00	0.0	3.4	121	16.2	72%
20/10/2014	12:15	0.0	2.6	115	16.0	73%
20/10/2014	12:30	0.0	2.8	118	16.5	71%
20/10/2014	12:45	0.0	3.1	107	16.5	71%
20/10/2014	13:00	0.0	4.3	109	15.9	72%
20/10/2014	13:15	0.0	3.9	112	14.9	76%
20/10/2014	13:30	0.0	3.9	105	14.4	78%
20/10/2014	13:45	0.0	3.9	113	13.8	81%
20/10/2014	14:00	0.0	3.8	120	13.9	80%
20/10/2014	14:15	0.0	4.0	116	13.4	82%
20/10/2014	14:30	0.0	3.3	119	13.1	83%
20/10/2014	14:45	0.0	3.5	119	12.9	83%
20/10/2014	15:00	0.0	3.6	117	12.6	84%
20/10/2014	15:15	0.0	3.3	113	12.4	84%
20/10/2014	15:30	0.0	3.5	125	12.8	82%
20/10/2014	15:45	0.0	3.4	124	13.0	80%
20/10/2014	16:00	0.0	4.0	121	12.8	81%
20/10/2014	16:15	0.0	3.8	124	12.4	83%
20/10/2014	16:30	0.0	3.0	104	12.0	85%
20/10/2014	16:45	0.0	3.4	115	11.7	88%
20/10/2014	17:00	0.0	2.9	114	11.4	90%
20/10/2014	17:15	0.0	3.1	114	11.2	91%
20/10/2014	17:30	0.0	3.3	119	11.3	89%
20/10/2014	17:45	0.0	2.4	108	11.3	88%
20/10/2014	18:00	0.0	2.9	114	11.2	89%

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg)	Temp (°C)	Relative huimidity (%)
20/10/2014	18:15	0.0	2.7	114	10.8	90%
20/10/2014	18:30	0.0	2.3	112	10.6	91%
20/10/2014	18:45	0.0	2.8	111	10.5	92%
20/10/2014	19:00	0.0	3.7	116	10.3	93%
20/10/2014	19:15	0.0	3.5	124	10.0	93%
20/10/2014	19:30	0.0	3.9	127	9.6	94%
20/10/2014	19:45	0.0	3.5	125	9.6	93%
20/10/2014	20:00	0.0	3.0	119	9.6	93%
20/10/2014	20:15	0.0	3.1	121	9.5	94%
20/10/2014	20:30	0.0	3.1	124	9.4	95%
20/10/2014	20:45	0.0	3.5	119	9.4	94%
20/10/2014	21:00	0.0	3.3	120	9.3	94%
20/10/2014	21:15	0.0	3.7	123	9.3	94%
20/10/2014	21:30	0.0	3.2	123	9.2	94%
20/10/2014	21:45	0.0	3.1	129	9.1	94%
20/10/2014	22:00	0.0	3.1	127	9.1	94%
20/10/2014	22:15	0.0	2.5	123	9.1	95%
20/10/2014	22:30	0.0	2.6	128	9.1	95%
20/10/2014	22:45	0.0	2.9	128	9.1	95%
20/10/2014	23:00	0.0	2.3	127	9.2	95%
20/10/2014	23:15	0.0	2.2	125	9.2	95%
20/10/2014	23:30	0.0	2.2	129	9.3	95%
20/10/2014	23:45	0.0	2.0	122	9.2	95%

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