APPENDIX C

Lamberts North Operational Noise Assessment – September 2018

aurecon

Project: Mt Piper Power Station Ash Placement

Lamberts North – Operational Noise Assessment September 2018

Reference: 246493-001

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Document prepared by:

Aurecon Australasia Pty Ltd
ABN 54 005 139 873
Level 2, 116 Military Road
Neutral Bay NSW 2089
PO Box 538
Neutral Bay NSW 2089
Australia

T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

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Author Signature		Approver Signature	
Name	Akil Lau	Name	Les Thorpe
Title	Acoustic Engineer	Title	Project Director

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Aurecon Australasia Pty Ltd
ABN 54 005 139 873
Level 2, 116 Military Road
Neutral Bay NSW 2089
PO Box 538
Neutral Bay NSW 2089
Australia
T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

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1 Executive summary

Aurecon has been engaged to undertake noise monitoring at the Lamberts North Ash Repository site to assess noise emissions against the applicable Conditions of Approval (CoA). Two sites are identified in the CoA (location 1 Blackmans Flat and Location 2 Wallerawang). The CoA requires that noise emissions from the Lamberts North site do not exceed $L_{Aeq(15min)}$ 42 dBA at either site during daytime operation.

Aurecon attended site to undertake noise measurements between 2 – 4 September 2018. The ambient noise levels measured at Location 1 and Location 2 exceed the $L_{Aeq\ (15min)}$ 42 dBA day time noise target. However, noise emissions from the Lamberts North site were subjectively inaudible and the noise environment was dominated by other surrounding simultaneous noise sources and activities including surrounding coal mines, road traffic, insects, etc. On this basis it is not possible to conclusively determine the noise contribution from the operational ash placement activities at Lamberts North site at Locations 1 and 2 between 2 – 4 September 2018.

To quantify the likely noise contribution at Location 1 and Location 2 from the Lamberts North site, calculations were undertaken to estimate the environmental noise emissions from the various identified activities. Based on the worst–case noise modelling predictions undertaken, the noise resulting from the operation of equipment and mobile plant at the Lamberts North site are below the $L_{Aeq(15min)}$ 42dBA CoA criterion and are therefore deemed to comply with the *Lamberts North Ash Placement Project – Operational Environmental Management Plan (May 2013)* at the representative residential receivers Location 1 and Location 2.

2 Introduction

2.1 Project understanding

On 16 February 2012, Delta Electricity received Project Approval (09_0186) under delegation from the Minister of Planning for the Mt Piper Ash Placement Project (the Project) under Section 75J - *Environmental Planning and Assessment Act 1979* to permit the continued disposal of ash generated by the Mt Piper Power Station into the Lamberts North area, which is an extension of the existing Mt Piper Ash Repository. The Project Approval was granted subject to Conditions of Approval. EnergyAustralia NSW acquired Mt Piper Power Station and associated land holdings and infrastructure from the state-owned Delta Electricity in September 2013. As such the project is now owned by EnergyAustralia NSW.

This report has been developed in accordance with the Lamberts North Ash Placement Project Condition of Approval (CoA) E11 and the mitigation measures specified in the Operational Environment Management Plan (OEMP May 2013). The OEMP outlines the requirements of the ongoing noise monitoring program and operational noise review in accordance with CoA's E7, E8, E9 and E11.

2.2 Background to the Project

Lamberts North Ash Repository is located immediately east of EnergyAustralia NSW's existing Mt Piper Ash Repository, which is described as Area 1 in the Environmental Assessment (EA) (SKM, 2010). Ash placement at Mt Piper Ash Repository is still currently being undertaken, but alternates with ash placement at Lamberts North.

Both sites are located in an area characterised by both rural and industrial influences, with a number of coal mines in relatively close proximity. The project site is predominately surrounded by Ben Bullen State Forest, which lies to the north and south east of Mt Piper Power Station, together with open cut coal mines and coal washeries. Wallerawang Power Station which is also owned by EnergyAustralia NSW, lies to the south east of the project site, approximately 5 km away, but is no longer operational following the announcement in November 2014, that the power station would be closed.

Lamberts North ash repository is approximately 53 hectares.

Historically, the Lamberts North area has been highly disturbed as a result of extensive mining activities including underground working (from the 1950s to the early 1990s) and recent open-cut mining activities being carried out by Centennial Coal.

EnergyAustralia NSW has engaged a principal contractor (Lend Lease) to manage and operate both the Mt Piper (Area 1) and Lamberts North ash repositories. Operations at Lamberts North commenced on 2 September 2013.

2.3 Scope of work

In accordance with CoA E11, the scope of work includes noise assessment comprising of attended / unattended noise measurements at two sensitive receiver locations to determine potential noise impacts arising from the operational activities at Lamberts North ash repository.

2.4 Sensitive receivers

The sensitive receivers located within the vicinity of the Project and identified for noise impacts within the Operation Noise Management and Monitoring Plan (ONMMP), a sub plan of the OEMP, are

described in Table 1 below. The two sensitive receivers closest to the site are located at Blackmans Flat approximately 1.4 km to the east of Lamberts North and at Wallerawang approximately 2.5 km south east of Lamberts North.

A third location 'Location 3' has been used as an additional location to measure the reference noise levels from the operational activities. Measurements at location 3 / 3A are within the Lambert's North site and are used for reference only and monitoring requirements at these locations are not covered in the ONMMP.

The positions of the measurement locations are shown in Figure 1.

Table 1 | Sensitive receivers nearest to Lamberts North

Location ID[a]	Description	Map Coordinates	Noise monitoring location	Distance from Lamberts North Ash Repository
1	Blackmans Flat	33.36468ºS 150.05904ºE	Located at the western end of Noon Street on the southern side of the road. Positioned at the boundary of the residential property 90 m from the Castlereagh Highway.	1.4 km east
2	Wallerawang	33.37765ºS 150.06073ºE	Situated on a rural property southeast of Lamberts North, and approximately 1.3 km from Castlereagh Highway.	2.5 km south east
3	Lamberts North	33.35745ºS 150.04206ºE	Additional location at the south eastern boundary of the Lamberts North site	Within the Lamberts North site
3A	Lamberts North	33.3583ºS 150.04527ºE	Additional location at the south western boundary of the Lamberts North site	

[a] Refer to Figure 1 for locations

Figure 1 | Environmental noise monitoring locations

3 Operations at Lamberts North

3.1 Operation methodology

Key potential noise impacts during operational activities at Lamberts North and Mt Piper Ash Repository sites are listed below:

- Transporting fly ash and bottom ash to the ash repository using haulage trucks along the designated haul roads;
- Placing ash in stockpiles in designated areas before being spread out by a dozer;
- Compacting the ash using a dozer and roller;
- Maintenance on the haulage roads using a grader, roller, dozers and water carts;
- Dust suppression across the site using a series of techniques including but not limited to water carts and sprinkler systems;
- Developing and maintaining water management structures (containments, drains and sumps) using an excavator;
- Using various sized pumps on site to pump water from various water sources;
- Using light vehicles on occasion to inspect the ash repository and carry out environmental monitoring;
- The machinery and plant generate noise from the engine and drive line, hydraulics and reverse warning devices.

3.2 Activities at Lamberts North

The Mt Piper and Lamberts North sites are located adjacent to each other. Ash deposition at the Lamberts North site or Mt Piper site is dependent on many factors which are decided on a weekly basis by the Lend Lease environmental manager.

During the site visit from 2 – 4 September 2018, ash placement operations were occurring at Lamberts North site but no ash placement was occurring at Mt Piper Ash Repository (Area 1).

The equipment outlined in Table 2 was evident at Lamberts North during the site visit.

Noise generated from some of the equipment at a distance of seven metres was measured at Lamberts North by Aurecon in January 2013 (*Lamberts North Construction Noise monitoring 14-15 January 2013*). Sound Power Levels (SWL) for the rest of the equipment were referenced from *AS 2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites*. Another set of measurements were conducted on 03/09/2018 which are also referenced in Table 2.

Below is the summary of activities identified at Lamberts North during the site visit:

- The day activities started at 06:00 for a 06:15 start, which included the daily tool box talk and work related discussions.
- The equipment on site consisted of a dozer, a dump truck, a water cart and one light commercial vehicle based on the initial briefing provided to us by the Lend Lease security officer prior to attending the site. Appendix F shows the copy of site attendance sheet signed by plant operators.

- The dump truck was being loaded with ash near the ash bins and was unloaded at the junction of Lamberts North and Mt Piper ash repository sites.
- The dozer was operating on the ash stock pile, but was not visible or audible at monitoring Location 3.
- One water cart was sighted but was only operating occasionally as required.
- The light commercial vehicle was occasionally being used to transport drivers.

- All activities ceased by 17:00. No activities occurred during the evening or night time period (18:00 – 06:00) at either the Lamberts North or Mt Piper sites.

Table 2 | Equipment sighted at Lamberts North and Mt Piper site during the site visit

Equipment type	Number of equipment on site during the site visit	Sound Power Level SWL for each equipment type dBA[b]
Dozer / Crawler tractor**	1	105
Excavator	1	108
Dump Truck**	2	102
Water Cart / truck*	1	101
Light commercial vehicle	1	100

* Sound Power Levels (SWL) calculated based on noise measurements at a distance of 7 m which were carried out during a previous site visit (see Mt Piper Power Station Ash Placement Project – Lamberts North Construction Noise monitoring 14-15 January 2013, Revision 2, dated 11 February 2013).

**Another set of measurements were undertaken during 2 – 4 September 2018 site visit for the Dump Truck and Dozer.

3.3 Description of the surrounding environment

The Lamberts North site is predominantly surrounded by Ben Bullen State Forest with open cut coal mines and coal washeries. Noise sources, other than those resulting from ash placement activities, were audible during the site visit (e.g. light to heavy vehicles on distant road, animal noises, etc.) and contributed to the cumulative noise at the measurement location (Location 2).

Activities at Springvale colliery which is operated by Centennial Coal and lies to the south east of the site includes, but is not limited to the transportation of coal via conveyors, operation of equipment and mobile plant, etc. may also contribute to the cumulative noise at the measurement locations. Pine Dale coal mine is located to the north east of the site, but is unlikely to contribute to the cumulative noise at the measurement locations as the mine is currently under care and maintenance (i.e. non-operational).

[b] SWL includes adjustment for tonality.

4 Noise criteria

4.1 Conditions of Approval relating to noise

The ONMMP seeks to address the specific requirements of the CoA attached to the Project Approval for Lamberts North, insofar as they relate to noise and vibration during operation.

CoA E7 and CoA D3a(ii) define the operational noise requirements for the project, to ensure noise emissions from operational activities do not exceed the criteria shown in Table 3 below.

Table 3 | Operation noise criteria

Location	$L_{Aeq\ (15\ minute)}$ dBA		
	Day Time (7:00 – 18:00)	**Evening Time (18:00 – 22:00)**	**Night Time (22:00 – 7:00)**
All private receivers within the township of Blackmans Flat	42	38	35
All other residences	42	38	35

Note: These criteria do not apply where the Proponent and an affected landowner have reached a negotiated agreement in regard to noise, and a copy of that agreement has been forwarded to the Director-General and the NSW EPA.

4.2 Operational hours

In accordance with the CoA E1, operational activities associated with the project shall only be undertaken from 6:00am to 8:00pm Monday to Friday and 6:00am to 5:00pm Saturday and Sunday. Operations outside the hours stipulated above are only permitted in emergency situations.

5 Noise survey

5.1 Methodology

Attended and unattended noise measurements were conducted from 2 – 4 September 2018 at the boundary of the nearest residential properties (Location 1 and Location 2) likely to be exposed to noise from the ongoing ash placement operation.

The statistical noise measurements including the averaged A-weighted noise levels (L_{Aeq}), maximum A-weighted noise levels (L_{Amax}) and statistical A-weighted L_{A90} and L_{A10} noise levels[c] were conducted using a Larson Davis 831 Type 1 sound level meter equipped with a LD PRM831 pre-amplifier and a PCB 377B02 ½" microphone. The microphone 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 m and at least 3.5 m from any reflecting structure other than the ground. Maximum wind speeds at the microphone position was predominantly less than 5 m/s. The measurement period at each location was 15 minutes. A Larson Davis CAL200 was utilised to calibrate the sound level meter before and after each series of measurements with no significant calibration drift noted (less than 1 dB). Measurements were taken in general accordance with the Australian Standard *AS 1055 1997: Acoustics – Description and measurement of environmental noise*. Table 4 shows the equipment used for all the measurements undertaken on site.

Table 4 | Sound pressure level measurement equipment

Equipment	Make	Model	Serial No.	Type	Last Calibration	Calibration Due
Sound Level Meter	LD	831	0001595	1	19/08/2016	19/08/2018
Noise logger 1	LD	LXT	1719	1	11/09/2016	1/09/2018
Noise logger 2	LD	LXT	1667	2	29/09/2016	29/09/2018
Calibrator	LD	CAL200	6345	-	14/02/2016	14/02/2018

Noise measurements were conducted at three locations (as shown in Figure 1).

5.2 Weather data

Clear sky and intermittent wind was prevalent at Location 3 and 3A over the attended monitoring period on 2 – 4 September 2018. Clear sky and intermittent wind with speeds of less than 1.5 m/s was apparent over the monitoring period at Location 1 and Location 2.

Weather data for the monitoring periods, as provided by the Mt Piper weather station (located within the Mt Piper Power Plant site), is shown in Appendix E. Noise measurement data with wind speeds higher than 5m/s was excluded from the assessment during that time.

As discussed in Section 3.2, there was no ash placement activity during the evening or night time period (18:00 – 06:00). In accordance with the NSW Noise Policy for Industry (NPI), activities at the

[c] For an explanation of the acoustic terms please refer to the attached Glossary of Terminology in Appendix A

Lamberts North site during 06:00 – 07:00 are not considered as night time activity as this time period falls within the defined shoulder period[d].

As per Appendix C (*Procedure of assessing noise increase due to temperature inversions*) of *NSW Noise Policy for Industry, "if the development does not operate at night, there is no potential for noise impact due to inversions, and no further consideration of these effects is required"*.

Below is the summary of weather conditions prevalent during the noise monitoring periods which complies with the CoA E7 and CoA D3a(ii):

- Wind speeds were less than 3 m/s at 10 m above ground level for most of the time.
- Stability Category F temperature inversion conditions were not prevalent during the operational activities.
- Stability Category G temperature inversion conditions were not prevalent during the operational activities.

5.3 Noise measurement results

During the monitoring works, both attended and unattended monitoring was undertaken.

- Unattended continuous monitoring was undertaken at Location 1 and Location 2 from 11:00 am on 02 September to 09:00 am on 04 September 2018. Detailed results of continuous noise measurements over each 15-minute period are shown in Appendix D and average sound pressure levels over the day, evening and night-time monitoring periods is provided in Table 5.

  As noted in Appendix D and E, wind speeds greater than 5 m/s were experienced at the weather station for a few hours. The measured noise data during these periods was excluded from the overall measurements to ensure compliance with conditions CoA E7 and CoA D3a(ii).

- Attended noise monitoring was also undertaken at all three locations. Multiple 15-minute measurements were undertaken and Table 5 provides a summary of the noise monitoring results for each location.

A list of operating equipment identified at the Lamberts North site is outlined in Section 3.

Table 5 | Results of environmental noise monitoring

Note: rows in grey are results of attended monitoring, rows in white are results of unattended monitoring

Location	Date	Time	Period	Measured sound Pressure Level, dBA				Note
				$L_{Aeq, 15min}$ #	$L_{A10, 15min}$ ^^	$L_{A90, 15min}$ ^	$L_{Amax, 15min}$ *	
Location 1 *(Blackmans Flat)*	02/09/2018	10:14	Day	49	53	39	64	Note 1
	03/09/2018	9:27	Day	55	58	44	71	
	02/09/2018	7am-6pm	Day	55	58	47	76	
		6pm-10pm	Evening	51	57	40	70	
		10pm-7am	Night	49	55	42	66	
	03/09/2018	7am-6pm	Day	53	56	45	78	
		6pm-10pm	Evening	50	56	40	68	

[d] As per NSW Noise Policy for Industry Section 3.3 (Dealing with 'shoulder' periods): For early morning (5am-7am) operations, it may be unduly stringent to expect such operations to be assessed against the night time criteria-especially if existing background noise levels are steadily rising in the these early morning hours.

				Measured sound Pressure Level, dBA				
		10pm-7am	Night	48	55	36	69	
Location 2 *(Wallerawang)*	02/09/2018	10:37	Day	45	46	40	66	Note 2
	03/09/2018	9:01	Day	46	47	43	69	
	02/09/2018	7am-6pm	Day	42	44	37	87	
		6pm-10pm	Evening	42	44	34	64	
		10pm-7am	Night	45	44	40	83	
	03/09/2018	7am-6pm	Day	44	44	41	81	
		6pm-10pm	Evening	41	45	30	63	
		10pm-7am	Night	49	45	28	90	
Location 3 *(South eastern boundary of Lamberts North)*	02/09/2018	9:38	Day	57	58	55	70	Note 3
	03/09/2018	10:11	Day	42	43	38	73	

Measurements that were affected by rain and wind speeds higher than 5m/s were excluded from the assessment.

N/A refers to no recorded measurements from the noise logger due to equipment outage. As there was no activity during the night time period, the outage had no effect on the outcome of the final assessment.

L_{Aeq} refers to A-weighted equivalent continuous sound pressure level over measurement period. It is used to quantify the average noise level over a time period.

^^ *L_{A10} refers to the 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.*

^ *L_{A90} refers to the 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_{Amax} refers to the maximum A-weighted noise level detected during the measuring period. It refers to the maximum background noise detected.*

5.4 Discussion of results

5.4.1 Note 1 (Residence - Location 1)

We have been advised by EA NSW that this site has been purchased by Centennial Coal and currently there are no residential receivers on the site. Regular noise monitoring as per OEMP May 2013 is being conducted at this site.

From site observations at residential Location 1 (i.e. Blackmans Flat) during the attended noise monitoring, the ambient noise was dominated by the traffic along Castlereagh Highway, local domestic and natural noises (e.g. insects, etc.). There was no audible noise from the westerly direction (i.e. Centennial Coal, Springvale Mine, Lamberts North, etc.).

The maximum equivalent continuous sound pressure level over 15 minutes at Location 1 was measured at $L_{Aeq\ (15minute)}$ 55 dBA. Birds and insects contributed to the $L_{Amax\ 15\ minute}$ of 64 - 78 dBA in the day/ evening/ night time.

5.4.2 Note 2 (Residence - Location 2)

The background noise level (L_{A90}) at the rural residential Location 2 (i.e. Wallerawang) was similar to the background noise level at Location 1, especially during the evening time measurements. Noise contribution during the day and evening time period included noise from insects and birds. Other sources of ambient sound at this site included natural sounds (from wind noise, etc.) and distant vehicle traffic noise.

Subjectively on site there was no evidence of noise originating from the north westerly direction, thus indicating that noise contribution from Lamberts North to the overall equivalent sound pressure level at this location was negligible. Given the buffer distance of at least 2.5 km between Location 2 and Lamberts North, and with the intervening topography, the operational noise impact during day time at this location is considered to be minimal or insignificant.

Maximum equivalent continuous noise over 15 minutes at Location 2 was measured at $L_{Aeq\ (15minute)}$ 49 dBA. Birds and insects contributed to the $L_{Amax\ 15\ minute}$ of 63 - 90 dBA in the day/ evening/ night time.

5.4.3 Note 3 (Lamberts North eastern boundary - Location 3)

Further to the assessments at Location 1 and location 2 required as part of the assessment of compliance against the CoA, additional measurements were undertaken at the South eastern boundary of Lamberts North site.

From site observations at the south eastern site boundary of Lamberts North during attended noise monitoring, noise was clearly audible from the mobile plant operating on Lamberts North. The noise varied and included sources such as engine noise from the dump trucks, reverse beeps from dozer/ trucks, bucket bangs of the dozer, loading of ash in the dump truck, etc.

5.5 Previous monitoring data

Summary of previous data collected for Lamberts North is presented below in Table 6.

Table 6 | Summary of previous environmental noise monitoring data

Location	Period	Measured Equivalent Sound Pressure Level, L_{Aeq} dBA						
		March 2015	September 2015	March 2016	October 2016	April 2017	November 2017	April 2018
Location 1 *(Blackmans Flat)*	Day	53	52	52	56	56	56	56
	Evening	50	50	49	53	52	51	51
	Night	49	47	47	51	50	48	49
Location 2 *(Wallerawang)*	Day	41	45	45	49	60	42	49
	Evening	42	41	45	46	46	40	44
	Night	41	41	43	51	44	44	43

		Measured Equivalent Sound Pressure Level, L_{Aeq} dBA						
Location 3 *(South eastern boundary of Lamberts North*	Day	54	57	52	54	56	57	66

6 Noise assessment

The results of the measured noise levels at the sensitive receivers stipulated in the CoA (Location 1 and Location 2) can be found in Table 5 above. As discussed in Section 4, maximum 15 minute daytime equivalent sound pressure levels (L_{Aeq}) at both the receiver locations were dominated by traffic noise, birds, insects, low hum from Mt Piper Power Station and noise from nearby coal mines. These measured equivalent sound pressure levels were in excess of the 42 dBA day time noise target as per Table 3, however, operational noise from Lamberts North was inaudible at both the sensitive receivers. As the operational noise contribution from Lamberts North was inaudible, Aurecon undertook a desktop based noise prediction to estimate the noise contribution from the operational activities. This is described in more detail in the following section.

The operational activity at Lamberts North site commenced each day from approximately 06:00 until 17:00 during our site visit. There were no operational activities between 17:00 and 06:00.

6.1 Predicted noise contribution

For the purpose of this assessment, the worst case scenario of the following equipment operating simultaneously at the same location at Lamberts North, was considered. Refer to Table 2 for construction itinerary.

We note that the magnitude of the noise emission during the operation of the project may vary and will depend on the number and intensity of machines operating and the working location of the equipment. It is unlikely that all the plant and equipment will be running simultaneously in the same location. In addition the nature of activities onsite is expected to vary from day to day.

The predicted noise levels were calculated (based on sound propagation through geometric spreading) at a distance based on worst case noise emission levels (i.e. maximum sound power levels) without considering any barrier effects from the undulating surrounding terrain. However due to intermittent operational characteristics and constant change of distance between the source-receiver, a 50% operational efficiency (equipment operational for 50% of the time during each 15-minute measurement period) for each equipment type in the calculation has been used. The results of this calculation are shown in Table 7.

It should be noted that the predicted levels in this section are worst case for each of the above operational activities at the assessment locations and include adjustments for annoying activities as outlined in the Interim Construction Noise Guideline (ICNG). The above prediction methodology takes into account the number of individual machines operating as well as the percentage in use during a 15 minute period, with all scheduled equipment operating at the minimum distance from the nearest sensitive receiver.

The predicted levels in Table 7 provide a theoretical maximum cumulative noise impact. The distances shown in Table 7 are considered minimum between the operational works and the respective receiver zones. The calculation also assumes that each item of equipment is operating at maximum capacity (i.e. maximum sound power level). In reality the mobile plant operate at much lower capacity during its operation and hence the levels shown in Table 7 are considered conservative and should be interpreted as indicative worst case only.

Table 7 | Predicted noise emission from Lamberts North equipment

Equipment at Lamberts North	Sound Power Level (SWL), dBA	Predicted sound pressure level at indicated distance, $L_{Aeq\ (15min)}$ dBA	
		1.4 km (Location 1)*	2.5 km (Location 2)*
General activity at Lamberts North			
Dozer / Crawler tractor	105	32	27
Excavator	108	34	29
Dump Truck x 2	102	35	30
Water cart	101	27	22
Light commercial vehicle	100	26	21
Worst case predicted noise level from the operation of the above equipment		**38**	**33**
Daytime noise criterion		**42**	**42**

As shown in Table 8, results of our assessment revealed the following:

- Worst case modelling predicted that noise levels would comply with the day and evening time criteria at both Location 1 and Location 2 as shown Table 8.
- Worst case modelling indicates that the maximum predicted noise level will exceed the noise criteria during night time at Location 1. However CoA E1 for Lamberts North restricts any activities after 20:00 on weekdays and 17:00 on weekends (refer to Section 4.2 for more details), and therefore any predicted night time exceedance is not relevant.

Table 8 | Summary of maximum predicted noise level against the noise criteria (dBA)

Location*	Description	Maximum theoretical predicted noise	Day limit 42 dBA (07:00-18:00)	Evening limit 38 dBA (18:00-22:00) ^	Night limit 35 dBA (22:00-07:00) ^
1	Blackman's Flat	38	✓	N/A	N/A
2	Wallerawang	33	✓	N/A	N/A

✓ Complies with the stipulated noise criteria

^ No operational activity during Evening or night time periods.

* Refer to Figure 1 for receiver locations

As evident from Table 8 above, the worst case noise associated with the operational activities at Lamberts North is predicted to comply with the stipulated noise criteria at both the sensitive receptors for the day periods. The noise emission predictions correlate the on site observations as the predicted emissions at Location 1 and Location 2 are greater than 10 dB below the ambient background noise levels measured on site and would thereby be subjectively inaudible.

7 Recommendations

7.1 Noise management measures

Should complaints from the community be received, the following noise control measures could be applied to minimise environmental noise emission from Lamberts North during operation of the project:

- If possible avoid the coincidence of noisy plant/machine working simultaneously.
- Construction trucks and other heavy machinery to use loop tracks as much as possible on the site to minimise the amount of reversing activities, i.e. managed through the Operational Traffic and Transport Management Plan.
- Consider the use of alternative warning system to the conventional single tone reversing alarm, such as broadband sound reversing alarm (e.g. BBS-TEK Backalarms) and warning lights.
- Installation of additional silencer/mufflers on the engine exhaust for plant working at Lamberts North.

8 Conclusion

Attended and unattended noise monitoring at Lamberts North has been carried out by Aurecon from 2 – 4 September 2018 in accordance with Australian Standard "*AS1055.1-1997 Acoustics – Description and measurement of environmental noise, Part 1: General procedures*" using a Type 1 LD 831 sound level meter. Worst case noise predictions were also carried out to provide an estimate of the noise contribution from operational activities at Lamberts North.

8.1 Location 1: Blackman's Flat

The environmental survey results revealed that the ambient noise at Location 1 (i.e. Blackmans Flat) was relatively high and the maximum equivalent continuous sound pressure level over 15 minutes at Location 1 was measured at $L_{Aeq\ (15minute)}$ 55 dBA. The measured noise levels were dominated by the intermittent road traffic along Castlereagh Highway and some local domestic noises. Attended measurements indicated that noise emissions from the Lamberts North site were subjectively inaudible at the Location 1 site.

The maximum predicted noise contribution resulting from the operation of equipment/ plant at the Lamberts North site at Location 1 was determined to be 38 dBA as shown in Table 7. This contribution is deemed to comply with the requirements of the CoA.

8.2 Location 2: Wallerawang

The background noise level at Location 2 (i.e. Wallerawang) was relatively similar to the background noise level at Location 1 especially during evening time monitoring. The main sources of ambient sound at Location 2 were the natural sounds from wind noise, insects, bird/wildlife, etc. and distant vehicle traffic noise.

Subjectively there was no evidence of noise originating from the north westerly direction at Location 2. This suggests that noise contribution from Lamberts North to the overall equivalent sound pressure level at this location is negligible. Maximum equivalent continuous noise over 15 minutes at Location 2 was measured at $L_{Aeq\ (15minute)}$ 49 dBA.

The maximum predicted noise contribution resulting from the operation of equipment/ plant at the Lamberts North site at Location 2 was determined to be 33 dBA as shown in Table 7. This contribution is deemed to comply with the requirements of the CoA.

8.3 Summary

The ambient noise levels measured at Locations 1 and 2 exceed the 42 dBA day time noise target. However, it is not possible to conclusively determine the noise contribution from the operational ash placement activities at Lamberts North site at Locations 1 and 2 between 02 - 04 September 2018 due to the presence of other surrounding simultaneous noise sources and activities including surrounding coal mines, road traffic, insects, etc.

Based on the worst case noise modelling predictions undertaken, the noise resulting from the operation of equipment and mobile plant at the Lamberts North site comply with the *Lamberts North Ash Placement Project – Operational Environmental Management Plan (May 2013)* at the representative residential receivers Location 1 and Location 2.

9 References

Measurements and assessment of the construction activities were carried out in accordance with:

- Office of Environment & Heritage (OEH) *Interim Construction Noise Guideline (ICNG).*
- Australian Standard *AS 1055 1997: Acoustics – Description and measurement of environmental noise*.
- Australian Standard *AS 2436-2000 Guide to noise and vibration control on construction demolition and maintenance sites*.
- Lamberts North Ash Placement Project – Operational Environmental Management Plan (OEMP) May 2013.
- *Delta Electricity Project Conditions of Approval for Mt Piper Power Station Ash Repository Extension Project (approved on 16 February 2012).*
- *Mt Piper Power Station Ash Placement Project – Lamberts North Construction Noise monitoring 14-15 January 2013 (Revision 2, dated 11 February 2013)*
- *NSW EPA Noise Policy for Industry (2017)*

Appendix A
Glossary of terms

Term	Definition
Sound Pressure Level (Lp)	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 (dBA) & 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%.

Term	Definition
L_{Cpk}	The peak C-weighted sound pressure level for a time interval.
$L_{Cmax,T}$	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_{AF}	Instantaneous A-weighted noise level is the noise displayed for each second of the measurement during the entire monitoring.
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}).

Appendix B
Photos of noise monitored locations at Blackmans Flat and Wallerawang

Figure 2 | Photograph of Measurement Location 1 (Blackman's Flat)

Figure 3 | Photograph of Measurement Location 2 (Wallerawang)

Figure 4 | Photograph of Lamberts North South eastern boundary

Figure 5 | Photograph of Lamberts North South eastern boundary with a Haul Truck operating (Location 3)

Appendix C
Lamberts North location map

Mount Piper Aerial View

Ash Repository

Legend

- Blackmans Flat

Western Water Management Area

Northern Boundary Road

Ash Repository Road

Southern Boundary Road

Lamberts East Boundary Road

Google Earth

400 m

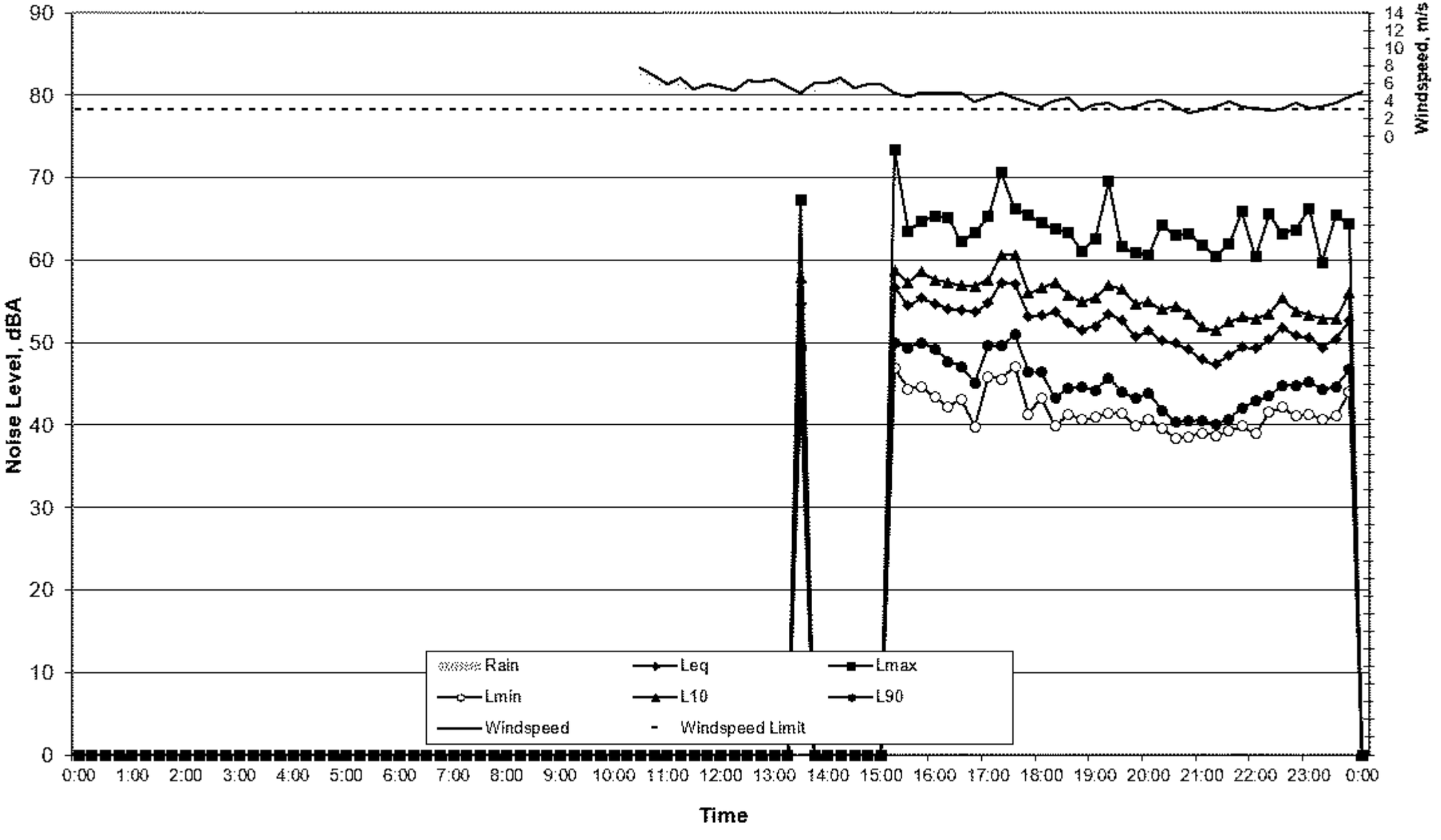
N

Appendix D
Noise monitoring graphs

Measured Ambient Noise Levels

Blackmans Flat (L1)

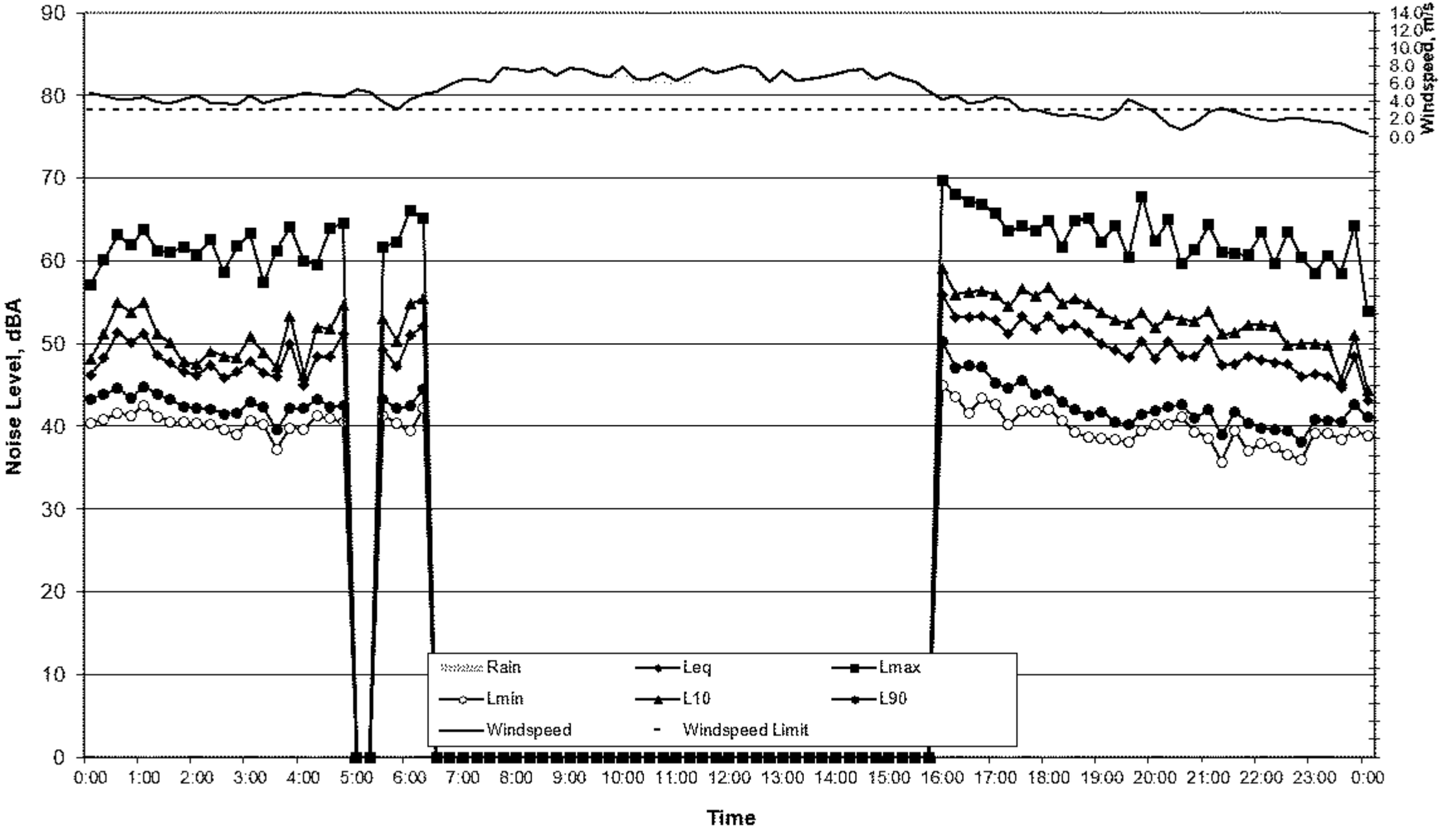
Sunday, 2 September 2018



Measured Ambient Noise Levels

Blackmans Flat (L1)

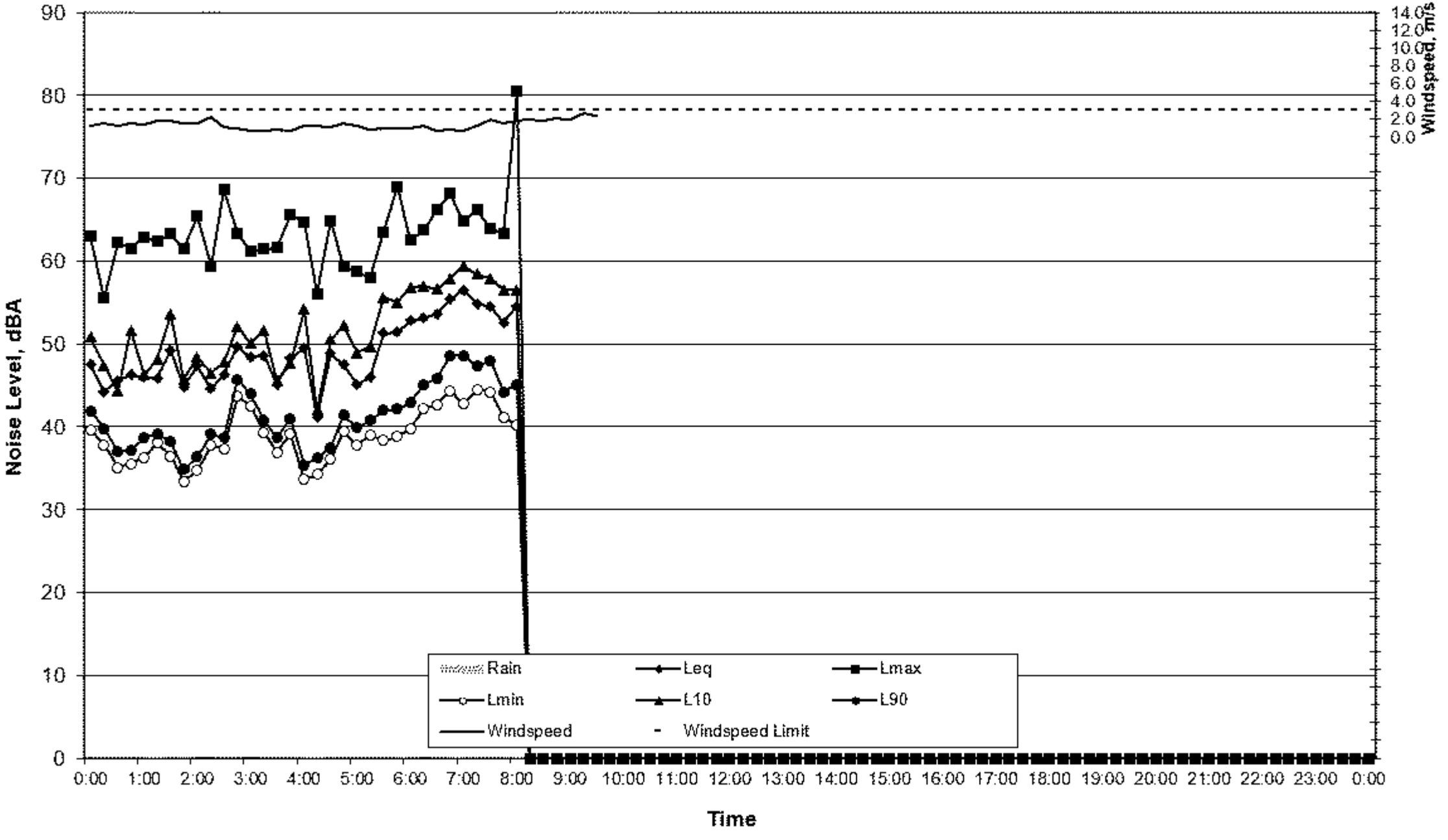
Monday, 3 September 2018



Measured Ambient Noise Levels

Blackmans Flat (L1)

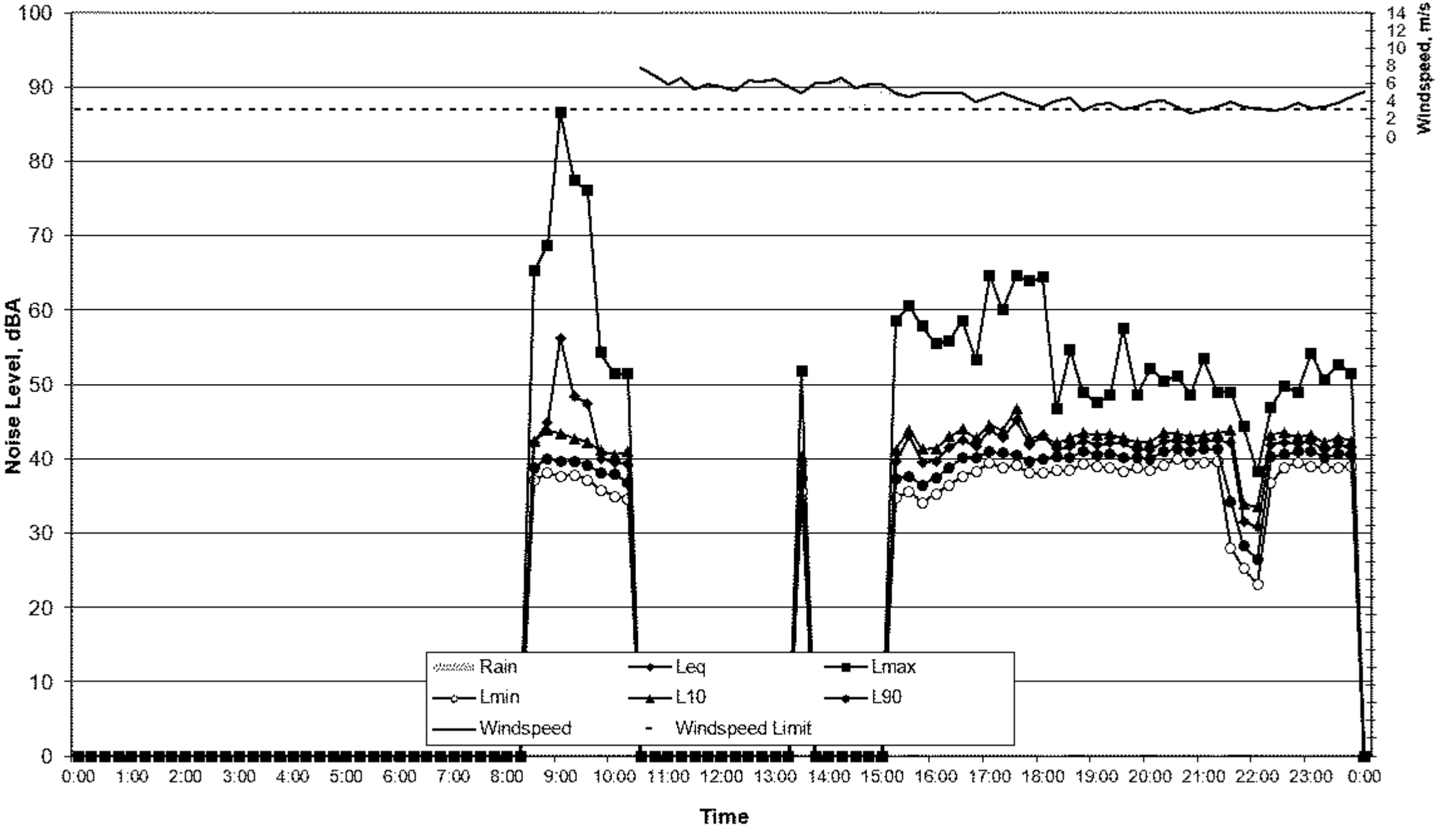
Tuesday, 4 September 2018



Measured Ambient Noise Levels

Wallerawang (L2)

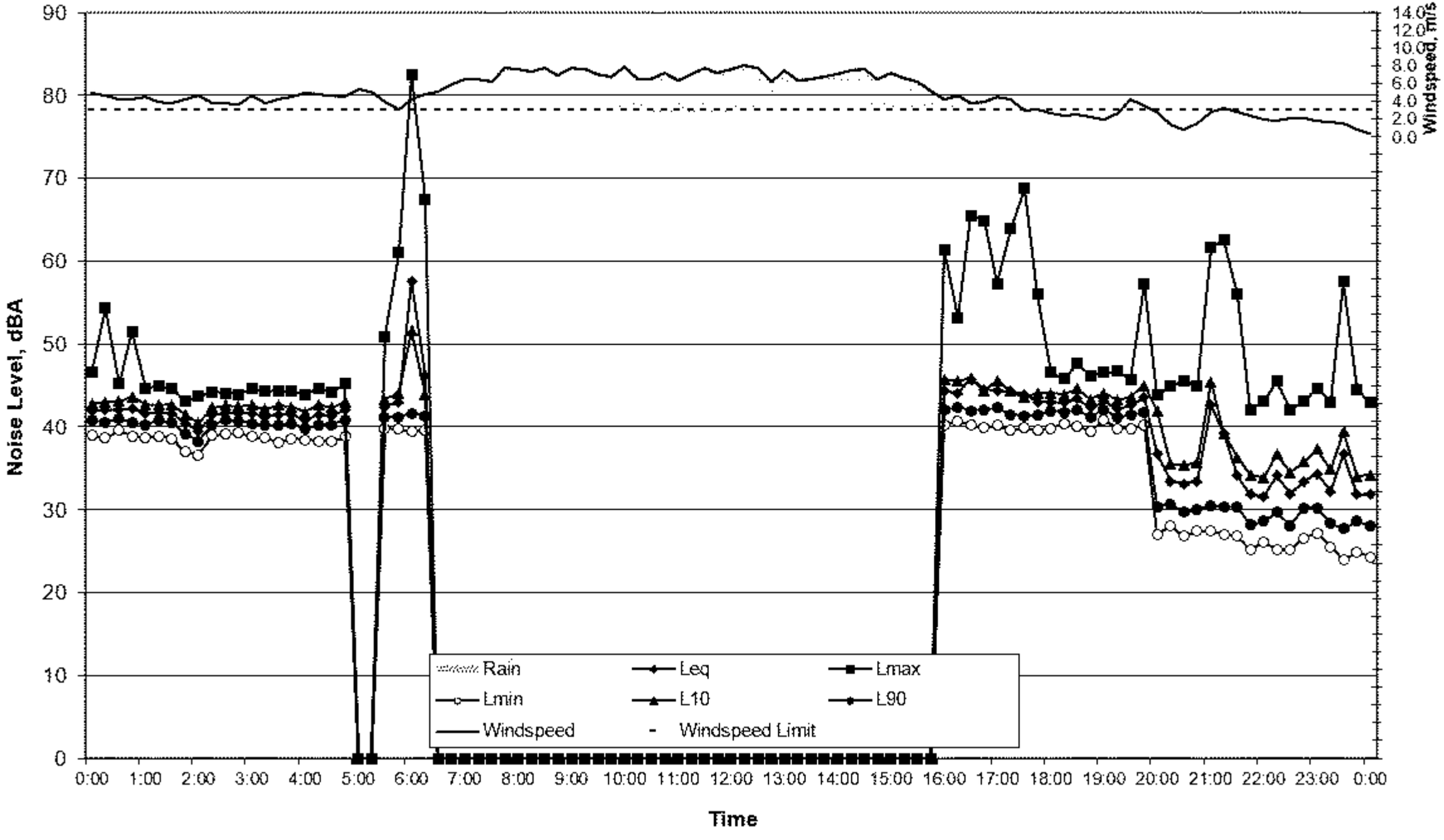
Sunday, 2 September 2018



Measured Ambient Noise Levels

Wallerawang (L2)

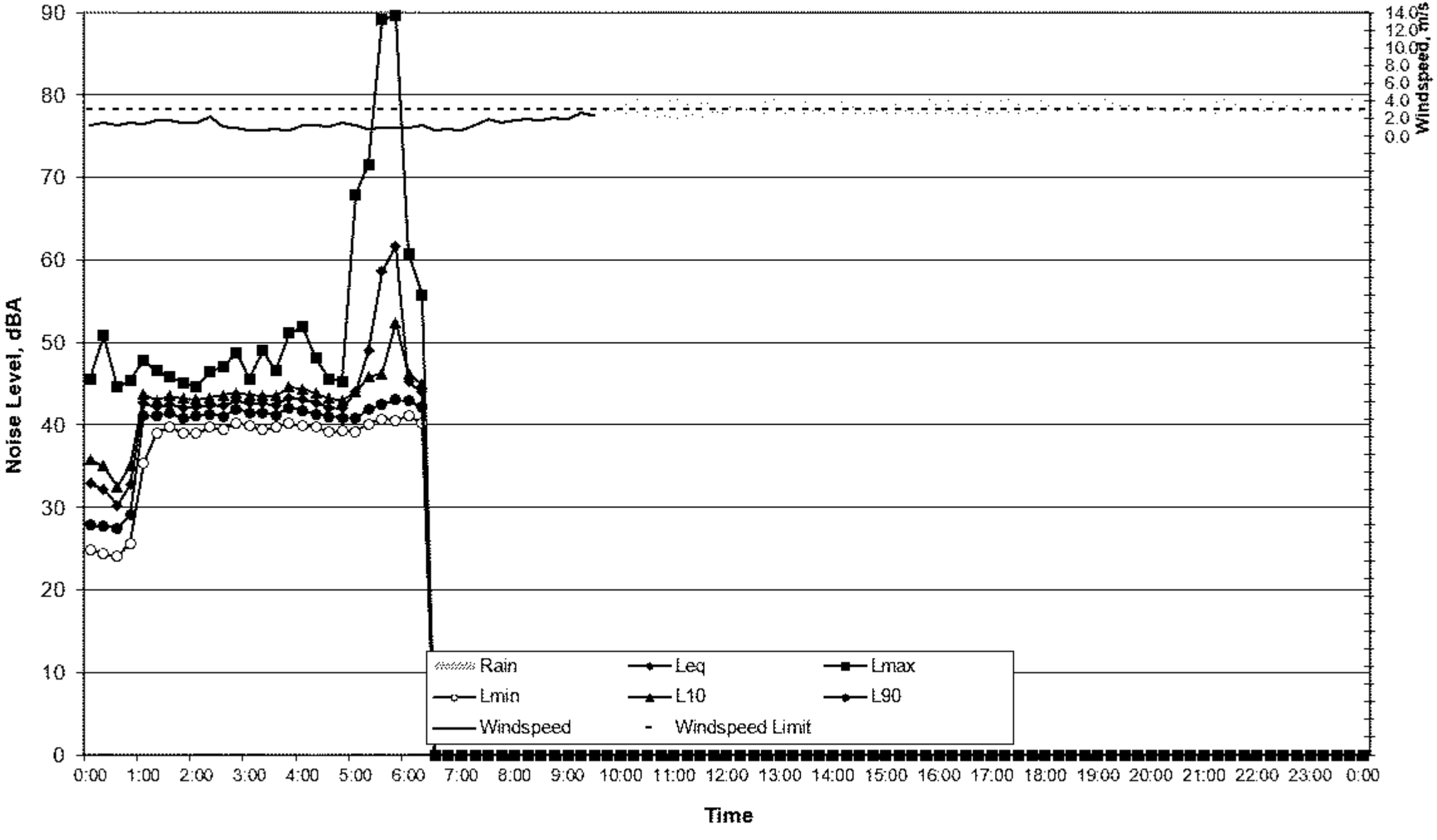
Monday, 3 September 2018



Measured Ambient Noise Levels

Wallerawang (L2)

Tuesday, 4 September 2018



Appendix E
Weather summary

Table 9 | Meteorological conditions during noise survey

Note: Highlighted rows shows the evidence of rain or wind speeds higher than 5 m/s. Corresponding measured noise levels are excluded from the assessment.

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg.)	Temp (°C)	Relative humidity (%)
02/09/2018	10:30:00 AM	0.0	1.7	166	9.5	59.2
02/09/2018	10:45:00 AM	0.0	1.3	139	9.5	58.3
02/09/2018	11:00:00 AM	0.0	1.4	169	10.0	54.7
02/09/2018	11:15:00 AM	0.0	1.7	171	9.7	56.0
02/09/2018	11:30:00 AM	0.0	0.7	186	10.3	53.1
02/09/2018	11:45:00 AM	0.0	1.7	226	10.4	51.8
02/09/2018	12:00:00 PM	0.0	1.2	153	11.7	44.6
02/09/2018	12:15:00 PM	0.0	1.7	194	12.4	43.1
02/09/2018	12:30:00 PM	0.0	1.5	262	11.5	44.1
02/09/2018	12:45:00 PM	0.0	1.3	161	11.8	44.5
02/09/2018	1:00:00 PM	0.0	1.7	165	13.1	41.7
02/09/2018	1:15:00 PM	0.0	2.5	238	12.5	43.0
02/09/2018	1:30:00 PM	0.0	2.1	238	12.9	39.4
02/09/2018	1:45:00 PM	0.0	2.0	275	12.6	39.6
02/09/2018	2:00:00 PM	0.0	2.0	267	12.8	37.6
02/09/2018	2:15:00 PM	0.0	2.4	259	12.7	37.5
02/09/2018	2:30:00 PM	0.0	3.0	227	13.6	37.7
02/09/2018	2:45:00 PM	0.0	3.0	227	13.6	37.5
02/09/2018	3:00:00 PM	0.0	3.0	221	13.4	38.4
02/09/2018	3:15:00 PM	0.0	2.8	240	13.0	38.2
02/09/2018	3:30:00 PM	0.0	2.6	252	12.2	40.9
02/09/2018	3:45:00 PM	0.0	2.5	257	12.2	40.8
02/09/2018	4:00:00 PM	0.0	2.8	155	11.6	50.2
02/09/2018	4:15:00 PM	0.0	2.7	59	11.3	57.5
02/09/2018	4:30:00 PM	0.0	2.3	58	10.7	62.0
02/09/2018	4:45:00 PM	0.0	2.7	109	9.7	67.7
02/09/2018	5:00:00 PM	0.0	2.5	85	8.8	74.7
02/09/2018	5:15:00 PM	0.0	2.4	119	8.3	77.1
02/09/2018	5:30:00 PM	0.0	3.1	135	7.9	79.0
02/09/2018	5:45:00 PM	0.0	2.3	126	7.6	80.5
02/09/2018	6:00:00 PM	0.0	1.7	119	7.5	81.6
02/09/2018	6:15:00 PM	0.0	1.6	115	7.4	81.6
02/09/2018	6:30:00 PM	0.0	1.5	118	7.3	81.3
02/09/2018	6:45:00 PM	0.0	1.6	116	7.2	81.2

Note: Highlighted rows shows the evidence of rain or wind speeds higher than 5 m/s. Corresponding measured noise levels are excluded from the assessment.

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg.)	Temp (°C)	Relative humidity (%)
02/09/2018	7:00:00 PM	0.0	1.8	101	6.7	82.1
02/09/2018	7:15:00 PM	0.0	1.7	95	6.2	84.7
02/09/2018	7:30:00 PM	0.1	1.4	100	5.7	88.4
02/09/2018	7:45:00 PM	0.1	1.9	108	5.2	91.4
02/09/2018	8:00:00 PM	0.0	1.5	111	5.0	93.1
02/09/2018	8:15:00 PM	0.1	1.8	116	4.8	93.7
02/09/2018	8:30:00 PM	0.0	2.5	133	4.7	94.0
02/09/2018	8:45:00 PM	0.0	2.4	132	4.7	94.2
02/09/2018	9:00:00 PM	0.0	2.3	133	4.6	94.3
02/09/2018	9:15:00 PM	0.0	2.4	126	4.5	94.1
02/09/2018	9:30:00 PM	0.0	2.5	131	4.3	93.8
02/09/2018	9:45:00 PM	0.0	2.4	134	4.1	93.7
02/09/2018	10:00:00 PM	0.1	2.5	139	3.9	93.9
02/09/2018	10:15:00 PM	0.1	2.6	137	3.7	94.1
02/09/2018	10:30:00 PM	0.1	2.1	124	3.6	94.3
02/09/2018	10:45:00 PM	0.1	1.9	123	3.4	94.3
02/09/2018	11:00:00 PM	0.1	1.9	126	3.3	94.4
02/09/2018	11:15:00 PM	0.0	2.1	135	3.2	94.5
02/09/2018	11:30:00 PM	0.1	1.9	136	3.2	94.7
02/09/2018	11:45:00 PM	0.0	1.7	131	3.3	94.8
03/09/2018	12:00:00 AM	0.0	1.8	142	3.3	94.8
03/09/2018	12:15:00 AM	0.0	2.1	149	3.3	94.8
03/09/2018	12:30:00 AM	0.0	2.3	144	3.4	94.8
03/09/2018	12:45:00 AM	0.0	2.3	147	3.5	94.8
03/09/2018	1:00:00 AM	0.0	2.1	145	3.5	94.7
03/09/2018	1:15:00 AM	0.0	2.5	153	3.4	94.1
03/09/2018	1:30:00 AM	0.0	1.8	154	3.3	93.5
03/09/2018	1:45:00 AM	0.0	1.8	159	3.4	93.1
03/09/2018	2:00:00 AM	0.0	1.3	172	3.5	93.0
03/09/2018	2:15:00 AM	0.0	1.4	167	3.5	93.0
03/09/2018	2:30:00 AM	0.0	1.8	156	3.5	93.2
03/09/2018	2:45:00 AM	0.0	2.2	151	3.5	93.3
03/09/2018	3:00:00 AM	0.0	1.8	155	3.5	93.3
03/09/2018	3:15:00 AM	0.0	1.7	143	3.6	93.3
03/09/2018	3:30:00 AM	0.0	2.3	136	3.6	92.7
03/09/2018	3:45:00 AM	0.0	1.6	150	3.6	92.3
03/09/2018	4:00:00 AM	0.0	2.0	151	3.6	92.1
03/09/2018	4:15:00 AM	0.0	1.4	164	3.7	91.9
03/09/2018	4:30:00 AM	0.0	1.7	157	3.7	91.6
03/09/2018	4:45:00 AM	0.0	1.9	140	3.7	91.0
03/09/2018	5:00:00 AM	0.0	2.1	142	3.7	90.3
03/09/2018	5:15:00 AM	0.0	1.8	156	3.7	90.0
03/09/2018	5:30:00 AM	0.0	1.8	157	3.7	90.0
03/09/2018	5:45:00 AM	0.0	2.0	149	3.7	90.1
03/09/2018	6:00:00 AM	0.0	2.3	154	3.8	89.5
03/09/2018	6:15:00 AM	0.0	2.0	148	3.8	89.3
03/09/2018	6:30:00 AM	0.0	2.3	144	3.9	89.0
03/09/2018	6:45:00 AM	0.0	2.3	147	4.0	88.5
03/09/2018	7:00:00 AM	0.0	2.3	144	4.1	88.4
03/09/2018	7:15:00 AM	0.0	2.3	148	4.2	88.7

Note: Highlighted rows shows the evidence of rain or wind speeds higher than 5 m/s. Corresponding measured noise levels are excluded from the assessment.

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg.)	Temp (°C)	Relative humidity (%)
03/09/2018	7:30:00 AM	0.0	2.3	131	4.3	89.0
03/09/2018	7:45:00 AM	0.0	2.1	139	4.6	89.1
03/09/2018	8:00:00 AM	0.0	2.3	141	4.9	88.3
03/09/2018	8:15:00 AM	0.0	1.9	141	5.1	87.8
03/09/2018	8:30:00 AM	0.0	2.0	133	5.3	87.3
03/09/2018	8:45:00 AM	0.0	2.3	123	5.5	87.0
03/09/2018	9:00:00 AM	0.0	2.5	134	5.8	86.9
03/09/2018	9:15:00 AM	0.0	2.5	128	6.0	85.8
03/09/2018	9:30:00 AM	0.0	3.0	127	6.3	84.8
03/09/2018	9:45:00 AM	0.0	3.2	120	6.6	83.1
03/09/2018	10:00:00 AM	0.0	3.4	127	7.3	81.4
03/09/2018	10:15:00 AM	0.0	3.3	137	8.1	77.8
03/09/2018	10:30:00 AM	0.0	3.6	131	7.9	76.9
03/09/2018	10:45:00 AM	0.0	4.0	129	8.3	74.3
03/09/2018	11:00:00 AM	0.0	3.6	123	7.9	75.0
03/09/2018	11:15:00 AM	0.0	3.0	113	8.1	75.0
03/09/2018	11:30:00 AM	0.0	2.7	117	8.4	73.8
03/09/2018	11:45:00 AM	0.0	3.6	123	8.1	76.1
03/09/2018	12:00:00 PM	0.0	3.2	127	8.2	76.0
03/09/2018	12:15:00 PM	0.0	2.5	123	8.3	75.9
03/09/2018	12:30:00 PM	0.0	2.9	140	8.1	77.0
03/09/2018	12:45:00 PM	0.0	2.9	134	8.1	80.6
03/09/2018	1:00:00 PM	0.0	2.1	126	8.0	82.5
03/09/2018	1:15:00 PM	0.1	3.1	132	7.6	84.8
03/09/2018	1:30:00 PM	0.0	2.4	142	7.1	88.2
03/09/2018	1:45:00 PM	0.0	2.9	128	7.5	87.2
03/09/2018	2:00:00 PM	0.0	2.9	102	8.0	82.7
03/09/2018	2:15:00 PM	0.0	3.3	125	8.4	78.3
03/09/2018	2:30:00 PM	0.1	2.7	139	8.3	80.2
03/09/2018	2:45:00 PM	0.0	2.8	116	7.9	82.0
03/09/2018	3:00:00 PM	0.0	3.3	132	7.6	83.0
03/09/2018	3:15:00 PM	0.1	3.4	142	7.3	85.8
03/09/2018	3:30:00 PM	0.0	2.9	128	8.5	82.1
03/09/2018	3:45:00 PM	0.0	3.8	141	7.8	81.3
03/09/2018	4:00:00 PM	0.0	3.8	143	7.6	83.3
03/09/2018	4:15:00 PM	0.0	3.0	142	7.4	83.5
03/09/2018	4:30:00 PM	0.0	3.7	139	7.3	83.8
03/09/2018	4:45:00 PM	0.0	3.2	136	6.8	85.9
03/09/2018	5:00:00 PM	0.0	3.2	139	6.4	87.6
03/09/2018	5:15:00 PM	0.0	3.1	135	6.3	87.8
03/09/2018	5:30:00 PM	0.0	2.6	132	6.2	88.6
03/09/2018	5:45:00 PM	0.0	2.8	141	5.9	90.8
03/09/2018	6:00:00 PM	0.0	3.0	145	5.8	91.9
03/09/2018	6:15:00 PM	0.0	2.6	140	5.8	92.0
03/09/2018	6:30:00 PM	0.0	2.6	140	5.8	91.8
03/09/2018	6:45:00 PM	0.0	3.2	136	5.7	91.8
03/09/2018	7:00:00 PM	0.0	2.5	139	5.6	92.3
03/09/2018	7:15:00 PM	0.0	2.4	135	5.6	92.4
03/09/2018	7:30:00 PM	0.0	2.9	134	5.6	92.4
03/09/2018	7:45:00 PM	0.0	2.7	137	5.5	93.0

Note: Highlighted rows shows the evidence of rain or wind speeds higher than 5 m/s. Corresponding measured noise levels are excluded from the assessment.

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg.)	Temp (°C)	Relative humidity (%)
03/09/2018	8:00:00 PM	0.0	2.7	139	5.4	93.9
03/09/2018	8:15:00 PM	0.0	2.4	137	5.4	94.4
03/09/2018	8:30:00 PM	0.0	2.8	131	5.5	94.5
03/09/2018	8:45:00 PM	0.0	2.5	121	5.4	94.5
03/09/2018	9:00:00 PM	0.0	2.6	127	5.5	94.4
03/09/2018	9:15:00 PM	0.0	2.5	143	5.4	94.6
03/09/2018	9:30:00 PM	0.0	2.5	152	5.3	94.8
03/09/2018	9:45:00 PM	0.0	2.3	140	5.4	95.0
03/09/2018	10:00:00 PM	0.0	2.6	129	5.4	95.1
03/09/2018	10:15:00 PM	0.0	2.7	119	5.5	95.1
03/09/2018	10:30:00 PM	0.0	2.3	121	5.4	95.1
03/09/2018	10:45:00 PM	0.1	3.0	116	5.5	95.2
03/09/2018	11:00:00 PM	0.0	2.9	128	5.4	95.1
03/09/2018	11:15:00 PM	0.0	3.0	116	5.5	94.9
03/09/2018	11:30:00 PM	0.0	2.5	116	5.5	94.3
03/09/2018	11:45:00 PM	0.0	2.6	118	5.4	94.1
04/09/2018	12:00:00 AM	0.0	2.4	133	5.4	94.5
04/09/2018	12:15:00 AM	0.0	2.6	139	5.3	95.0
04/09/2018	12:30:00 AM	0.0	2.1	127	5.3	95.3
04/09/2018	12:45:00 AM	0.0	2.3	132	5.3	95.4
04/09/2018	1:00:00 AM	0.0	2.5	126	5.3	95.5
04/09/2018	1:15:00 AM	0.0	3.2	132	5.3	95.4
04/09/2018	1:30:00 AM	0.0	3.1	131	5.3	95.2
04/09/2018	1:45:00 AM	0.0	2.5	128	5.3	95.0
04/09/2018	2:00:00 AM	0.0	2.3	127	5.2	94.7
04/09/2018	2:15:00 AM	0.0	2.1	125	5.2	94.7
04/09/2018	2:30:00 AM	0.0	2.3	134	5.2	94.9
04/09/2018	2:45:00 AM	0.0	2.6	126	5.3	95.2
04/09/2018	3:00:00 AM	0.0	2.3	121	5.2	95.4
04/09/2018	3:15:00 AM	0.0	3.1	114	5.3	95.3
04/09/2018	3:30:00 AM	0.0	2.4	123	5.1	94.3
04/09/2018	3:45:00 AM	0.0	2.7	132	5.2	94.1
04/09/2018	4:00:00 AM	0.0	2.4	121	5.4	94.0
04/09/2018	4:15:00 AM	0.0	3.1	120	5.4	94.2
04/09/2018	4:30:00 AM	0.0	2.8	120	5.5	93.6
04/09/2018	4:45:00 AM	0.0	2.5	122	5.5	92.6
04/09/2018	5:00:00 AM	0.0	2.6	124	5.4	92.3
04/09/2018	5:15:00 AM	0.0	2.7	126	5.3	93.2
04/09/2018	5:30:00 AM	0.0	2.3	129	5.2	94.1
04/09/2018	5:45:00 AM	0.1	1.9	152	5.2	94.8
04/09/2018	6:00:00 AM	0.0	1.9	152	5.3	95.1
04/09/2018	6:15:00 AM	0.0	2.8	142	5.4	95.4
04/09/2018	6:30:00 AM	0.0	3.0	125	5.5	95.6
04/09/2018	6:45:00 AM	0.0	3.0	128	5.5	95.4
04/09/2018	7:00:00 AM	0.0	2.8	128	5.5	95.5
04/09/2018	7:15:00 AM	0.0	3.2	123	5.4	95.3
04/09/2018	7:30:00 AM	0.0	3.0	126	5.4	94.9
04/09/2018	7:45:00 AM	0.0	2.6	125	5.6	94.7
04/09/2018	8:00:00 AM	0.0	2.5	126	5.6	94.8
04/09/2018	8:15:00 AM	0.1	2.8	128	5.7	94.9

Note: Highlighted rows shows the evidence of rain or wind speeds higher than 5 m/s. Corresponding measured noise levels are excluded from the assessment.

Date	Time	Rainfall (mm)	Wind Speed 10m above ground (m/s)	Wind Direction (deg.)	Temp (°C)	Relative humidity (%)
04/09/2018	8:30:00 AM	0.0	2.8	124	5.9	94.8
04/09/2018	8:45:00 AM	0.0	3.0	128	6.3	94.7
04/09/2018	9:00:00 AM	0.0	4.0	107	6.7	91.1
04/09/2018	9:15:00 AM	0.0	3.5	98	7.1	86.8
04/09/2018	9:30:00 AM	0.0	3.2	115	7.0	88.7
04/09/2018	9:45:00 AM	0.0	2.6	123	7.1	89.3
04/09/2018	10:00:00 AM	0.0	2.7	116	7.1	90.5
04/09/2018	10:15:00 AM	0.0	2.9	117	7.2	91.0
04/09/2018	10:30:00 AM	0.0	2.9	107	7.5	91.6

Appendix F
Site attendance sheets

Lendlease Services business

MP-SF-733A – Site Communications Log Mt Piper Ash Placement Area

700 – Environmental Management

MT PIPER

DATE: 2.9.18

APA Operator Name		Verbal 103 and Time In	Communications Check				Time Out	Sign Out
			7:00am/pm	11:00am/pm	2:00am/pm	5:00am/pm		
Regulars	DEVELOPE	0600					1752	D
	P Wall	6:10					1752	P
	B Williams	628					1752	B
	Tim Sleath	630					1752	T
	Josh Lewis	7.15am					5.30pm	
Others								
LL M/O Initials								
Time of Check								

SUB-CONTRACTOR MECHANICAL PERSONNEL

Mechanical Personnel	Time in	Plant/Equipment	Nature of Breakdown/Service	Time Out	Equipment/Plant Available Y/N
AKIL GAU	8:47		Noise Monitoring	9:26	

Lendlease PERSONNEL COMMUNICATIONS LOG

Name	Time In	Time Out	Time In	Time Out	Time In	Time Out	Time In	Time Out
K Williams	1500	1700						

Lendlease Services business

MP-SF-733A – Site Communications Log Mt Piper Ash Placement Area

700 – Environmental Management

MT PIPER DATE: 3/9/18

APA Operator Name		Verbal 103 and Time In	Communications Check				Time Out	Sign Out
			7:00am/pm	11:00am/pm	2:00am/pm	5:00am/pm		
Regulars	P Gatt	6:10 -						
	[illegible]	6.15						
	P [illegible]	6:30						
	[illegible]	630						
	Tim Sladen	630						
	Josh Lowry	7:15am						
Others								
LL M/O Initials								
Time of Check								

SUB-CONTRACTOR MECHANICAL PERSONNEL

Mechanical Personnel	Time in	Plant/Equipment	Nature of Breakdown/Service	Time Out	Equipment/Plant Available Y/N
AKIL LAU	13:00		Noise Monitoring		

Lendlease PERSONNEL COMMUNICATIONS LOG

Name	Time In	Time Out	Time In	Time Out	Time In	Time Out	Time In	Time Out
K McManus	0700							
M White	0745							
B Lowry	0745							

Weather Reporting
Aurecon

Aurecon Australasia Pty Ltd
ABN 54 005 139 873
Level 2, 116 Military Road
Neutral Bay NSW 2089
PO Box 538
Neutral Bay NSW 2089
Australia
T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

Aurecon offices are located in:
Angola, Australia, Botswana, China,
Ghana, Hong Kong, Indonesia, Kenya,
Lesotho, Macau, Mozambique,
Namibia, New Zealand, Nigeria,
Philippines, Qatar, Singapore, South Africa,
Swaziland, Tanzania, Thailand, Uganda,
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