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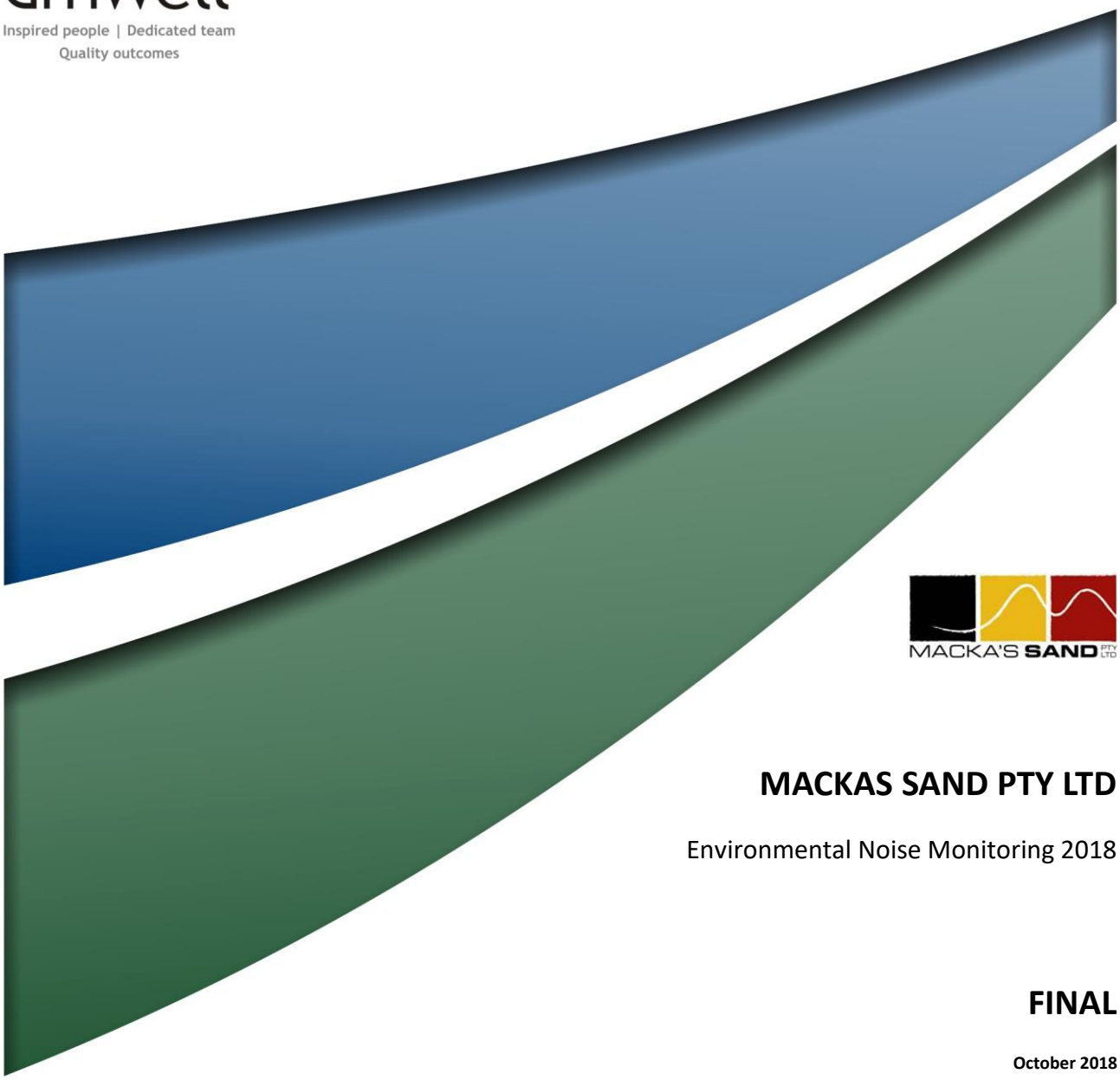

MACKA'S SAND PTY LTD

MACKAS SAND PTY LTD

Environmental Noise Monitoring 2018

FINAL

October 2018

MACKAS SAND PTY LTD

Environmental Noise Monitoring 2018

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mackas Sand Pty Ltd

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Report No.	1946/R91
Date:	October 2018

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Document Status

Rev No.	**Reviewer**		**Approved for Issue**	
	Name	**Date**	**Name**	**Date**
Final	Dave Davis	10 October 2018	Bret Jenkins	10 October 2018

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1.0 Introduction

1.1 Project Background

Mackas Sand Pty Ltd (Mackas Sand) was granted Project Approval 08_0142 in September 2009 by the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* to operate sand extraction operations at Salt Ash, approximately 25 kilometres north-east of Newcastle, in the Port Stephens Local Government Area (LGA) of New South Wales (NSW) (refer to **Figure 1.1**).

Mackas Sand has approval to extract and process sand from Lot 218 and Lot 220 as shown on **Figure 1.1**. It has been estimated that approximately 11.4 million tonnes (Mt) of sand resource will be extracted from Lot 220. Lot 218 has an identified resource of 9.6 Mt however Lot 218 has a potentially indefinite extraction life due to the ongoing movement of sand from the mobile dunes into the approved extraction area.

The Project Approval has been the subject of two (2) approved modifications, being:

- **Modification 1**: The modification included a change to the approved extraction level from 1.0 metre (m) to 0.7m above the maximum predicted groundwater level (subject to satisfying additional requirements), as well as the construction and use of an alternative haul route to access Lot 218. The alternate route connects directly from Lot 218, northward to Nelson Bay Road, as depicted within **Figure 1.1**. Modification 1 (MOD 1) was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure (now Minister for Planning and Environment-DPE). Construction of the MOD 1 alternate route commenced on 9 December 2013. With the subsequent extraction of sand commencing g at Lot 218 in February 2015.

- **Modification 2**: Altering the truck movements (in and out) of Lot 218. Modification 2 (MOD 2) was approved by the PAC on 16 March 2016

It is noted that Lot 220 and Lot 218 are located in close proximity to the Williamtown Royal Australian Air Force (RAAF) Base, including Newcastle Airport commercial operations, and the area is occasionally subject to noise impacts from overhead aircraft movements. Noise impacts from these movements have been taken into consideration for the current assessment and are not considered to significantly influence the monitoring assessment.

1.2 Scope

This Noise Monitoring Report has been prepared by Umwelt (Australia) Pty Limited (Umwelt) on behalf of Mackas Sand. The noise monitoring and reporting requirements for Mackas Sand are outlined in the Project Approval 08_0142 (as modified), Environment Protection Licence (EPL) 13218 and the Mackas Sand Noise Management Plan (Umwelt 2016).

This report presents the results of attended noise monitoring undertaken in August, September and October 2018 as part of the ongoing noise monitoring program for Mackas Sand.

A glossary of terms and abbreviations used in this report is provided in **Appendix 1**

Source: Department of Lands (2003), Google Earth (2016)

Legend

- Lot Boundaries (218 & 220)
- Approval Area
- Approved Site Access
- Noise Monitoring Location
- Residential Receiver

FIGURE 1.1

Monitoring Locations

File Name (A4): R70_V1/1646_468.dgn

2.0 Assessment Criteria

The consent conditions for the project, outlined in the Mackas Sand Project Approval 08_0142 and EPL 13218, set the noise limits for all stages of the operations. The assessment criteria for the noise generated by the Project, except for the noise generated by the use of the Alternate Access Road, are presented in **Table 2.1**. The receiver locations are shown on **Figure 1.1**.

Table 2.1 Industrial Noise Impact Assessment Criteria

Location	Day[1] LAeq, 15 min	Evening[1] LAeq, 15 min	Night[1] LAeq, 15 min	Night[1] LA1, 1 min
R18 – 2692 Nelson Bay Road, Salt Ash	39	39	40	45
R1 – 39 Lavis Lane, Williamtown	39	39	39	45
R19 – 2758 Nelson Bay Road Salt Ash	36	36	37	45
R26 – 6 Oakvale Drive, Salt Ash	36	36	35	45
R27 – 10 Janet Parade, Salt Ash	36	35	35	45
R17 – 2645 Nelson Bay Road, Salt Ash	35	35	36	45
All other residences	35	35	35	45

[1] Day time is 7.00 am to 6.00 pm Monday to Saturday and 8.00 am to 6.00 pm Sundays and Public Holidays, evening is 6.00 pm to 10.00 pm and night time is 10.00 pmto 7.00 am Monday to Saturday and 10.00 pm to 8.00 am Sundays and Public Holidays (NSW Industrial Noise Policy (INP) EPA 2000).

The assessment criteria for the noise generated by the use of the Alternate Access Road are presented in **Table 2.2** . However, Project Approval 08_0142 MOD2 notes that 'the noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.' Mackas Sand has written agreements with property owners and residents at 2344, 2353, 2367 and 2368 Nelson Bay Road and provided these to the Department in August 2015.

Table 2.2 Alternate Access Road Noise Impact Assessment Criteria dB(A)

Location	Shoulder[1] LAeq, 15 min	Day[1] LAeq, 15 min	Evening[1] LAeq, 15 min
2344 Nelson Bay Road, Williamtown (R13 = Site 6)	38	40	40
2353 Nelson Bay Road, Williamtown (R14 = Site 5)	39	41	41
2367 Nelson Bay Road, Williamtown	36	38	38
2368 Nelson Bay Road, Williamtown	38	40	40
All other residences	35	35	35

[1] Day time is 7.00 am to 6.00 pm Monday to Saturday and 8.00 am to 6.00 pm Sundays and Public Holidays, evening is 6.00 pm to 10.00 pm (NSW INP, EPA 2000). Shoulder is the period from 5.00 am to 7.00 am on Monday to Friday, but only for the use of the Alternate Access Road (see condition 4A of schedule 3 of Project Approval 08_0142 MOD2).

Condition 7 of Schedule 3 of the Project Approval 08_0142 requires that road traffic noise generated by the extraction operations does not exceed the criteria stipulated in **Table 2.3**.

Table 2.3 Traffic Noise Impact Assessment Criteria, dB(A)

Road	Day[1]	Night[1]
Lavis Lane, Oakvale Drive	60 LAeq, 1 hour	55 LAeq, 1 hour
Nelson Bay Road	60 LAeq, 15 hour	55 LAeq, 9 hour

[1] Day time is 7.00 am to 6.00 pm Monday to Saturday and 8.00 am to 6.00 pm Sundays and Public Holidays, evening is 6.00 pm to 10.00 pm and night time is 10.00 pm to 7.00 am Monday to Saturday and 10.00 pm to 8.00 am Sundays and Public Holidays

Land Acquisition Criteria, as set out in Condition 5 of Schedule 3 of the Project Approval 08_0142, are outlined in **Table 2.4** for night time noise levels and are applicable upon Mackas Sand receiving a written request for acquisition from the landowner.

Table 2.4 Land Acquisition Criteria, dB(A)

Property location	Night[1] LAeq, 15 min
R1 to R4	42
R20 to R23	41
All other privately-owned residences	40

[1] Night time is 10.00 pm to 7.00 am Monday to Saturday and 10.00 pm to 8.00 am Sundays and Public Holidays (NSW INP, EPA 2000).

Additional noise mitigation measures, as required in Condition 8 of Schedule 3 of the Project Approval 08_0142, must be undertaken if noise levels exceed the criteria in **Table 2.5**.

Table 2.5 Additional Noise Mitigation Criteria

Property location	Night[1] LAeq, 15 min
R1 to R4	40
R20 to R23	39
All other privately-owned residences	38

[1] Night time is 10.00 pm to 7.00 am Monday to Saturday and 10.00 pm to 8.00 am Sundays and Public Holidays (NSW INP, EPA 2000).

Additionally, EPL 13218 for sand extraction operations on Lot 218 and Lot 220, requires that noise from the extraction site must not exceed the limits specified in **Table 2.6**.

Table 2.6 EPL 13218 Condition L6.1 Noise Limits, dB(A)

Location	Day[1] LAeq, 15 min	Evening[1] LAeq, 15 min	Night[1] LAeq, 15 min	Night[1] LA1, 1 min
Residences north of private haul road servicing Lot 220	-	40	40	45
Residence R27	36	36	35	45
Residences R1 – R8	39	39	39	45
All other residences	-	36	35	45

[1] Day time is 7.00 am to 6.00 pm Monday to Saturday and 8.00 am to 6.00 pm Sundays and Public Holidays, evening is 6.00 pm to 10.00 pm and night time is 10.00 pm to 7.00 am Monday to Saturday and 10.00 pm to 8.00 am Sundays and Public Holidays (NSW INP, EPA 2000).

3.0 Assessment Methodology

Attended noise surveys are used to quantify and describe the acoustic environment around a site. Typically the results are compared with the noise criteria defined in the relevant Project Approval and/EPL to assess compliance. Attended monitoring is often considered the preferred method for determining compliance with prescribed limits because it allows for an accurate assessment of the contribution, if any, from an industrial noise source to measured ambient noise levels.

The compliance assessment methodology for Mackas Sand involved the following activities:

- Attended noise monitoring surveys to measure the ambient noise levels in the surrounding region and to assess the extraction operation's contribution to measured noise levels; and
- Comparison of the attended noise monitoring results against the relevant noise impact assessment criteria to assess compliance of the extraction operation with the relevant Project Approval and EPL criteria.

Compliance with the sleep arousal criteria is determined by comparing the LA1,1minute noise levels measured during the night period attended noise surveys with the sleep arousal criteria outlined in the Project Approval and EPL under which the site operates.

In accordance with the Noise Management Plan, compliance with the Project Approval and EPL noise criteria is assessed by undertaking noise monitoring at the locations shown in **Table 3.1**.

Table 3.1 Noise Management Plan Table 4.1 - Noise Monitoring Locations

Monitoring Location*	Description
Site 1 (R27)	Private residence (Hufnagl residence, 10 Janet Parade, Salt Ash) MGA N = 6370639, MGA E = 399542
Site 2 (R26)	Private residence (6 Oakvale Drive, Salt Ash) MGA N = 6370830, MGA E = 397906
Site 4 (R17)	Private residence, Lot 2, DP 818198, 2642 Nelson Bay Road, Salt Ash (situated on the corner of Oakvale Drive and Nelson Bay Road) MGA N = 6371455, MGA E = 398102
Site 5 (R14)	Private residence (2353 Nelson Bay Road, Williamtown) MGA N = 395687, MGA E = 6370072)
Site 6 (R13)	Private residence (2344 Nelson Bay Road, Williamtown) MGA N = 395656, MGA E = 6370035)

*Note Monitoring at Site 3 was discontinued following discussions with DPE during 2014.

Compliance monitoring of the road traffic noise contribution from the trucks associated with the Lot 220 extraction operations was undertaken at Noise Monitoring Site 4 (Lot 2 DP 818198). Noise Monitoring Site 4 is considered to represent the worst case monitoring location for Lot 220 operations. Compliance monitoring of the road traffic noise contribution from the trucks associated with the Lot 218 extraction operations was undertaken at Noise Monitoring Site 6 (2344 Nelson Bay Road, Williamtown). The results of the monitoring undertaken at Noise Monitoring Site 6 are considered to be representative and also be the worst case monitoring location (i.e. closest to the road and next to the acceleration lane for truck exiting the site). The monitoring results from Noise Monitoring Site 6 are considered to provide the most conservative result for the assessment of road traffic noise at all potentially affected receivers. Therefore if the noise from truck movements on the Alternate Access Road to Lot 218 comply at Noise Monitoring Site 6, it also confirms compliance at all other locations nominated in the Project Approval.

Road truck movements along Oakvale Drive past Noise Monitoring Site 4 during the monitoring period were associated with vehicles servicing not only Mackas Sand but the adjoining businesses of Mackas Sand and Soil Supplies and Sibelco Australia. The weighbridge heavy vehicle data log and attended truck logging during the traffic noise monitoring program was used to identify the heavy vehicle (i.e. truck) activity along Oakvale Drive that is associated with the transport of product from Lot 220.

The Mackas Sand extraction operation generated $LA_{eq,1hour}$ road traffic noise contribution was determined as the equivalent continuous noise level from all truck movements on public roads relevant to Mackas Sand from Lot 220 at Noise Monitoring Site 4 and from Lot 218 at Noise Monitoring Site 6, occurring per hour of the assessment period. The calculated noise levels at the façade of the residence of Noise Monitoring Site 4, as well as at the façade of Noise Monitoring Site 6 resulting from hourly traffic movements on public roads associated with the extraction operations during the night and day period were then assessed against relevant road traffic criteria. For this assessment, the measured traffic noise levels at Site 6 were taken to be representative of the noise levels received at Site 5 due to the similar offset distances from Nelson Bay Road.

4.0 Noise Monitoring Program

4.1 Industrial Noise

The purpose of the attended noise monitoring program was to quantify and describe the ambient noise environment in the region surrounding Lot 220 and Lot 218 and to interpret the results to account for the contribution of Mackas Sand operations to the surrounding noise environment. During the attended noise monitoring program, the noise sources contributing to the ambient noise environment were recorded, with particular attention focussed on the contribution from extraction operations undertaken at Lot 220 and Lot 218. The weather conditions over the monitoring period were also recorded.

Attended noise measurements were undertaken with a Type 1, Svantek 959 noise and vibration analyser, Serial Number 12918 under current NATA calibration. During the attended noise surveys, the noise meter was calibrated using a Brüel & Kjær Type 4231 Noise Meter Calibrator, Serial Number 2130702 under current NATA calibration. Calibration certificates are provided in Appendix 3. The noise monitor was run using three measurement profiles (Z- (Linear), C- and A- Weighting) and recorded A-weighted 1/3 octave noise levels at 1 second intervals over a 15 minute measurement period. Meteorological data was collected during each of the attended monitoring periods using a Kestrel 4500 weather monitor, Serial Number 665400, positioned within 5 metres and at a corresponding height to the noise monitoring microphone.

Attended noise monitoring was conducted in accordance with the NSW Noise Policy for Industry (EPA 2017) guidelines and the relevant sections of Australian Standard AS1055-2018, '*Acoustics – Description and Measurement of Environmental Noise*'.

4.2 Traffic Noise

The purpose of the road traffic noise monitoring program was to determine the contribution of Mackas Sand related road truck movements to the surrounding noise environment. During the road traffic monitoring program, attended logging of truck passbys was undertaken at Noise Monitoring Site 4 to allow for the identification of heavy vehicle truck movements along Oakvale Drive with Mackas Sand weighbridge heavy vehicle data log. As only heavy vehicles related to Mackas Sand extraction operation utilise the Alternate Access Road to Lot 218, for Noise Monitoring Site 6 it was assumed that all vehicles entering and leaving the intersection of the Alternate Access Road and Nelson Bay Road were attributable to Mackas Sand operations.

The noise logger microphones were installed in the free field at approximately the same offset distance from Nelson Bay Road as the residential façade most affected by Mackas Sand generated road traffic noise and at an approximate height of 1.2 metres above the ground level of the residence. Trucks passing the noise logger located at Noise Monitoring Site 4 and Site 6 from 6.00 am to 7.00 am and 7.00 am to 8.00 am, 10 August 2018 were observed and the passby time logged to assist in distinguishing noise generated by Mackas Sand heavy vehicles from those servicing Mackas Sand and Soil and Sibelco Australia.

Table 4.1 Traffic Noise Monitoring Program

Monitoring location	Logger type	Serial no.	Measurement
Site 4	Larson Davis LD831	0004379	10/08/2018 06:00 to 07:00 and 10/08/2018 07:00 to 08:00
Site 6	SVAN 959	12918	10/08/2018 06:00 to 07:00 and 10/08/2018 07:00 to 08:00

4.3 Monitoring Locations

The monitoring locations used during the attended noise monitoring program are described in **Table 4.2** and shown on **Figure 1.1**.

Table 4.2 Noise Monitoring Locations

Noise monitoring location	Description
Site 1	Private residence R27, 10 Janet Parade, Salt Ash MGA E = 399542, MGA N = 6370639
Site 2	Opposite private residence R26, 6 Oakvale Drive, Salt Ash (adjacent Oakvale Farm) MGA E = 397917, MGA N = 6370880
Site 4	Private residence Lot 2 DP 818198 (Corner of Oakvale Drive and Nelson Bay Road, Salt Ash) MGA E = 398078, MGA N = 6371444
Site 6	Private residence 2344 Nelson Bay Road, Williamtown MGA E = 395639, MGA N = 6370005

Note R24 to R27 descriptors are adopted from 'Noise Management Plan for Sand Extraction Operations' (Umwelt 2016).

The 2018 attended industrial noise monitoring program included monitoring at Noise Monitoring Sites 1, 2, 4 and 6. Attended monitoring of industrial noise was conducted for 15 minute periods during periods of suitable meteorological conditions.

As described in **Section 3.0**, regarding the measurement of noise from truck movements on the Alternate Access Road to Lot 218, it is considered that Site 6 is generally representative of Site 5 for the day, evening and night time periods.

Road traffic noise monitoring was conducted for one hour periods at Noise Monitoring Sites 4 and 6, during the night time period on 10 August 2018 and at same locations during the day period also on 10 August 2018.

5.0 Monitoring Results

5.1 Industrial Noise

Industrial noise monitoring was undertaken for 15 minutes period during suitable meteorological conditions. The locations and times of the noise monitoring were as shown in **Table 5.1**. The locations where noise monitoring was undertaken were chosen to demonstrate compliance at all locations, as described in **Section 3.0**. If compliance with the criteria is measured at the noise monitoring location which is closest to the extraction site, then by extrapolation it is assumed that compliance at locations further away is also achieved and therefore monitoring at the more distant monitoring locations is not required.

Table 5.1 Noise monitoring locations and times

Time period	Noise Monitoring Site Identifier	Date, Time	Comment
Day	1	9:47 am to 10:02 am, 10 September 2018	-
	2	8:33 am to 8:48 am, 10 September 2018	-
	4	7:00 am to 7:15am, 10 August 2018	-
	5	-	Compliance measured at Noise Monitoring Site 6:
	6	7:30 am to 7:45 am, 10 August 2018	-
Evening	1	7:00 pm to 7:15 pm, 10 September 2018	-
	2	7:37 pm to 7:52 pm, 10 September 2018	-
	4	7:19 pm to 7:34 pm, 9 October 2018	-
	5	-	Compliance measured at Noise Monitoring Site 6:
	6	8:00 pm to 8:15 pm, 9 October 2018	
Night	1	6:20 am to 6:35 am, 7 September 2018	-
	2	6:45 am to 7:00 am, 7 September 2018	-
	4	6:02 am to 6:17 am, 10 August 2018	-
	5		Compliance measured at Noise Monitoring Site 6:
	6	6:33 am to 6:48 am, 10 August 2018	-

The monitoring results are shown in **Table 5.2** to **Table 5.4**.

Further detail of the noise monitoring data is shown in **Figure A2.1** to **Figure A2.12** which can be found in **Appendix 2**. These figures include:

- The recorded overall A-weighted noise levels at 1 second intervals over a 15 minute measurement period;
- The results of a 1000 Hz low pass filter at 1 second intervals over the 15 minute measurement period;

- An assessment of the maximum LA1,1minute noise level recorded over the 15 minute measurement period for night period measurements; and

- The LAeq, 15minute and LA90, 15minute noise levels for the 15 minute measurement period.

Comments regarding the noise sources contributing to the ambient noise levels are also presented on **Figure A2.1** to **Figure A2.12**.

An assessment of the results from the attended noise monitoring program and the corresponding meteorological conditions are provided in **Section 6.0**.

Table 5.2 Summary Results for Day Period

Location	Monitoring period	Measure	Measured noise level	Estimated contribution from Mackas Sand	Meteorological conditions
Site 1	9:46 am to 10:01 am 10/08/2018	LAeq, 15 min	44.5	<30	Wind NW at 3.8 m/s, Cloudless sky
Site 2	8:33 am to 8:48 am 10/08/2018	LAeq, 15 min	49.8	<35	Wind NW at 3.3 m/s, Cloudless sky
Site 4	7:00 am to 7:15 am 10/08/2018	LAeq, 15 min	62.1	Not audible	Wind N at 0.6 m/s, Cloudless sky
Site 5	Monitoring not required as Site 6 is representative of Site 5 and if compliance is measured at Site 6 then compliance is achieved at Site 5.				
Site 6	7:30 am to 7:45 am 10/08/2018	LAeq, 15 min	60.9	<35	Wind N at 1.7 m/s, Cloudless sky

Table 5.3 Summary Results for Evening Period

Location	Monitoring period	Measure	Measured noise level	Estimated contribution from Mackas Sand	Meteorological conditions
Site 1	19:00 to 19:15 10/09/2018	LAeq, 15 min	58.3	Not audible	Wind NE at 1.1 m/s, Cloudless sky
Site 2	19:37 to 19:52 10/09/2018	LAeq, 15 min	53.0	Not audible	Wind NE at 1.9 m/s, Cloudless sky
Site 4	19:19 to 19:34 09/10/2018	LAeq, 15 min	57.8	Not audible	Wind NE at 3.6 m/s, Cloudless sky
Site 5	Monitoring not required as Site 6 is representative of Site 5 and if compliance is measured at Site 6 then compliance is achieved at Site 5.				
Site 6	20:00 to 20:15 09/10/2018	LAeq, 15 min	60.5	29 (Trucks on Alternate Access Road only - Sand extraction operations not audible)	Wind ENE at 3.1 m/s, 2/8 octa cloud cover

Table 5.4 Summary Results for Night Periods

Location	Monitoring period	Measure	Measured noise level	Estimated contribution from Mackas Sand	Meteorological conditions
Site 1	6:20 am to 6:35 am 07/09/2018	LAeq, 15 min LA1, 15min	55.5 70.1	<30 38	Wind ENE at 3.6 m/s, Cloudless sky
Site 2	6:46 am to 7:01 am 07/09/2018	LAeq, 15 min LA1, 15min	54.0 74.2	<30 <40	Wind NE at 3.6 m/s, Cloudless sky
Site 4	6:02 am to 6:17 am 10/08/2018	LAeq, 15 min	60.3	< 35 (Sand extraction operations not audible)	Wind WNW at 1.7 m/s, Cloudless sky
Site 5	Monitoring not required as Site 6 is representative of Site 5 and if compliance is measured at Site 6 then compliance is achieved at Site 5.				
Site 6	6:33 am to 6:48 am 10/08/2018	LAeq, 15 min	63.6	<35 (Sand extraction operations not audible)	Wind N at 1.1 m/s, Cloudless sky

5.2 Traffic Noise

Noise from Mackas Sand product transport by road is assessed by measurement of noise from Mackas Sand trucks on Nelson Bay Road and Oakvale Drive. No assessment of noise from Mackas Sand trucks on Lavis Lane is required as no Mackas Sand truck movements occur on Lavis Lane.

Traffic noise monitoring was undertaken at two monitoring locations, Site 4 and Site 6 during the night time period from 6:00 am to 7:00 am and during the day time period from 7:00 am to 8:00 am 10 August 2018.

The night and day time monitoring results include:

- The Mackas Sand road traffic noise contribution determined as the LAeq,1hour from all site truck movements on Nelson Bay Road occurring per hour of the assessment period; and
- The recorded LAeq,1hour Nelson Bay Road traffic noise levels occurring per hour of the assessment period.

The results from the road traffic noise monitoring undertaken at Noise Monitoring Site 4 and Site 6 are presented in **Table 5.5** and **Table 5.6**.

Table 5.5 Road Traffic Noise Level Contributions, Noise Monitoring Site 4, dB(A)

Day/night period	Start of assessed period	End of assessed period	Site 4 measured traffic noise level LAeq, 1 hour	Mackas Sand heavy vehicle noise level contribution, LAeq, 1 hour
Night	6:02 10/08/2018	7:03 10/08/2018	61	54
Day	7:00 10/08/2018	8:00 10/08/2018	61	53

Table 5.6 Road Traffic Noise Level Contributions, Noise Monitoring Site 6, dB(A)

Day/night period	Start of assessed period	End of assessed period	Site 6 measured traffic noise level LAeq, 1 hour	Mackas Sand heavy vehicle noise level contribution, LAeq, 1 hour
Night	6:01 10/08/2018	6:57 10/08/2018	63	53
Day	6:58 10/08/2018	8:05 10/08/2018	62	52

The results indicate that road traffic associated with Mackas Sand Lot 220 and Lot 218 operations was generating LAeq,1hour noise levels during the night time noise monitoring period of 54 dB(A) and 53 dB(A) at Sites 4 and 6 respectively, and 53 dB(A) and 52 dB(A) at Sites 4 and 6 respectively during the day time noise monitoring period. Over the same assessed periods, the overall road traffic noise levels at Site 4 and Site 6 were LAeq,1hour noise levels of 61 dB(A) and 63 dB(A) during the night time period and 61 dB(A) and 62 dB(A) during the day time period at Sites 4 and 6 respectively.

The traffic noise level contribution from Mackas Sand trucks was found to be 7 to 10 dB(A) less than the total traffic noise levels at Sites 4 and 6.

6.0 Assessment of Compliance

6.1 Industrial Noise

The measured industrial noise levels from the Mackas Sand site contributing to the ambient noise environment in the surrounding area and the relevant noise assessment criteria are collated in **Table 6.1**, **Table 6.2** and **Table 6.3** for the day, evening and night periods respectively. **Table 6.4** presents the results and the relevant assessment criteria for noise generated by traffic travelling on the Alternate Access Road to Lot 218.

Table 6.1 Day Time Industrial Noise Levels –Sand Extraction Activities versus Noise Criteria, dB(A)

Location	LAeq, 15minute	
	Noise criteria	Mackas Sand noise level contribution
Site 1	36	<30 (estimated – barely audible)
Site 2	36	Not audible (confirmed <36)
Site 4	35	Not audible (confirmed <35)
Site 5[1]	35	Not audible (confirmed <35)
Site 6	35	Not audible (confirmed <35)

[1] Noise monitoring at Site 6 is considered representative of Site 5

Table 6.2 Evening Industrial Noise Levels –Sand Extraction Activities versus Noise Criteria, dB(A)

Location	LAeq, 15minute	
	Noise criteria	Mackas Sand noise level contribution
Site 1	35	Not audible
Site 2	36	Not audible
Site 4	36	Not audible
Site 5[1]	35	Not audible[1] (confirmed <35)
Site 6	35	Not audible (confirmed <35)

[1] Noise monitoring at Site 6 is considered representative of Site 5

Table 6.3 Night Time Industrial Noise Levels –Sand Extraction Activities versus Noise Criteria, dB(A)

Location	LAeq, 15minute		LA1,1minute	
	Noise criteria	Estimated Mackas Sand noise level contribution	Noise criteria	Estimated Mackas Sand noise level contribution
Site 1	35	<30	45	38
Site 2	35	<30	45	<40
Site 4[1]	36	Not audible (confirmed <35)	45	Not audible (confirmed <35)
Site 5[1]	35	Not audible (confirmed <35)	45	Not audible (confirmed <45)
Site 6	35	Not audible (confirmed <35)	45	Not audible (confirmed <45)

[1] Noise monitoring at Site 6 is considered representative of Site 5

Table 6.4 Truck Noise Levels – Alternate Access Road to Lot 218, dB(A)

Location	Period	Noise Criteria LAeq, 15minute	Estimated Mackas Sand trucks noise level contribution LAeq, 15minute
Site 5[1]	Day Time (7:30 am to 7:45 am)	41	<38
Site 6	Day Time (7:30 am to 7:45 am)	40	<38
Site 5[1]	Evening (8:00 pm to 8:15 pm)	40	<29
Site 6	Evening (8:00 pm to 8:15 pm)	40	29
Site 5[1]	Night Time/Shoulder (6:33 am to 6:48 am)	39	<38
Site 6	Night Time/Shoulder (6:33 am to 6:48 am)	38	<38

[1] Noise monitoring at Site 6 is considered representative of Site 5

The results from the Mackas Sand compliance noise monitoring presented in **Table 6.1**, **Table 6.2**, **Table 6.3** and **Table 6.4** indicate that during the day, evening and night periods of attended monitoring, Mackas Sand was complying at all sites with the LAeq,15minute criteria for extraction operations and traffic travelling on the Alternate Access Road to Lot 218, as outlined in the Project Approval and EPL under which Mackas Sand operates (refer to **Section 2.0**).

The results from the Mackas Sand compliance noise monitoring presented in **Table 6.3** indicate that during the night time period of attended monitoring, Mackas Sand was complying at all sites with the LA1,1minute criteria outlined in the Project Approval and EPL under which Mackas Sand operates (refer to **Table 2.1** to **Table 2.6**).

6.2 Traffic Noise

The measured heavy vehicle noise levels from the Mackas Sand operation contributing to the road traffic noise levels are presented in **Table 6.5** for the night and day time assessment periods.

Table 6.5 Mackas Sand Road Traffic Noise Level Contribution, dB(A)

Road	Period	Noise Criteria	Noise level contribution LAeq,1 hour
Oakvale Drive as measured at corner of Oakvale Drive and Nelson Bay Road (Site 4)	Night	55 LAeq,1 hour	54
	Day	60 LAeq,1 hour	53
Nelson Bay Road as measured at 2352 Nelson Bay Road (Site 6)	Night	55 LAeq,9 hour	53
	Day	60 LAeq,15 hour	52

The results from the Mackas Sand road traffic compliance noise monitoring presented in **Table 6.5** indicate that road traffic associated with Mackas Sand was during both the night and day periods below relevant road traffic noise criteria outlined in the Project Approval and EPL under which the Mackas Sand premises operate (refer to **Table 2.3**).

7.0 Statement of Compliance

7.1 Industrial Noise

Results of the attended industrial noise monitoring program conducted on 10 August 2018, 7 September and 10 September 2018, indicate that at the time of monitoring, Mackas Sand was complying with the industrial noise assessment criteria at all receivers as outlined in the Mackas Sand Project Approval 08_0142 and EPL 13218 for the meteorological conditions experienced at the time of monitoring.

7.1.1 Mackas Sand trucks on Alternate Access Road to Lot 218

Based on the attended noise monitoring undertaken on 10 August 2018 and 9 October 2018, noise from Mackas Sand trucks on the Alternate Access Road to Lot 218 was complying with the applicable noise assessment criteria at all receivers as outlined in Project Approval 08_0142.

7.2 Traffic Noise

Based on the results of the road traffic noise monitoring program conducted from 6:00 am to 7:00 am and 7:00 am to 8:00 am, 10 August 2018 at the private residence on the corner of Oakvale Drive and Nelson Bay Road, as well as at 2352 Nelson Bay Road, it is concluded that at the time of monitoring Mackas Sand was complying with the road traffic noise assessment criteria at all receivers as outlined in the Mackas Sand Project Approval 08_0142 and EPL 13218 for the meteorological conditions experienced at the time of monitoring.

8.0 References

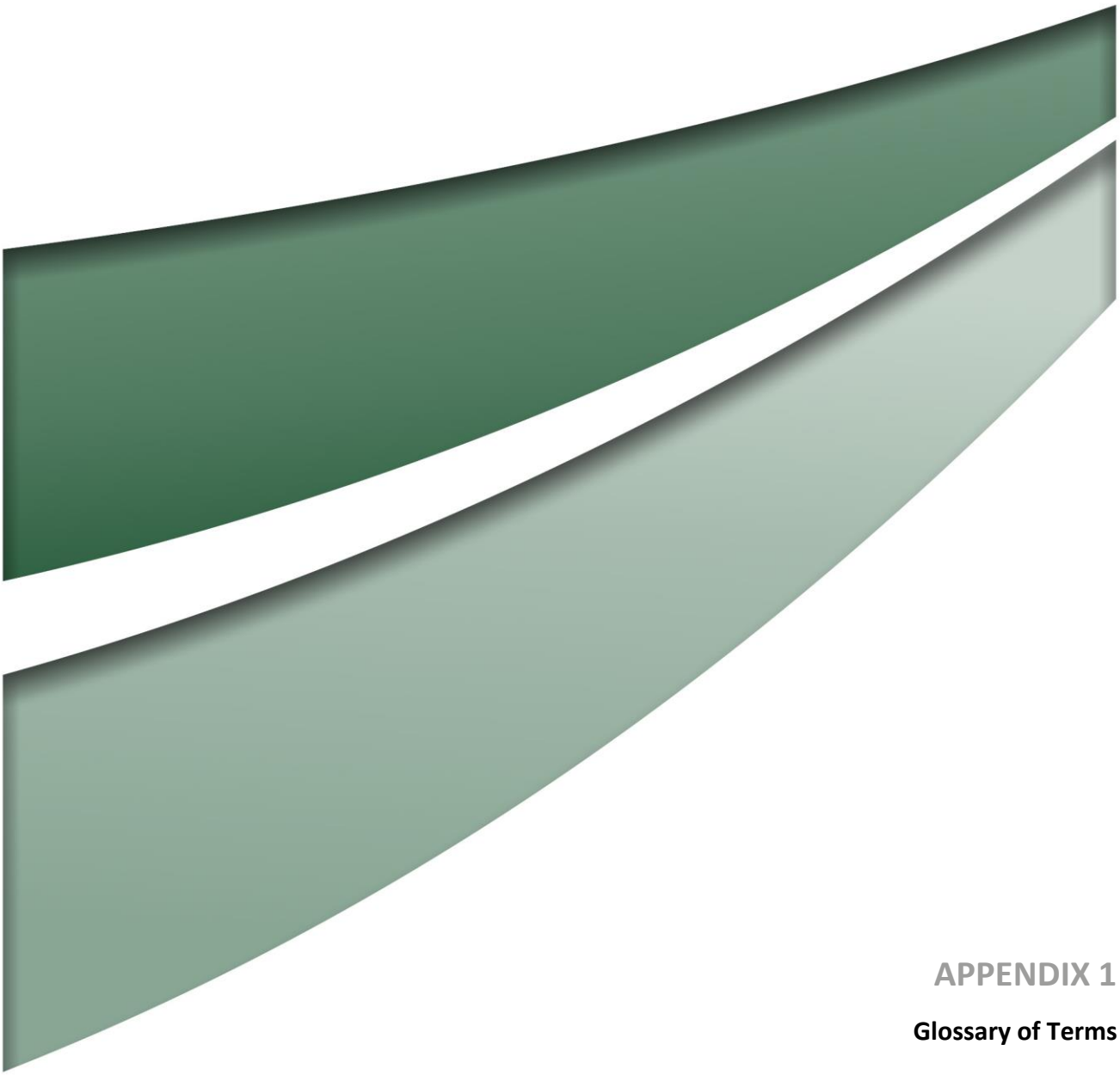
Australian Standard AS1055-1997. 'Acoustics – Description and Measurement of Environmental Noise.'

Australian Standard AS1055-2018. 'Acoustics – Description and Measurement of Environmental Noise.'

NSW Environment Protection Authority 2000. New South Wales Industrial Noise Policy.

NSW Environment Protection Authority 2017. New South Wales Noise Policy for Industry

Umwelt (Australia) Pty Limited, 2016. Noise Management Plan for Sand Extraction Operations.



APPENDIX 1

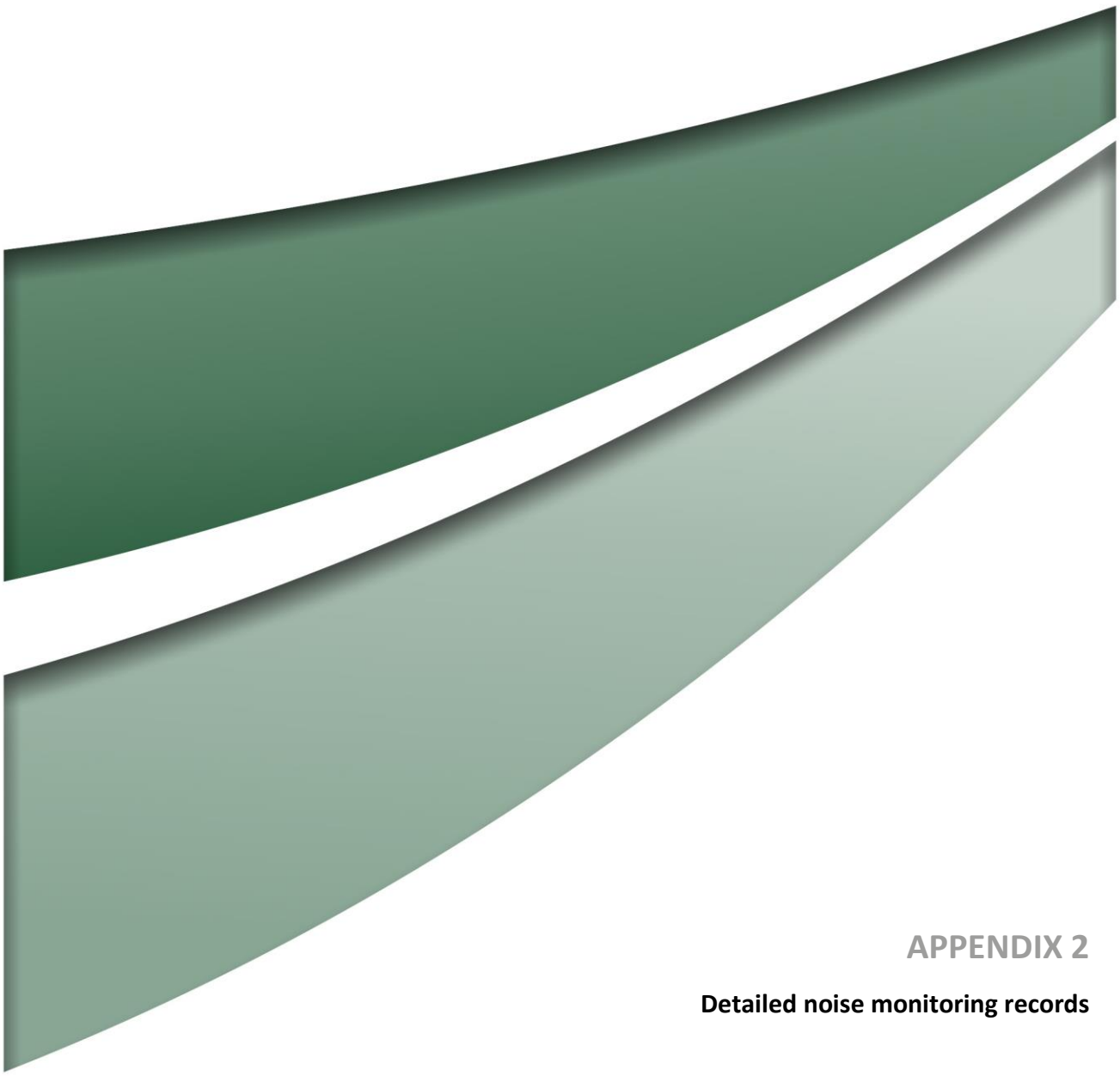
Glossary of Terms

Appendix 1 – Glossary and Definitions

1/3 Octave	Single octave bands divided into three parts.
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment background level – A single-figure background noise level representing each assessment period – day, evening and night (that is, three assessment background levels are determined for each 24 hour period of the monitoring period). It is determined by taking the lowest 10th percentile of the L90 level for each assessment period.
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dB(A), dBA	Decibels A-weighted.
dB(L), dB(Lin)	Decibels Linear or decibels Z-weighted.
Decibel (dB)	The units of sound level and noise exposure measurement where a step of 10 dB is a ten-fold increase in intensity or sound energy and actually sounds a little more than twice as loud.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second – one oscillation per second equals 1 hertz.
L_{A10}	The percentile sound pressure level exceeded for 10 per cent of the measurement period with 'A' frequency weighting calculated by statistical analysis. Typically used to assess the impact of an existing operation on a receiver area and is referred to as the cumulative noise levels at the receiver attributable to the noise source.
L_{A90}	Background Noise Level. The percentile sound pressure level exceeded for 90 per cent of the measurement period with 'A' frequency weighting calculated by statistical analysis.
L_{Amax}	The maximum of the sound pressure levels recorded over an interval of one second.
$L_{A1,1minute}$	The measure of the short duration high-level noises that cause sleep arousal. The noise level is measured as the percentile sound pressure level that is exceeded one per cent of measurement period with 'A' frequency weighting calculated by statistical analysis during a measurement time interval of one minute.

Appendix 1 – Glossary and Definitions

$L_{Aeq,t}$	Equivalent continuous sound pressure level – The value of the sound pressure level of a continuous steady noise that, a measurement interval of time (t), has the same mean square sound pressure as the sound under consideration whose level varies with time. Usually measured in dB with 'A' weighting.
L_{An}	Percentile level – A measure of the fluctuation of the sound pressure level which is exceeded 'n' per cent of the observation time.
RBL	Rating background level – The overall single figure background level representing each assessment period over the whole monitoring period determined by taking the median of the ABLs found for each assessment period.
SPL (dBA)	Noise: Sound pressure level – The basic measure of noise loudness. The level of the root-mean-square sound pressure in decibels given by: SPL = 10.log10 (p/po)2 where p is the rms sound pressure in pascals and po is the sound reference pressure at 20 µPa. decibels.
SWL	Sound power level – a measure of the energy emitted from a source as sound and is given by: SWL = 10.log10 (W/Wo) where W is the sound power in watts and Wo is the sound reference power at 10-12 watts.



APPENDIX 2

Detailed noise monitoring records

Day Period Attended Monitoring

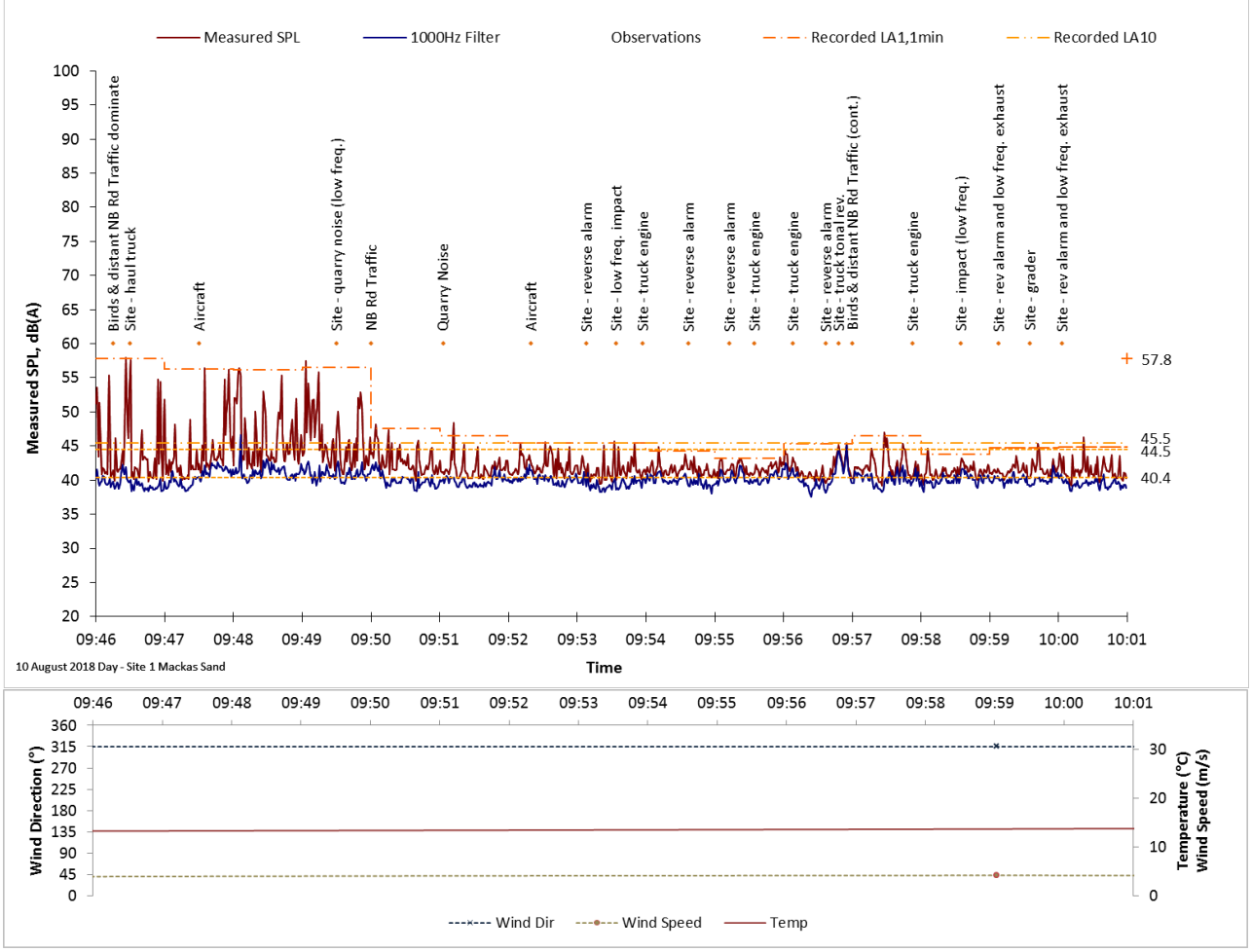


Figure A2.1
Site 1, 9:46 AM, 10th August 2018

The results in **Figure A2.1** indicate that the ambient noise environment at Noise Monitoring Site 1 was dominated by distant road traffic noise from Nelson Bay Rd throughout the monitoring period. Other noise contributions from birds, aircraft and trucks entering and exiting Mackas Sand via Janet Parade were audible at times in the background.

The $L_{Aeq,15minute}$ noise contribution from Mackas Sand was estimated to be less than 30 dB(A).

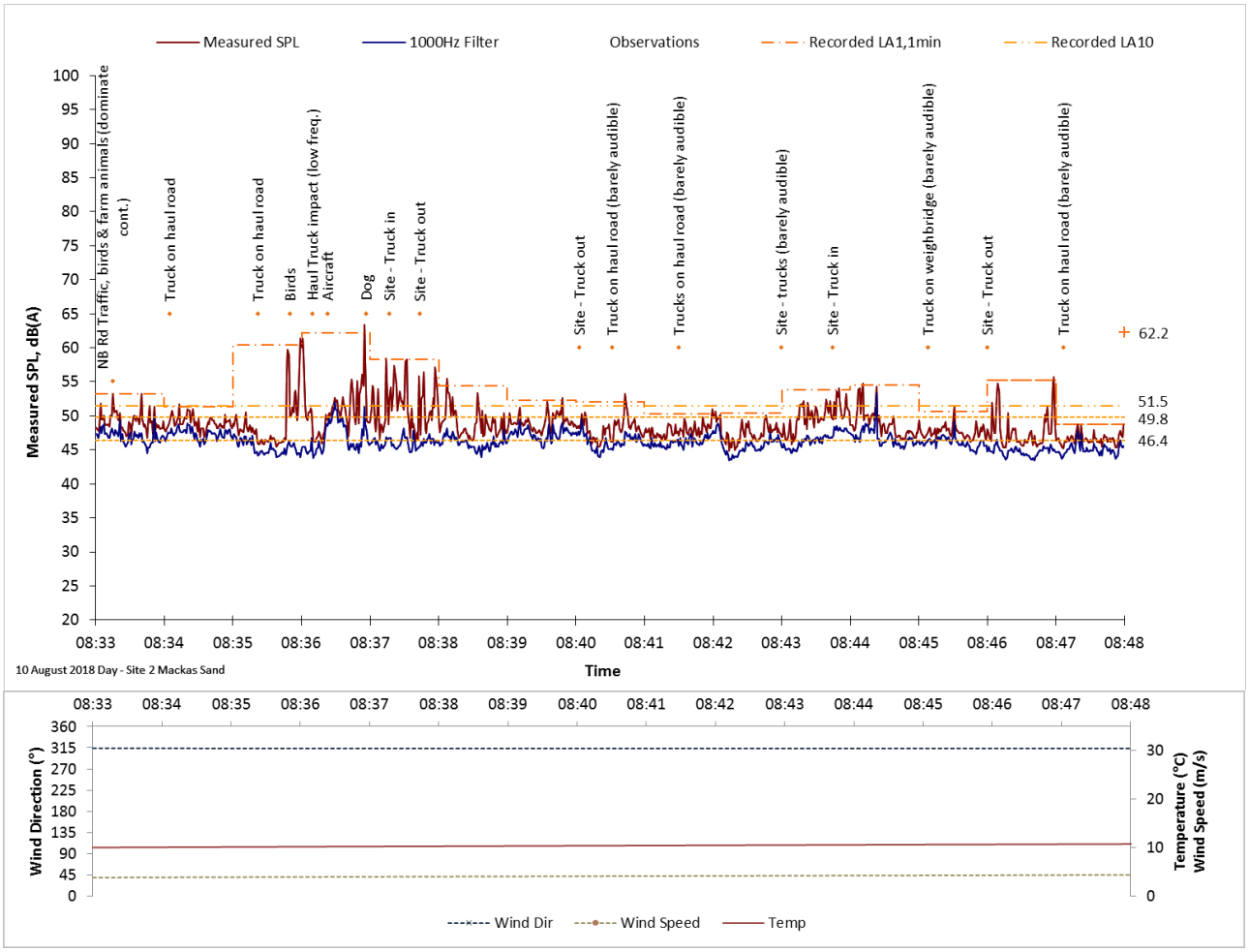


Figure A2.2
Site 2, 8:33 AM, 10th August 2018

The results in **Figure A2.2** indicate that the ambient noise environment at Noise Monitoring Site 2 was dominated by road traffic noise from Nelson Bay Rd throughout the monitoring period. Other noise contributions, from birds, dogs, farm animals, aircraft and trucks entering and exiting Mackas Sand via Oakvale Drive, were audible at times in the background.

The $L_{Aeq,15minute}$ noise contribution from Mackas Sand was estimated to be less than 35 dB(A).

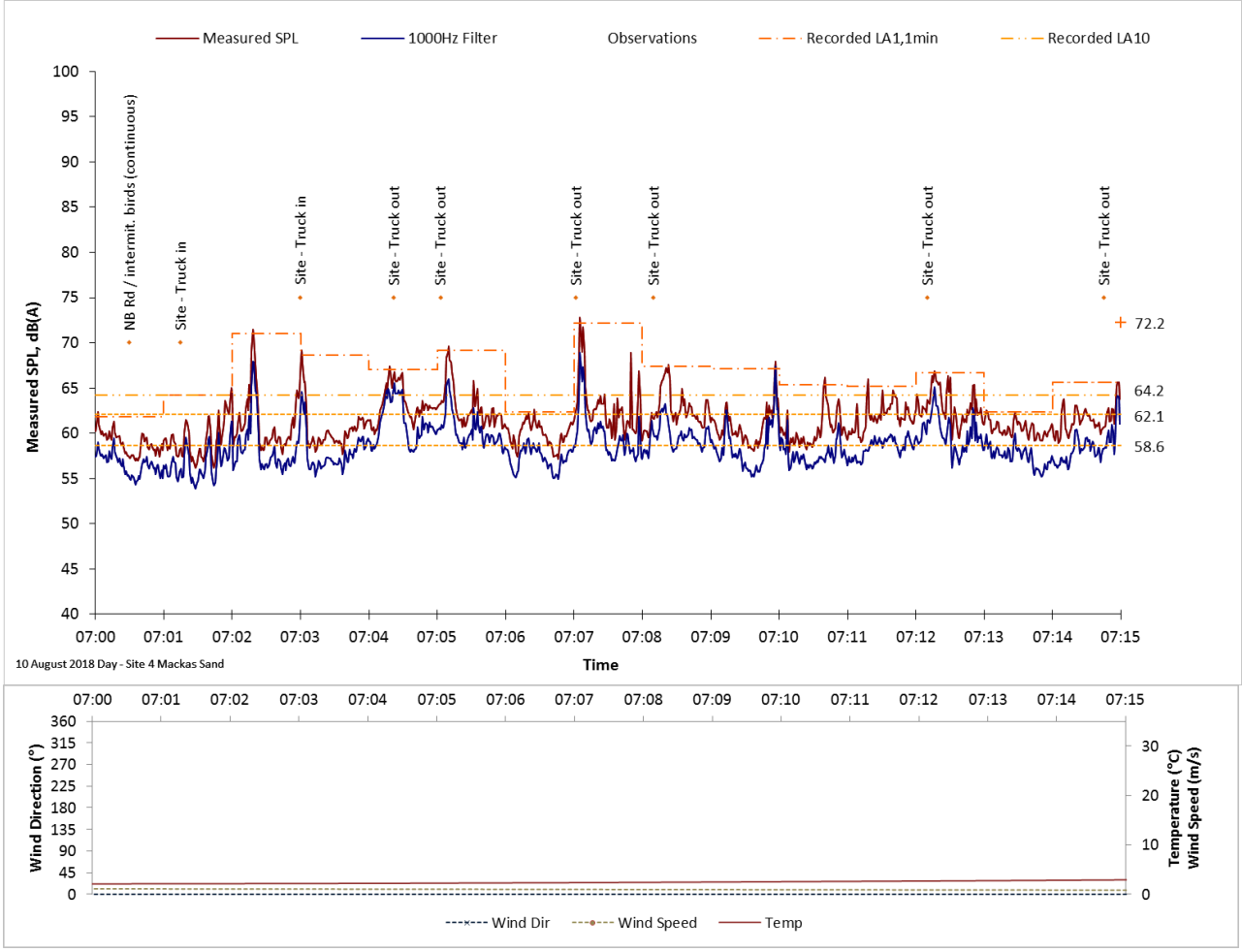


Figure A2.3
Site 4, 7:00 AM, 10th August 2018

The results in **Figure A2.3** indicate that the ambient noise environment at Noise Monitoring Site 4 was dominated by road traffic noise from Nelson Bay Rd throughout the monitoring period. Other noise contributions from birds and trucks entering and exiting Mackas Sand via Oakvale Drive, were audible at times in the background.

Noise from sand extractions operations at Mackas Sand was not audible during the measurement.

The $L_{Aeq,15minute}$ noise contribution from Mackas Sand was estimated to be less than 35 dB(A).

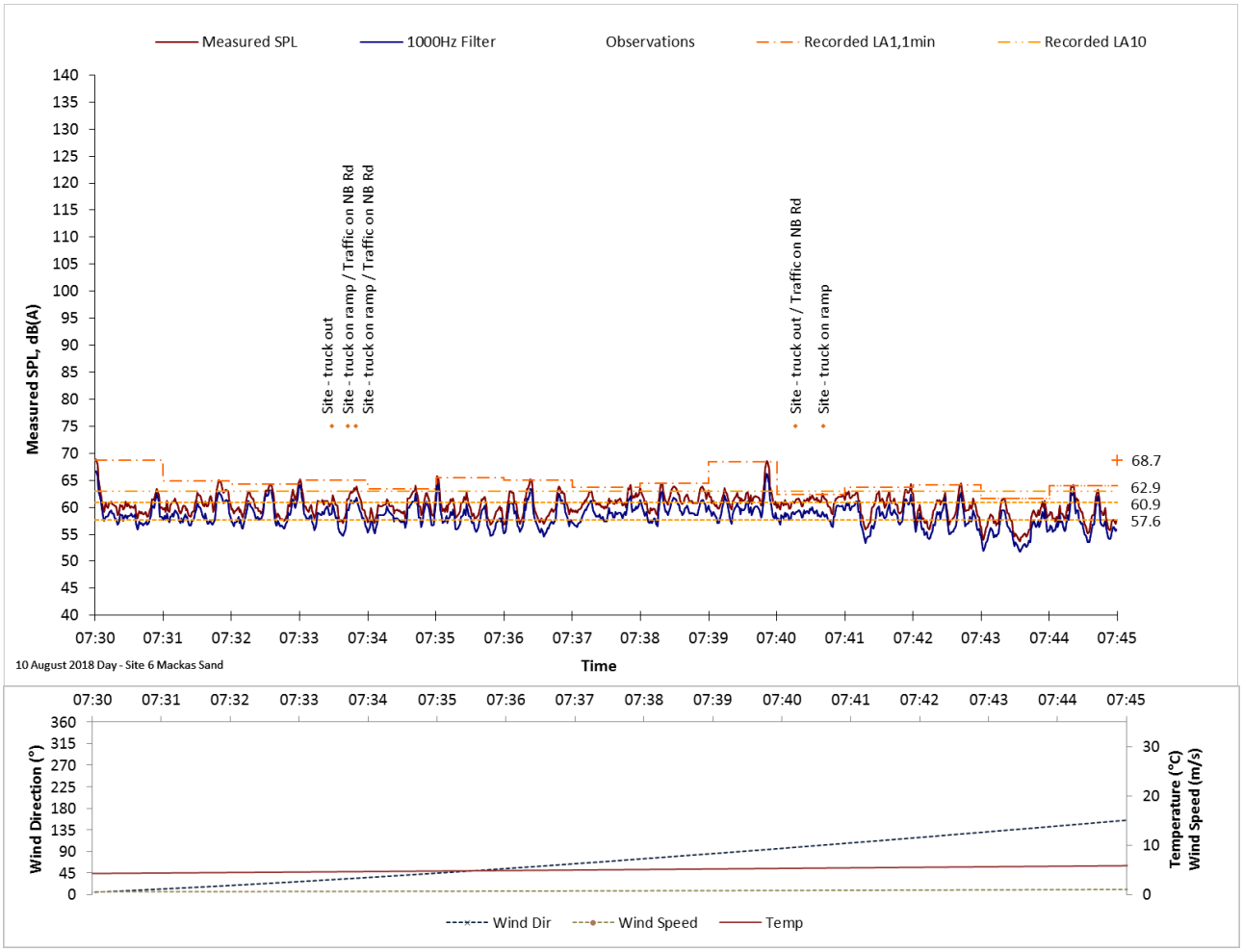


Figure A2.4
Site 6, 7:30 AM, 10th August 2018

The results in **Figure A2.4** indicate that the ambient noise environment at Noise Monitoring Site 6 was dominated by road traffic noise on Nelson Bay Road throughout the monitoring period. Other noise contributions resulted from birds and trucks entering and exiting Mackas Sand via the access road which were audible at times in the background.

The $L_{Aeq,15minute}$ noise contribution from Mackas Sand (trucks only) was estimated to be less than 38 dB(A).

Evening Period Attended Monitoring

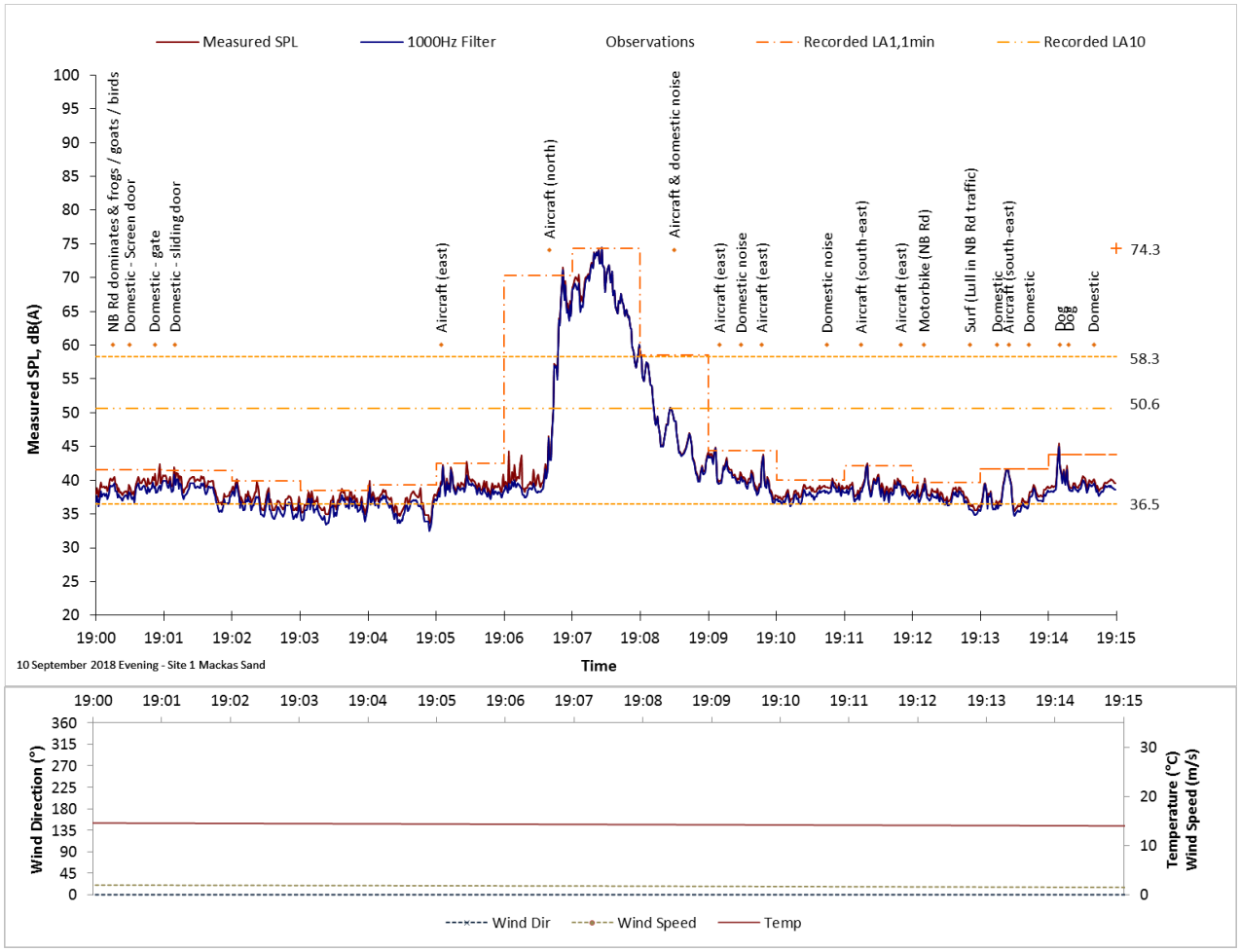


Figure A2.5
Site 1, 7:00 PM, 10th September 2018

The results in **Figure A2.5** indicate that the ambient noise environment at Noise Monitoring Site 1 was dominated by traffic noise on Nelson Bay Road throughout the monitoring period. Other noise contributions resulted from aircraft, frogs, goats, birds, surf and domestic activity which were audible at times in the background.

Noise from Mackas Sand was inaudible relative to the ambient acoustic environment. Noise from Mackas Sand was not audible during the monitoring period.

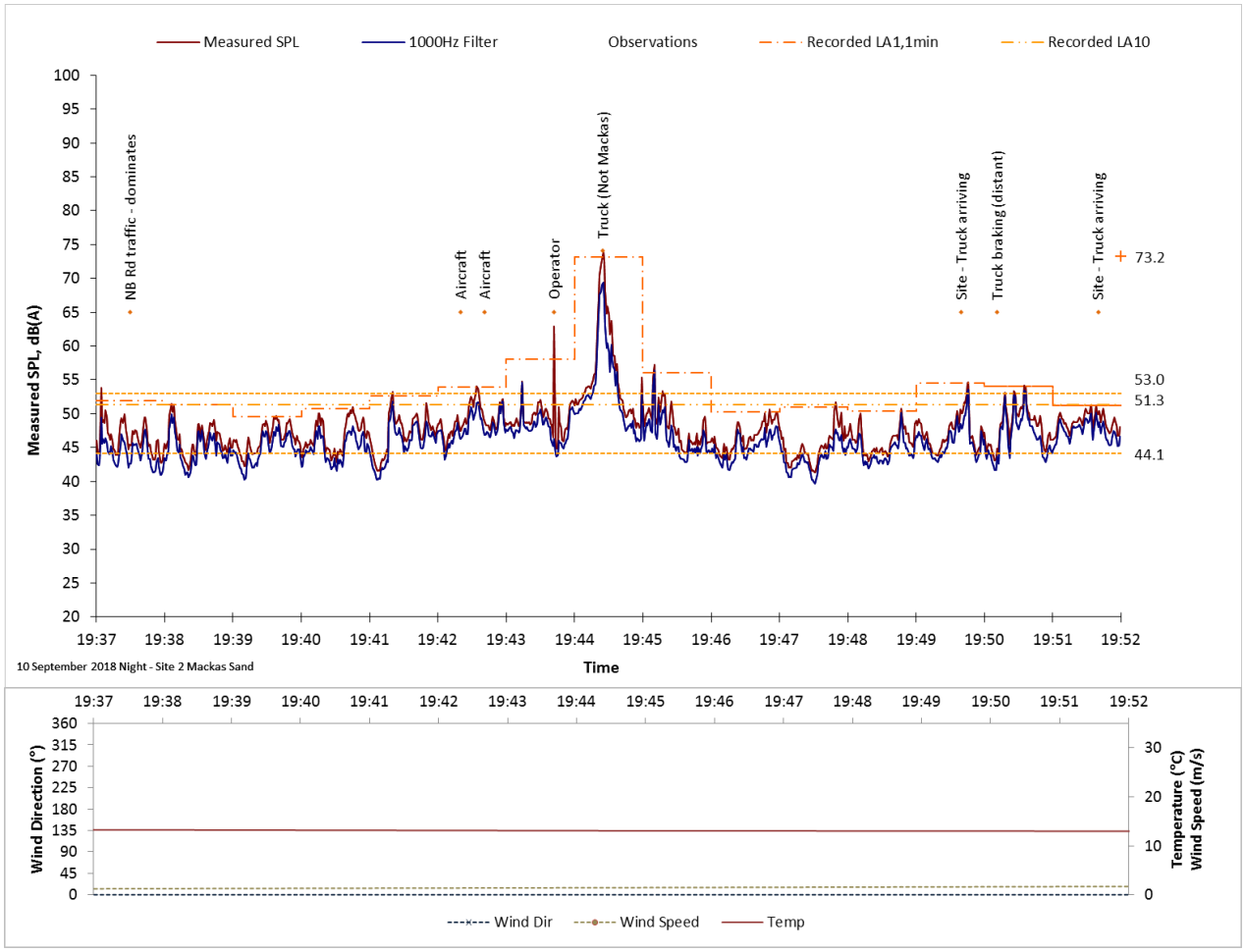


Figure A2.6
Site 2, 7:37 PM, 10th September 2018

The results in **Figure A2.6** indicate that the ambient noise environment at Noise Monitoring Site 2 was dominated by road traffic noise on Nelson Bay Road throughout the monitoring period. Other noise contributions from aircraft, local traffic and trucks entering and exiting Mackas Sand via Oakvale Drive were audible at times in the background.

Noise from Mackas Sand was not audible during the monitoring period.

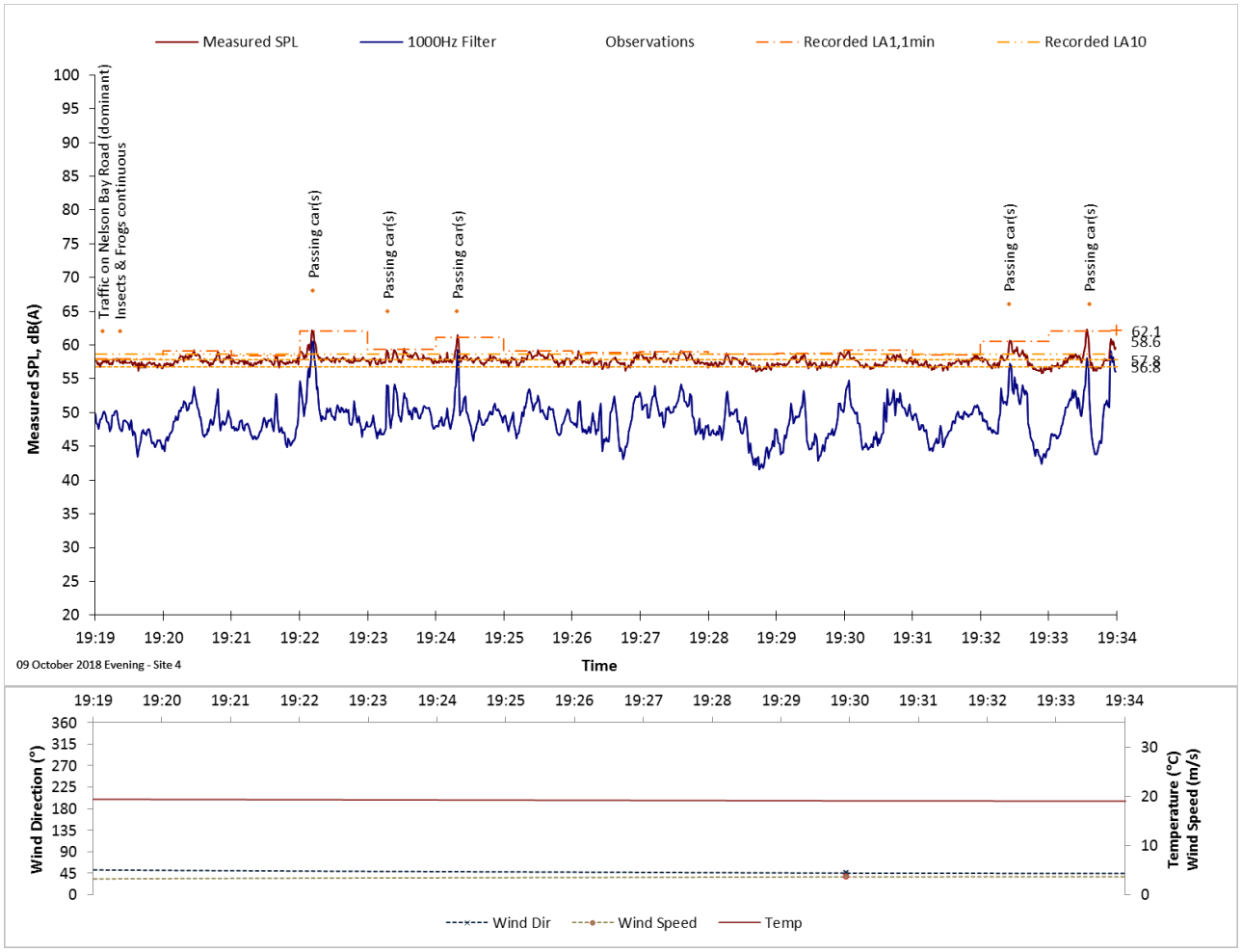


Figure A2.7
Site 4, 7:19 PM, 9th October 2018

The results in **Figure A2.7** indicate that the ambient noise environment at Noise Monitoring Site 4 was dominated by road traffic noise on Nelson Bay Road throughout the monitoring period. Other noise contributions from insects & frogs were continuously present.

Noise from Mackas Sand extraction operation was not audible during the monitoring period. No Mackas Sand truck movements were recorded on Oakvale Drive.

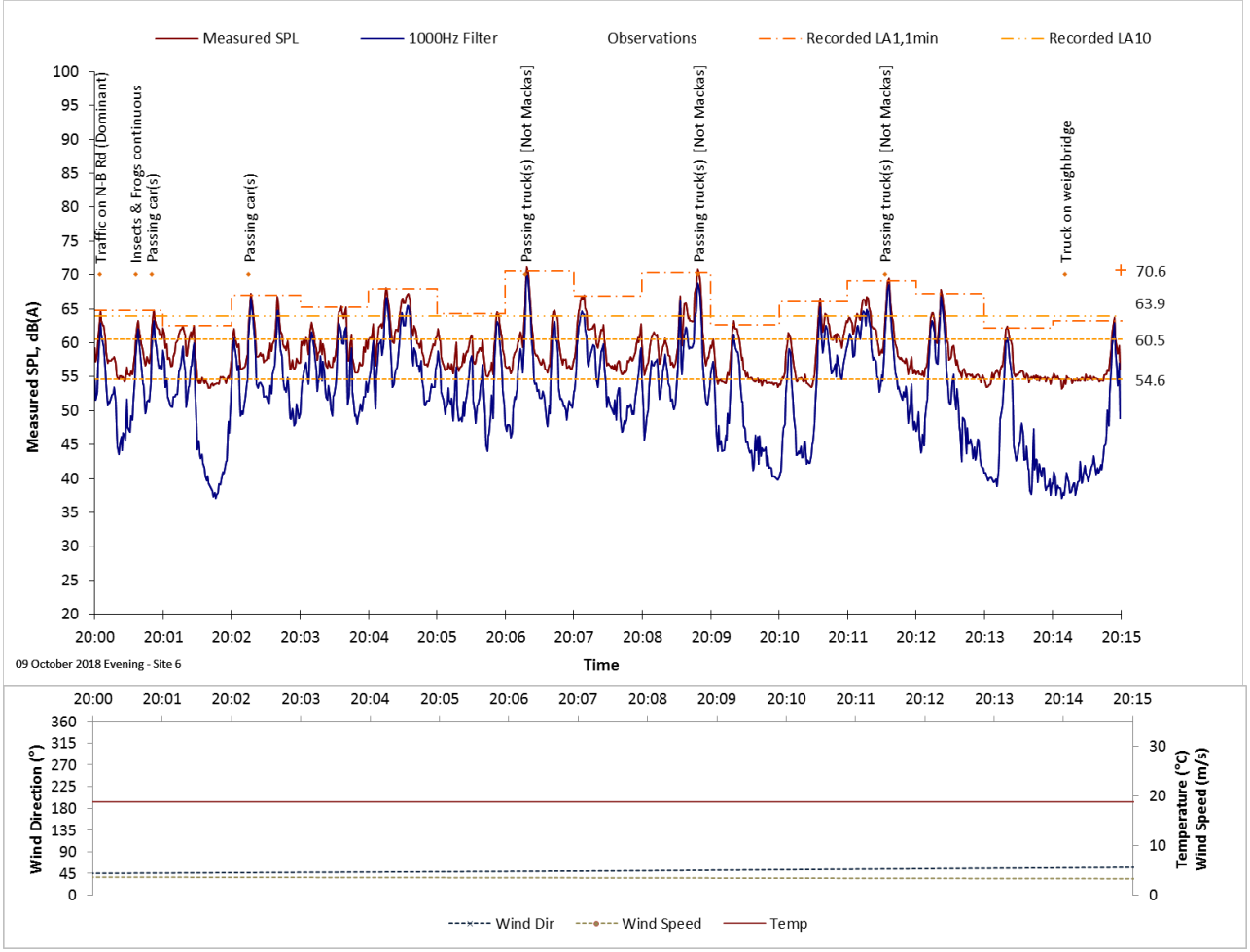


Figure A2.8
Site 6, 8:00 PM, 9th October 2018

The results in **Figure A2.8** indicate that the ambient noise environment at Noise Monitoring Site 6 was dominated by road traffic noise on Nelson Bay Road throughout the monitoring period. Other noise contributions from insects & frogs were continuously present.

Noise from Mackas Sand extraction operation was not audible during the monitoring period. The only Mackas Sand truck movement noise recorded during the monitoring period was a truck approaching Lot 218 on the Alternate Access Road and stopping on the Weighbridge.

The contribution of Mackas Sand trucks on the Alternate Access Road to the measured LAeq,15 minute noise level is estimated to be 29 dB(A).

Night Period Attended Monitoring

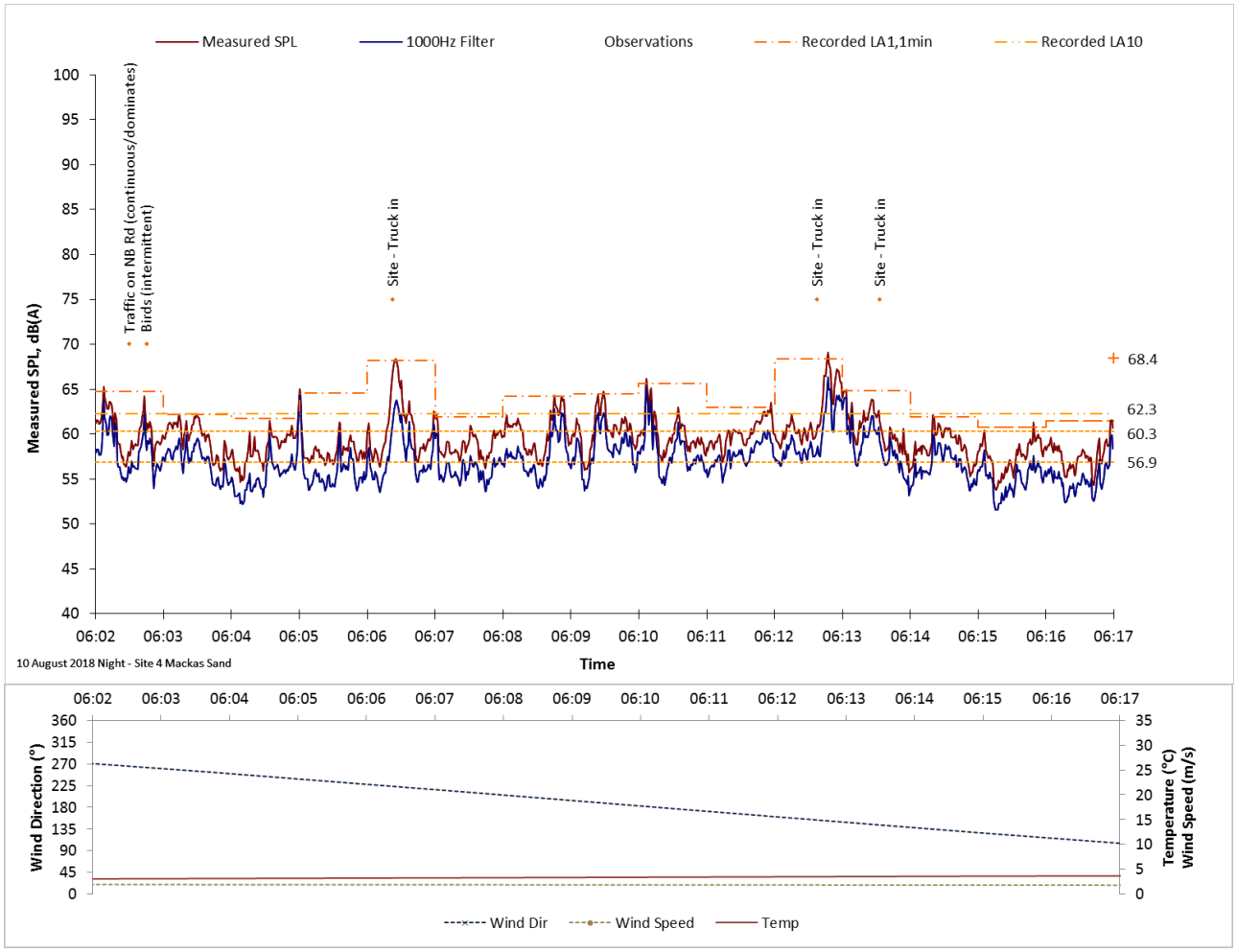


Figure A2.9
Site 4, 6:02 AM, 10th August 2018

The results in **Figure A2.9** indicate that the ambient noise environment at Noise Monitoring Site 4 was dominated by road traffic from Nelson Bay Road throughout the monitoring period. Other noise contributions from aircraft and trucks entering and exiting Mackas Sand via Oakvale Drive were audible at times in the background.

Noise from Mackas Sand was not audible during the monitoring period. The $L_{Aeq,15minute}$ noise contribution from extraction operations at Mackas Sand was estimated to be less than 35 dB(A).

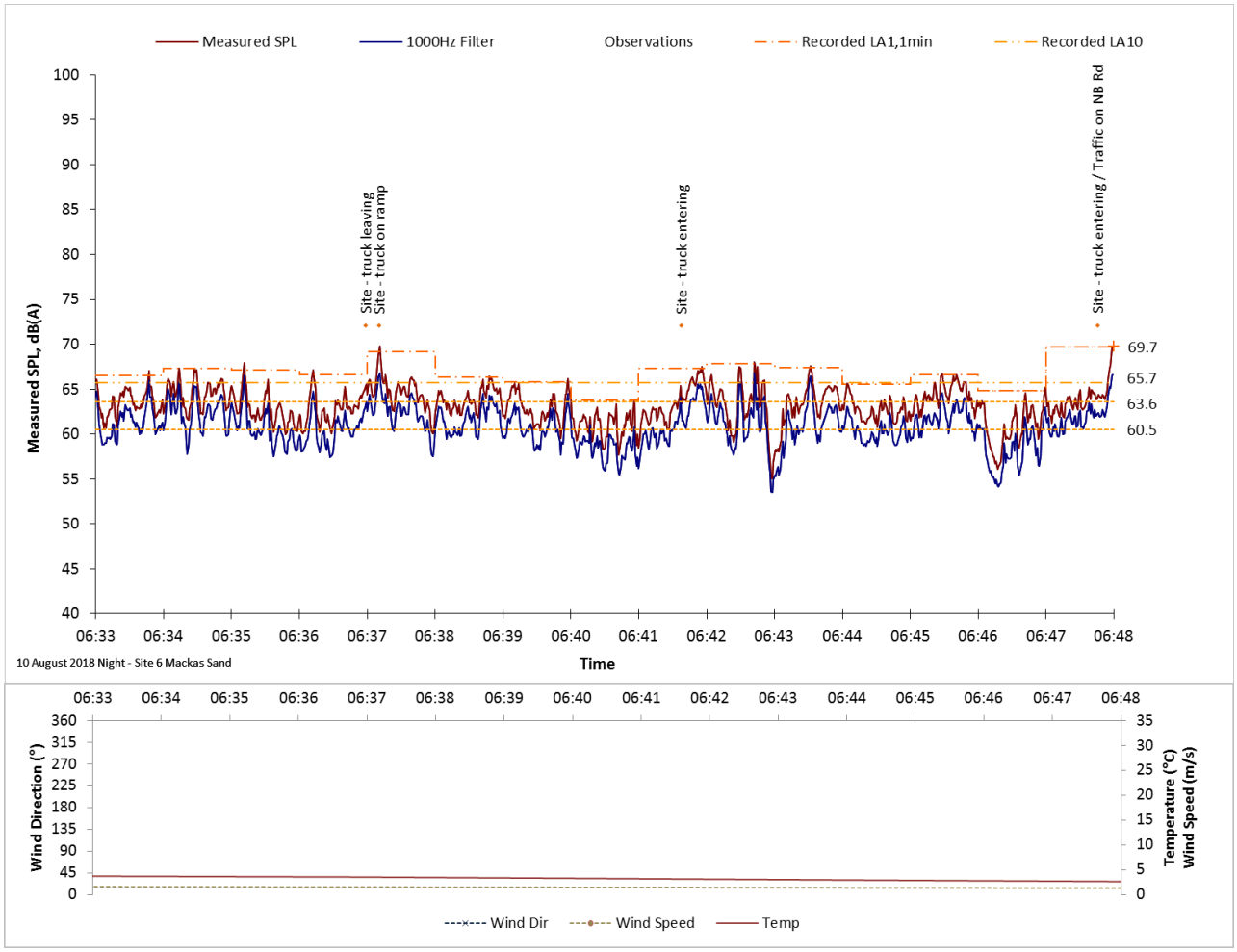


Figure A2.10
Site 6, 6:33 AM, 10th August 2018

The results in **Figure A2.10** indicate that the ambient noise environment at Noise Monitoring Site 6 was dominated by traffic noise on Nelson Bay Road throughout the monitoring period. Other noise contributions resulted from birds, insects and trucks entering and exiting Mackas Sand via the access road which were audible at times in the background.

Noise from Mackas Sand was not audible during the monitoring period. The $L_{Aeq,15minute}$ noise contribution from extraction operations at Mackas Sand was estimated to be less than 35 dB(A).

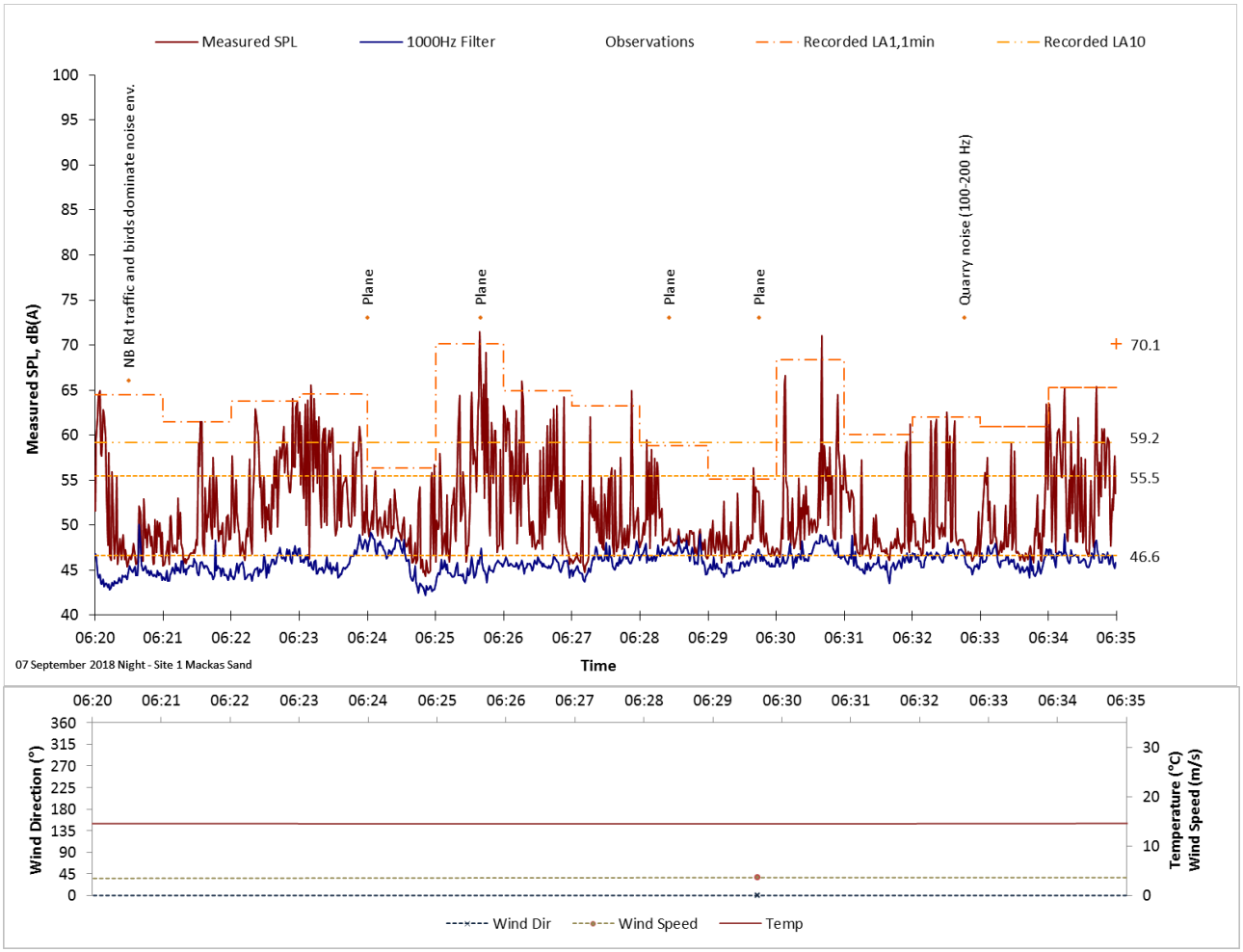


Figure A2.11
Site 1, 6:20 AM, 7th September 2018

The results in **Figure A2.11** indicate that the ambient noise environment at Noise Monitoring Site 1 was dominated by birds and traffic on Nelson Bay Road throughout the monitoring period. Other noise contributions from planes/aircraft were audible at times in the background.

The $L_{Aeq,15minute}$ noise contribution from Mackas Sand was estimated to be less than 30 dB(A).

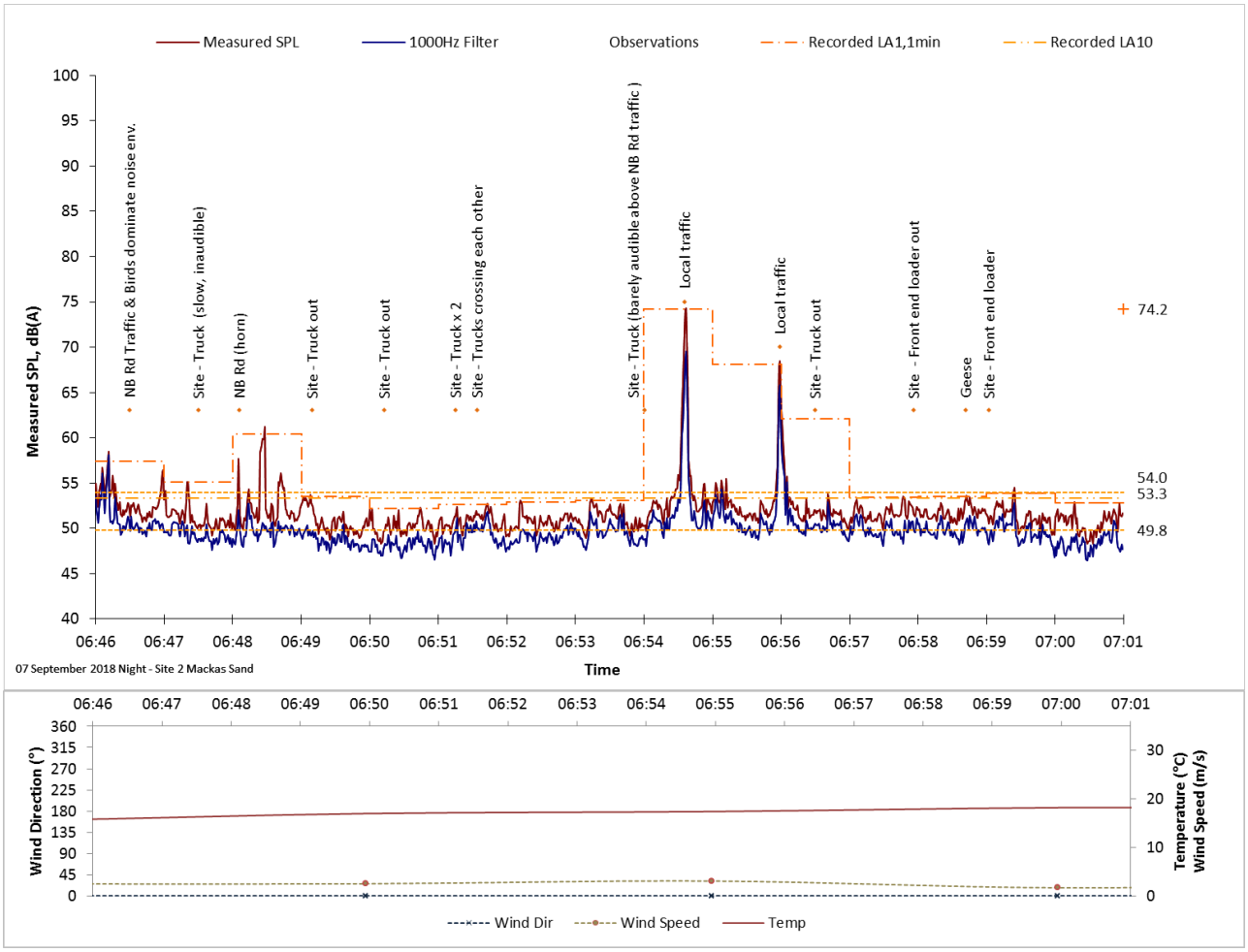
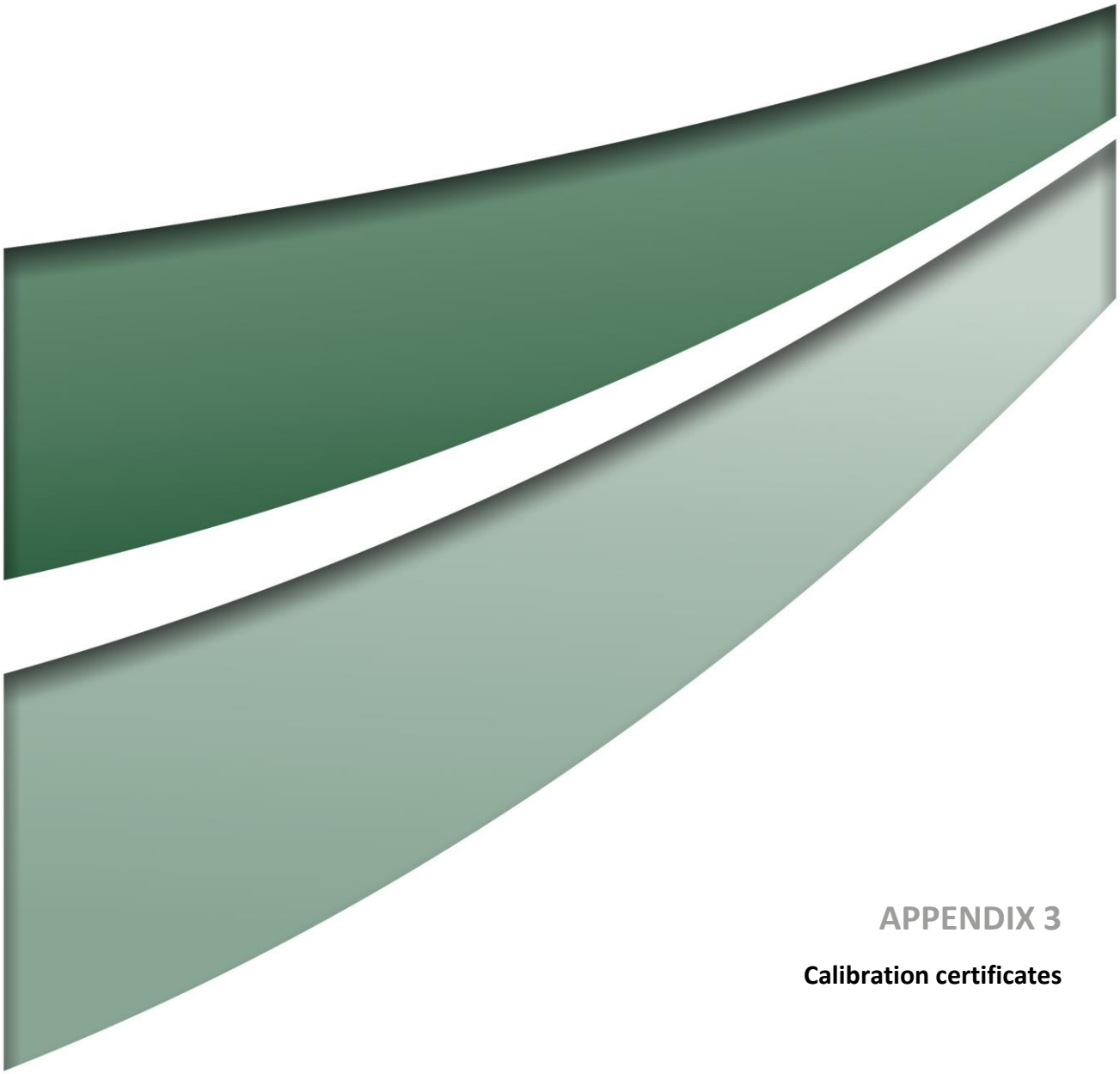


Figure A2.12
Site 2, 6:46 AM, 7th September 2018

The results in **Figure A2.12** indicate that the ambient noise environment at monitoring location Site 2 was dominated by road traffic noise from Nelson Bay Road. Other noise contributions from local traffic, geese and vehicles entering and exiting Mackas Sand via Oakvale Drive were audible at times in the background.

The $L_{Aeq,15minute}$ noise contribution from Mackas Sand was estimated to be less than 30dB(A).



APPENDIX 3

Calibration certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 22655

EQUIPMENT TESTED: Sound Level Calibrator

Manufacturer: B & K
Type No: 4231 **Serial No:** 2130702
Owner: Umwelt (Australia) Pty Ltd
75 York Street
Teralba, NSW 2284

Tests Performed: Measured output pressure level was found to be:

Parameter	Pre-Adj	Adj Y/N	Output: (db re 20 µPa)	Frequency: (Hz)	THD&N (%)
Level 1:	NA	N	93.91	999.9	0.79
Level 2:	NA	N	113.87	999.9	0.45
Uncertainty:			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:
Ambient Pressure: 1004 hPa ±1.5 hPa **Relative Humidity:** 50% ±5%
Temperature: 24 °C ±2° C
Date of Calibration: 02/05/2018 **Issue Date:** 02/05/2018
Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2004
CHECKED BY: ... **AUTHORISED SIGNATURE:** .....
Jack Kielt

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

NATA
WORLD RECOGNISED ACCREDITATION
Accredited Lab. 9262
Acoustic and Vibration Measurements

ACU-VIB
ELECTRONICS
HEAD OFFICE
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
Mobile: 0413 809806
Web site: www.acu-vib.com.au

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 22653 & FILT 4633

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-959	**Serial No:**	12918
Microphone Type:	40AE	**Serial No:**	88213
Filter Type:	1/3 Octave	**Serial No:**	12918
Comments:	All tests passed for class 1. (See over for details)		
Owner:	Umwelt (Australia) Pty Ltd 75 York Street Teralba, NSW 2284		
Ambient Pressure:	1006 hPa ±1.5 hPa		
Temperature:	24 °C ±2° C	**Relative Humidity:**	50% ±5%
Date of Calibration:	02/05/2018	**Issue Date:**	02/05/2018
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....
Jack Kiett

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

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Accredited Lab. No. 9262
Acoustic and Vibration Measurements

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CERTIFICATE NO.: SLM 22653 & FILT 4633

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

Tests Performed:	*Clause*	*Result*
Absolute Calibration	10	Pass
Acoustical Frequency Weighting	12	Pass
Self Generated Noise	11.1	Entered
Electrical Noise	11.2	Entered
Long Term Stability	15	Pass
Electrical Frequency Weightings	13	Pass
Frequency and Time Weightings	14	Pass
Reference Level Linearity	16	Pass
Range Level Linearity	17	Pass
Toneburst	18	Pass
Peak C Sound Level	19	Pass
Overload Indicator	20	Pass
High Level Stability	21	Pass

Statement of Compliance: The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.
A full technical report is available if required.

This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:

1. Relative attenuation clause 5.3

Date of Calibration: 02/05/2018 **Issue Date:** 02/05/2018

Checked by: ..

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

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Accredited Lab. No. 9262
Acoustic and Vibration Measurements

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