

**Mackas Sand Pty Ltd**

**ENVIRONMENTAL NOISE  
MONITORING JULY 2013**

September 2013

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**September 2013**

Prepared by  
**Umwelt (Australia) Pty Limited**

on behalf of  
**Mackas Sand Pty Ltd**

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Report No. **1646/R47/V1/FINAL**  
Date: **September 2013**



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## 1.0 Introduction

### 1.1 Project Background

Mackas Sand Pty Ltd (Mackas Sand) was granted Major 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 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 of sand resource will be extracted from Lot 220. Lot 218 has an identified resource of 9.6 million tonnes 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.

At the time of preparing this report, sand extraction was only being undertaken on Lot 220. No extraction activities have occurred on Lot 218. As of July 2013, no sand product had been transported along Lavis Lane from Lot 218.

It is noted that the Lot 220 site is located in close proximity to the Williamtown Royal Australian Air Force (RAAF) Base, and is occasionally subject to noise impacts from overhead jet 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 Major Project Approval 08\_0142, Environmental Protection Licence (EPL) 13218 and the Mackas Sand Noise Management Plan (Umwelt 2009a).

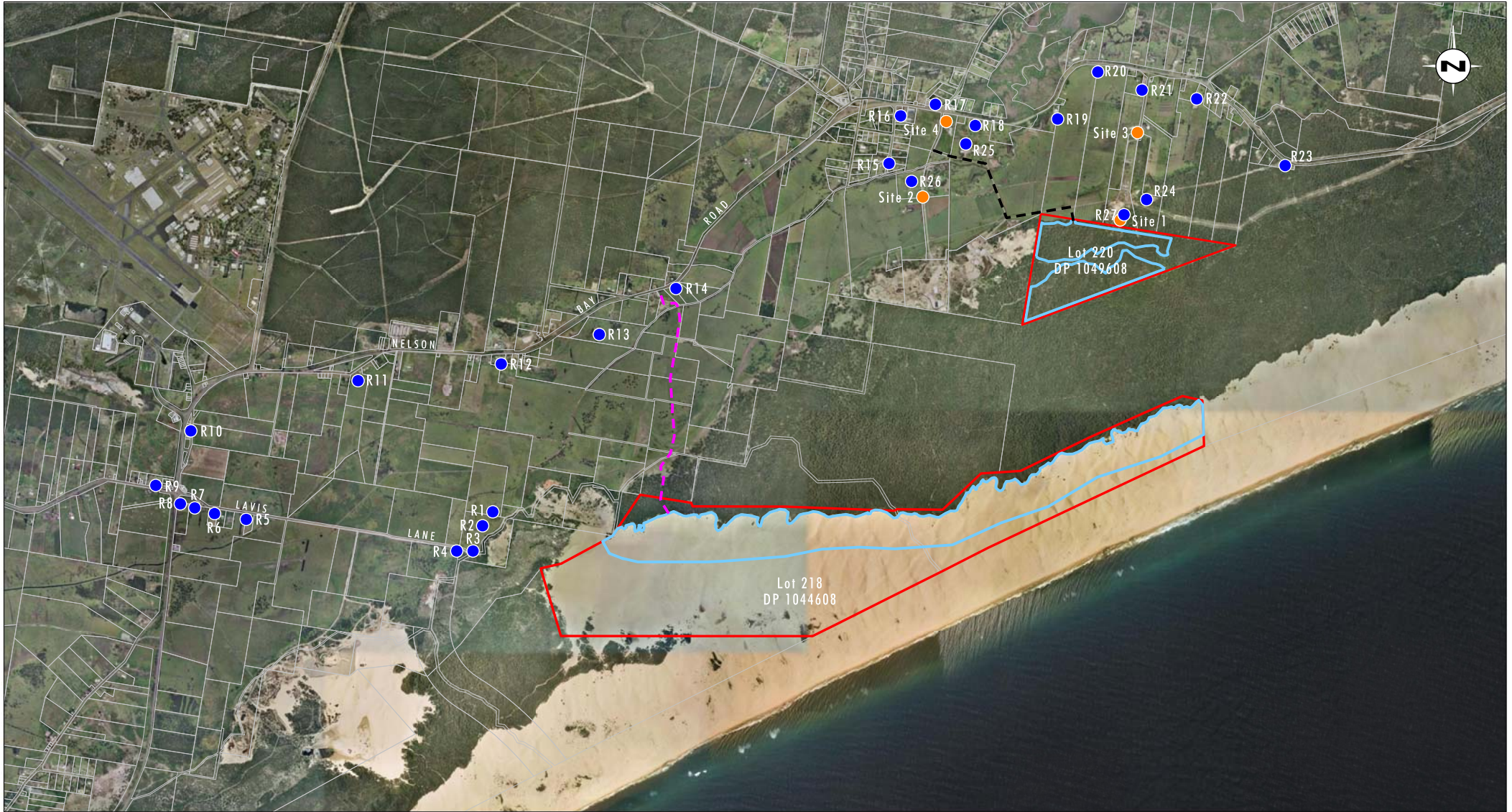
This report presents the results of attended noise monitoring undertaken in July 2013 as part of the ongoing noise monitoring program for Mackas Sand.

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

## 2.0 Assessment Criteria

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





Source: Department of Lands (2003)

0 0.5 1 2 km  
1:45 000

**Legend**

- Lot Boundaries (218 & 220)
- Approved Operational Area
- Residential Receivers
- Noise Monitoring Location
- Approved Site Access
- Proposed Site Access

File Name (A4): R47\_V1/1646\_378.dgn

FIGURE 1.1

Noise Monitoring Sites

**Table 2.1 – Noise Impact Assessment Criteria, dB(A)**

Location	Day LAeq, 15 min	Evening LAeq, 15 min	Night LAeq, 15 min	Night LA1, 1 min
R18 – 300 Nelson Bay Road	39	39	40	45
R1 – Lavis Lane residence	39	39	39	45
R19 – 316 Nelson Bay Road	36	36	37	45
R26 – Residence opp. Oakvale Farm	36	36	35	45
R27 – Hufnagl residence	36	35	35	45
R17 – 287 Nelson Bay Road	35	35	36	45
All other residences	35	35	35	45

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.

Condition 7 of Schedule 3 of Major Project Approval 08\_0142 requires that road traffic noise generated by quarry operations does not exceed the criteria stipulated in **Table 2.2**.

**Table 2.2 – Traffic Noise Impact Assessment Criteria, dB(A)**

Road	Day/Evening LAeq, 1 hour	Night LAeq, 1 hour
Lavis Lane, Oakvale Drive, Nelson Bay Road	60	55

Compulsory Land Acquisition Criteria, as set out in Condition 5 of Schedule 3 of Major Project Approval 08\_0142, are outlined in **Table 2.3** for night time noise levels and are applicable upon Mackas Sand receiving written request for acquisition from the landowner.

**Table 2.3 – Land Acquisition Criteria, dB(A)**

Property Location	Night LAeq, 15 min
R1 to R4	42
R20 to R23	41
All other privately owned residences	40

Additional noise mitigation measures, as required in Condition 8 of Schedule 3 of Major Project Approval 08\_0142, must be undertaken if noise levels exceed the criteria in **Table 2.4**.

**Table 2.4 – Additional Noise Mitigation Criteria, dB(A)**

Property Location	Night LAeq, 15 min
Residences R2 to R4 (and R1)	40
Residences R20 to R23	39
All other privately-owned residences	38

Additionally, the S 58 Licence Variation 1514548 of EPL 13218 for sand extraction operations on Lot 218 and Lot 220 Salt Ash, issued on 29 May 2013, requires that noise from the premises must not exceed the limits specified in **Table 2.5**.

**Table 2.5 – EPL 13218 Condition L6.1 Noise Limits, dB(A)**

Location	Day	Evening	Night	Night
	LAeq, 15 min	LAeq, 15 min	LAeq, 15 min	LA1, 1 min
Residences North of private haul road servicing Lot 220	-	40	40	45
Residence R27	36	36	35	45
Residences R1, R2, R3, R4, R5, R6, R7 and R8.	39	39	39	45
All other residences	-	36	35	45

## 3.0 Assessment Methodology

### 3.1 Approved Quarry Operational Phases

The approved quarrying operations on Lot 220 were, from a noise perspective, designed to be undertaken in three phases of development. Mackas Sand Noise Management Plan (Umwelt 2009a) outlines the potential noise impacts from each of the phases and presents control measures, monitoring programs and assessment methodologies to minimise the risk of noise impacts on residences adjacent to the quarry operations. **Section 3.1** of this report outlines the planned phases of the quarry operations while **Section 3.2** outlines the corresponding noise monitoring and assessment methodologies. **Section 3.3** discusses the status of quarrying operations as at July 2013 and the methodology used to assess any potential noise impacts from the quarry.

#### 3.1.1 Phase 1 Extraction – Lot 220

Phase 1 operations on Lot 220 consists of extraction and transport off site of material only (no screening). Limited machinery will be used during this phase of the operations. All operations during Phase 1 will be in excess of 250 metres from nearest potentially affected residence (R27).

#### 3.1.2 Phase 2 Extraction – Lot 220

During Phase 2 on Lot 220, operations include screening of sand initially using mobile screens and the use of mobile plant in addition to that used during Phase 1. Once sufficient space is established on the quarry floor, the sand processing plant will be constructed. At this time operations will be consistent with Normal Operations described in the environmental assessment (EA) (Umwelt 2009b). Equipment will operate up to seven days per week during daytime, evening and night time periods. In addition to this, a product truck and water cart will operate at Lot 220 between the hours of 5.00 am and 10.00 pm Monday to Saturday and 8.00 am and 12.00 pm Sundays and Public Holidays.

Approximately 10 to 20 per cent of sand from Lot 220 will be transported from the operation or blended with other products without processing. Approximately 40 to 90 per cent of extracted sand will pass through 14 millimetre vibrating screens prior to being loaded onto trucks. The vibrating screens will be portable and will follow the extraction operations, where



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feasible. Waste material from the screens will consist of sand aggregates, fallen vegetation and leaf litter, and will be incorporated into the final landform of the site.

### **3.1.3 Phase 3 Extraction – Lot 220**

Normal Operations on Lot 220 will involve the processing of sand and extraction of sand from areas greater than 250 metres from receiver R27. Equipment used on Lot 220 during Normal Operations will include the simultaneous use of the sand processing plant, up to four front-end loaders, a vibrating screen and a haul truck.

Phase 3 will consist of Normal Operations for Lot 220 with the following modifications to operations during daytime extraction operations when within 250 metres of receiver R27:

- there will only be two front-end loaders, a vibrating screen and haul truck operating within 250 metres of receiver R27. These will be located within 25 metres of the extraction face and either a localised barrier will be placed around the vibrating screen or it will be placed within 5 metres of the extraction face; or
- extraction will be undertaken with only one front-end loader, vibrating screen and haul truck operating within 250 metres of receiver R27.

There will be no extraction equipment operating within 250 metres of receiver R27 during evening and night time periods unless agreement is reached with the landholder.

## **3.2 Compliance Assessment Methodology per Phase**

### **3.2.1 Phase 1 Extraction – Lot 220**

There was no noise monitoring undertaken during Phase 1 of operations. Up until November 2010, there was no screening undertaken on Lot 220.

### **3.2.2 Phase 2 Extraction – Lot 220**

Monitoring of Phase 2 operations on Lot 220 and traffic noise from Lot 218 and Lot 220 product haulage on Lavis Lane and Oakvale Drive respectively, has been undertaken as part of compliance monitoring required by EPL 13218 Licence Condition M7. Technically, Phase 2 extractions commenced in early November 2010 when a Chieftain 1400 mobile screen was brought to Lot 220, however the screen is only used on an intermittent basis to screen the top layer of sand to remove roots, fallen vegetation and leaf litter.

Product haulage on Lavis Lane had not commenced at the time of undertaking this noise compliance assessment.

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### **3.2.3 Phase 3 Extraction – Lot 220**

Prior to commencing Phase 3 of operations on Lot 220, detailed monitoring of noise emissions will build on noise monitoring carried out for Phase 2. Noise emissions from both mobile and fixed equipment will be measured and a revised Noise Management Plan addressing extraction operations within 250 metres of receiver R27 will be developed. Phase 3 extractions had not commenced at the time of undertaking this noise compliance assessment.

### **3.3 Quarry Operations as at July 2013**

The quarrying operations at Lot 220 on 12 July 2013 were equivalent to Phase 2 extraction operations.

The quarrying operations at the time of monitoring consisted of a single Sumitomo SH450HD 45 tonne excavator that was used to extract the sand and a Volvo 180F Wheel Loader that was used to load sand into a Volvo A35D articulated dump truck, a Volvo A40E articulated dump truck and product trucks. Quarried sand was delivered by the articulated dump trucks via a private haul road to the nearby Mackas Sand and Soil Supplies. Road registered product trucks servicing the quarry arrived and departed the site via the site access road and Oakvale Drive.

A mobile power screen (Turbo Chieftain 1400) and an elevated stacker (Telestack TC421R) were also located within the quarry. Neither the power screen nor the elevated stacker was in operation during the attended monitoring period.

### **3.4 Compliance Assessment**

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 approvals 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 methodology involved the following activities:

- attended noise monitoring surveys to measure the ambient noise levels in the surrounding region and to assess the sand extraction operation's contribution to measured noise levels; and
- comparison of the attended noise monitoring results with the relevant noise impact assessment criteria to assess compliance of the sand extraction operations 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 development consents and EPLs under which the site operates.

Compliance monitoring of the site-generated LAeq,1hour road traffic noise contribution was undertaken during the site visit at the closest offset house to Oakvale Drive, at 2642 Nelson Bay Road.

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Road truck movements along Oakvale Drive past the monitoring location 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. Mackas Sand heavy vehicle log data and attended truck logging during the unattended traffic noise monitoring program was used to correlate heavy vehicle activity along Oakvale Drive associated with the transport of product directly from Lot 220.

The Mackas Sand site generated LAeq,1hour road traffic noise contribution was determined as the equivalent continuous noise level from all site truck movements occurring per hour of the assessment period. The calculated noise levels at the façade of 2642 Nelson Bay Road resulting from hourly traffic movements associated with the Project during the night and day period were then assessed against LAeq,1hour road traffic criteria.

## **4.0 Noise Monitoring Program**

### **4.1 Attended Noise Monitoring – Industrial Noise**

Attended noise monitoring was conducted at two locations in the region surrounding the Lot 220 sand extraction site during the night period on 12 July 2013 between 6.12 am and 7.05 am and at three locations during the day period between 7.22 am and 8.58 am on 12 July 2013.

The purpose of the attended noise monitoring program was to quantify and describe the ambient noise environment in the region surrounding the Lot 220 extraction site and to interpret the results to account for the contribution of sand extraction related activities 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 the Lot 220 operations site. The weather conditions over the monitoring period were also recorded.

Attended noise monitoring was conducted in accordance with the NSW Environment Protection Agency (EPA) *Industrial Noise Policy* (INP) (EPA 2000) guidelines and the *Australian Standard AS1055-1989, 'Acoustics – Description and Measurement of Environmental Noise, Part 1 General Procedures'*.

### **4.2 Unattended Noise Monitoring – Traffic Noise**

Road traffic noise monitoring was conducted at the closest offset house to Oakvale Drive, during the night period on 12 July 2013 between 6.00 am and 6.59 am and at the same location during the day period between 7.00 am and 8.00 am on 12 July 2013.

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 monitoring of truck passbys was undertaken at the monitoring location to assist in correlating heavy vehicle truck movements along Oakvale Drive with Mackas Sand heavy vehicle log data.

## 4.3 Monitoring Locations

### 4.3.1 Monitoring Locations – Industrial Noise Impact

The monitoring locations used during the attended noise monitoring program are described in Table 4.1 and shown on Figure 1.1.

**Table 4.1 – Monitoring Locations for Industrial Noise Monitoring Program**

Monitoring Location	Description
Site 1	Private residence (R27 – Hufnagl residence, 10 Janet Parade, Salt Ash) MGA N = 6370639, MGA E = 399542
Site 2	Private residence (R26 – 6 Oakvale Drive, Salt Ash) MGA N = 6370830, MGA E = 397906
Site 3	Private residence (R24 – 9A Janet Parade, Salt Ash) MGA N = 6371363, MGA E = 399685

Note: R24 to R27 descriptors are from 'Noise Management Plan for Sand Extraction Operations' (Umwelt 2009a).

The July 2013 attended industrial noise monitoring program included monitoring at Sites 1, 2 and 3. Noise monitoring data from the reference sites has been used to assist in identifying and assessing the contribution of the Mackas Sand site sand extraction operations to industrial noise levels at the receiver locations (Sites 1 to 3).

### 4.3.2 Monitoring Location – Traffic Noise Impact

The Mackas Sand generated LAeq, 1 hour road traffic noise contribution has been determined from unattended noise logging undertaken from 6.00 am to 8.00 am, 12 July 2013 at the closest offset house to Oakvale Drive, at 2642 Nelson Bay Road.

The noise logger microphone was installed at 1 metre from the residential façade most affected by Mackas Sand generated road traffic noise and at a height of 1.5 metres above the floor of the dwelling. Attended truck logging of all trucks passing the noise logger from 6.00 am to 8.00 am, 12 July 2013 was undertaken to assist in distinguishing noise generated by Mackas Sand heavy vehicles from those servicing Mackas Sand and Soil and Sibelco Australia.

**Table 4.2 – Monitoring Location for Traffic Noise Monitoring Program**

Monitoring Location	Location	Logger Type	Logger Serial No.	Measurement
Site 4	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	ARL EL 215	194525	6.00 am 12/07/2013 to 8.00 am 12/07/2013

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## 4.4 Monitoring Results

### 4.4.1 Industrial Noise Impact

Attended noise monitoring was undertaken at two monitoring locations during the night time and three monitoring locations during the day time period (refer to **Table 4.1**).

Attended noise measurements were undertaken with a Type 1, Svantek 959 noise and vibration analyser, Serial Number 12918. During the attended noise surveys the noise meter was calibrated using a Brüel & Kjær Type 4231 Noise Meter Calibrator, Serial Number 2130702. 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 of the noise monitoring microphone.

The night time attended noise monitoring was undertaken between 6.12 am and 7.05 am on 12 July 2013. The day time attended noise monitoring was undertaken between 7.22 am and 8.58 am on 12 July 2013.

The night and day time monitoring results shown in **Figures 4.1 to 4.5** and **Tables 4.3** and **4.4** include:

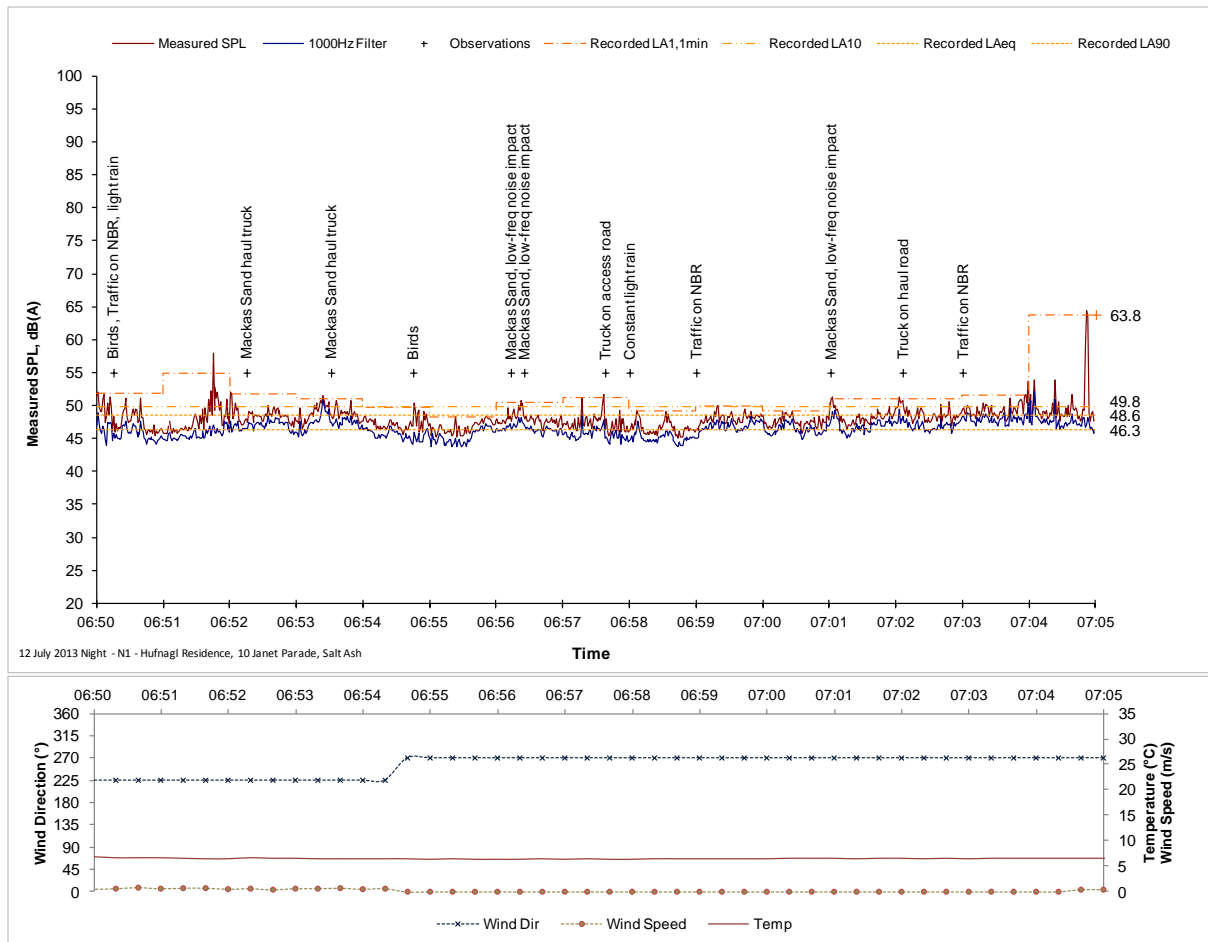
- the recorded overall A-weighted noise levels at 1 second intervals over a 15 minute measurement period;
- the results of a 1000 Hz low pass filter at 1 second intervals over the 15 minute measurement period;
- an assessment of the maximum LA1,1minute noise level recorded over the 15 minute measurement 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 **Figures 4.1 to 4.5**.

An assessment of the results from the attended noise monitoring program and the corresponding meteorological conditions are provided in **Section 4.4.1**.

#### 4.4.2 Night Time Period Attended Monitoring on 12 July 2013

Figure 4.1 – Site 1, 6.50 am (R27 – 10 Janet Parade, Salt Ash), 12 July 2013



Note: NBR – Nelson Bay Road.

The results in **Figure 4.1** indicate that the ambient noise environment at monitoring location Site 1 (R27 – 10 Janet Parade) was dominated by local rural noise sources including birds as well as traffic on Nelson Bay Road and a light rain that was falling during the monitoring period. Other noise contributions resulted from mine noise from Mackas Sand.

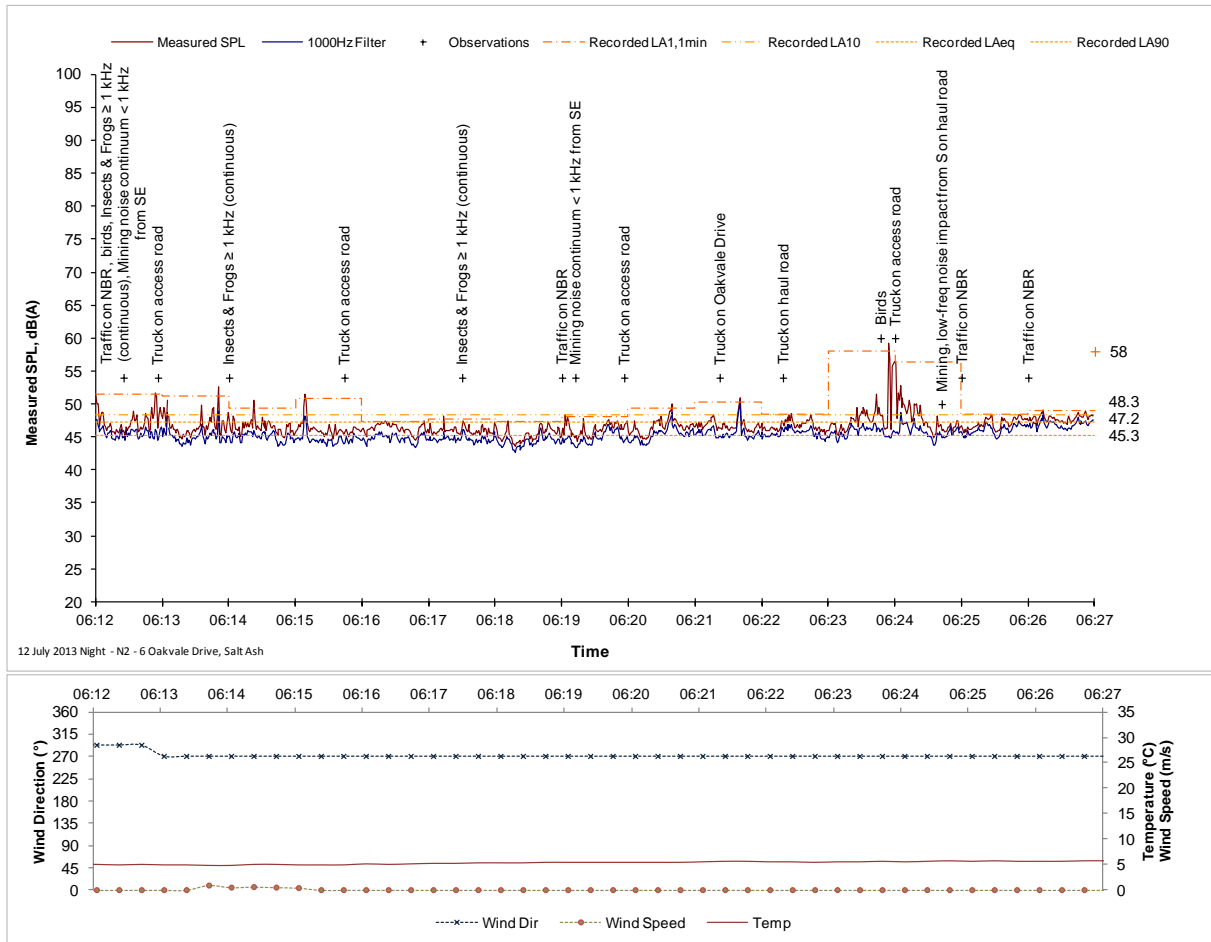
The LAeq,15minute noise contribution from the Mackas Sand site was discernible from the ambient noise environment at the monitoring location. Audible noises included low-frequency noise impacts and noise from Mackas Sand haul trucks and B-Doubles when travelling along the private haul road that services operations in Lot 220, Mackas Sand and Soil and Sibelco Australia.

The LAeq,15minute noise contribution from Mackas Sand was estimated to be less than 25 dB(A).

The LA1,1minute noise contribution from Mackas Sand was estimated to be 45 dB(A), resulting from truck vibration and rattles when entering and departing Lot 220 across the entrance cattle grid.



**Figure 4.2 – Site 2, 6.12 am (R26 – 6 Oakvale Drive, Salt Ash), 12 July 2013**



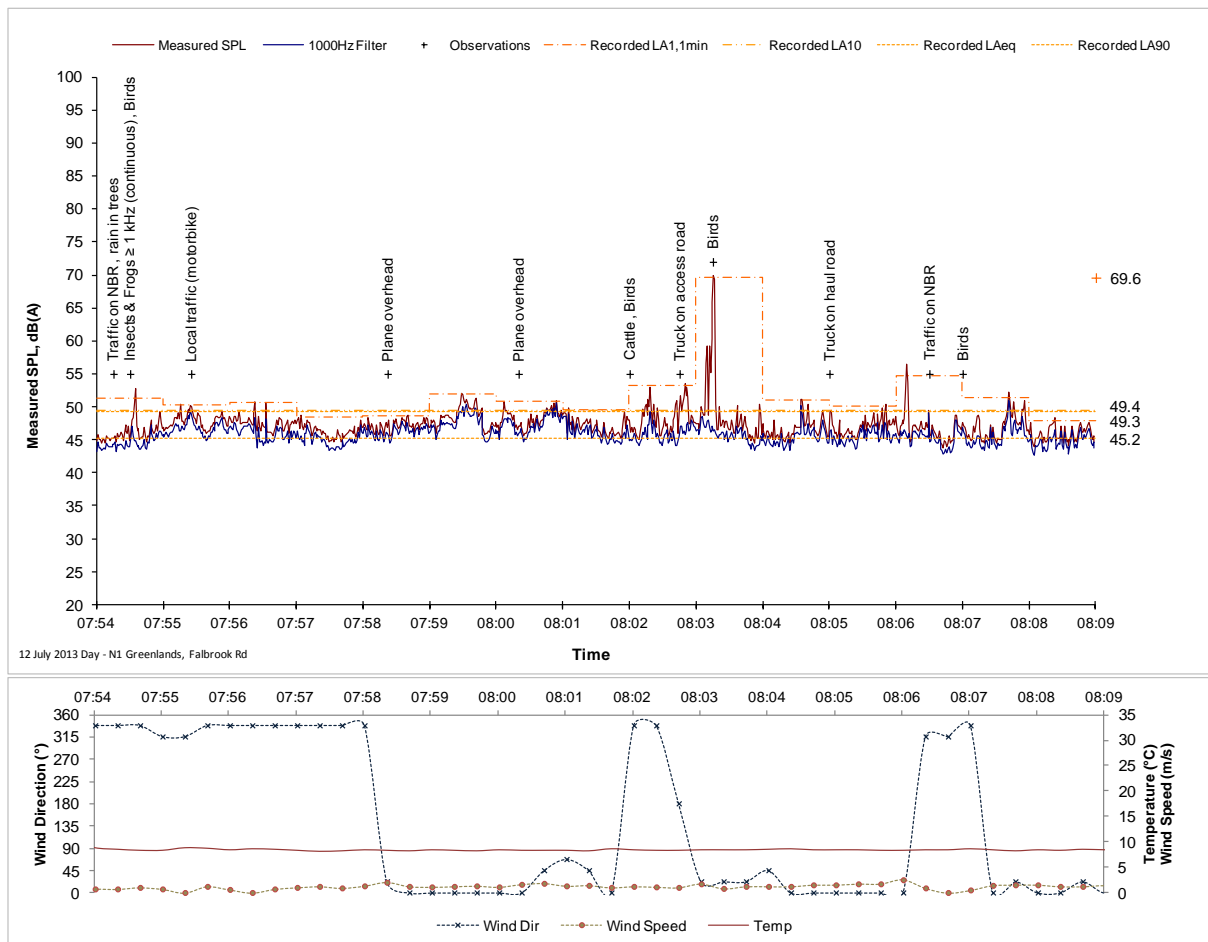
Note: NBR – Nelson Bay Road.

The results in **Figure 4.2** indicate that the ambient noise environment at monitoring location Site 2 (R26 – 6 Oakvale Drive) was dominated by local rural noise sources including insects, frogs, and birds, trucks on the site’s access and haul road, a noise continuum from Sibelco Australia to the south-east, as well as road traffic from Nelson Bay Road. Other noise contributions resulted from low-frequency noise impacts from the south along the haul road.

Noise from Mackas Sand was inaudible during the attended monitoring period.

#### 4.4.3 Day Period Attended Monitoring on 12 July 2013

Figure 4.3 – Site 1, 7.55 am (R27 – 10 Janet Parade, Salt Ash), 12 July 2013

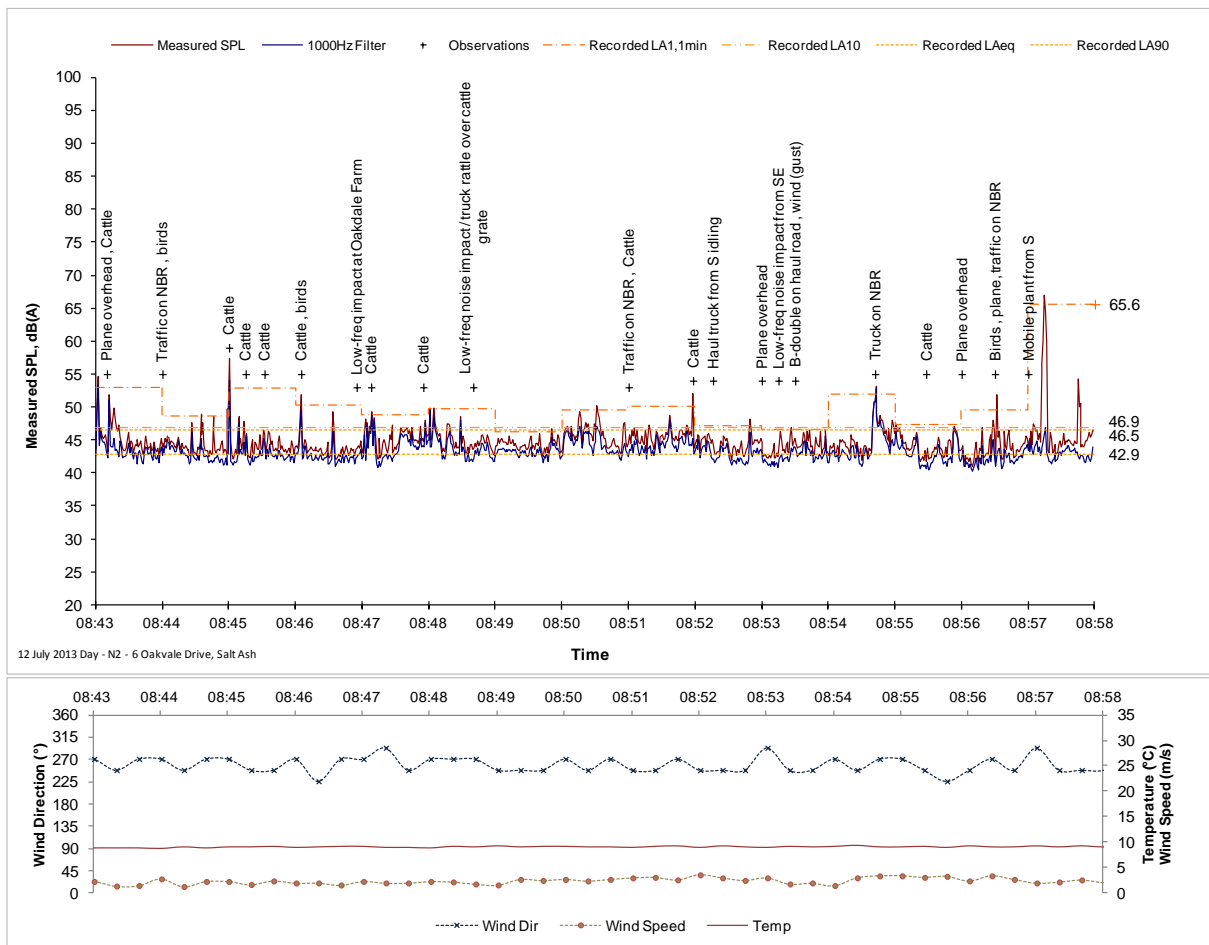


Note: NBR – Nelson Bay Road.

The results in **Figure 4.3** indicate that the ambient noise environment at monitoring location Site 1 (R27 – 10 Janet Parade) was dominated by road traffic noise on Nelson Bay Road as well as local rural noise sources including insects, frogs, birds and cattle. Other noise contributions resulted from overhead aircraft, local traffic and B-doubles on the haul road.

Noise from Mackas Sand was inaudible during the attended monitoring period.

**Figure 4.4 – Site 2, 8.43 am (R26 – 6 Oakvale Drive, Salt Ash), 12 July 2013**

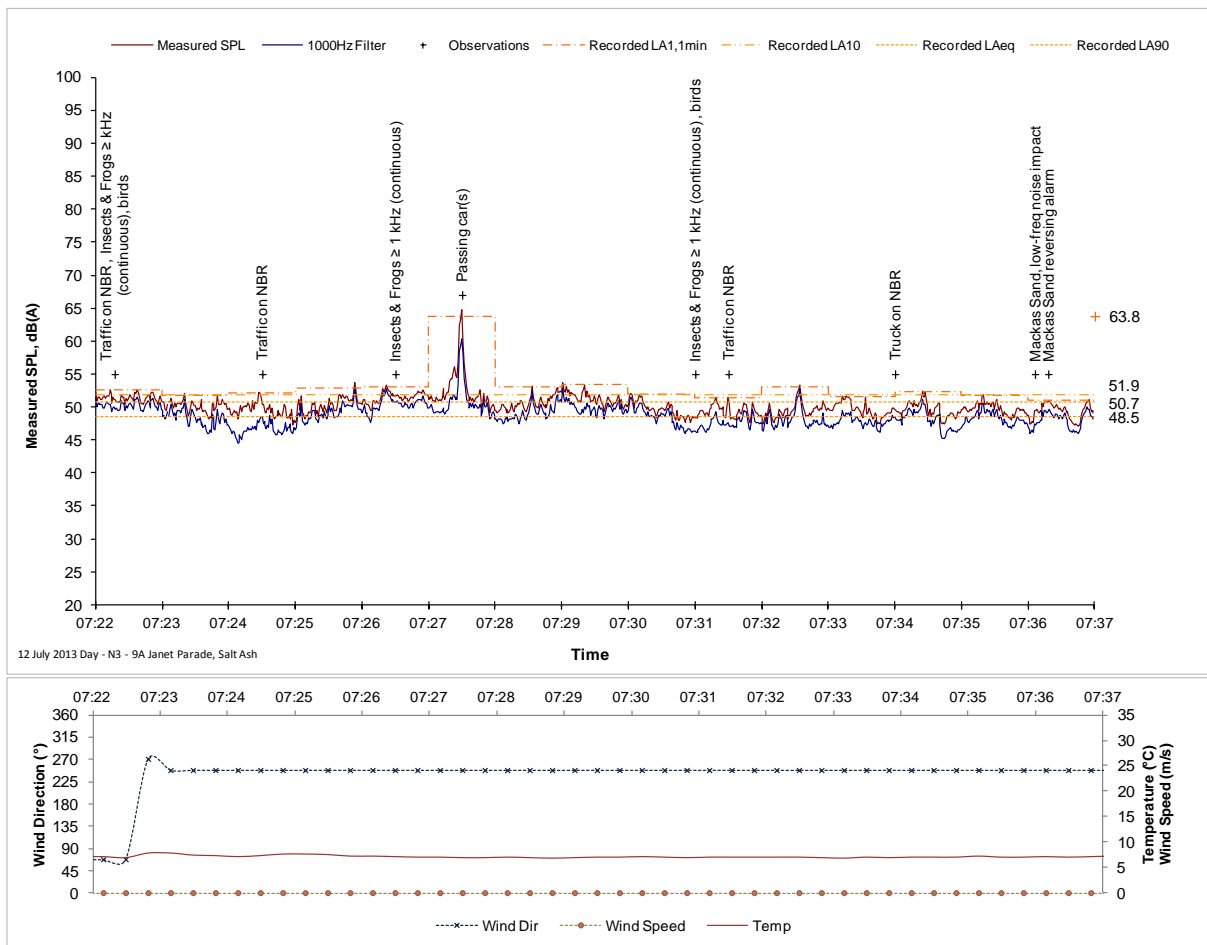


Note: NBR – Nelson Bay Road.

The results in **Figure 4.4** indicate that the ambient noise environment at monitoring location Site 2 (R26 – 6 Oakvale Drive) was dominated by road traffic noise on Nelson Bay Road as well as local rural noise sources including cattle, birds and wind. Other noise source contributions resulted from overhead aircraft, B-doubles on the haul and access roads and an excavator from Mackas Soil and Sand.

Noise from Mackas Sand was inaudible during the attended monitoring period.

**Figure 4.5 – Site 3, 7.22 am (R24 – 9A Janet Parade, Salt Ash), 12 July 2013**



Note: NBR – Nelson Bay Road.

The results in **Figure 4.5** indicate that the ambient noise environment at monitoring location Site 3 (R24 – 9A Janet Parade) was dominated by road traffic noise on Nelson Bay Road as well as local rural noise sources including insects, frogs and birds. Other noise contributions resulted from a barely audible low-frequency noise impact and reversing alarm from Mackas Sand as well as a passing car.

The LAeq,15minute noise contribution from Mackas Sand was estimated to be less than 25 dB(A).

#### 4.4.4 Traffic Noise Impact

Traffic noise impact monitoring was undertaken at one monitoring location during the night time from 6.00 am to 6.59 am and during the day time from 7.00 am to 8.00 am 12 July 2013 at the closest offset house to Oakvale Drive, at 2642 Nelson Bay Road (refer to **Table 4.2**).

An Acoustic Research Laboratories – Environmental Logger Type EL-215 unit was used to measure the ambient noise levels at 2642 Nelson Bay Road. The noise logger was calibrated using a Brüel & Kjær Type 4231 Noise Meter Calibrator, Serial Number 2130702. The EL-215 noise monitor was run using the A-Weighting measurement profile and was used to collect statistical and equivalent (Leq) sound pressure level data down to a 1 second interval. Details of the noise monitoring schedule are presented in **Table 4.2**.

Attended truck logging of heavy vehicle passbys during the traffic noise impact monitoring period was used in conjunction with the Mackas Sand heavy vehicle data log to assist in identifying Mackas Sand heavy vehicle passbys in the unattended monitoring logger results.

The night and day time monitoring results presented in **Section 4.4.2** include:

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

An assessment of the results from the road traffic noise monitoring program is provided in **Section 4.5.2**.

## 4.5 Assessment of Monitoring Results

### 4.5.1 Assessment of Attended Monitoring Results – Industrial Noise

During the attended noise monitoring program, the ambient noise levels surrounding the Mackas Sand site were recorded with particular attention paid to the contribution of the Mackas Sand site operations.

The results of the attended noise monitoring program, summarised in **Tables 4.3** and **4.4**, indicate that under the meteorological conditions at the time of monitoring the Mackas Sand site was complying with LA1,1minute industrial noise assessment criteria at Site 1 during the night time period and with the LAeq,15minute industrial noise assessment criteria, during both the night and day time monitoring periods, outlined in the development consents and EPLs under which Mackas Sand operates.

Site related assessment criteria for industrial noise are summarised in **Section 2**.

**Table 4.3 – Summary of Attended Industrial Noise Monitoring – July 2013, dB(A) Night Time Period: 6.12 am to 7.05 am on 12 July 2013**

Location <sup>1</sup>	Monitoring Period (15 min starting)	Measure	Measured Noise Level	Estimated Contribution from Mackas Sand	Meteorological <sup>3</sup> Conditions
Site 1	6.50 am	LA90, 15 min	46	- <sup>2</sup>	< 0.8 m/s, SW – W, 7°C, 98%
		LAeq, 15 min	49	< 25	
		LA1, 1min	64	45	
Site 2	6.12 am	LA90, 15 min <sup>2</sup>	45	- <sup>2</sup>	< 0.9 m/s, W – WNW, 5°C, 95%
		LAeq, 15 min	47	Inaudible	
		LA1, 1min	58	Inaudible	

Note 1: No measurements were conducted at Site 3 in the night period.

Note 2: Not discernible from background ambient noise levels.

Note 3: Meteorological conditions include wind speed (m/s), direction, temperature (°C) and relative humidity (%).

**Table 4.4 – Summary of Attended Industrial Noise Monitoring – July 2013, dB(A)  
Day Time Period: 7.22 am to 8.58 am on 12 July 2013**

Location	Monitoring Period (15 min starting)	Measure	Measured Noise Level	Estimated Contribution from Mackas Sand	Meteorological Conditions <sup>1</sup>
Site 1	7.55 am	LA90, 15 min	45	- <sup>2</sup>	0.0 – 2.5 m/s, W - E, 9°C, 94%
		LAeq, 15 min	49	Inaudible	
		LA1, 1min	70	N/A <sup>3</sup>	
Site 2	8.43 am	LA90, 15 min	43	- <sup>2</sup>	1.2 – 3.5 m/s, SW – WNW, 9°C, 100%
		LAeq, 15 min	47	Inaudible	
		LA1, 1min	66	N/A <sup>3</sup>	
Site 3	7.22 am	LA90, 15 min	49	- <sup>2</sup>	Calm, 8°C, 100%
		LAeq, 15 min	51	< 25	
		LA1, 1min	64	N/A <sup>3</sup>	

Note 1: Meteorological conditions include wind speed (m/s), direction, temperature (°C) and relative humidity (%).

Note 2: Not discernible from background ambient noise levels.

Note 3: The assessment of LA1, 1min is not applicable during the day time.

#### 4.5.2 Assessment of Monitoring Results – Traffic Noise

The measured road traffic noise level contribution of Nelson Bay Road and Oakvale Drive, the number of heavy vehicle passbys associated with Mackas Sand and the measured road traffic noise level contribution from Mackas Sand heavy vehicles for the night and day time monitoring periods are presented in **Table 4.5**.

No assessment of compliance with the traffic noise impact assessment criteria has been made during the evening period as there were no Mackas Sand-related truck movements along Oakvale Drive during this period.

**Table 4.5 – Nelson Bay Road, Oakvale Drive and Mackas Sand 1 hour Night and Day Time Road Traffic Noise Level Contribution, dB(A)**

Day/Night Period	Start of assessed 1 hour period [Hr:Min:Sec]	End of assessed 1 hour period [Hr:Min:Sec]	Nelson Bay Rd, Oakvale Drive Noise Level Contribution LAeq,1hour	Number of Mackas Sand Heavy Vehicle pass-by events	Mackas Sand Heavy Vehicle Noise Level Contribution LAeq,1hour
Night	6:00:00	6:59:59	62	11	44
Day	7:00:00	7:59:59	61	2	34

The results from the road traffic noise monitoring presented in **Table 4.5** indicate that haul truck operations associated with Mackas Sand sand extraction operations were generating LAeq,1hour noise levels at 44 dB(A) during the night time noise monitoring period and 34 dB(A) during the day time noise monitoring period. Over the same assessed hour periods, road traffic on Nelson Bay Road and Oakvale Drive generated LAeq,1hour noise levels at 62 dB(A) during the night time period and 61 dB(A) during the day time period respectively.



## 5.0 Assessment of Compliance

### 5.1 Compliance Results – Industrial Noise

The measured industrial noise level from the Mackas Sand site contributing to the ambient noise environment, as recorded during the attended noise surveys, and the relevant noise assessment criteria are presented in **Tables 5.1** and **5.2** for the night period and day period respectively.

**Table 5.1 – Predicted Night Time Industrial Noise Levels Versus Noise Criteria, dB(A)**

Location	LAeq,15minute		LA1,1minute	
	Noise Criteria	Mackas Sand Noise Level Contribution	Noise Criteria	Mackas Sand Noise Level Contribution
Site 1	35	< 25	45	45
Site 2	35	Inaudible	45	Inaudible

Note: No measurements were conducted at Site 3 in the night period.

**Table 5.2 – Predicted Day Time Industrial Noise Levels Versus Noise Criteria, dB(A)**

Location	LAeq,15minute	
	Noise Criteria	Mackas Sand Noise Level Contribution
Site 1	36	Inaudible
Site 2	35	Inaudible
Site 3	36	< 25

The results from the Mackas Sand compliance noise monitoring presented in **Table 5.1** indicate that the Mackas Sand sand extraction operations were generating LA1,1minute noise levels during the night time period at the relevant industrial noise criteria outlined in the development consents and EPLs under which the Mackas Sand operates (refer to **Table 2.1**).

The results from the Mackas Sand compliance noise monitoring presented in **Tables 5.1** and **5.2** indicate that during the night and daytime periods of attended monitoring, Mackas Sand extraction operations was generating LAeq,15minute noise levels below relevant industrial noise criteria outlined in the development consents and EPLs under which the Mackas Sand operates (refer to **Table 2.1**).

### 5.2 Compliance Results – Traffic Noise

The measured heavy vehicle noise levels from the Mackas Sand operation contributing to the road traffic noise levels, as recorded by the road traffic noise survey, and the relevant noise assessment criteria are presented in **Table 5.3** for the night and day period. As there were no site related truck movements recorded during the evening period no assessment of compliance with the traffic noise impact assessment criteria has been made during this period.

**Table 5.3 – Mackas Sand 1 hour Night and Day Time Road Traffic Noise Level Contribution versus Noise Criteria, dB(A)**

<b>Road</b>	<b>Period</b>	<b>Noise Criteria L<sub>Aeq,1hour</sub></b>	<b>Noise Level Contribution L<sub>Aeq,1hour</sub></b>
Lavis Lane, Oakvale Drive, Nelson Bay Road	Night	55	44
	Day	60	34

Note: Noise from Mackas Sand operations occurs during the morning shoulder period but has been assessed using the relevant night time and day time criteria for consistency with noise limits set out in Major Project Approval 08\_142.

The results from the Mackas Sand road traffic compliance noise monitoring presented in **Table 5.3** indicate that haul truck operations associated with Mackas Sand sand extraction operations were generating noise levels during both the night and day periods below relevant road traffic noise criteria outlined in the development consents and EPLs under which the Mackas Sand site operates (refer to **Table 2.1**).

## **6.0 Statement of Compliance**

### **6.1 Statement of Compliance – Industrial Noise**

Results of the attended industrial noise monitoring program conducted on 12 July 2013 indicated that Mackas Sand was complying with both the LA<sub>1,1minute</sub> industrial noise assessment criteria and the LA<sub>eq,15minute</sub> industrial noise assessment criteria as outlined in the Mackas Sand Major Project Approval 08\_0142 and EPL 13218 for the meteorological conditions experienced at the time of monitoring.

### **6.2 Statement of Compliance – Traffic Noise**

Results of the road traffic noise monitoring program conducted from 6.00 am to 8.00 am, 12 July 2013 at the closest offset house to Oakvale Drive, at 2642 Nelson Bay Road, indicated that Mackas Sand was complying with the LA<sub>eq, 1 hour</sub> road traffic noise assessment criteria as outlined in the Mackas Sand Major Project Approval 08\_0142 and EPL 13218 for the meteorological conditions experienced at the time of monitoring.

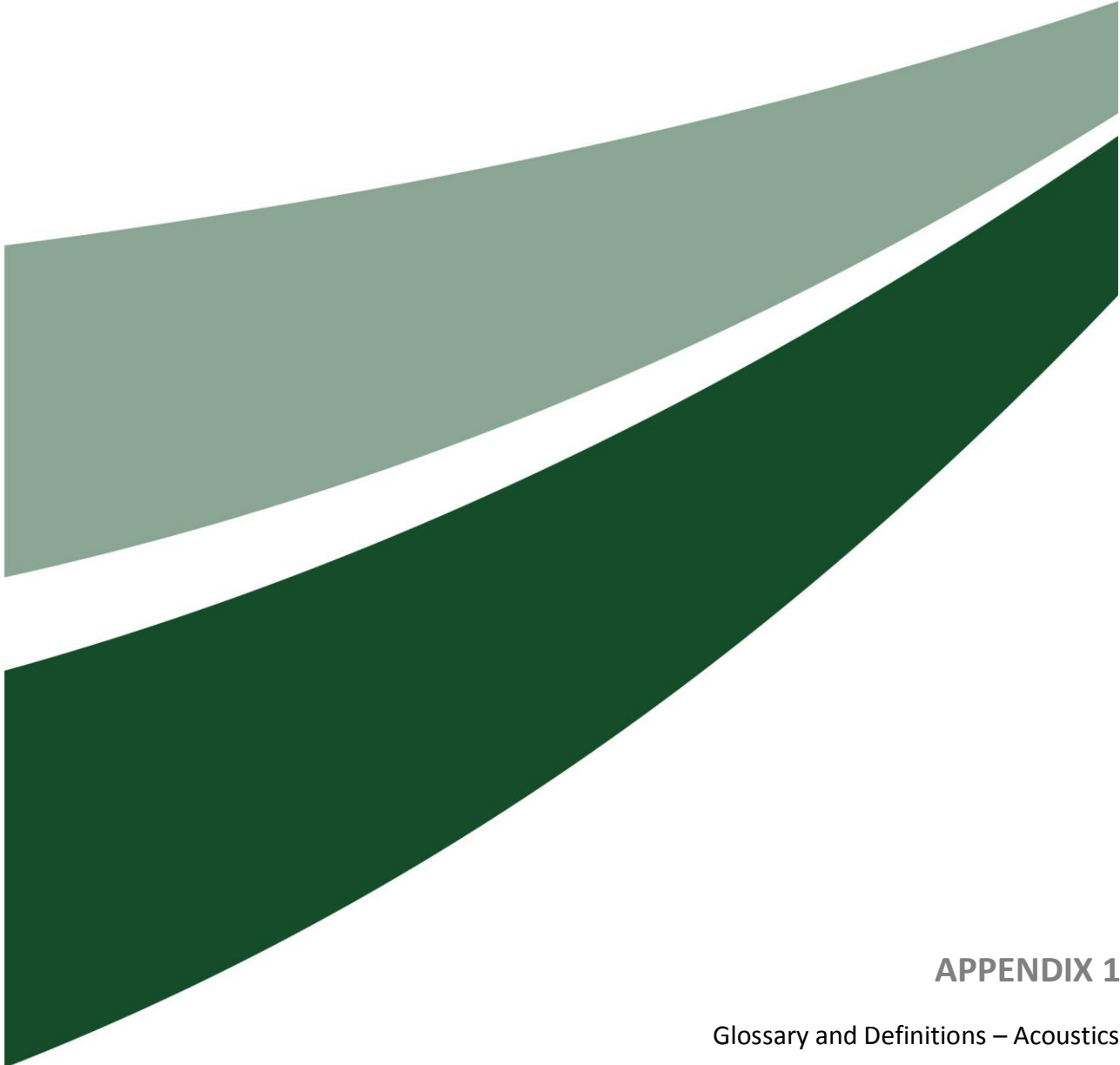
## **7.0 References**

Australian Standard AS1055-1989. *'Acoustics – Description and Measurement of Environmental Noise, Part 1 General Procedures'*.

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

Umwelt (Australia) Pty Limited, 2009a. Noise Management Plan for Sand Extraction Operations.

Umwelt (Australia) Pty Limited, 2009b. Noise Impact Assessment of Sand Extraction Operations from Lot 218 DP 1044608 and Lot 220 DP 1049608, Salt Ash.



## **APPENDIX 1**

Glossary and Definitions – Acoustics

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## Appendix 1 – Glossary and Definitions – Acoustics

1/3 Octave	Single octave bands divided into three parts.
ABL	Assessment background level - A single-figure background level representing each assessment period – day, evening and night (that is, three assessment background levels are determined for each 24-h period of the monitoring period). It is determined by taking the lowest 10th percentile of the L90 level for each assessment period.
Airblast	Sound wave from blasting (overpressure).
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)	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 – 1 oscillation per second equals 1 hertz.
LA10	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.
LA90	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.
LAm <sub>ax</sub>	The maximum of the sound pressure levels recorded over an interval of 1 second.
LA1, 1 minute	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 1 per cent of measurement period with 'A' frequency weighting calculated by statistical analysis during a measurement time interval of 1 minute.
LA <sub>eq,t</sub>	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.

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LAn	Percentile level – A measure of the fluctuation of the sound pressure level which is exceeded ‘n’ per cent of the observation time.
MIC	Maximum explosive charge mass (kg) detonated per delay (any 8ms interval).
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
PVS (mm/s)	Peak Vector Sum.
PVV (mm/s)	Peak Particle Velocity.
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.
SD (m)	The scaled distance for airblast and ground vibration from the charge to the receiver.
SPL (dBL)	Blasting: peak airblast level measured in dB Linear.
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:
	$SPL = 10 \cdot \log_{10} (p/p_0)^2$
	where p is the rms sound pressure in pascals and p <sub>0</sub> 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:
	$SWL = 10 \cdot \log_{10} (W/W_0)$
	where W is the sound power in watts and W <sub>0</sub> is the sound reference power at 10 <sup>-12</sup> watts.



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