

Gerroa Sand Quarry

Noise Monitoring Report – March 2023

Background

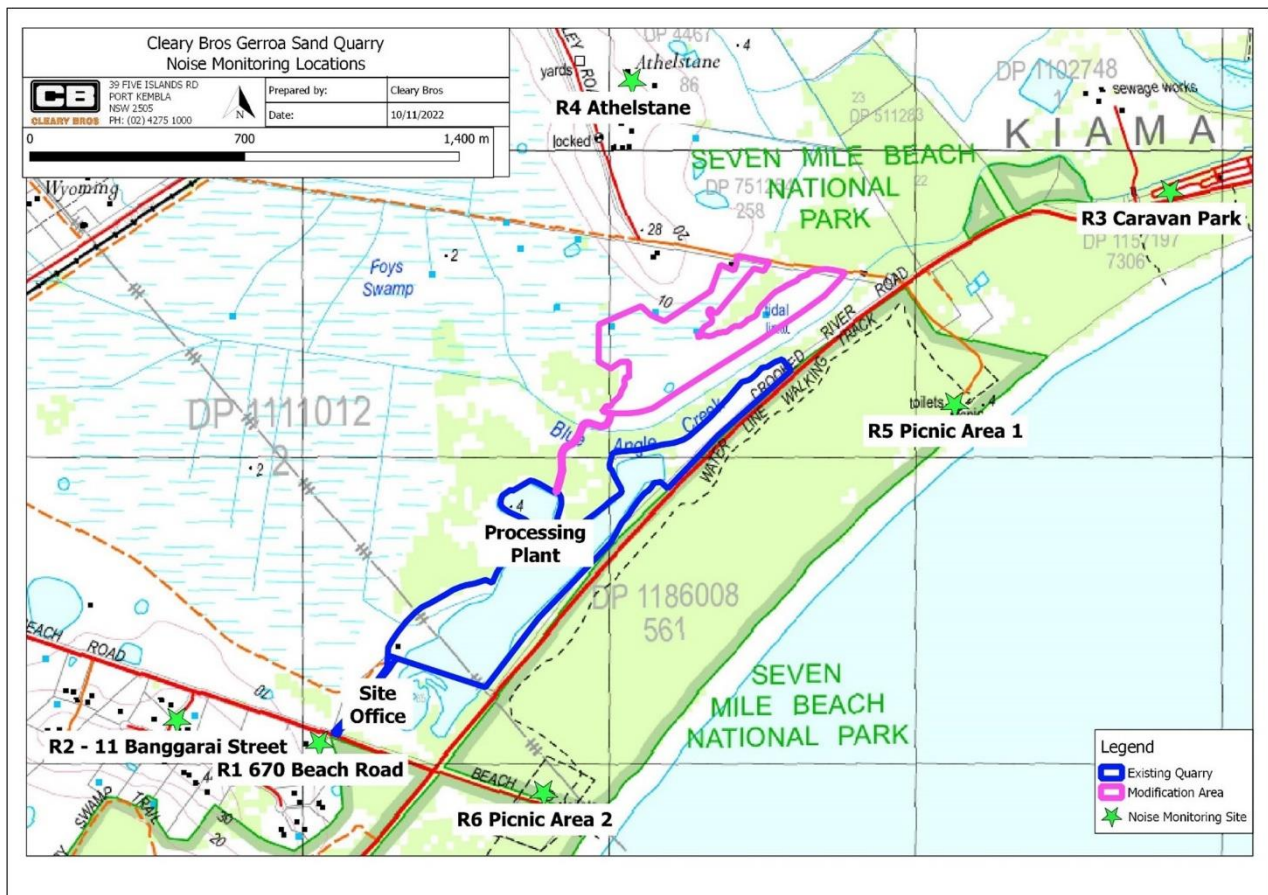
The project approval for the Gerroa Sand Resource (05/0099 Mod 1) requires preparation of a noise monitoring program for the project (schedule 3, condition 4A(c)). The Noise Management Plan (version 1 revision 4, dated 28/11/2022) details the approved noise monitoring program as follows.

Initial noise monitoring is to be undertaken within three months of the commencement of operations in the modification area. Subsequent noise monitoring will be undertaken annually during the winter months. Winter monitoring has been selected as this is the period which was identified as having the greatest likelihood of noise enhancing conditions.

Noise monitoring will be undertaken in accordance with the NSW EPA's Noise Policy for Industry (2017).

Noise monitoring locations are shown in the figure below and are as follows:

- 670 Beach Road (R1);
- 11 Bangarrai Street (R2);
- the Coralea property (as proxy for R4 Athelstane);
- receivers R5 and R6 in Seven Mile Beach National Park; and
- R3 Seven Mile Beach Holiday Park.



Operator attended measurements will be taken to quantify the maximum (L_{Amax}) and the average (L_{Aeq15min}) intrusive noise from site activities over a 15 minute measuring period. Measurements are to be taken during the daytime while the site is in normal operation.

All measurements will be made with acoustic instrumentation carrying current NATA or manufacturer calibration certificates. Instrument calibration will be checked before and after each measurement survey.

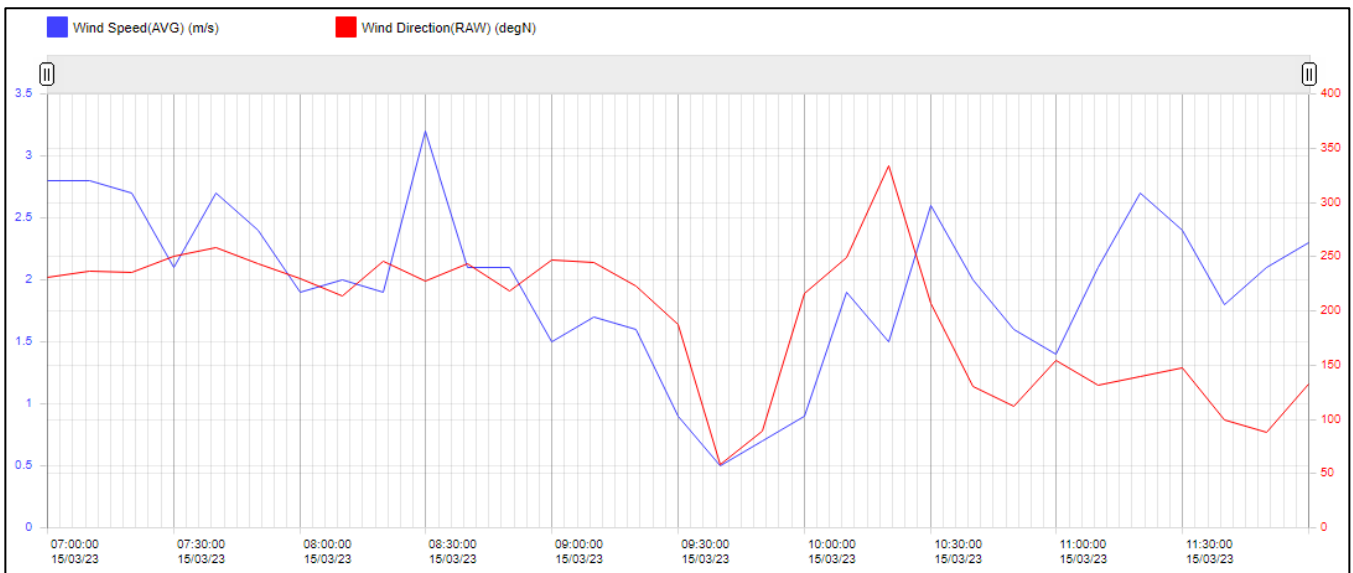
Noise measurements will be undertaken at the most affected point of the receptor boundary for residences, within the clearing at each recreational area, and at the southernmost boundary of the caravan park. Noise monitoring will be scheduled to target periods of calm conditions.

Where applicable the modification factors in Fact Sheet C of the Noise Policy for Industry will be applied to the measured noise level (these factors refer to noise that is tonal, impulsive, intermittent, irregular or with dominant low frequencies).

All noise measurements will be accompanied by qualitative and quantitative measurements of prevailing local weather conditions in line with Section B3 of the Noise Policy for Industry. The operator shall record any significant sand quarry generated noise sources and obtain the operating logs for quarry plant and equipment during the measurement period.

Noise Survey

Noise monitoring in accordance with the above methodology was undertaken on 15th March 2023. Meteorological conditions on the day aligned with the targeted conditions, with calm to very light winds throughout the monitoring periods, as shown by the below extract from the on-site weather station for the period of monitoring (note the weather station times are EST, and so are one hour behind those times recorded in the field sheets in EDST).



Measurements were recorded using the Cirrus Optimus C171B logger, with Cirrus MK224 microphone, a Class 1 instrument (last calibrated 9/6/2022). The microphone was mounted on a mast 1.4m high, with a wind sock employed. The unit was field calibrated before and after each measurement. The closest publicly accessible location to the receiver was chosen in each case, generally in a direct line to the site to the quarry. The only exception to this was for R3 (Athelstane), where monitoring was conducted approximately 200m south of the receiver on Cleary Bros property, and in a direct line between

Athelstane and the quarry. Project-related noise levels at the receiver would be no greater than that recorded at the monitoring site in this instance. All monitoring was conducted by Mark Hammond, Quality and Environment Manager for Cleary Bros.

Operations at the quarry during the period of monitoring included continuous use of 2 large loaders (Cat 974 and Cat 980) and 2 articulated dump trucks (Cat 740 “Moxy”). In addition, 6 truck and dogs entered the site and departed with a load of fine sand. Due to recent rainfall, all operations were restricted to the existing processing and stockpiling area, and the quarry access road.

Noise from quarry related activities was not detected at any of the monitoring sites at any time. Dominant noise sources were ocean waves for the sites close to Seven Mile Beach, local road, insect, and bird noise for the rural residential sites to the south of the quarry, and insect and bird noise for the rural site to the north of the quarry. Other noise contributions at most sites included local road traffic and aircraft, including helicopters, low-level light planes, and higher altitude jet planes. A summary of noise levels recorded at each site and the compliance status of the Gerroa Sand Quarry is included in the table below.

ID	Location	Measured Noise Levels			Quarry contribution	Criteria	Compliant
		Background L _{A90}	Average L _{Aeq}	Maximum L _{Amax}		dBA _{eq-15 min}	Yes/No
R1	670 Beach Road	44.2	64.5	84.1	Not audible	41	Yes
R2	11 Banggarai St	36.8	46.8	66.6	Not audible	40	Yes
R3	Caravan Park	46.0	53.8	77.0	Not audible	36	Yes
R4	Athelstane	37.4	44.5	70.7	Not audible	40	Yes
R5	Picnic Area 1	43.0	48.6	65.9	Not audible	40	Yes
R6	Picnic Area 2	43.6	46.5	66.1	Not audible	40	Yes

Record sheets from each site are included at the end of the report, along with graphs showing the variations in noise levels throughout each 15 minute sample.

Summary



The Gerroa Sand Quarry complied with the noise criteria of the Noise Management Plan and Development Consent, with the site inaudible at all locations during the period of monitoring. The next monitoring episode is scheduled for Winter 2023.

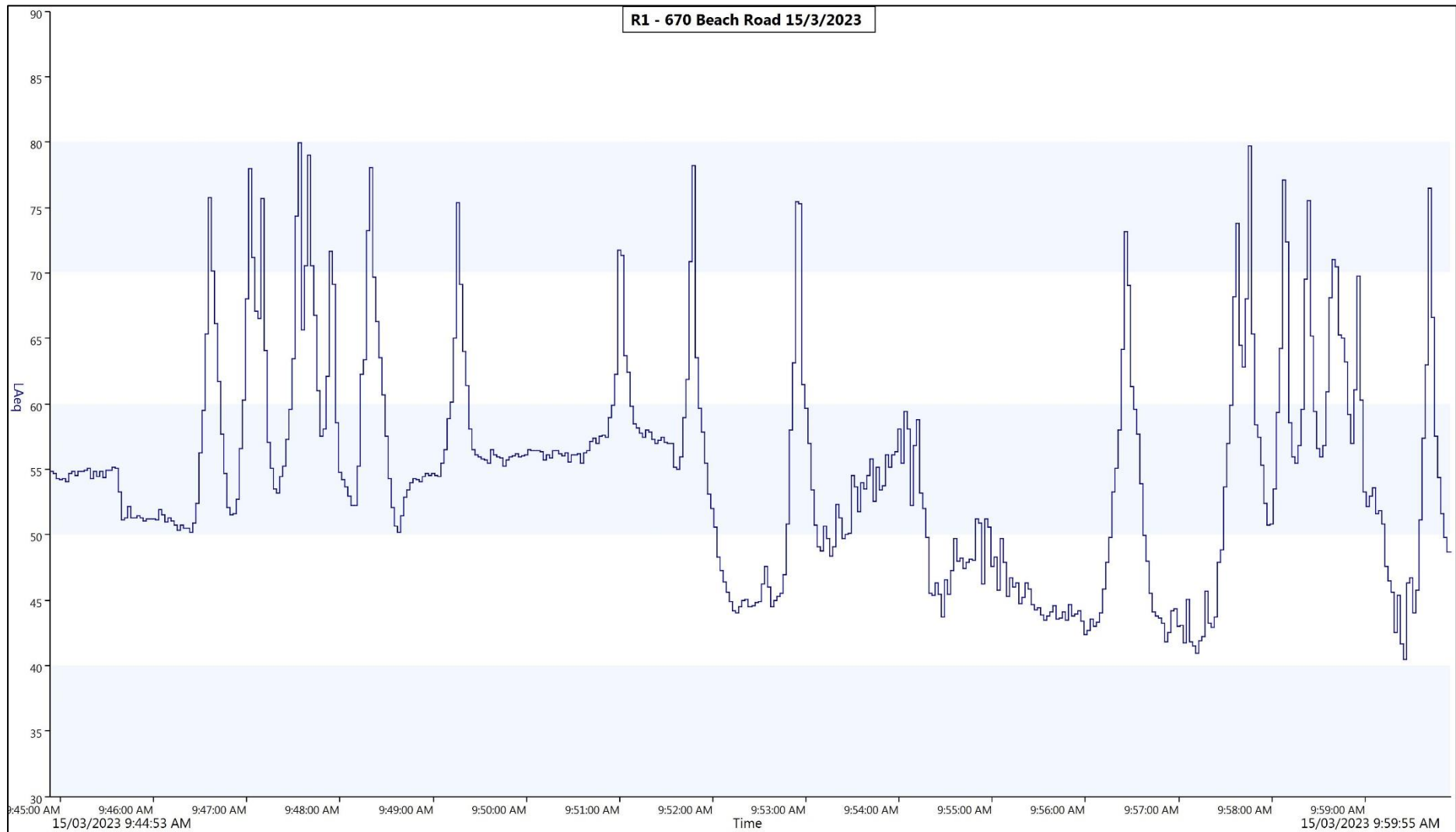
Report Prepared by:

Mark Hammond

Quality and Environment Manager

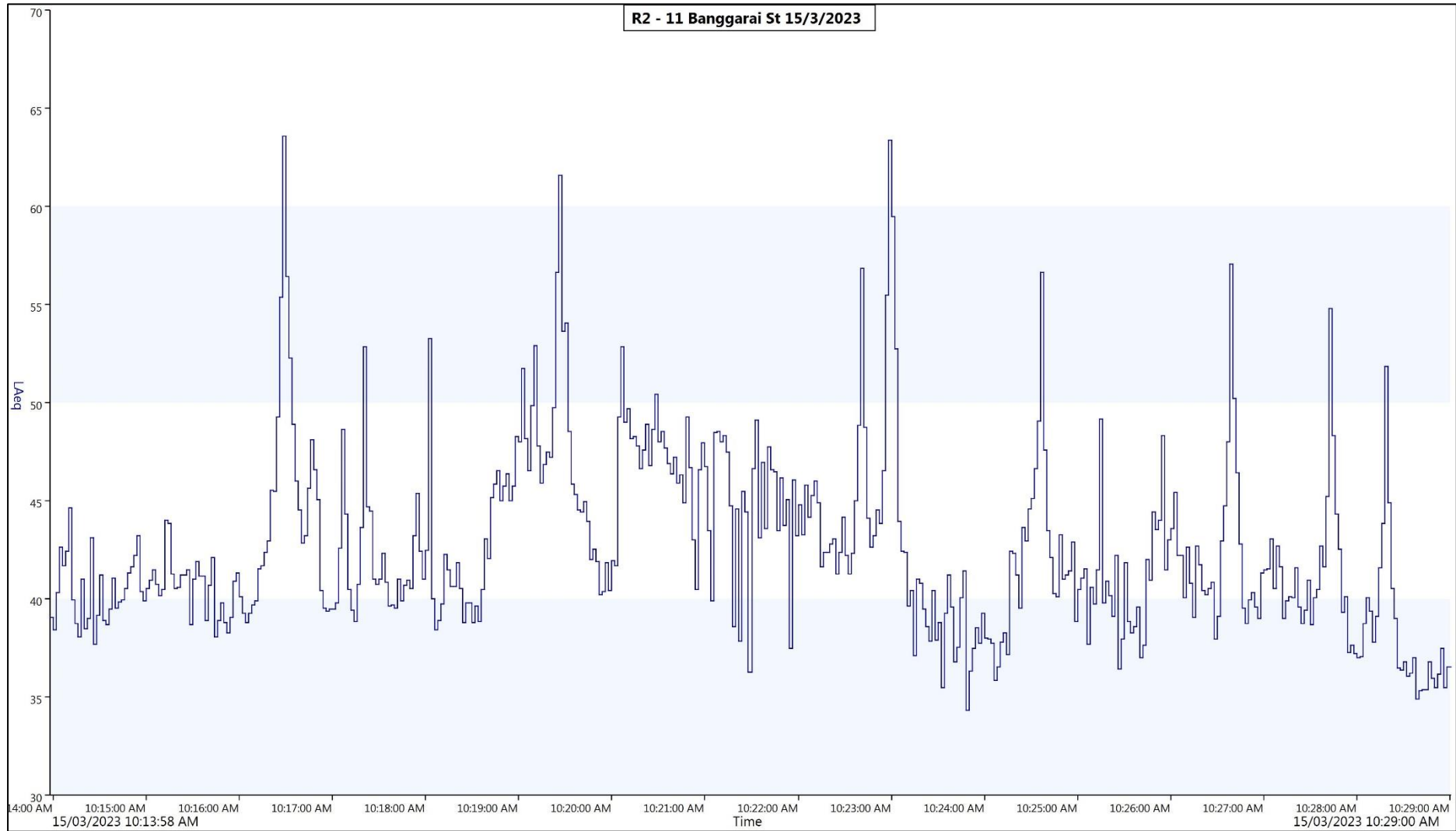
16/3/2023

Noise Monitoring Location	R1				Map of Noise Monitoring Location  <p>GPS location: 34.78895°S, 150.77122°E</p>
Noise Monitoring Address	670 Beach Road				
Wind Speed and Direction	Calm to very light W breeze				
Meteorological Conditions	Sunny, minor high cloud				
Quarry Activities	2 x loaders (974, 980), 2 x Moxy's (740), 6 x T&D loads of sand				
Noise Instrumentation Used	Cirrus Optimus 171B, Serial No G301210 Cirrus MK224, Serial No 212412D				
Calibration Date	9/6/2022				
Weather Instrument Used	Vaisala WXT536				
<p>Logger deployed at entrance to property on Beach Road, approximately opposite entrance to quarry. Noise dominated by background insects, varying between 42 to 56 dBA, mostly in the 46-51 dBA range, interspersed with regular road traffic noise, climbing up to 84 dBA as vehicles passed near monitor. The Gerroa Sand Quarry was not audible at this location during the measurement.</p> <p>Recorded Noise Levels(LA_{max}):</p> <ul style="list-style-type: none"> • Insects: 56 dBA • Local traffic (Beach Rd): cars to 82 dBA, trucks (non-quarry) to 84 dBA • Birds: <45 dBA • Traffic on Gerroa Road: <50 dBA (estimated at 42 dBA) • Helicopter: 61 dBA 					
Ambient Noise Logging Results – NPfI Defined Time Periods					
Monitoring Period	Noise Level (dBA)				
	RBL	LA _{eq}	L ₁₀	L ₁	
Daytime	N/A	N/A	N/A	N/A	
Evening					
Night-time					
Attended Noise Monitoring Results					
Date	Start Time	End Time	Measured Noise Level (dBA)		
			LA90	LAeq	LAmax
15/3/2023	9:33	9:48	44.2	64.5	84.1
Photo of Noise Monitoring Location					
					

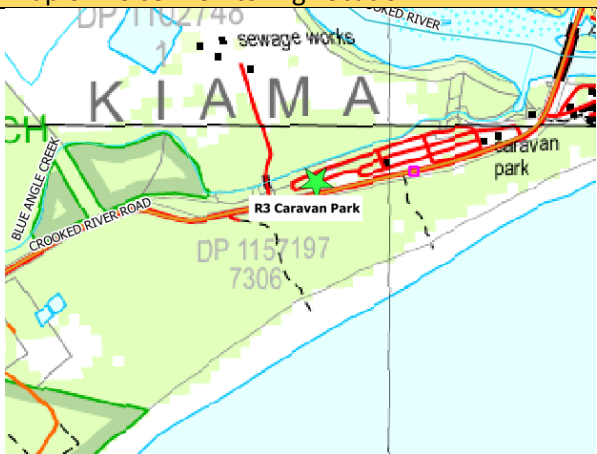



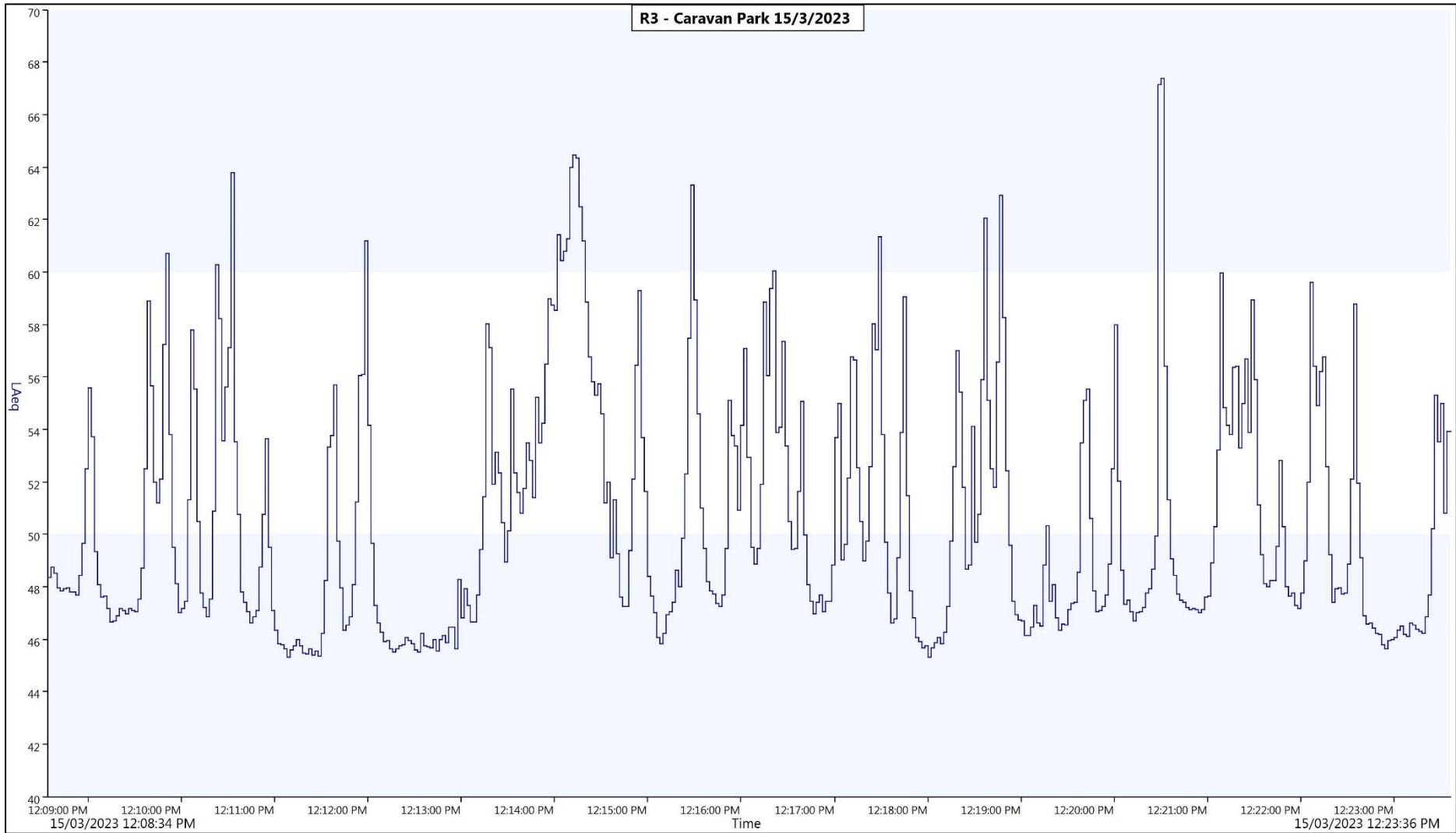
Short-term peaks generally represent local road traffic on Beach Road. Outside of these periods noise levels are dominated by insects.

Noise Monitoring Location		R2			Map of Noise Monitoring Location		
Noise Monitoring Address		11 Banggarai Street					
Wind Speed and Direction		Calm to very light W breeze					
Meteorological Conditions		Sunny, few high clouds					
Quarry Activities		2 x loaders (974, 980), 2 x Moxy's (740), 6 x T&D loads of sand					
Noise Instrumentation Used		Cirrus Optimus 171B, Serial No G301210 Cirrus MK224, Serial No 212412D					
Calibration Date		9/6/2022					
Weather Instrument Used		Vaisala WXT536					
<p>Logger deployed on back entrance to property on Banggarai St, 40m south of Beach Road. Noise dominated by birds, varying between 42 to 52 dBA, with insects and house pump audible during lulls. The Gerroa Sand Quarry was not audible at this location during the measurement.</p> <p>Recorded Noise Levels(LA_{max}):</p> <ul style="list-style-type: none"> • Birds: 52 dBA • Household pump: 39 dBA • Insects: 38 dBA, frogs <36 dBA, cows: 42 dBA • Local traffic (Beach Rd): cars up to 65 dBA, trucks (non-quarry) up to 66 dBA • Helicopter: 40 dBA, jet plane: 46 dBA, light plane: 52 dBA 							
Ambient Noise Logging Results – NPfI Defined Time Periods					Photo of Noise Monitoring Location		
Monitoring Period		Noise Level (dBA)					
		RBL	LA _{eq}	L ₁₀	L ₁		
Daytime		N/A	N/A	N/A	N/A		
Evening							
Night-time							
Attended Noise Monitoring Results							
Date	Start Time	End Time	Measured Noise Level (dBA)				
			LA ₉₀	LA _{eq}	LA _{max}		
15/3/2023	10:02	10:17	36.8	46.8	66.6		


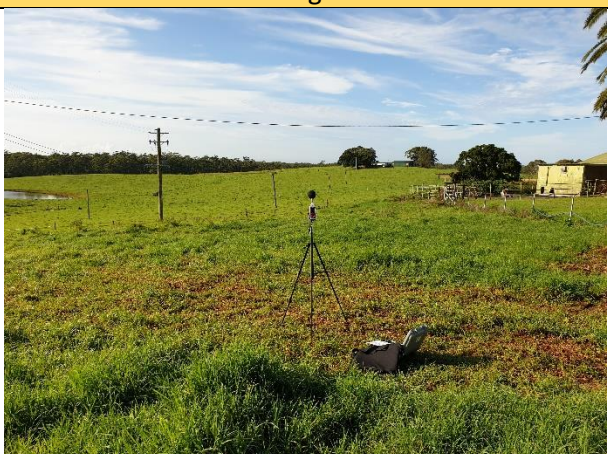


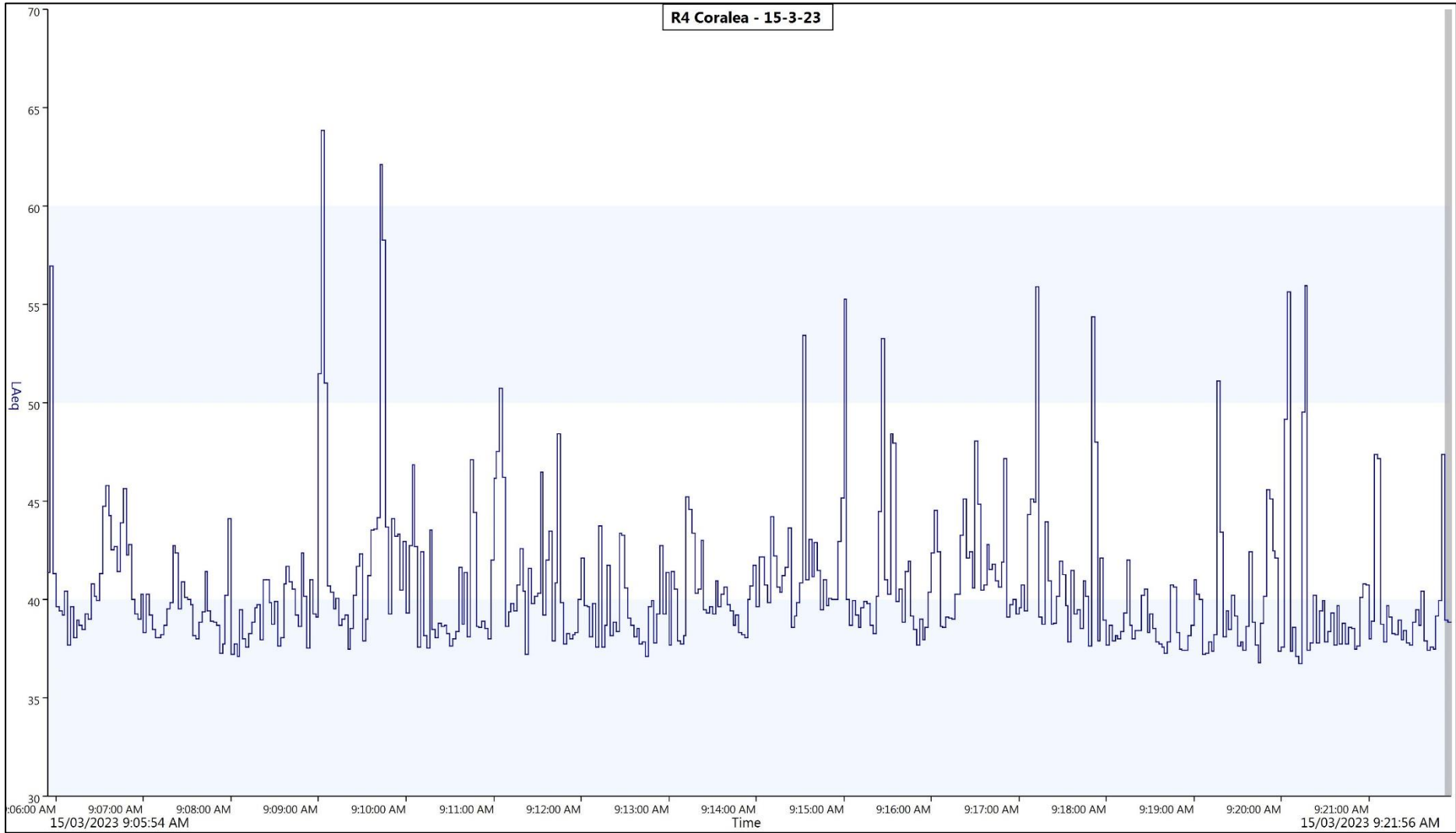
Short-term peaks generally represent local road traffic on Beach Road, and where these are wider (>20 seconds duration), include influence from aircraft. Outside of these periods noise levels are dominated by birds.

Noise Monitoring Location	R3				Map of Noise Monitoring Location  GPS location: 34.77369°S, 150.80034°E
Noise Monitoring Address	Caravan Park				
Wind Speed and Direction	Calm to very light breeze (direction imperceptible)				
Meteorological Conditions	Sunny, clear				
Quarry Activities	2 x loaders (974, 980), 2 x Moxy's (740), 6 x T&D loads of sand				
Noise Instrumentation Used	Cirrus Optimus 171B, Serial No G301210 Cirrus MK224, Serial No 212412D				
Calibration Date	9/6/2022				
Weather Instrument Used	Vaisala WXT536				
Logger deployed on STP access road immediately east of bridge over Blue Angle Creek, approximately 35m west of Gerroa Road. Noise dominated by ocean noise/waves, very constant between 45 to 47 dBA, interspersed with regular road traffic noise on Gerroa Road, climbing up to 67 dBA as vehicles passed closest to monitor. The Gerroa Sand Quarry was not audible at this location during the measurement. Recorded Noise Levels(LA _{max}): <ul style="list-style-type: none"> • Ocean/waves: 47 dBA • Insects: 48 dBA • Gerroa Road traffic: 67 dBA • Birds (once-off): 48 (66) dBA • Helicopter: 65 dBA 					
Ambient Noise Logging Results – NPfl Defined Time Periods					Photo of Noise Monitoring Location 
Monitoring Period	Noise Level (dBA)				
	RBL	LA _{eq}	L ₁₀	L ₁	
Daytime	N/A	N/A	N/A	N/A	
Evening					
Night-time					
Attended Noise Monitoring Results					
Date	Start Time	End Time	Measured Noise Level (dBA)		
			LA ₉₀	LA _{eq}	LA _{max}
15/3/2023	11:57	12:12	46.0	53.8	70.0

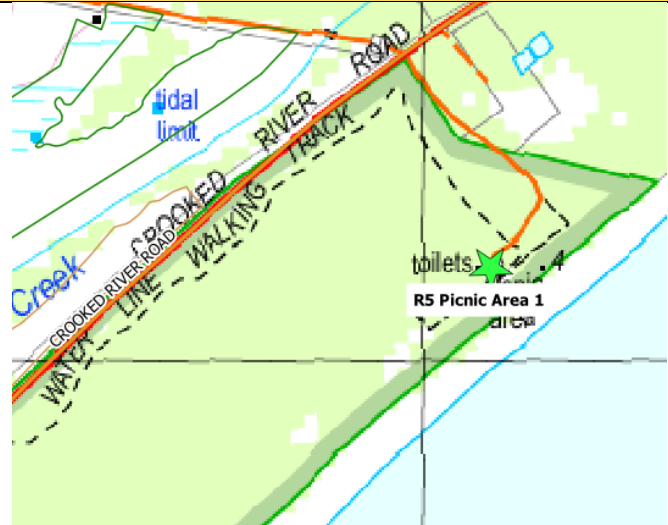



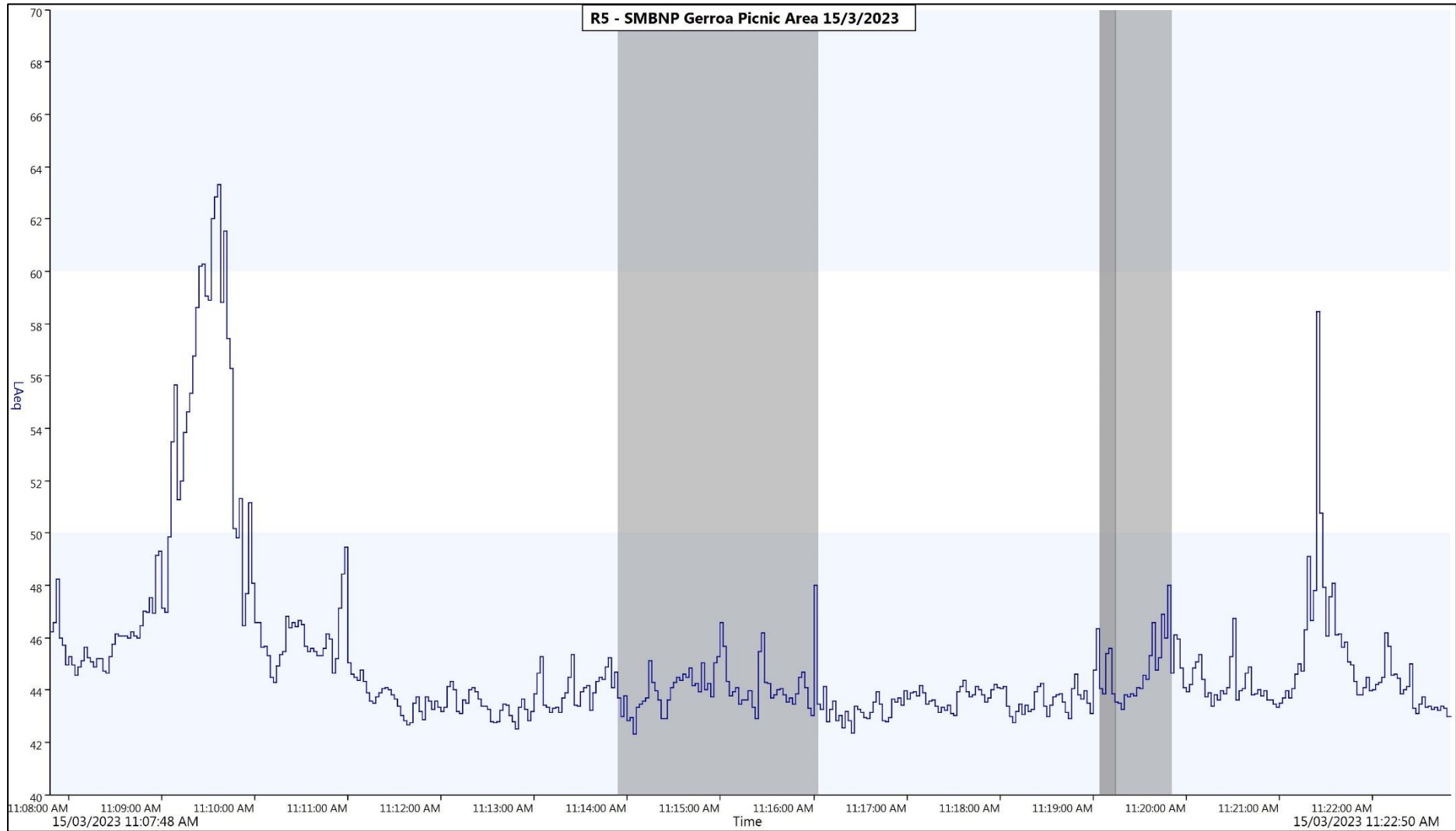
Short-term peaks generally represent local road traffic on Gerroa Road. The wider peak around 12:14pm is related to a helicopter flying overhead. Outside of these periods noise levels are dominated by waves on nearby Seven Mile Beach.

Noise Monitoring Location	R4				Map of Noise Monitoring Location 
Noise Monitoring Address	Athelstane				
Wind Speed and Direction	Calm				
Meteorological Conditions	Sunny, light high cloud				
Quarry Activities	2 x loaders (974, 980), 2 x Moxy's (740), 6 x T&D loads of sand				
Noise Instrumentation Used	Cirrus Optimus 171B, Serial No G301210 Cirrus MK224, Serial No 212412D				
Calibration Date	9/6/2022				
Weather Instrument Used	Vaisala WXT536				
<p>Logger deployed in paddock east of garage at Coralea, 200m south of Athelstane residence. Noise dominated by insect and bird noise, predominantly varying between 37 to 42 dBA. Occasional magpie, crow, and kookaburra up to 60-65 dBA. The Gerroa Sand Quarry was not audible at this location during the measurement.</p> <p>Recorded Noise Levels(LA_{max}):</p> <ul style="list-style-type: none"> Insects: 42 dBA Birds: 65 dBA Road traffic from Princes Highway (to northwest): < 38dBA, car horn: 45 dBA Train: 42 dBA 					
Ambient Noise Logging Results – NPfl Defined Time Periods					Photo of Noise Monitoring Location 
Monitoring Period	Noise Level (dBA)				
	RBL	LA _{eq}	L ₁₀	L ₁	
Daytime	N/A	N/A	N/A	N/A	
Evening					
Night-time					
Attended Noise Monitoring Results					
Date	Start Time	End Time	Measured Noise Level (dBA)		
			LA ₉₀	LA _{eq}	LA _{max}
15/3/2023	8:54	9:09	37.4	44.5	70.7

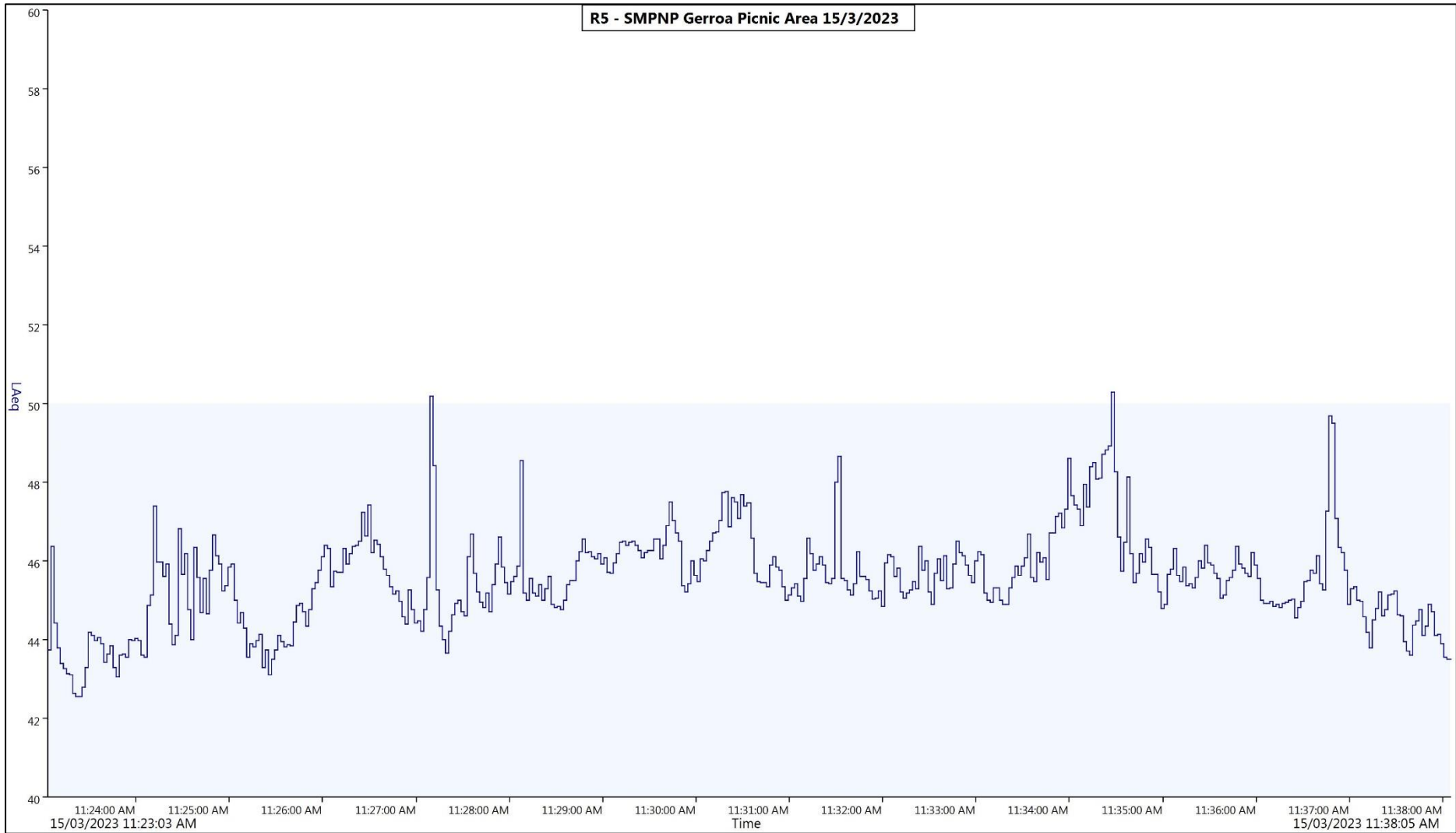


Short-term peaks are due to distinct chirps from birds in the local area. Remaining noise levels are dominated by insects and background bird noises.



Noise Monitoring Location	R5				Map of Noise Monitoring Location
Noise Monitoring Address	Picnic Area 1				 <p>GPS location: 34.77960°S, 150.79374°E</p>
Wind Speed and Direction	Very light breeze (direction not discernible)				
Meteorological Conditions	Sunny, clear sky				
Quarry Activities	2 x loaders (974, 980), 2 x Moxy's (740), 6 x T&D loads of sand				
Noise Instrumentation Used	Cirrus Optimus 171B, Serial No G301210 Cirrus MK224, Serial No 212412D				
Calibration Date	9/6/2022				
Weather Instrument Used	Vaisala WXT536				
<p>Logger deployed near toilet block at end of access road, approximately 400m SE of Gerroa Road. Noise dominated by ocean noise/waves, very constant between 42 to 46 dBA, with the occasional aircraft up to 66 dBA. Minor car noise from the nearby carpark was audible, but no noise from Gerroa Rd. The Gerroa Sand Quarry was not audible at this location during the measurement.</p> <p>Recorded Noise Levels(LA_{max}):</p> <ul style="list-style-type: none"> • Ocean/waves: 46 dBA • Birds: 50 dBA; Insects: <42 dBA • Person talking: 46 dBA • Helicopter: 66 dBA; light plane: 51 dBA • Carpark noise: 47 dBA, occasional brake squeal to 63 dBA 					
Ambient Noise Logging Results – NPfI Defined Time Periods					
Monitoring Period	Noise Level (dBA)				
		RBL	LA _{eq}	L ₁₀	
Daytime	N/A	N/A	N/A	N/A	
Evening					
Night-time					
Attended Noise Monitoring Results					
Date	Start Time	End Time	Measured Noise Level (dBA)		
			LA ₉₀	LA _{eq}	LA _{max}
15/3/2023	10:45	11:11	43.0	48.6	65.9
15/3/2023 (duplicate)	11:11	11:26	43.8	45.7	54.5

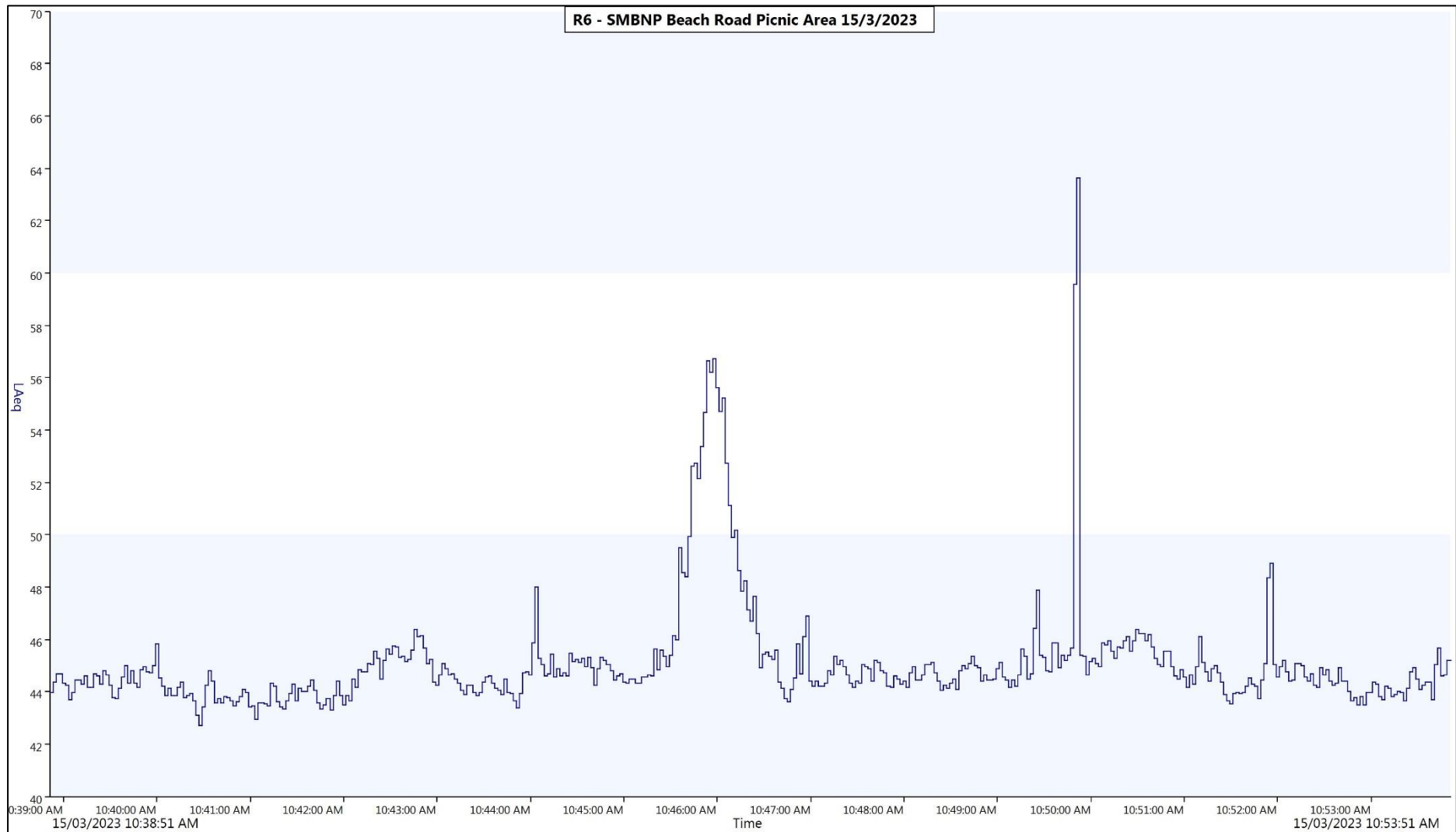


Background noise levels are dominated by waves on Seven Mile Beach. The wide peak around 11:10 is due to a helicopter, while the peak around 11:21 was due to a car in the nearby carpark, with squealing brakes recorded as the short sharp spike. Note the recording was stopped as shown by the shading at times where members of the public were talking close to the monitor, as these were thought to not represent the noise levels present for the broader site.



Background noise levels are dominated by waves on Seven Mile Beach. Some short peaks are related to chirps from birds, while the wider peaks are related to aircraft noise.

Noise Monitoring Location		R6			Map of Noise Monitoring Location		
Noise Monitoring Address		Picnic Area 2			 <p>GPS location: 34.79040°S, 150.77921°E</p>		
Wind Speed and Direction		Calm to very light breeze (direction not discernible)					
Meteorological Conditions		Sunny, clear					
Quarry Activities		2 x loaders (974, 980), 2 x Moxy's (740), 6 x T&D loads of sand					
Noise Instrumentation Used		Cirrus Optimus 171B, Serial No G301210 Cirrus MK224, Serial No 212412D					
Calibration Date		9/6/2022					
Weather Instrument Used		Vaisala WXT536					
<p>Logger deployed in northern extent of clearing of the picnic area, approximately 300m SE of Gerroa Road, and 100m north of picnic area access road.</p> <p>Noise dominated by ocean noise/waves, very constant between 42 to 46 dBA, with the occasional other varied noise contributions. Traffic on Gerroa Road was not audible. The Gerroa Sand Quarry was not audible at this location during the measurement.</p> <p>Recorded Noise Levels(LA_{max}):</p> <ul style="list-style-type: none"> • Ocean/waves: 46 dBA • Birds: generally <50 dBA, occasional chirps to 63 dBA ; Insects: <42 dBA • Light plane: 58 dBA • Carpark noise: < 42 dBA 							
Ambient Noise Logging Results – NPfl Defined Time Periods							Photo of Noise Monitoring Location
Monitoring Period		Noise Level (dBA)					
		RBL	LA _{eq}	L ₁₀	L ₁		
Daytime		N/A	N/A	N/A	N/A		
Evening							
Night-time							
Attended Noise Monitoring Results							
Date	Start Time	End Time	Measured Noise Level (dBA)				
			LA ₉₀	LA _{eq}	LA _{max}		
15/3/2023	10:27	10:42	43.6	46.5	66.1		



Background noise levels are dominated by waves on Seven Mile Beach. The broad peak around 10:46 is related to a light aircraft, while the other very short spikes are due to chirps from birds.