ANNUAL ENVIRONMENTAL MANAGEMENT REPORT (AEMR) FOR THE KARUAH HARD ROCK QUARRY, KARUAH, NSW.

AEMR Period –

16 January, 2017 – 15 January, 2018

Prepared by Hunter Quarries Pty Ltd

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APPENDIX 2 – EPL 11569

APPENDIX 3 – Water Management

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APPENDIX 5 – Noise Monitoring Reports

ABBREVIATIONS

AEMR	Annual Environmental Management Report
AQMP	Air Quality Monitoring Program
CCC	Community Consultative Committee
DA	Development Application
DDG	Dust Deposition Gauge
DIPNR	Former Department of Infrastructure Planning and Natural Resources (now DPE)
DPE	NSW Department of Planning and Environment
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Program
EMS	Environmental Management Strategy
EPL	Environment Protection Licence
GLC	Great Lakes Council
Ha	Hectare
HQPL	Hunter Quarries Pty Ltd
km	Kilometre
L	Litre
LDP	Licenced Discharge Point
OEH	Office of Environment and Heritage
POEO Act	Protection of the Environment Operations Act 1997
NPWS	NSW National Parks and Wildlife Service, now part of OEH
RFS	NSW Rural Fire Service
SLR	SLR Consulting Australia Pty Ltd
SWMP	Site Water Management Plan
tpa	tonnes per annum

i PURPOSE OF THE REPORT

Hunter Quarries Pty Ltd (HQPL) has prepared this report which fulfils the Annual Environmental Management Report (AEMR) requirement of the Development Consent (DA 265-10-2004), Schedule 4 Condition 5. However, this AEMR has been prepared generally in accordance with the Department of Planning and Environment (DPE) 2015 Annual Review Guidelines. As such, HQPL acknowledges that while this document is an AEMR as required by the Development Consent, it has been prepared to be consistent with the format of an Annual Review.

*This AEMR serves to cover the reporting period from the **16 January 2017 to 15 January 2018**.*

This report provides specific detail on the project including a summary of environmental monitoring data and environmental performance during the reporting period. All environmental data in full can be supplied at request.

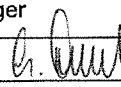
Name of Operation	Karuah Hardrock Quarry
Name of Operator	Hunter Quarries Pty Ltd
Development Consent / Project Approval #	DA 265-10-2004
Name of holder of Development Consent / Project Approval	Hunter Quarries Pty Ltd
Mining Lease #	None
Water Licences	None
AEMR start date	16 January 2017
AEMR end date	15 January 2018

I, Greg Dressler, certify that this AEMR is a true and accurate record of the compliance status of Karuah Hardrock Quarry for the period 16 January 2017 to 15 January 2018 and that I am authorised to make this statement on behalf of Hunter Quarries Pty Ltd.

Note.

a) The AEMR is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or

Name of authorised reporting officer	Greg Dressler
Title of authorised reporting officer	Quarry Manager
Signature of authorised reporting officer	
Date	26.03.18

1.0 STATEMENT OF COMPLIANCE

Tables 1 - 3 outline the compliance status of the quarry operations at the end of the reporting period within the relevant approval conditions.

Table 1 Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
Environment Protection Licence (No. 11569).	YES
Development Consent (DA265-10-2004)	YES

Table 2 DPE Compliance Status Key

Risk level	Colour code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Admin NC	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Table 3 Non- Compliance

Relevant Approval	Condition #	Condition Description (Summary)	Compliance Status	Site Comment	Where Addressed in AEMR
DA265-10-2004	Nil	eg. Operating hours	Compliant		
EPL 11569	Nil	eg. Rehabilitation	Compliant		

2.0 INTRODUCTION

This Annual Environmental Management Report (AEMR) provides detail on the reporting period from the ***16 January 2017 to 15 January 2018.*** The AEMR period covers the same period as the Environment Protection Licence (EPL) Annual Return period.

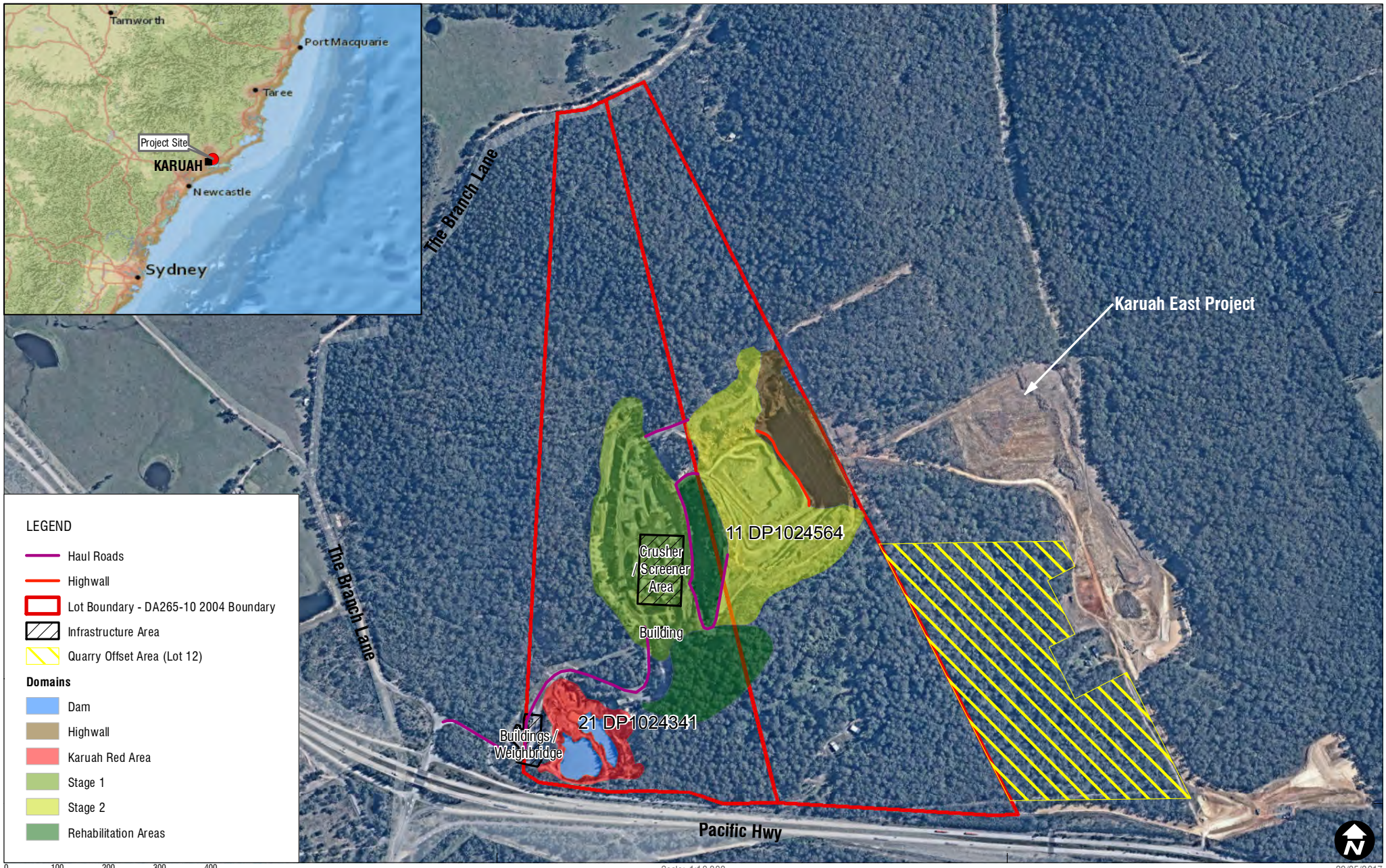
2.1 Project Overview

The Great Lakes Council (GLC) granted conditional Development Consent for a hard rock quarry and crushing plant at Karuah on 3 December 1997. Hunter Quarries Pty Limited (HQPL) purchased the site from Mountain Industries in 2002 and has since operated a hard rock quarry at the site, known as Karuah Quarry. The material extracted at the quarry is known as 'andesite' and is a hard, blue rock used for various purposes such as road base material, construction aggregate, aggregate used for concrete batching, drainage works, fill, landscaping and other uses.

The site is contained wholly within the Great Lakes Local Government Area and is located adjacent to Karuah Red Quarry and the Pacific Highway. It is approximately 4 kilometres (km) north of Karuah.

Development Consent (DA 265 – 10 – 2004) for the quarry's proposed expansion was granted on the 3 June 2005 by the former Minister for Infrastructure, Planning and Natural Resources. **Figure 1** shows the location of the site including Lot 21 DP 1024341, Lot 11 DP 1024564 and part of Lot 12 DP 1024564. Quarrying activities are undertaken on Lot 21 and Lot 11.

A 16 hectare (ha) conservation offset area was established on a southern portion of Lot 12.



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Karuah Hardrock Quarry and Conservation Offset Area

FIGURE 1

3.0 APPROVALS

HQPL is required to hold relevant approvals for the quarrying operation and these are detailed in **Table 4.**

Table 4 Current Consents and Licences

Instrument	Date of Issue	Date of Expiration	Comments
Environment Protection Licence (No. 11569).	30 June 2005	N/A	The EPL is a requirement of *the Protection of the Environment Operations Act* (PoEO Act) *1997*.
Development Consent (DA265-10-2004)	3 June 2005	3 June 2027	DA 265-10-2004 will lapse 22 years after the approval date 03 June 2005.

HQPL has an Environment Protection Licence 11569 (EPL 11569) which covers its activities at Karuah Quarry. **Table 5** outlines the licensing limits for production and material handling.

Table 5 EPL Fee-Based Activity

EPL Fee-based Activity	Current Scale (tpa)
Crushing, Grinding or Separating	> 100,000 – 500,000 t processed
Land-based extractive activity	> 100,000 – 500,000 t obtained

3.1 Consent Conditions for Reporting in the AEMR

Table 6 details the relevant conditions in Development Consent (DA 265-10-2004) that must be reported annually in the AEMR, and the respective section(s) in this document where these consent conditions are addressed.

Table 6 Checklist for AEMR Reporting

Condition Number	Condition Requirement for AEMR	Document Section
Schedule 3 Condition 23	*The Applicant shall include a progress report on the implementation and performance of the Flora and Fauna Management Plan and the Conservation Offset Strategy in the AEMR.*	*Section 6.5*
Schedule 3 Condition 29 (c)	*The Applicant shall include a progress report on the re-vegetation and maintenance of the visual bund in the AEMR, to the satisfaction of the Director General.*	*Section 8.1*
Schedule 3 Condition 34 (d)	*The Applicant shall report on waste management and minimisation in the AEMR to the satisfaction of the Director-General.*	*Section 6.7*
Schedule 3 Condition 37 (b)	*The Applicant shall include a copy of this (production) data in the AEMR.*	*Section 4.1*
Schedule 3 Condition 41	*The Applicant shall include a progress report on the Rehabilitation Management Plan in the AEMR.*	*Section 8*
Schedule 4 Condition 5	*The Applicant shall prepare and submit an AEMR to the Director-General and the relevant agencies. This report must address:* *a) identify the standards and performance measures that apply to the development;*	*Section 3 and 6*
	b) describe the works carried out in the last 12 months;	*Section 4*
	c) describe the works that will be carried out in the next 12 months;	*Section 4.2*
	d) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;	*Section 9.3*
	e) include a summary of the monitoring results for the development during the past year;	*Section 8*
	f) include an analysis of these monitoring results against the relevant: • *impact assessment criteria;* • *monitoring results from previous years;* • *predictions in the EIS;*	*Section 6*
	g) identify any trends in the monitoring results over the life of the development;	*Section 6*
	h) identify any non-compliance during the previous year; and	*Section 11.2*
	i) describe what actions were, or are being taken to ensure compliance.	*Section 11*

3.2 Department of Planning and Environment Feedback (2016 AEMR)

The Department of Planning and Environment (DPE) provided feedback to HQPL in the letter dated 3 May 2017 requesting some additional information for this AEMR. **Table 7** outlines where this information has been covered.

Table7 DPE Feedback on 2016 AEMR

Aspect	Document Section
Section 2.1 Project Overview - In accordance with Section 2 of the Guidelines, please revise Figure 1 to show the regional context , current operational disturbance footprint and offset areas.	A revised figure **(Figure 1)** has been prepared.
Section 4.4.2 Production of Material - In accordance with Schedule 2 Condition 7 of the approval , please include a table summarising the annual extraction of andecite since 2005.	A table summarising annual tonnage since 2005 has been provided (Section 4.4.2)
Section 9.3 Complaints - In accordance with Section 9 of the Guidelines, please provide a summary of complaint trends compared to previous years (graph preferred).	See Section 9.3 for complaints management.
Section 11 Incidents and Non-Compliances - In accordance with Section 11 of the Guidelines please provide a summary of the Official Caution and Voluntary Undertaking issued by the Department in July 2016 and details of HQPL response.	See Section 11.

The DPE approved the 2016 AEMR in a letter dated 9 June 2017.

4.0 OPERATIONS SUMMARY

The following section briefly describes the general operation and environmental performance of the Karuah Quarry operations during this AEMR period. Quarry operations continued within the already approved quarry footprint.

4.1 Exploration

No exploration activities took place during this reporting period.

4.2 Land Preparation

During the reporting period no land clearing or preparation was undertaken. There is no planned additional clearing as part of the Karuah Quarry operation.

4.3 Construction Activities

There were no construction activities undertaken at HQPL during the AEMR period.

4.4 Quarry Operations

The current operations involve progressive drilling and blasting, which is followed by crushing and screening to produce the required materials. Some weathered material is extracted by ripping, which eliminates the need for blasting. The quarry currently produces a range of crushed natural rock product for use in landscaping, local road making and construction projects. Quarrying activities are allowed from 7am to 6pm Monday to Friday and from 7am to 1pm on Saturday. Maintenance activities are permitted 7 days a week between 7am to 6pm.

4.4.1 Equipment

During the reporting period the following equipment was utilised for the extraction of the hard rock material:

- Excavator x 3;
- Mobile crusher (screening and crushing equipment);
- Pegson 1000 Crusher;
- Front end loader x 5;
- 13,000 litre (L) water tanker; and
- Onsite Haul trucks x 4; and
- Road Grader.

4.4.2 Production of Material

This AEMR is required to report on the production operations of the quarry and these are summarised in **Tables 8 and 9.**

Table 8 Monthly Production Summary (tonnes)

Month	Monthly total (tonnes)
January 16- January 31, 2017	18,823
Feb-17	38,172
Mar-17	33,560
Apr-17	33,931
May-17	73,378
Jun-17	58,262
Jul-17	51,476
Aug-17	48,781
Sep-17	51,518
Oct-17	35,783
Nov-17	37,004
Dec-17	12,279
January 1- January 15, 2018	5,783
Total production for the AEMR period	**498,752**

The site was below the production criteria in the Development Consent (limit 500,000 tonnes annually).

Table 9 Production and Operations Summary

Material	Approved Limit (Specify Source)	Previous Reporting Period (actual)	This Reporting Period (actual)	Next Reporting Period (forecast)
Waste Rock/Overburden*	0	0	0	0
Rock Product	500,000 tonnes (Schedule 1, DA 265-10-2004)	497,077	498,752	490,000
Saleable Product (Transported Offsite)	500,000 tonnes (Schedule 1, DA 265-10-2004)	497,077	498,752	490,000
Hours of Operation	Monday – Friday 7am to 6pm Saturday 7am to 1pm Sunday and public holidays no work at any time Minor maintenance works on plant and machinery may be carried out 7 days a week and public holidays 7am to 6pm (Schedule 3, condition 2, DA 265-10-2004)	No change	No change	No change

"In the early stages of operation at Karuah Quarry, overburden was generated to enable the formation of the pit. No overburden was generated in the AEMR period with quarrying of 'hardrock' only.

Table 10 outlines production since 2005 at the Karuah Quarry.

Table 10 Production and Operations Summary Since 2005

AEMR Period	Production (tonnes)
1 January, 2005 – 31July, 2006 (19 month period)	595,898
1 August, 2006 – 31 July 2007	338,528
1 August, 2007 – 31 July 2008	494,117
1 August, 2008 – 31 July 2009	779,006
1 August, 2008 – 31 July 2009	460,294
1 August, 2010 to 15 January, 2012 (16 month period)	637,234
16 January, 2012 to 15 January, 2013	460,148
16 January, 2013 to 15 January, 2014	458,040
16 January, 2014 to 15 January, 2015	442,831
16 January, 2015 to 15 January, 2016	412,779
16 January, 2016 to 15 January, 2017	497,077
16 January, 2017 to 15 January, 2018	498,752

Note, there have been two occasions where the AEMR period changed at the Karuah Quarry based on consultation with the DPE. Since 2012 the period has been January 16 – January 15. The date of the Development Consent (265-10-2004) is from 3 June 2005 and the period of the consent is until 3 June 2027. The Development Consent (Schedule 2 Condition 7) states there is a total production limit 11.2 million tonnes of andesite from the site within the period of this consent.

Since the start of 2005 until 15 January 2018 the quarry has produced 6,074,704 tonnes which is well within the overall extraction limit.

4.5 Water Management

Surface water at Karuah Quarry is managed in accordance with HQPL Surface Water Management Plan (SWMP).

The principal objective of surface water management for the quarry is to ensure that there is no uncontrolled discharge of water from the site and that the water quality leaving the site meets the appropriate quality standards. This objective is intrinsic to erosion and sedimentation designs and controls for the quarry. As such, the following specific objectives of this SWMP have been established:

- Conducting best practice land clearing procedures for all proposed disturbance areas;
- Separating *undisturbed* runoff from *disturbed* runoff where possible to minimise and isolate the amount of disturbed or “dirty water” runoff;
- Directing sediment-laden runoff into designated sediment control dams;
- Diverting clean runoff from areas upstream of the operation into natural depressions and creeks;
- Constructing the haul road and working pit face with effective surface drainage thereby reducing roadside erosion and sedimentation;
- Allowing sediments to settle in sediment control dams so that the water can be re-used for on-site dust depression, thereby maintaining dam capacities for subsequent rainfall events;
- Maintaining sediment control structures to ensure that the designed capacities are maintained for optimum settling of sediments; and
- Implementing an effective revegetation and maintenance program for the site.

Key water management features are outlined in **Appendix 3**.

Water Management is discussed further in **Section 7.**

4.6 Rehabilitation during the Reporting Period

There was no new rehabilitation during the reporting period.

Rehabilitation performance is discussed in **Section 8**.

4.7 Next Reporting Period

Table 11 outlines forecast operations for the next reporting period.

Table 11 Forecast Operations for Next Reporting Period

Operational Area	Forecast for Next Reporting Period
Pit expansion areas	No proposed changes. Operations continuing during the next reporting period within the existing disturbance footprint.
Infrastructure Development/Upgrades	No proposed changes to infrastructure or development.
Quarry Fleet Upgrades	No proposed fleet upgrades required.

5.0 ACTIONS REQUIRED FROM PREVIOUS AEMR

The previous AEMR was submitted in March 2017, and the site received comments from the DPE in a letter dated 3 May 2017 to provide additional information for the AEMR. The 2016 AEMR was updated and resubmitted to the DPE on with updates included in **Table 7**.

The actions required as an outcome of the previous AEMR, including any actions that have been undertaken and when the actions were completed are provided in **Table 12.**

Table 12 Actions Required from Previous AEMR

Action Required from Previous AEMR	Action Taken by the Operator	Where Discussed in the AEMR
DPE		
Covered within the resubmitted 2016 AEMR.	See **Table 7**.	
Proposed Actions by HQPL		
Continue to update the website with monitoring data and key environment and community information.	Continued	Section 9
Continue weed reduction program (target rehabilitation and conservation areas).	Weed management continued during the reporting period, including targeting spraying.	Section 6.5
Remain within licensing and production limits.	Within limits	Section 3
Continuation of community support program.	Continued	Section 9

6.0 ENVIRONMENTAL PERFORMANCE

6.1 Meteorological Monitoring

Schedule 3 Condition 16 of the Development Consent (DA265-10-2004) requires HQPL to *"ensure that there is a suitable meteorological station operating in the vicinity of the development"*.

A new meteorological station was installed in August 2016 which is used by both the Karauh Quarry and Karuah East Quarry. The location of the station is shown in **Appendix 4**. **Table 13** presents a summary of the meteorological data collected by HQPL during the AEMR reporting period.

Table 13 AEMR Meteorological Data

Month	Temp (C°)			Rainfall			Wind
	Average (C°)	Min Temp (C°)	Max Temp (C°)	Total (mm)	Max Daily (mm)	No rain days > 1 mm	Max Wind Gust (km/h)
Jan-17 (16th - 31st)	26.0	15.5	43.7	19.8	7.2	5	55.6
Feb-17	25.3	13.1	46.7	87.6	43.6	8	62.7
Mar-17	21.9	13.2	33.8	282.2	45.2	18	56.8
Apr-17	17.1	7.3	27.9	100.6	26.8	12	47.3
May-17	14.5	2.3	25.9	21.8	7.4	5	37.9
Jun-17	12.6	4.3	20.0	228.4	44.4	16	33.1
Jul-17	10.8	0.8	23.5	25.4	20.2	2	52.1
Aug-17	12.3	3.0	27.8	51.8	21.4	5	59.2
Sep-17	16.3	3.7	35.6	21.0	12.6	2	34.8
Oct-17	19.2	7.9	37.0	91.8	35.0	8	54.4
Nov-17	19.4	8.7	32.0	86.2	23.6	10	52.1
Dec-17	23.8	12.5	42.5	40.6	13.0	8	78.1
Jan-18 (1st – 15th)	24.6	12.9	44.2	34.2	25.0	3	66.0

In summary:

- Total rainfall: 1091.4mm (represents an increase since previous period);
- Monthly rainfall average: 84mm;
- Number of rainy days >1mm: 107 days
- Highest temperature: 46.7 C;
- Lowest temperature: 0.8 C; and
- Average temperature: 18.8 C.

6.2 Noise

6.2.1 EIS Predictions

The 2004 EIS noted that operational noise levels are predicted to meet project specific noise goals at all nearest, potentially affected non-project related residential locations surrounding the site. The 2004 EIS predicted that there would be no increase in road traffic noise levels due to quarry contributed traffic discernible at any residential location adjacent to the Highway.

6.2.2 Approved Criteria

Approved noise criteria from the Development Consent are outlined in **Table 14.**

Table 14 Noise Criteria for Karuah Quarry

Time Period	Noise Limit (dBA) – Laeq (15minute)
Day 7:00am to 6:00pm Monday to Friday 7:00am to 1:00pm Saturday	48
Evening 6:00pm to 10:00pm Monday to Friday	47
At All Other Times	46

6.2.3 Key Environmental Performance or Management Issues

In accordance with the Development Consent both operator attended and unattended noise monitoring has been conducted at the nearest residential receivers to the quarry during the reporting period.

Noise monitoring locations are shown in **Appendix 4**.

A summary of the results is provided in **Tables 15 to 18**, with full copies of the noise monitoring reports appended to this AEMR in **Appendix 5**.

Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds and quarry operations. The noise reports and monitoring tables below provide further details on the following information:

- Monitoring location and serial number of the noise logger;
- Date, start time, Wind velocity (m/s) and Temperature (ºC) at the measurement location; and
- Typical maximum (LAmax) and contributed noise levels.

Quarry contributions listed in the tables are from Karuah Quarry and are stated only when a contribution could be quantified.

May 2017 Noise Monitoring

Table 15 May 2017 Noise Monitoring Results – Attended

Location	Date/Start Time/ Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LAmax	LA1	LA10	LA90	LAeq	
NM1 Lot 3 DP785172 Northern Boundary	04/05/2017 15:34 Wind: Calm Temp 19°C	76	73	69	59	66	Pacific Highway ~ 67-74 Insects ~ 30-35 Birdsong ~ 35-40 Aircraft ~ 54 Quarry inaudible
		Contribution not measurable above background noise.					
NM2 Lot 2 DP 785172 Northern Boundary	04/05/2017 15:01 Wind: Calm Temp 20°C	71	68	64	56	61	Pacific Highway ~ 55-71 Insects ~ 3-40 Birdsong ~ 40 Reversing alarm audible from construction works ~ 45-50 Quarry inaudible
		Contribution not measurable above background noise.					
NM3 Lot 22 DP 1024341 Northern Boundary	04/05/2017 14:28 Wind: Calm Temp 20°C	73	69	63	57	61	Pacific Highway ~ 58-73 Birdsong to 45 Construction audible ~ 58-63 Quarry inaudible
		Contribution not measurable above background noise.					
Location F 1714 Branch Lane, Karuah	04/05/2017 12:59 Wind: Calm Temp 19°C	79	65	50	44	54	Local road traffic ~ 75-79 Pacific Highway ~ 43-53 Construction ~ 42-46 Quarry audible in lulls Dumping to 45
		Contribution of Karuah Quarry Operations ~ LAeq <30 dBA					

Table 16 May 2017 Noise Monitoring Results - Unattended

INP Period	LA1	LA10	LA90	LAeq
NM1				
Daytime during Operational Hours[1]	73	69	57	66
Daytime outside Operational Hours[2]	74	70	57	66
Evening[3]	75	70	52	66
Night[4]	75	68	40	64
NM2				
Daytime during Operational Hours[1]	68	63	52	61
Daytime outside Operational Hours[2]	69	64	52	62
Evening[3]	69	64	47	60
Night[4]	69	63	37	58
NM3				
Daytime during Operational Hours[1]	64	61	52	58
Daytime outside Operational Hours[2]	64	61	51	59
Evening[3]	66	63	49	60
Night[4]	66	62	40	58

Note: 1. Daytime - 7.00 am to 5.00 pm Monday to Friday, 8.00 am to 12.00 pm Saturday, not operations on Sunday
2. Daytime - 5.00 pm to 6.00 pm Monday to Friday, 12.00 pm to 6.00 pm Saturday, 8.00 am to 6.00 pm Sunday

3. *Evening - 6.00 pm 10.00 pm*
4. *Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.*

Noise generated by traffic on the Pacific Highway and insect noise dominated ambient noise levels at noise monitoring locations NM1, NM2 and NM3. At Location F noise from the Pacific Highway and Branch Lane dominated ambient noise levels.

The quarry was inaudible and unmeasurable at NM1. NM2 and NM3 monitoring locations due to high background noise levels from traffic and nearby construction. However, the quarry operations were audible at Location F during lulls in ambient noise.

Results from the ambient unattended noise logger measurements conducted at three noise monitoring locations also indicate that the Karuah Quarry is not a major contributor to ambient noise levels at each of these locations.

December 2017 Noise Monitoring

Table 17 December 2017 Noise Monitoring Results – Operator Attended

Location	Date/Start Time/ Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LAmax	LA1	LA10	LA90	LAeq	
NM1 Lot 3 DP785172 Northern Boundary	13/12/2017 16:03 Wind: 4.5m/s NE Temp 31°C	80	74	70	63	68	Pacific Highway ~ 55-80 Insects ~60-65 Quarry inaudible
		Contribution not measurable above background noise.					
NM2 Lot 2 DP 785172 Northern Boundary	13/12/2017 16:21 Wind: 4.5m/s NE Temp 31°C	75	75	74	69	72	Pacific Highway ~ 55-75 Insects ~ 55-69 Quarry inaudible
		Contribution not measurable above background noise.					
NM3 Lot 22 DP 1024341 Northern Boundary	13/12/2017 15:16 Wind: 4.5m/s NE Temp 31°C	72	70	69	59	65	Pacific Highway ~ 54-72 Insects ~ 53-65 Quarry inaudible
		Contribution not measurable above background noise.					
Location F 1714 Branch Lane, Karuah	13/12/2017 15:39 W 4.5 m/s NE Temp 31°C	78	66	51	46	56	Local road traffic 75-78 Pacific Highway 38-49 Insects 39-48 Karuah Quarry barely audible in lulls Engine noise 32-35
		Contribution of Karuah Quarry Operations ~ LAeq 34 dBA					

Table 18 Unattended Continuous Monitoring Ambient Noise Level (December 2017)

INP Period	LA1	LA10	LA90	LAeq
NM1				
Daytime during Operational Hours[1]	69	66	55	67
Daytime outside Operational Hours[2]	68	64	54	62
Evening[3]	66	63	51	59
Night[4]	67	64	52	61
NM3				
Daytime during Operational Hours[1]	75	69	54	66
Daytime outside Operational Hours[2]	74	69	54	64
Evening[3]	75	69	49	65
Night[4]	75	69	39	63

Note:
1. *Daytime - 7.00 am to 5.00 pm Monday to Friday, 8.00 am to 12.00 pm Saturday, not operational on Sunday*
2. *Daytime - 5.00 pm to 6.00 pm Monday to Friday, 12.00 pm to 6.00 pm Saturday, 8.00 am to 6.00 pm Sunday*
3. *Evening - 6.00 pm 10.00 pm*
4. *Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.*

The noise contribution of Karuah Quarry operations remained significantly lower than that from road traffic on the Pacific Highway during all attended noise surveys. The noise compliance results indicate that compliance with the relevant consent conditions was achieved at all noise monitoring locations during all periods.

Results from the ambient unattended noise logger measurements conducted at three noise monitoring locations also indicate that the Karuah Quarry is not a major contributor to ambient noise levels at each of these locations.

6.2.4 Management Measures

The following objectives and management measures apply to noise management at Karuah Quarry:

- To reduce and/or control noise associated with the quarry operations; and
- To train all relevant personnel in methods to reduce/control noise.

6.2.5 Proposed Improvements to Management Measures

Noise monitoring indicates that the noise levels emitted by the site are below the requirements within the consent criteria. Noise monitoring will continue to be completed in the next AEMR period.

The effectiveness of existing noise mitigation controls will continue to be monitored by the Quarry Manager as part of the routine noise monitoring program and environmental inspections.

6.3 Blasting

6.3.1 EIS Predictions

The 2004 EIS predicted that air blast and ground vibration levels will meet the EPA Guidelines at all residential locations surrounding the development with appropriate maximum instantaneous charge (MIC) limits in place.

6.3.2 Approved Criteria

According to both the EPL 11569 and DA 265-10-2004, the overpressure level from blasting operations must not exceed 115 dB(L) for more than 5% of the total number of blasts, at any residences or nearby receiver, and must not exceed 120dB(L) at any time.

Ground vibration must not exceed 5mm/s for 5% of the total number of blasts over a period of 12 months, and must not exceed 10mm/s at the nearby receiver.

6.3.3 Key Environmental Performance or Management Issues

During the reporting period all blasts were monitored at the blast monitoring locations shown in **Appendix 4**. Note that Monitor 1 is located at the front gate of the quarry and is for internal monitoring purposes only.

Table 19 outlines the blast monitoring results at the Quarry during the AEMR period.

Table 19 Blast Monitoring Results During the AEMR Period

DATE	Time of Blast	Monitor 2 – (Nearest Private Residence)	
		Overpressure Level (dBL)	Peak Particle Velocity (mm/s)
03/02/2017	12:55 pm	108.8	1.25
03/02/2017	1:04 pm	108.0	1.18
21/03/2017	13:30 pm	Below detection limits	
04/04/2017	12:35 pm	106.5	1.40
12/05/2017	12:373 pm	104.9	0.94
22/05/2017	2:11 pm	109.9	1.18
09/06/2017	1:31 pm	109.5	1.47
30/06/2017	1:31 pm	103.5	1.12
24/07/2017	1:35 pm	Below detection limits	
08/09/2017	12:29 pm	101.0	1.62
20/09/2017	12:29 pm	101.9	0.65
12/10/2017	12:57 pm	Below detection limits	
25/10/2017	12:30 pm	Below detection limits	
1/11/2017	12:57 pm	111.8	1.88
30/11/2017	12:28 pm	105.5	1.99
04/12/2017	12:25 pm	110.9	1.68

Table 20 provides a summary of the blasting results during the AEMR period.

Table 20 Blast Monitoring Summary for AEMR Period

Blast Monitoring Summary for AEMR Period *(16 January 2017 – 15 January 2018)*	**Monitor 2 (Nearest Private Residence)**
Total No. of Blasts during reporting period	16
No. of Blast records collected – ie. Values registered	12
No. of Blasts with no results or no value registered.	4
No. of blasts exceeding 5 mm/s	0
No. of Blasts exceeding 115 dBL	0
Average PPV value (mm/s)	1.3
Highest PPV value (mm/s)	2.0
Lowest PPV value (mm/s)	0.7
Average overpressure value (dBL)	107.1
Highest overpressure value (dBL)	111.8
Lowest overpressure value (dBL) registered	101.0

A number of blasts occurred where the levels of vibration and noise encountered during the blast were below the set minimum trigger levels of the monitoring equipment and as such no results or values were registered. Blast monitoring trigger levels used at the Quarry are set at 88 dB(L) for overpressure and 0.5 mm/s for ground vibration. Therefore, any blasts not triggering the monitoring equipment are significantly below the required overpressure and ground vibration criteria.

During the AEMR period:

- No blasts exceeded 120 dBL; and
- No blast exceeded 115 dBL at the nearest residential dwelling or privately owned land; and
- No ground vibration peak particle velocity readings exceeding 5 mm/s.

Blasting results have been below approved criteria and EIS predictions.

6.3.4 Management Measures

The following control measures have been employed at the site:

- Considerations of explosive loading, initiation sequence and firing;
- Use of experienced blast contractors;
- Monitoring of meteorological conditions prior to blasting; and
- Notifying landowners (at their request) and occupiers of blast events.

Additionally, all blasting activities at Karuah Quarry are monitored by a licensed blasting contractor. Monitoring equipment is located at the front gate (monitor 1) to the quarry and at the nearest residence (Monitor 2).

6.3.5 Proposed Improvements to Management Measures

Blast monitoring will continue at both monitor 1 and 2 locations and report on all blasts within the AEMR.

Where blast monitors are not triggered, the blast contractor will provide notification and evidence that the blast was monitored.

6.4 Air Quality

6.4.1 EIS Predictions

The 2004 EIS for an Extension to the Karuah Quarry predicted that dust levels from the operation would be within the criteria of 4 g/m^2/month. HQPL can demonstrate that air quality monitoring through dust depositional monitoring after several years clearly shows the quarry is meeting air quality criteria.

6.4.2 Approved Criteria

All air quality monitoring conducted at the quarry during the reporting period was compared to criteria stipulated in Schedule 3 Consent Condition 13, of DA 265-10-2004 which apply at any privately owned residences, or on more than 25% of any privately owned land, and are as follows:

- Deposited dust annual average assessment criteria less than 4 g/m2/month; and
- Deposited dust increase in deposited dust level of greater than 2 g/m^2/month.

There are no EPL criteria relating to dust levels at Karuah Quarry.

6.4.3 Key Environmental Performance or Management Issues

The principle source of air pollution at the quarry is in the form of airborne dust, which arises from activities such as quarrying, vehicle movements and crushing.

The criteria outlined in Schedule 3, Consent Condition 13, of DA 265-10-2004 apply to any privately owned residences or on more than 25% of any privately owned land, and are as follows:

- Deposited dust annual average assessment criteria less than 4 g/m^2/month; and
- Deposited dust increase in deposited dust level of greater than 2 g/m^2/month.

There are no EPL criteria relating to dust levels at Karuah Quarry.

The results in **Tables 21** illustrate that all dust gauges were below the annual average assessment criteria of 4 g/m^2/month during the 2017 reporting period.

Table 21 Depositional Dust Monitoring Summary (g/m^2/month)

Date	DDG 1	DDG 2	DDG 3	DDG 4
21/12/2016 to 18/01/2017	0.4	0.8	0.7	2.5
18/01/2017 to 16/02/2017	1.3	0.9	1.2	1.2
16/02/2017 to 20/03/2017	0.4	1.4	0.5	3.8
20/03/2017 to 21/04/2017	0.6	0.7	0.5	0.8
21/04/2017 to 23/05/2017	0.6	0.6	1.1	0.8
23/05/2017 to 20/06/2017	0.5	1.3	0.9	1.6
20/06/2017 to 18/07/2017	0.4	0.2	0.5	1.2
18/07/2017 to 17/08/2017	0.6	0.5	0.6	0.5
17/08/2017 to 14/09/2017	1.4	0.2	1.4	1.5
14/09/2017 to 12/10/2017	1.1	0.1	1.2	1.8
12/10/2017 to 09/11/2017	1.7	0.5	0.9	1.0
09/11/2017 to 07/12/2017	1.0	1.8	0.7	1.8
07/12/2017 to 08/01/2018	1.3	0.6	1.1	1.7
08/01/2018 to 05/02/2018	1.5	0.8	1.3	1.0
Annual Average	**0.9**	**0.7**	**0.9**	**1.5**

Table 22 shows long term dust monitoring results. Annual averages in 2017 have decreased from the 2016 reporting period at DDG1 and DDG2, and only slightly increased at DDG3 and DDG4. Annual averages at all dust gauges have remained relatively consistent since monitoring commenced in 2013, with no exceedances of annual criteria recorded.

Table 22 Long- term Depositional Dust Monitoring Summary

Dust Depositional Gauge	Monitoring Summary for AEMR period	Monitoring Results 2017 Period (g/m^2/month)	Monitoring Results 2016 Period (g/m^2/month)	Monitoring Results 2015 Period (g/m^2/month)	Monitoring Results 2014 Period (g/m^2/month)	Monitoring Results 2013 Period (g/m^2/month)
DDG 1	Insoluble Solids Reporting Period Average	0.9	1.9	1.5	1.2	1.7
	Max. Insoluble Solids	1.7	4.0	6.4	2.2	5.1
	Min. Insoluble Solids	0.4	0.4	0.3	0.5	0.5
DDG 2	Insoluble Solids Reporting Period Average	0.7	1.0	0.9	0.9	1.0
	Max. Insoluble Solids	1.8	3.0	3.7	2.2	1.8
	Min. Insoluble Solids	0.1	0.3	0.3	0.4	0.4
DDG 3	Insoluble Solids Reporting Period Average	0.9	0.7	0.6	0.8	1.0
	Max. Insoluble Solids	1.4	1.3	2.8	1.4	3.2
	Min. Insoluble Solids	0.5	0.3	0.1	0.3	0.2
DDG 4	Insoluble Solids Reporting Period Average	1.5	1.3	1.2	1.6	1.4
	Max. Insoluble Solids	3.8	3.2	4.1	7.1	9.5
	Min. Insoluble Solids	0.5	0.3	0.3	0.3	0.2

6.4.4 Management Measures

The following management measures have been adopted at the site to control dust:

- Air quality monitoring;
- Minimising disturbance of land to only what is required by quarry activities;
- Minimising distance travelled by hauling rock the shortest distance possible;
- Utilising quarry runoff water for dust suppression on roads, stockpiles, production plant and work areas. A 13,000 litre (L) water cart is used at the site to assist with firefighting capabilities and dust management. Water is regularly collected from Sediment Dam 2 and sprayed on roads throughout the quarry to minimise dust generated from vehicle movements;
- Engaging the services of a contract road sweeper to regularly clean roadways around the entrance to the quarry; and
- Ensuring loads are covered when leaving the site.

6.4.5 Proposed Improvements to Management Measures

HQPL will continue to monitor air quality in accordance with the conditions of the Development Consent and will also review measures for improving dust management on site. Air quality monitoring during this reporting period demonstrates that air quality and dust levels are complying with the development consent criteria and the current OEH air quality goals, which are outlined in section 5.4 of the EIS (ADW, 2004).

A citrus oil dust suppression system was trialled during 2017 on the crushing plant, and potential for ongoing implementation will be discussed in 2018.

6.5 Biodiversity

6.5.1 EIS Predictions

The 2004 Stage 2 EIS stated:
The proposed extension will impact on four endangered species, one directly and the others indirectly. The impacts can be adequately mitigated to allow these species to continue to function unimpeded by the proposed extension. A conservation off-set of 16 hectares will be provided on adjacent land. The off-set will comprise similar habitat to that which will be disturbed by quarrying. The off-set will ensure an appropriate level of formal protection for threatened flora and fauna species in the long-term.

6.5.2 Approved Criteria

There are no specific criteria associated with biodiversity management for the site. Activities need to be completed in accordance with the EIS.

6.5.3 Key Environmental Performance or Management Issues

HQPL implement a *Flora and Fauna Management Plan.* The key components and management measures of the *Flora and Fauna Management Plan* include:

- A vegetation clearing protocol;
- Flora and fauna monitoring;
- Topsoil management;
- *Conservation Offset Management Plan*; and
- *Remnant Vegetation Conservation Plan*.

The maximum disturbance footprint for the quarry was reached in 2007. Therefore no further land or vegetation clearing is expected to take place on site. As such, the environmental performance and management issues in relation to vegetation clearing and topsoil are minimal.

Flora and Fauna Monitoring

There was no flora and fauna monitoring undertaken during 2017 at the Karuah Quarry. Ecological monitoring is undertaken annually in the Lot 12 offset area as part of the annual monitoring at the adjacent Karuah East Quarry. The results from the 2017 monitoring indicate that while some species are stressed from dry conditions, the vegetation and fauna habitats within the Karuah East Biodiversity Offset Area (BOA) and Lot 12 are in high condition and remain relatively unchanged since the baseline survey.

Stock and Feral Animals

A number of vertebrate pest species were identified areas adjacent areas around the site for the Karuah East Project, including Feral Dog, Feral Rabbit, Feral Pig and Feral Cat; however, there was no evidence of disturbance from feral animals within the Lot 12 conservation area.

Weeds

The biodiversity monitoring and site inspections in previous reporting periods have identified *Lantana camara* (Lantana) as being the most widespread and abundant weed species across the site, including the conservation area. An intensive weed spraying regime across the Karuah Quarry and the adjacent Karuah East Quarry targeting the areas of Lantana was undertaken in 2017. Spraying at Karuah Quarry was

undertaken on three occasions during the reporting period. Spraying was successful at reducing Lantana and will be continued in 2018.

6.5.4 Management Measures

Biodiversity impacts continue to be managed in accordance with the *Flora and Fauna Management Plan*.

Long Term Security of the Conservation Offset Area

Conditions 17 and 18 of the consent outline the requirements for the establishment and long term security of the conservation offset area on the southern portion of Lot 12 DP 1024564 (as shown in Appendix 2 of the consent). The proponent is in the process of progressing a caveat on the title of Lot 12 DP 1024564 in consultation with the NSW DPE. Following endorsement of the caveat by the Secretary (NSW DPE), the proponent will formalise the caveat with NSW Land and Property Information (NSW LPI). Whilst the conservation offset area has not yet been finalised, Hunter Quarries recognises the importance of maintaining and enhancing the conservation offset area and accordingly implements the Flora and Fauna Management Plan that includes a Management Plan for the Conservation Offset Area.

It is anticipated that the caveat will be progressed further with the NSW DPE over the next 12 months.

6.5.5 Proposed Improvements to Management Measures

HQPL has improved its weed spraying regime and will continue to undertake weed control measures particularly around haul roads and within rehabilitation areas, including along the edges in 2018.

Site inspections for the identification of noxious weeds will continue to be undertaken.

6.6 Heritage (Aboriginal and Non- Aboriginal)

6.6.1 EIS Predictions

The archaeological survey conducted for the EIS (ADW, 2004) process did not find any heritage items onsite. There were no predicted impacts to heritage from the Karuah Quarry.

6.6.2 Approved Criteria

There are no specific criteria associated with heritage relating to the project.

The process for managing any unexpected heritage items is outlined in **Section 6.6.4**.

6.6.3 Key Environmental Performance or Management Issues

There were no issues relating to Aboriginal and Cultural heritage during the reporting period.

6.6.4 Management Measures

Should unexpected Aboriginal objects/features be encountered, work must stop immediately and the area cordoned off with a high visibility barrier. The Quarry Manager is to then contact a heritage consultant and Registered Aboriginal Parties (RAPs). The heritage consultant, in consultation with the RAPs, is to conduct a field survey to assess the Aboriginal objects/features identified. The heritage consultant, in consultation with the RAPs, will then recommend appropriate mitigation measures.

The Quarry Manager is to implement the mitigation measures that are recommended by the heritage consultant and agreed to by the RAPs and in accordance with OEH regulations. If additional visual inspection and salvage is recommended, the Quarry Manager is to arrange for the heritage consultant and RAPs to undertake those works.

Provided that these heritage contingency protocols have been followed, works within the Project Area may proceed.

6.6.5 Proposed Improvements to Management Measures

As there have been no heritage items located to date, no improvements to management measures are proposed.

6.7 General Waste Management

6.7.1 Environmental Management

HQPL use a licensed contractor for waste removal at the site. Typical waste at the quarry generally consists of non- hazardous and general wastes, as well as oily wastes. The general and non- hazardous wastes are placed in a skip bin and removed from site.

Oily water accumulates in the workshop sump within a bunded area and is removed by a licenced contractor when the sump is full. Additionally, scrap steel and tyres are separated and stockpiled until there is a sufficient quantity for removal by a licensed contractor for recycling.

6.7.2 Environmental Performance

JR Richards, a waste contractor, removes waste from a 3 metre cubed waste bin at the site. There were 26 collections during the reporting period, with capacity of the bin ranging from 50% to 100%. Over the year, approximately 50 cubic metres of waste was removed from the site, with this being a small increase compared to the previous period.

6.7.3 Proposed Improvements to Management Measures

HQPL will continue to effectively manage their waste on site, including continuing to reuse and recycle where possible.

6.8 Summary of Environmental Performance

Table 23 provides a summary of the environmental performance at the site for the reporting period.

Table 23 Environmental Performance

Aspect	Approval Criteria/EIS Prediction	Performance During the Operating Period	Trend/Key Management Implications	Implemented/Proposed Management Actions
Noise	See Section 6.2.1	Compliant	Within criteria	Continued monitoring
Blasting	See Section 6.3.1	Compliant	Within criteria	Continued monitoring
Air Quality	See Section 6.4.1	Compliant	Within criteria	Continued monitoring
Biodiversity	See Section 6.5.1	Compliant	Within criteria	Continued management
Heritage	See Section 6.6.1	Compliant	Within criteria	Continued monitoring
Waste	No predictions	Compliant	Minimal change over successive years.	Continued monitoring

7.0 WATER MANAGEMENT

7.1 Summary of Water Management at Site

7.1.1 Environmental Management

Surface water at Karuah Quarry is managed in accordance with HQPL Surface Water Management Plan (SWMP). The primary objective of water management at the site is to remain compliant with EPL 11569. As such, water contained within the footprint of the development is directed to Sediment Dam 2. Where this is not possible, water is directed through sediment control structures such as silt fences and retention sumps. Key surface water management features are presented in **Appendix 3**.

Water Storage and Use

During this reporting period, water from Sediment Dam 2 has been used for the following:

- Dust suppression on internal access and haul roads; and
- Process water/dust suppression for the crusher, conveyors and stockpiles.

HQPL continued to record water usage during the reporting period.

The capacity of the dam is approximately 18 ML. During the reporting period the volume of water stored in Sediment Dam 2 ranged from 8 ML to just less than 18 ML. Capacity was almost reaching in June 2017, but no offsite discharge was required.

7.1.2 Proposed Improvements to Management Measures

Sediment Dam 2 and other erosion and sediment control structures are continually and regularly inspected. Additionally, surface water is pumped from Sediment Dam 2 to the smaller sediment dam to reduce the risk of overflow and discharge, and to reduce sediment load. In order to reduce the risk of water discharges, the level of Sediment Dam 2 is maintained at a low level.

7.2 Water Take

Table 24 outlines the water take at Karuah Quarry for the reporting period.

Table 24 Water Take

Water Licence Number	Water Sharing Plan, Source and Management Zone (as applicable)	Entitlement	Passive Take/Inflows	Active Pumping	TOTAL
Nil water licenses for Karuah Quarry	-	Nil	-	Nil	-

7.3 Discharges

Water Discharge Events

There were no discharge events at Karuah Quarry (Sediment Dam 2) during the reporting period. In the event of a discharge, surface water parameters and volume are to be monitored in accordance with the conditions in the EPL. This includes monitoring water quality daily during discharge and sampling for pH and TSS at the licenced discharge point (LDP). During discharge events, water discharging from the site needs to be within the parameters outlined in Condition L2.4 of EPL 11569. The site has the ability to pump water back up into the pit area (unused section) to increase capacity.

Although no discharge occurred, Karuah still sampled the Sediment Dam 2 twice during the 2017 reporting period. The results are presented in **Table 25**.

Table 25 Surface Water Monitoring Results 2017

Date	EPL Criteria	29 May 2017	29 November 2017
pH	**6.5 - 8.5**	7.5	8.0
EC (µS/cm)	-	376	383
TSS (mg/L)	**40**	86	39
Turbidity (NTU)	-	480	280
Oil and Grease (mg/L)	**5**	-	-
Total Nitrogen	-	1.5	1.5
Total Phosphorus	-	0.24	0.1

As evident, the parameters are within the pH criteria on both occasions. TSS was above criteria in May 2017; however no discharge occurred so Karuah remains compliant with Condition L2.4 of EPL 11569. No results were obtained for oil and grease during the reporting period, but should discharge occur, Karuah will include this parameter.

7.4 Salinity Trading Scheme Credit Use

Not applicable to HQPL.

7.5 Compensatory Water to Other Users

Not applicable to HQPL.

8.0 REHABILITATION

There have been limited opportunities to establish rehabilitation at the quarry site, due to the configuration of the quarry and the progressive nature of the working areas. Once works have ceased at the quarry, rehabilitation will be undertaken and completed in accordance with the *Rehabilitation Management Plan*.

A *Conceptual Rehabilitation and Closure Management Plan* is currently being prepared for Karuah Quarry which will combine the requirements of Schedule 3 Condition 39 (Rehabilitation Management Plan) and Schedule 3 Condition 44 (Quarry Closure Plan) of DA 265-10-2004 into one document. The plan will be submitted to the DPE for approval in 2018.

8.1 Rehabilitation Performance During Reporting Period

A summary of rehabilitation at Karuah Quarry is outlined in **Table 26**.

Table 26 Summary of Rehabilitation Performance During Reporting Period

Guideline Requirement	Site Comment
Extent of the operations and rehabilitation at completion of the reporting period	Rehabilitation undertaken as per the annual rehabilitation inspection, which included an inspection of the visual bund. No rehabilitation was undertaken in the AEMR period.
Agreed post- rehabilitation land use	Woodland, with the pit area to be returned to a wetland post quarrying land use.
Key rehabilitation performance indicators	The *Rehabilitation Management Plan* includes completion criteria.
Renovation or removal of buildings	None during reporting period.
Any other Rehabilitation taken including: • Exploration activities; • Infrastructure; • Dams; and • The installation or maintenance of fences, bunds and any other works.	No rehabilitation undertaken during the AEMR period.
Any rehabilitation areas which have received formal sign off from DRG	None.
Variations to activities undertaken to those proposed (including why there were variations and whether DRG was notified)	No rehabilitation undertaken during the AEMR period.
Outcomes of trials, research projects and other initiatives	Key notes from the rehabilitation inspection are outlined in **Section 8.2**.
Key issues that may affect successful rehabilitation	Weed management is a continuous management issue for the site.

8.2 Summary of Rehabilitation Inspection

Rehabilitation inspections are completed in Rehabilitation Area 1 and Rehabilitation Area 2 annually. The inspection includes reviewing key features such as:

- Ground cover;
- Erosion;
- Overstorey, mid storey and lower storey;
- Nutrient cycling;
- Presence of mortality or die back; and
- Presence of weeds.

The location of the two rehabilitation areas is shown on **Figure 2**.

The rehabilitation in Rehabilitation Area 1 is mostly on rocky substrate with some soil. There is minimal erosion, with a good cover of acacias and some eucalypts have established. There is minimal ground cover in some areas; with evidence of weeds (mainly Lantana) mostly along the edge of the rehabilitation area. There is minimal change in groundcover and general conditioning from previous monitoring periods.

Rehabilitation Area 2 is on a combination of rocky substrate and soil with minimal erosion. The cover of acacias is abundant, with a greater number of eucalypts established in this area compared to Rehabilitation Area 1. There is good ground cover in most areas and there is minimal change in groundcover and general conditioning from previous reporting periods. Weeds are dominant on the edge of the rehabilitation area, with the most dominant weed being Lantana.

Both rehabilitation areas were subject to a weed spraying regime for Lantana in 2017. Spraying was successful at reducing Lantana and will be continued in 2018.

There appeared to be additional acacias that have fallen over in the rehabilitation areas since the previous rehabilitation inspection. This is a sign that the acacias are starting to thin out, with additional rehabilitation plantings required (likely eucalyptus species).

Table 27 details the rehabilitation status by year in accordance with the key rehabilitation performance indicators.

Table 27 Rehabilitation Status

Quarry Area Type	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
	Previous AEMR Period (ha)	Current AEMR Period (ha)	Next AEMR Period (ha)
A. Total Quarry Footprint (including access road in)	25.6 ha	25.6 ha	25.6 ha
B. Total Active Disturbance	22.8 ha	22.8 ha	22.8 ha
C. Land Being Prepared for Rehabilitation	0	0	0
D. Land Under Active Rehabilitation	1.7 ha	1.7 ha	1.7 ha
E. Completed Rehabilitation	0	0	0

There is approximately 1.1 ha of remnant bushland within the total quarry footprint which contributes to the 25.6 ha of the quarry footprint.

There was no new rehabilitation during the reporting period.

Photo 1 –Eucalypts are growing within the two rehabilitation areas

Photo 2: Reduction in weeds within the rehabilitation area due to weed spraying regime in 2017

Figure 2 Location of Rehabilitation Areas

8.3 Actions for the next Reporting Period

The DPE 2015 Annual Review Guidelines require the AEMR to outline the rehabilitation actions proposed during the next reporting period. These actions are detailed in **Table 28**.

Table 28 Actions for the Next Reporting Period

Requirement	Site Comment
Describe the steps to be undertaken to progress agreement during next reporting period, where final rehabilitation outcomes have not yet been agreed between stakeholders	There is no planned additional rehabilitation at the site in the next AEMR period. As previously discussed the Conceptual Quarry Closure Plan will be developed in 2018.
Outline proposed rehabilitation trials, research projects and other initiatives to be undertaken during next reporting period	There are no additional rehabilitation trials during the next AEMR period. The current rehabilitation areas will continue to be inspected and managed as required.
Summary of rehabilitation activities proposed for next report period	There is no planned additional rehabilitation at the site in the next AEMR period.

9.0 COMMUNITY

9.1 Community Engagement Activities

In both 2007 and 2011, HQPL sent flyers to nearby neighbours and advertised for expressions of interest for a Community Consultative Committee (CCC).

There is currently no specific CCC for Karuah Quarry, however a CCC meeting is held quarterly for the adjacent Karuah East Quarry were community members are able to discuss Karuah Quarry if required.

9.2 Community Contributions

HQPL feels strongly about supporting the local community and has a long history of community contributions. They are the proud supporters of various local and regional community groups and charities.

Additional information regarding community contributions can be found on the HQPL website at http://hunterquarries.com.au/community/.

9.3 Complaints

No complaints have been received at Karuah Quarry in the previous four reporting periods.

One complaint was received during the 2017 reporting period. This complaint was received from a local resident on 15 May 2017 relating to noise. The complainant remarked that the noise has been a lot louder in recent days/weeks, and that the Quarry is not allowed to crush on Saturdays.

After reviewing weather station data from the time of the complaint, the noise increase is most likely caused by cooler and calmer conditions and temperature inversion. Six monthly noise monitoring was conducted in the first week of May 2017 (see **Section 6.2.3**) and results indicated that the noise generated form Karuah Quarry were within consent and EPL limits.

The complainant was informed that all quarrying activities are permitted between 7am and 1pm on Saturday as per DA265-10-2004. A reminder to operational staff regarding operating hours was given during tool box talks, and staff were asked to be mindful of noise levels generated onsite, especially during the cooler months.

When a complaint is received, it is logged and investigated by the Quarry Manager. Feedback is then provided to the complainant and government agencies, as required. This process forms a part of the Karuah Quarry Environmental Management Strategy (EMS).

A telephone number has been established for the purpose of receiving complaints and enquiries from the community and this number is available on the HQPL website (www.hunterquarries.com.au) and is provided on a sign at the entrance to the quarry. The community can contact the quarry on **(02) 4997 5966** as well as through the HQPL website.

10.0 INDEPENDENT AUDIT

There is a requirement for Independent Environmental Audits at Karuah Quarry as per Schedule 4 Condition 6 of the Development Consent.

Within 2 years of the date of this consent, and every 5 years thereafter, unless the Director-General directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development.

The previous audit was undertaken in July 2014. The next audit is due in July 2019.

11.0 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 Summary of Incidents

There were no reportable incidents during the 2017 reporting period.

A small oil spill of approximately 20 litres occurred in the oil shed on 19 June 2017. The spill was contained within the shed and spill kits were used. Due to the minor nature of this incident, Karuah did not need to activate the *Pollution Incident Response Management Plan* or report the spill to authorities.

11.2 Summary of Non-Compliances

There were no non-compliances during the reporting period.

12.0 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Table 29 outlines the proposed actions in the next AEMR.

Table 29 Proposed Actions in the Next AEMR

Proposed Action	Timeline	Management Plan Requires Revision (Y/N)
Continue to update the website with monitoring data and key environment and community information.	Continuous	No
Continue weed reduction program (target rehabilitation and conservation areas).	Continuous as required.	No
Remain within licensing and production limits.	Continuous	No
Continuation of community support program.	Continuous	No
Preparation of a Conceptual Rehabilitation and Closure Plan for DPE approval.	Mid 2018	Yes

13.0 REFERENCES

The following documents and reports have been used to assist in writing the quarry's AEMR:

DoP (2005) *Development Consent DA265-10-2004*.

DEC-EPA, (2002) *Environment Protection Licence 111569*.

Asquith & deWitt (ADW) (2004) *Environmental Impact Statement: Proposed Hard Rock Quarry Extension*.

SLR Consulting (2015 Review) *Environmental Management Strategy*

SLR Consulting (2015 Review) *Environmental Monitoring Plan*

SLR Consulting (2015 Review) *Rehabilitation Management Plan*

SLR Consulting (2015 Review) *Bushfire Management Plan*

SLR Consulting (2015 Review) Site *Water Management Plan*.

APPENDIX 1 – Development Consent

Development Consent

Section 80 of the *Environmental Planning and Assessment Act 1979*

I, the Minister for Infrastructure, Planning and Natural Resources, approve the Development Application referred to in Schedule 1, subject to the conditions in Schedules 2 to 4.

These conditions are required to:
- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the development.

SIGNED

Craig Knowles, MP
Minister for Infrastructure, Planning and Natural Resources

Sydney 3 June 2005 File No. S04/00635

SCHEDULE 1

Development Application:	DA 265-10-2004.
Applicant:	Hunter Quarries Pty Limited.
Consent Authority:	Minister for Infrastructure, Planning and Natural Resources.
Land:	Lot 21 DP 1024341, Lot 11 DP 1024564 & Lot 12 DP 1024564.
Proposed Development:	The development includes: • implementing the remainder of the approved Stage 1 quarry operation; • extending the quarry operations into the Stage 2 area • upgrading and using existing infrastructure on site; • rehabilitating the site by re-contouring and revegetating exposed surfaces; and • producing up to 500,000 tonnes of product a year over the next 22 years.
State Significant	The proposal is classified as State significant development under section 76A(7) of the *Environmental Planning and Assessment Act 1979* as it is an extractive industry that would extract more than 200,000 tonnes of material a year.
Integrated Development:	The proposal is classified as integrated development, under section 91 of the *Environmental Planning and Assessment Act 1979* as it requires an additional approval under the *Protection of the Environment Operations Act 1997.*

Designated Development:	The proposal is classified as designated development under section 77A of the *Environmental Planning and Assessment Act 1979* as it is an extractive industry that would "obtain or process for sale, or reuse, more than 30,000 cubic metres of extractive material per year…". Consequently, it meets the criteria for designated development in schedule 3 of the *Environmental Planning and Assessment Regulation 2000*.

Notes:

- *To find out when this development consent becomes effective, see section 83 of the Environmental Planning and Assessment Act 1979* (EP&A Act);
- *To find out when this development consent is liable to lapse, see section 95 of the EP&A Act; and*
- *To find out about appeal rights, see section 97 of the EP&A Act*

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DEFINITIONS

AEMR	Annual Environmental Management Report
Applicant	Hunter Quarries Pty Limited, or its successors
BCA	Building Code of Australia
CCC	Community Consultative Committee
Council	Great Lakes Shire Council
DA	Development Application
Day	Day is defined as the period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
DEC	Department of Environment and Conservation
Department	Department of Infrastructure, Planning and Natural Resources
Director-General	Director-General of the Department of Infrastructure, Planning and Natural Resources, or delegate
DPI	Department of Primary Industry
EIS	Environmental Impact Statement titled 'Environmental Impact Statement to accompany a State Significant Development Application for an existing Hard Rock Quarry, Property: Lot 21 DP 1024341 and Lot 11 DP 1024564, Pacific Highway, Karuah', Volumes 1, 2 & 3, dated October 2004 and prepared by Asquith and deWitt Pty Ltd
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPL	Environment Protection License
Evening	Evening is defined as the period from 6pm to 10pm
GTA	General Terms of Approval
Minister	Minister for Infrastructure and Planning, or delegate
Night	Night is defined as the period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
POEO Act	*Protection of the Environment Operations Act 1997*
Privately owned land	Land not owned by the Applicant or its related companies or where a private agreement does not exist between the Applicant and the land owner
Receiver	As defined in the *NSW Industrial Noise Policy* (EPA 2000)
Site	Land to which the DA applies (Lot 21 DP 1024341, Lot 11 DP 1024564 & Lot 12 DP 1024564)
Stage 1	Existing quarry operation approved by Great Lakes Shire Council on 11 November 1997 (DA 302/97) including the 'Karuah Red quarry' site, as marked on the map in Appendix 1.
Stage 2	Proposed quarry extension as marked on the map in Appendix 1.

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. The Applicant shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.

TERMS OF APPROVAL

2. The Applicant shall carry out the development generally in accordance with the:
   (a) DA 265-10-2004;
   (b) EIS titled *Environmental Impact Statement to accompany a State Significant Development Application for an existing Hard Rock Quarry, Property: Lot 21 DP 1024341 and Lot 11 DP 1024564, Pacific Highway, Karuah*, Volumes 1, 2 & 3, dated October 2004 and prepared by Asquith and deWitt Pty Ltd; and
   (c) conditions of this development consent.

3. If there is any inconsistency between the above, the conditions of this consent shall prevail to the extent of the inconsistency.

4. The Applicant shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
   (a) any reports, plans or correspondence that are submitted in accordance with this development consent; and
   (b) the implementation of any actions or measures contained in these reports, plans or correspondence.

LIMITS ON APPROVAL

5. This consent lapses 22 years after the date it commences.

6. The Applicant shall not produce or transport more than 500,000 tonnes of material a year from the development.

7. The Applicant shall not extract more that 11.2 million tonnes of andecite from the site within the period of this consent.

SURRENDER OF CONSENTS

8. Within 6 months of the date of this consent, the Applicant shall surrender all existing development consents and continuing use rights associated with the site, in accordance with clause 97 of the EP&A Regulation.

STRUCTURAL ADEQUACY

9. The Applicant shall ensure that any new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

   Notes:
   - *Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for any building works.*
   - *Part 8 of the EP&A Regulation sets out the detailed requirements for the certification of development.*

DEMOLITION

10. The Applicant shall ensure that all demolition work is carried out in accordance with *AS 2601-2001: The Demolition of Structures,* or its latest version.

OPERATION OF PLANT AND EQUIPMENT

11. The Applicant shall ensure that all plant and equipment at the site, or used in connection with the development, are:
    a) maintained in a proper and efficient condition; and
    b) operated in a proper and efficient manner.

IDENTIFICATION OF BOUNDARIES

12. Within 6 months of the date of this consent, the Applicant shall:
    (a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction under Stage 1 and Stage 2;
    (b) submit a survey plan of these boundaries and the proposed timing of extraction within Stage 1 and Stage 2 to the Director-General; and
    (c) ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify these limits.

SECTION 94 CONTRIBUTIONS

13. The Applicant shall pay a contribution of 4.7 cents per cubic meter of material per kilometere hauled to Council for the maintenance/repair of public roads in accordance with Council's Section 94 Plan for road haulage, to the satisfaction of Council.

    Note: The applicable contribution rate is reviewed annually by Council and new rates, if applicable become operational from 1 July each year. The contribution is to be paid at the rate that is current at the time.

SCHEDULE 3
SPECIFIC ENVIRONMENTAL CONDITIONS

[1]NOISE

Noise Impact Assessment Criteria

1. The Applicant shall ensure that the noise generated by the development does not exceed the criteria specified in Table 2 at any residence or noise sensitive receptor on privately owned land.

Time Period	Noise Limits dB(A)
	$L_{Aeq\ (15minute)}$
Day (7am to 6pm) Monday to Friday and 7am to 1pm Saturday	48
Evening (6pm to 10pm) Monday to Friday	47
At all other times	46

Table 2: Noise Impact Assessment Criteria for the Development

Notes:

- *Noise from the site is to be measured within thirty meters of any residence or other noise sensitive areas to determine compliance with the noise criteria set out in Table 2.*
- *$LA_{eq(15\ minute)}$ is the equivalent continuous noise level - the level of noise equivalent to the energy average of noise levels occurring over a measurement period.*
- *For the purpose of noise measures required for this condition, the LA_{eq} noise level must be measured or computed at the point defined in this condition over a period of 15 minutes using "FAST" response on the sound level meter.*
- *For the purpose of the noise criteria for this condition, 5dBA must be added to the measured level if the noise is substantially tonal or impulsive in character. The location or point of impact can be different for each development, for example, at the closest residential receiver or at the closest boundary of the development. Measurement locations can be:*
  - *a) 1 meter from the facade of the residence for night time assessment;*
  - *b) at the residential boundary;*
  - *c) 30 meters from the residence (rural situations) where boundary is more than 30 meters from residence.*
- *The noise emission limits identified in this condition apply for prevailing meteorological conditions (winds up to 3m/s), except under conditions of temperature inversions. Noise impacts that may be enhanced by temperature inversions must be addressed by:*
  - *a) documenting noise complaints received to identify any higher level of impacts or patterns of temperature inversions;*
  - *b) where levels of noise complaints indicate a higher level of impact then actions to quantify and ameliorate any enhanced impacts under temperature inversions conditions should be developed and implemented.*

Operating Hours

2. The Applicant shall comply with the operating hours in Table 1:

Activity	Days of the Week	Time
• Construction	Monday – Friday	7am to 6pm
• Extraction and processing	Saturday	7am to 1pm
• Internal and off-site transportation of product	Sunday and public holidays	No work at any time
Minor maintenance works on plant and machinery	7 days a week and public holidays	7am to 6pm

Table 1: Operating Hours for the Development

Note: Delivery of material outside of the hours of operation permitted by condition 2 is only allowed, where that delivery is required by the police or other authorities for safety reasons; and/or where the operation or personnel or equipment are endangered. In such circumstances, prior notification should be provided to the DEC and affected residents as soon as possible, or within a reasonable period in the case of emergency.

Noise Monitoring

3. Within 6 months of the date of this consent, the Applicant shall prepare and implement a Noise Monitoring Program for the development to evaluate compliance with the noise impact assessment criteria in this consent, in consultation with the DEC, and to the satisfaction of the Director-General.

[1] Incorporates DEC GTAs

[2]BLASTING AND VIBRATION

Airblast Overpressure Criteria

4. The Applicant shall ensure that the airblast overpressure level from blasting at the development does not exceed the criteria in Table 3 at any residence or sensitive receiver on privately owned land.

Airblast overpressure level [dB(Lin Peak)]	Allowable exceedance
115	5% of the total number of blasts over a period of 12 months
120	0%

Table 3: Airblast Overpressure Limits

Ground Vibration Criteria

5. The Applicant shall ensure that the peak particle velocity from blasting at the development does not exceed the criteria in Table 4 at any residence or sensitive receiver on privately owned land.

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of the total number of blasts over a period of 12 months
10	0%

Table 4: Ground Vibration Limits

Blasting Restrictions

6. Blasting at the site may only take place:
   a) between 9am and 3pm Monday to Friday inclusive;
   b) once per week; and
   c) at such other times as may be approved by the DEC.

Public Notice

7. Within 6 months of this consent, the Applicant shall establish a blasting notification register of landowners and other interested persons, within 2 km of the quarry.

8. Throughout the life of the development, the Applicant shall notify all registered individuals of up coming blasting operations at the development site.

Property Inspections

9. Within 3 months of this consent, the Applicant shall advise all landowners within 1 kilometer of the development that they are entitled to a structural property inspection.

10. If the Applicant receives a written request for a structural property inspection from any landowner within 1 kilometer of the development, the Applicant shall within 3 months of receiving this request:
    a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to inspect the condition of any building or structure on the land, and if necessary recommend measures to mitigate any potential blasting impacts; and
    b) give the landowner a copy of the property inspection report.

Property Investigations

11. If any landowner within 1 kilometre of the site claims that buildings and/or structures on his/her land have been damaged as a result of blasting at the development, the Applicant shall within 3 months of receiving this request:
    (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to investigate the claim; and
    (b) give the landowner a copy of the property investigation report.

[2] Incorporates DEC GTAs

If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant shall repair the damages to the satisfaction of the Director-General.

If the Applicant or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Director-General for resolution.

If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 3).

Operating Conditions

12. The Applicant shall implement all practical measures to ensure the safety of people, and avoid and/or minimise any blasting impacts of the development on any privately owned land

[3]AIR QUALITY

Air Quality Impact Assessment Criteria

13. The Applicant shall ensure that the dust emissions generated by the development do not cause additional exceedances of the ambient air quality impact assessment criteria listed in Tables 6, 7, and 8 at any residence on, or on more than 25 percent of, any privately owned land.

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3

Table 6: Long Term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3

Table 7: Short Term Impact Assessment Criterion for Particulate Matter

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

Table 8: Long Term Impact Assessment Criteria for Deposited Dust

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 2003, AS 3580.10.1-1991: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Operating Conditions

14. The Applicant shall implement all practical measures to minimise and/or prevent the emission of dust from the site.

Monitoring

15. Within 6 months of the date of this consent, the Applicant shall prepare and implement an Air Quality Monitoring Program for the development to evaluate compliance with the air quality impact assessment criteria in this consent, in consultation with the DEC, and to the satisfaction of the Director-General.

[4]METEOROLOGICAL MONITORING

16. Within 6 months of this consent, the Applicant shall ensure that there is a suitable meteorological station operating in the vicinity of the development in accordance with the requirements in Approved Methods for Sampling of Air Pollutants in New South Wales, and to the satisfaction of the DEC and the Director-General.

[3] Incorporates DEC GTAs

[4] Incorporates DEC GTAs

FLORA AND FAUNA

Conservation Offset Area

17. The Applicant shall establish, conserve, and maintain the area of vegetation in Lot 12 DP 1024564 marked on the map in Appendix 2, to the satisfaction of the Director- General.

18. Within 3 years of this consent, the Applicant shall implement suitable arrangements to provide long term security for the conservation offset area, to the satisfaction of the Director-General.

    Note: The long term security of the offset can be achieved through a combination of the following: Deed of Agreement with the Minister, rezoning the land under the Great Lakes Local Environment Plan 1996, caveats on the title under the Conveyancing Act 191, etc….

Flora and Fauna Management Plan

19. Before carrying out any clearing associated with Stage 2 of the development, the Applicant shall prepare, and subsequently implement, a Flora and Fauna Management Plan for the development to the satisfaction of the Director-General. This plan must include:
    a) a Vegetation Clearing Protocol;
    b) a Remnant Vegetation Conservation Plan; and
    c) a Conservation Offset Management Plan.

20. The Vegetation Clearing Protocol shall describe the procedures that would be implemented for:
    a) minimising the areas of remnant vegetation to be cleared;
    b) delineating areas of remnant vegetation to be cleared;
    c) protecting areas outside of the disturbance areas;
    d) undertaking pre-clearance surveys (including observations/surveys for threatened species);
    e) identification of fauna management strategies;
    f) conserving and reusing topsoil;
    g) collecting seed from the site for rehabilitation works;
    h) salvaging and reusing material from the site for habitat enhancement; and
    i) controlling weeds.

21. The Remnant Vegetation Conservation Plan shall:
    a) describe what measures would be implemented to conserve, maintain and enhance the vegetation on the site which will not be cleared as part of the development (in particular sub-populations of Tetratheca juncea (Black-eyed Susan)); and
    b) describe how the performance of these measures would be monitored over time.

22. The Conservation Offset Management Plan shall:
    a) describe the habitat in the conservation offset area for following threatened species:
        - Phascogale tapoatafa (Brush-tailed Phascogale);
        - Ninox strenua (Powerful Owl);
        - Phascolarctos cinereus (Koala); and
        - Tetratheca juncea (Black-eyed Susan).
    b) justify why this area is suitable as a conservation offset for the species described in (a) above;
    c) establish baseline data for the existing habitat in the proposed conservation offset area;
    d) describe how the proposed conservation offset area would be managed, including long-term measures for:
        - feral animal control;
        - weed management;
        - stock management; and
        - bush fire management.
    e) describe how the ecological performance of the conservation offset area would be monitored over time.

Reporting

23. The Applicant shall include a progress report on the implementation and performance of the Flora and Fauna Management Plan and the Conservation Offset Strategy in the AEMR.

[5]SURFACE WATER

Pollution of Waters

24. Except as may be expressly provided by an Environment Protection License, the Applicant shall comply with section 120 of the *Protection of the Environment Operations Act 1997* during the carrying out of the development.

Water Discharge Limit

25. The Applicant shall only discharge water from the development in accordance with the provisions of a DEC Environment Protection License

Site Water Management Plan

26. Within 12 months of the date of this consent, the Applicant shall prepare, and subsequently implement, a Site Water Management Plan for the development, in consultation with the DEC, and to the satisfaction of the Director-General. The plan shall detail how site water management on site will be integrated with existing surface water management and erosion and sediment control systems and address surface water management and erosion and sediment control at both the construction and operation phases of the development. This plan must include:
    a) an Erosion and Sediment Control Plan;
    b) a Surface Water Monitoring Program; and
    c) a site water balance.

Erosion and Sediment Control

27. The Erosion and Sediment Control Plan must:
    a) be consistent with the requirements of the Department of Housing's Managing Urban Stormwater: Soils and Construction manual;
    b) identify activities that could cause soil erosion and generate sediment;
    c) describe what measures would be implemented to minimise soil erosion and off-site sediment transport from the following locations:
        - the active quarry face and pit;
        - product and top soil stockpile sites;
        - haul roads;
        - workshop areas;
        - rehabilitation areas; and
        - all other exposed and disturbed surfaces within the site.
    d) describe the location and function of erosion and sediment control structures and their capacity to contain runoff in relation to above average rainfall events;
    e) describe what measures would be implemented to maintain the structures over time;
    f) describe how the effectiveness of the Erosion and Sediment Control Plan will be measured and monitored.

Surface Water Monitoring

28. The Applicant shall:
    a) measure:
        - the volume of water discharged from the site via licensed discharge points;
        - water use on the site;
        - water transfers across the site; and
        - dam and water structure storage levels.
    b) regularly monitor the quality of the surface water discharged from the licensed discharge points on the site;

    to the satisfaction of the DEC and the Director-General.

VISUAL IMPACT

29. The Applicant shall
    a) implement all practicable measures to minimise the visual impacts of the development;
    b) retain, re-vegetate and subsequently maintain a visual bund within the Stage 1 works area (in accordance with Figures 13 and 14 of the EIS) to minimise the visual impacts of development;
    c) include a progress report on the re-vegetation and maintenance of the visual bund in the AEMR,

    to the satisfaction of the Director General.

[5] Incorporates DEC GTAs

[6]TRAFFIC AND TRANSPORT

Pacific Highway

30. The Applicant shall ensure that vehicular access to and from the quarry and the Pacific Highway is via the newly constructed grade separated interchange at Branch Lane.

Parking

31. The Applicant shall provide sufficient parking on-site for all quarry-related traffic to the satisfaction of the Director-General.

Road Haulage

32. The Applicant shall ensure that all loaded vehicles entering or leaving the site are covered.

33. The Applicant shall ensure that sediment and/or other pollutants are not tracked onto any public roads servicing the development.

[7]WASTE MANAGEMENT

34. The Applicant shall:
    a) monitor the amount of waste generated by the development;
    b) investigate ways to minimise waste generated by the development;
    c) implement reasonable and feasible measures to minimise waste generated by the development; and
    d) report on waste management and minimisation in the AEMR.

    to the satisfaction of the Director-General.

35. The Applicant must not cause, permit or allow any waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing or disposal or any waste generated at the site to be disposed of at the site, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997.

    Note: the above condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the site if it requires an environment protection licence under the Protection of the Environment Operations Act 1997.

BUSHFIRE MANAGEMENT

36. The Applicant shall:
    a) ensure that the development is suitably equipped to respond to any fires on-site; and
    b) assist the Rural Fire Service and Emergency Services as much as possible if there is a fire on-site.; and within 6 months of the date of this consent, the Applicant shall prepare a conservation sensitive Bushfire Management Plan for the development, to the satisfaction of Council and the Rural Fire Service.

PRODUCTION DATA

37. The Applicant shall:
    a) provide annual production data to the DPI (Minerals) using the standard form for that purpose; and
    b) include a copy of this data in the AEMR.

REHABILITATION

38. The Applicant shall progressively rehabilitate the site to the satisfaction of the Director-General.

Rehabilitation Management Plan

39. Within 6 months of the date of this consent, the Applicant shall prepare, and subsequently implement, a Rehabilitation Management Plan for the site, which integrates rehabilitation works for both Stage 1 and Stage 2 areas, to the satisfaction of the Director-General: This plan must:
    a) identify the disturbed area at the site (both Stage 1 and Stage 2);
    b) describe in general the short, medium, and long term measures that would be implemented to rehabilitate the site;
    c) describe in detail the measures that would be implemented over the next 5 years to rehabilitate the site; and
    d) describe in detail how rehabilitation measures will be integrated with:

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[6] Incorporates DEC GTAs

[7] Incorporates DEC GTAs

- erosion and sediment control works on site;
- remnant vegetation and habitat enhancement and conservation works; and
- visual screening works;

e) describe how the performance of these measures would be monitored over time.

40. Within 5 years of providing the Rehabilitation Management Plan to the Director-General, and every 5 years thereafter, the Applicant shall review and update the plan to the satisfaction of the Director-General.

Reporting

41. The Applicant shall include a progress report on the Rehabilitation Management Plan in the AEMR.

Rehabilitation Bond

42. Within 6 months of the date of this consent, the Applicant shall lodge a suitable conservation and rehabilitation bond for the development with the Director-General. The sum of the bond shall be calculated at $\$2.50/m^2$, or as otherwise agreed to with the Director-General, for the area of disturbance at the development.

    Notes:
    - *If the rehabilitation is completed to the satisfaction of the Director-General, the Director-General will release the rehabilitation bond.*
    - *If the rehabilitation is not completed to the satisfaction of the Director-General, the Director-General will call in all, or part of, the rehabilitation bond, and arrange for the satisfactory completion of these works.*

43. Within 3 years of lodging the rehabilitation bond with the Director-General, and every 5 years thereafter, unless the Director-General directs otherwise, the Applicant shall review, and if necessary revise, the sum of the rehabilitation bond to the satisfaction of the Director-General. This review must consider:
    a) the effects of inflation;
    b) any changes to the area of disturbance; and
    c) the performance of any progressive rehabilitation which has been undertaken at the site.

QUARRY CLOSURE PLAN

44. At least 3 years prior to the cessation of quarrying, the Applicant shall prepare a Quarry Closure Plan for the development, in consultation with the Council, and to the satisfaction of the Director-General. The plan must:
    a) define the objectives and criteria for quarry closure;
    b) investigate options for the future use of the site, including any final void(s);
    c) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the development; and
    d) describe how the performance of these measures would be monitored over time.

SCHEDULE 4
ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING AND REPORTING

ENVIRONMENTAL MANAGEMENT STRATEGY

1. Within 6 months of the date of this consent, the Applicant shall prepare, and subsequently implement an Environmental Management Strategy for the development to the satisfaction of the Director-General. This strategy must:
   a) provide the strategic context for environmental management of the development;
   b) identify the statutory requirements that apply to the development;
   c) describe in general how the environmental performance of the development would be monitored and managed during the development;
   d) describe the procedures that would be implemented to:
      - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
      - receive, handle, respond to, and record complaints;
      - resolve any disputes that may arise during the course of the development;
      - respond to any non-compliance;
      - manage cumulative impacts; and
      - respond to emergencies; and
   e) describe the role, responsibility, authority, and accountability of all the key personnel involved in environmental management of the development.

2. Within 3 months of the completion of the Independent Environmental Audit (see condition 6 below), the Applicant shall review, and if necessary revise, the Environmental Management Strategy to the satisfaction of the Director-General.

ENVIRONMENTAL MONITORING PROGRAM

3. Within 6 months of the date of this consent, the Applicant shall prepare an Environmental Monitoring Program for the development, in consultation with the relevant agencies, and to the satisfaction of the Director-General. This program must consolidate the various monitoring requirements in Schedule 4 of this consent into a single document.

4. Within 3 months of the completion of the Independent Environmental Audit (see condition 6 below), the Applicant shall review, and if necessary revise, the Environmental Monitoring Program to the satisfaction of the Director-General.

ANNUAL REPORTING

5. The Applicant shall prepare and submit an AEMR to the Director-General and the relevant agencies. This report must address:
   a) identify the standards and performance measures that apply to the development;
   b) describe the works carried out in the last 12 months;
   c) describe the works that will be carried out in the next 12 months;
   d) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;
   e) include a summary of the monitoring results for the development during the past year;
   f) include an analysis of these monitoring results against the relevant:
      - impact assessment criteria;
      - monitoring results from previous years; and
      - predictions in the EIS;
   g) identify any trends in the monitoring results over the life of the development;
   h) identify any non-compliance during the previous year; and
   i) describe what actions were, or are being taken to ensure compliance.

INDEPENDENT ENVIRONMENTAL AUDIT

6. Within 2 years of the date of this consent, and every 5 years thereafter, unless the Director-General directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
   a) be conducted by a suitably qualified, experienced, and independent person whose appointment has been endorsed by the Director-General;
   b) be consistent with *ISO 19011:2002 - Guidelines for Quality and/ or Environmental Systems Auditing*, or updated versions of this guideline;
   c) assess the environmental performance of the development, and its effects on the surrounding environment;
   d) assess whether the development is complying with the relevant standards, performance measures, and statutory requirements;

e) review the adequacy of the Applicant's Environmental Management Strategy and Environmental Monitoring Program; and
f) if necessary, recommend measures or actions to improve the environmental performance of the development, and/or the environmental management and monitoring systems.

7. Within 3 months of commissioning this audit, or as otherwise agreed by the Director-General, the Applicant shall submit a copy of the audit report to the Director-General, with a response to the recommendations contained in the audit report.

COMMUNITY CONSULTATIVE COMMITTEE

8. Within 3 months of the date of this consent the Applicant shall seek expressions of interest from members of the local community to serve as a member of a Community Consultative Committee for the development.

9. If at least two members of the local community express an interest to serve on the CCC the Applicant shall establish the CCC. The CCC shall:
(a) be comprised of:
- 2 representatives from the Applicant, including the person responsible for environmental management at the quarry;
- 1 representative from Council (if available); and
- at least 2 representatives from the local community,

whose appointment has been approved by the Director-General in consultation with the Council;
(b) be chaired by an independent chairperson, whose appointment has been endorsed by the Director-General;
(c) meet at least twice a year; and
(d) review and provide advice on the environmental performance of the development, including any construction or environmental management plans, monitoring results, audit reports, or complaints.

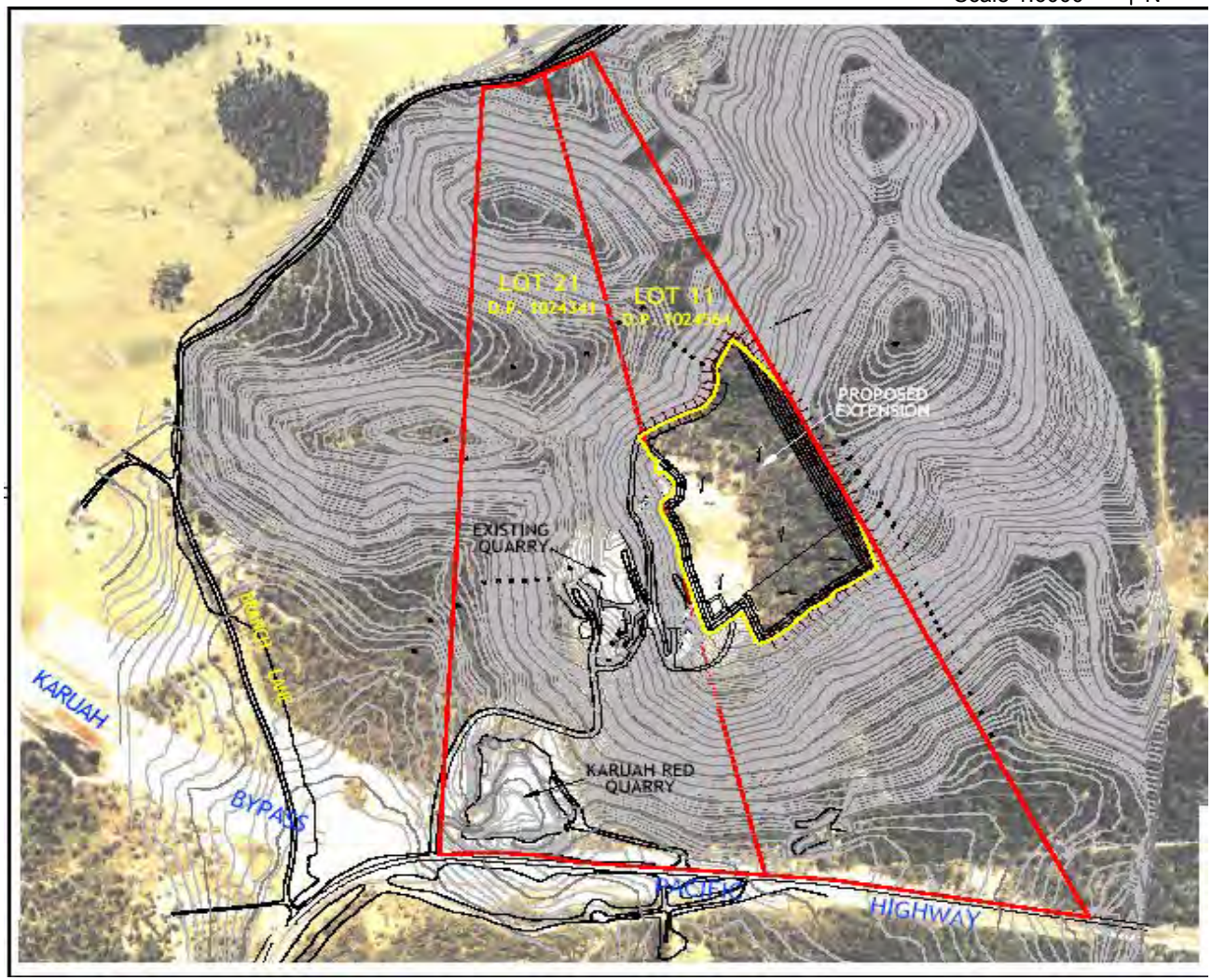
In addition, the Applicant shall, at its own expense:
(a) ensure that 2 of its representatives attend the Committee's meetings;
(b) provide the Committee with regular information on the environmental performance and management of the development;
(c) provide meeting facilities for the Committee;
(d) arrange site inspections for the Committee, if necessary;
(e) take minutes of the Committee's meetings;
(f) make these minutes available to the public for inspection within 14 days of the Committee meeting, or as agreed to by the Committee;
(g) respond to any advice or recommendations the Committee may have in relation to the environmental management or performance of the development; and
(h) forward a copy of the minutes of each Committee meeting, and any responses to the Committee's recommendations to the Director-General within a month of acceptance of the minutes by the Committee.

10. If the Applicant does not receive at least two expressions of interest to serve on the CCC the Applicant shall instead develop a communications strategy for consulting with Council and residents within 2 km of the development, to the satisfaction of the Director-General. This strategy should outline how the Applicant will advise Council and nearby residents on its environmental management plans, monitoring results, audit reports or complaints. This communication should occur twice a year.

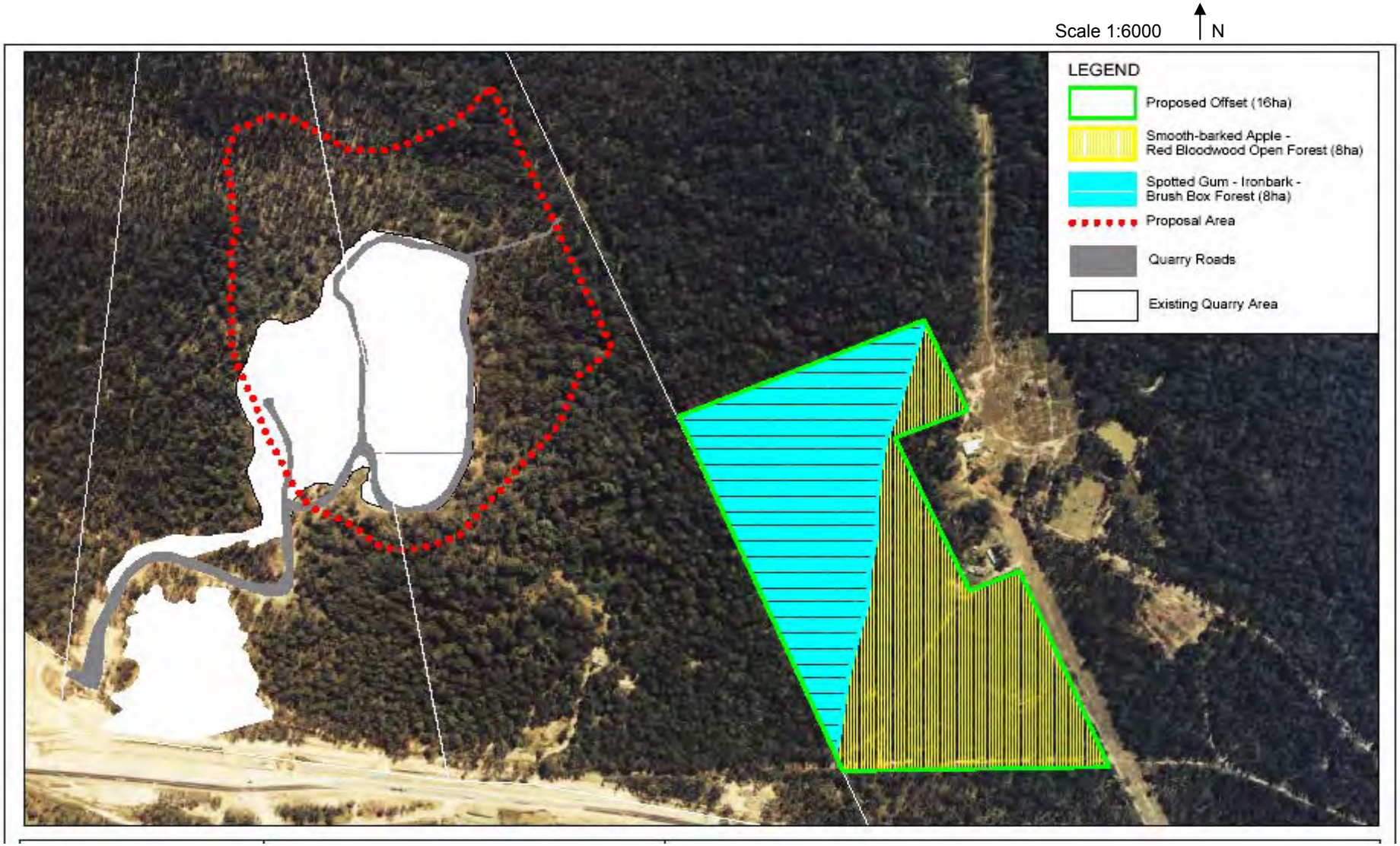
Notes: If during the course of the development, a Community Consultative Committee that has been established is found to be no longer effective, the Director-General may agree to its disbandment.

APPENDIX 1: STAGE 1 AND STAGE 2 QUARRY OPERATIONS

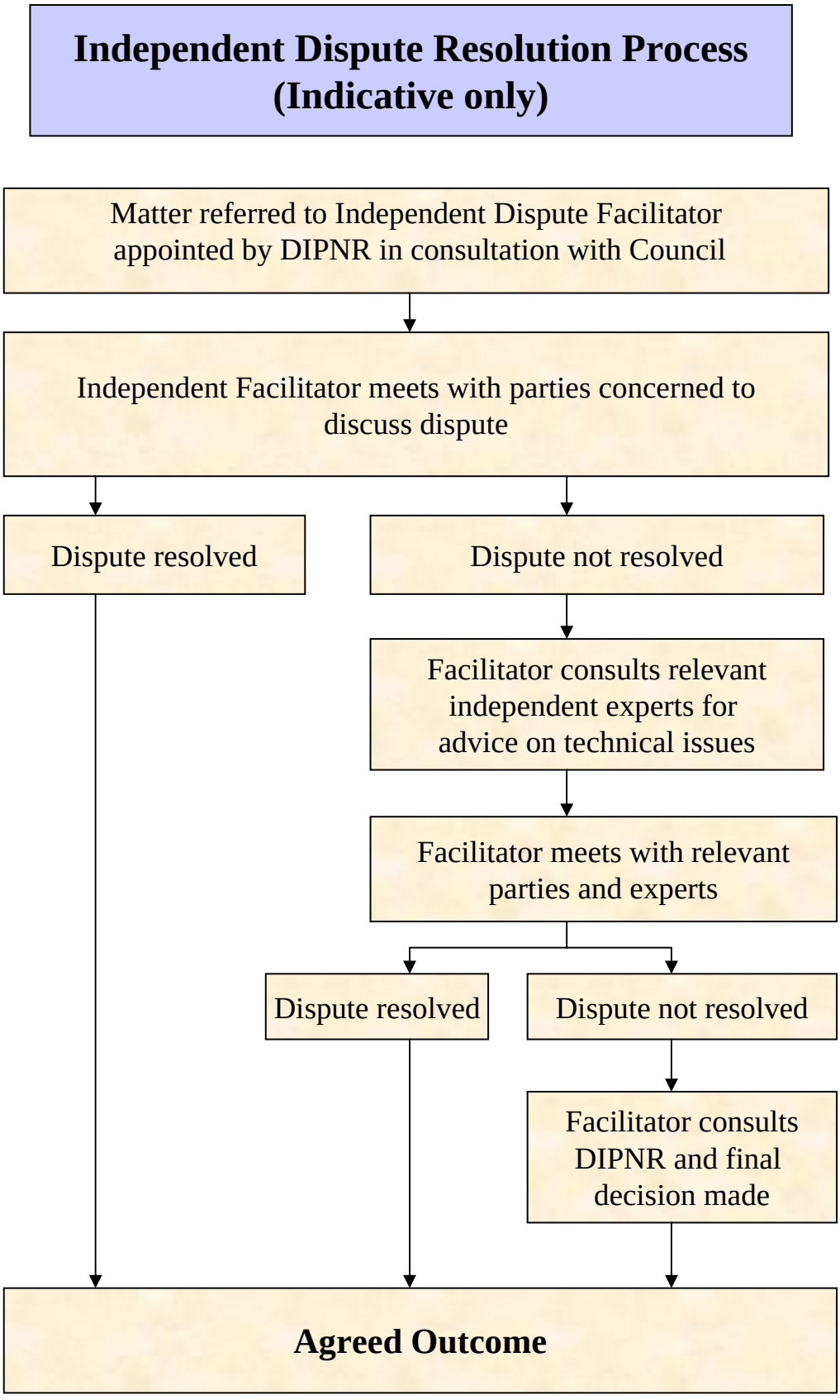
Scale 1:6000 N



APPENDIX 2: CONSERVATION OFFSET AREA



APPENDIX 3: DISPUTE RESOLUTION PROCESS



APPENDIX 2 – Environment Protection Licence

Environment Protection Licence

Licence - 11569

Licence Details	
Number:	11569
Anniversary Date:	16-January

Licensee

HUNTER QUARRIES PTY LTD

PO BOX 3284

THORNTON NSW 2322

Premises

KARUAH QUARRY

CORNER OF ANDERSITE ROAD AND THE BRANCH LANE

KARUAH NSW 2324

Scheduled Activity

Crushing, grinding or separating

Extractive activities

Fee Based Activity	Scale
Crushing, grinding or separating	> 100000-500000 T annual processing capacity
Land-based extractive activity	> 100000-500000 T annual capacity to extract, process or store

Region

North - Hunter

Ground Floor, NSW Govt Offices, 117 Bull Street

NEWCASTLE WEST NSW 2302

Phone: (02) 4908 6800

Fax: (02) 4908 6810

PO Box 488G NEWCASTLE

NSW 2300

Environment Protection Licence

Licence - 11569

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Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

Licence - 11569

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

HUNTER QUARRIES PTY LTD
PO BOX 3284
THORNTON NSW 2322

subject to the conditions which follow.

Environment Protection Licence

Licence - 11569

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Crushing, grinding or separating	Crushing, grinding or separating	> 100000 - 500000 T annual processing capacity
Extractive activities	Land-based extractive activity	> 100000 - 500000 T annual capacity to extract, process or store

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
KARUAH QUARRY
CORNER OF ANDERSITE ROAD AND THE BRANCH LANE
KARUAH
NSW 2324
LOT 21 DP 1024341, LOT 11 DP 1024564, LOT 12 DP 1024564

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

Environment Protection Licence

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2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

P1.2 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge to waters Discharge quality monitoring	Discharge to waters Discharge quality monitoring	Discharge from sediment dam No 2 identified as "Water Monitoring Site" as shown on map titled "Karuah Hard Rock Quarry Environmental Monitoring Locations, Figure 1" dated 23/06/2014 and filed as EPA document DOC16/422333 on File EF13/3101

P1.3 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
2	Dust deposition monitoring		Dust deposition gauge DDG1, as shown on map titled "Karuah Hard Rock Quarry Environmental Monitoring Locations, Figure 1" dated 23/06/2014 and filed as EPA document DOC16/422333 on File EF13/3101
3	Dust deposition monitoring		Dust deposition gauge DDG2, as shown on map titled "Karuah Hard Rock Quarry Environmental Monitoring Locations, Figure 1" dated 23/06/2014 and filed as EPA document DOC16/422333 on File EF13/3101
4	Dust deposition monitoring		Dust deposition gauge DDG3, as shown on map titled "Karuah Hard Rock Quarry Environmental Monitoring Locations, Figure 1" dated 23/06/2014 and filed as EPA document DOC16/422333 on File EF13/3101
5	Dust deposition monitoring		Dust deposition gauge DDG4, as shown on map titled "Karuah Hard Rock Quarry Environmental Monitoring Locations, Figure 1" dated 23/06/2014 and filed as EPA document DOC16/422333 on File EF13/3101

Environment Protection Licence

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3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Water and/or Land Concentration Limits

POINT 1

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible				5 &/or non-visible
pH	pH				6.5 - 8.5
Total suspended solids	milligrams per litre				50

Note: The oil and grease limit specified in the table above is defined as not more than 5 milligrams per litre (mg/L) and/or no visible oil and grease.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the

premises to be disposed of at the premises, except as expressly permitted by the licence.

L3.2 This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if those activities require an environment protection licence.

L4 Blasting

L4.1 Blasting in or on the premises must only be carried out between 0900 hours and 1500 hours, Monday to Friday. Blasting in or on the premises must not take place on weekends or Public Holidays without the prior approval of the EPA.

L4.2 The airblast overpressure level from blasting operations in or on the premises must not exceed:
115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period at any residence or noise sensitive location (such as a school or hospital) that is not owned by the licensee or subject of a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative overpressure level.

L4.3 The airblast overpressure level from blasting operations in or on the premises must not exceed:
120 dB (Lin Peak) at any time at any residence or noise sensitive location (such as a school or hospital) that is not owned by the licensee or subject of a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative overpressure level.

L4.4 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed 5 mm/second for more than 5% of the total number of blasts during each reporting period at any residence or noise sensitive location (such as a school or hospital) that is not owned by the licensee or subject of a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative overpressure level.

L4.5 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed 10 mm/second at any time at any residence or noise sensitive location (such as a school or hospital) that is not owned by the licensee or subject of a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative overpressure level.

L4.6 Error margins associated with any monitoring equipment used to measure airblast overpressure or peak particle velocity are not to be taken into account in determing whether or not the limit(s) has been exceeded.

L4.7 Offensive blast fume must not be emitted from the premises.

Definition:

Offensive blast fume means post-blast gases from the detonation of explosives at the premises that by reason of their nature, duration, character or quality, or the time at which they are emitted, or any other circumstances:
1. *are harmful to (or likely to be harmful to) a person that is outside the premises from which it is emitted, or*
2. *interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted.*

Environment Protection Licence

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 All areas in or on the premises must be maintained in a condition that prevents or minimises the emission of dust to the air.

O3.2 Any activity carried out in or on the premises must be carried out by such practical means as to prevent dust or minimise the emission of dust to the air.

O3.3 Any plant operated in or on the premises must be operated by such practical means to prevent or minimise dust or other air pollutants.

O3.4 All trafficable areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the emmission of dust to the air, or emmission from the premises of wind-blown or traffic generated dust.

O4 Emergency response

O4.1 The licensee must maintain, and implement as necessary, a current Pollution Incident Response Management Plan (PIRMP) for the premises. The licensee must keep the incident response plan on the premises at all times. The incident response plan must document systems and procedures to deal with all types of incidents (e.g. spills, explosions or fire) that may occur at the premises or that may be associated with activities that occur at the premises and which are likely to cause harm to the environment.

The PIRMP must be tested at least annually or following a pollution incident.

The licensee must develop the Pollution Incident Response Management Plan in accordance with the

requirements in Part 5.7A of the Protection of the Environment Operations (POEO) Act 1997 and POEO regulations.

O5 Processes and management

O5.1 All tanks and storage areas for drums containing material that has potential to cause environmental harm must be bunded or have an alternative spill containment system in-place.

The bunding and/or spill containment systems must be properly designed, engineered, and constructed to be suitable for the material types and quantities stored therein in accordance with all appropriate standards, including Australian Standards (AS)1940 and AS1596.

O5.2 Bunds must:
a) have walls and floors constructed of impervious materials;
b) be of sufficient capacity to contain 110% of the volume of the tank (or 110% volume of the largest tank where a group of tanks are installed);
c) have floors graded to a collection sump; and
d) not have a drain valve incorporated in the bund structure,

or be constructed and operated in a manner that achieves the same environmental outcome.

O5.3 The drainage from all areas at the premises which will liberate suspended solids when stormwater runs over these areas must be diverted into adequately sized sedimentation basins.

O5.4 The sedimentation basins must be maintained to ensure that their design capacity is available for the storage of all runoff from cleared areas.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

Environment Protection Licence

Licence - 11569

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Air Monitoring Requirements

POINT 2,3,4,5

Pollutant	Units of measure	Frequency	Sampling Method
Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19

M2.3 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Nitrogen (total)	milligrams per litre	Daily during any discharge	Grab sample
Oil and Grease	Visible	Daily during any discharge	Visual Inspection
pH	pH	Daily during any discharge	Grab sample
Phosphorus (total)	milligrams per litre	Daily during any discharge	Grab sample
Total suspended solids	milligrams per litre	Daily during any discharge	Grab sample

M3 Testing methods - concentration limits

M3.1 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2010* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:

a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

M4 Recording of pollution complaints

M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M4.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

M6 Blasting

M6.1 The licensee must monitor all blasts carried out in or on the premises at or near the nearest residence or noise sensitive location (such as a school or hospital) that is likely to be most affected by the blast and that is not owned by the licensee or subject of a private agreement between the owner of the residence or noise sensitive location and the licensee relating to alternative blasting limits.

Environment Protection Licence

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6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

Environment Protection Licence

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R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

R4.1 The licensee must report any exceedence of the licence blasting limits to the regional office of the EPA as soon as practicable after the exceedence becomes known to the licensee or to one of the licensee's

employees or agents.

R4.2 **Blast Monitoring Report**

The licensee must supply, with each Annual Return, a Blast Monitoring Report which must include the following information relating to each blast carried out within the premises during the reporting period covered by the Annual Return:
a) the date and time of the blast;
b) the location of the blast on the premises;
c) the blast monitoring results at each blast monitoring station; and
d) an explanation for any missing blast monitoring results.

7 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

Environment Protection Licence

Licence - 11569

Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 11569

flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder describe d at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

Environment Protection Licence

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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Ms Michelle Bruce

Environment Protection Authority

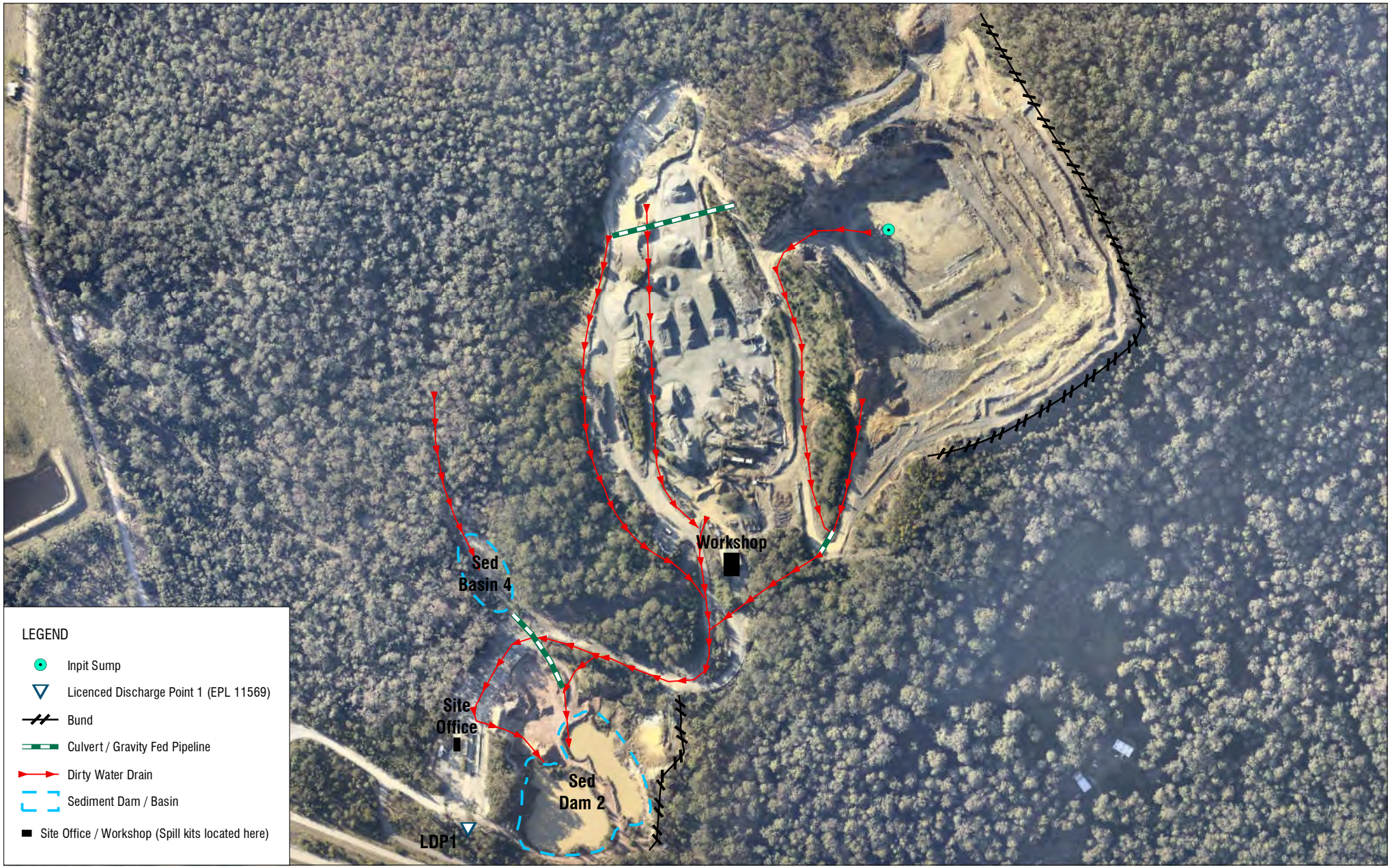
(By Delegation)

Date of this edition: 16-January-2002

End Notes

1	Licence varied by notice 1015394, issued on 11-Jul-2002, which came into effect on 05-Aug-2002.
2	Licence varied by notice 1048149, issued on 30-Jun-2005, which came into effect on 25-Jul-2005.
3	Licence varied by notice 1061485, issued on 14-Sep-2006, which came into effect on 14-Sep-2006.
4	Licence varied by notice 1072188, issued on 16-Apr-2007, which came into effect on 16-Apr-2007.
5	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
6	Licence varied by notice 1113805, issued on 04-May-2010, which came into effect on 04-May-2010.
7	Licence varied by notice 1502901 issued on 29-Dec-2011
8	Licence varied by notice 1528535 issued on 26-Aug-2016

APPENDIX 3 – Water Management



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Date:	12/12/2014
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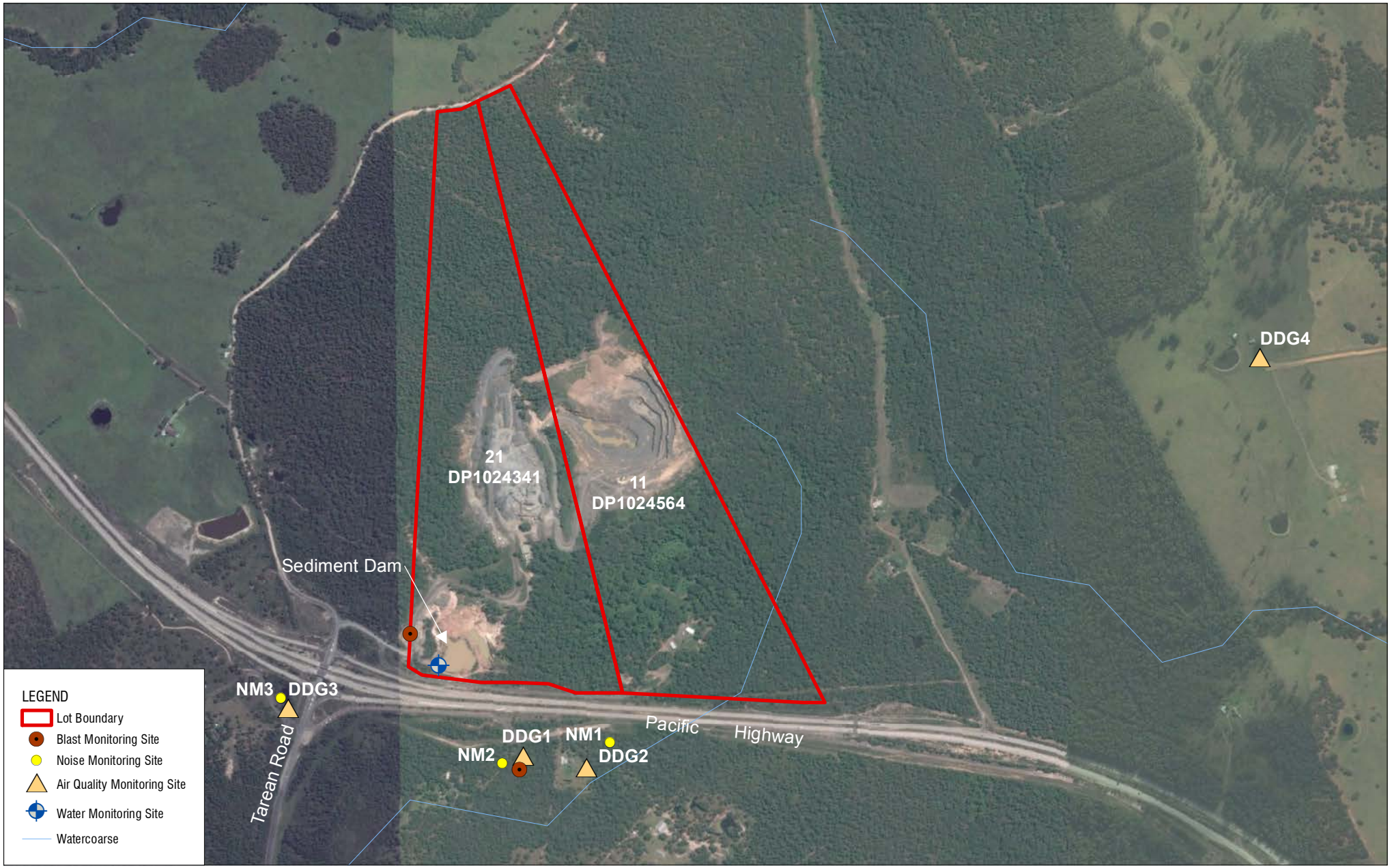
Hunter Quarries Pty Ltd

Environmental Services and Support

Quarry Operations
Water Management

FIGURE 1

APPENDIX 4 – Environmental Monitoring Locations and Figures



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Hunter Quarries Pty Ltd

Environmental Services and Support

Karuah Hard Rock Quarry
Environmental Monitoring Locations

FIGURE 1

Sheet Size: A4

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Karuah Quarry Domain Areas

FIGURE 2

APPENDIX 5 – Noise Monitoring Reports

global environmental solutions

Karuah Quarry

Biannual Noise Monitoring Assessment

May 2017

Report Number 630.01541-R22

7 March 2018

Hunter Quarries Pty Ltd

PO Box 3284

THORNTON NSW 2322

Version: -v1.0

Karuah Quarry

Biannual Noise Monitoring Assessment

May 2017

PREPARED BY:

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
630.01541-R22--v1.0	7 March 2018	Martin Davenport	Yang Liu	

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1 INTRODUCTION

Hunter Quarries Pty Ltd (Hunter Quarries) has operated a hard rock quarry approximately four (4) kilometres north of Karuah since 1997. In October 2004, Hunter Quarries applied to the Department of Planning and Infrastructure (DP&I) for approval to expand the quarry. The Minister for Planning granted development consent on 3 June 2005 (DA 265-10-2004).

Hunter Quarries has commissioned SLR Consulting Australia Pty Ltd (SLR) to prepare and implement a noise monitoring program for the Karuah Quarry in accordance with the conditions of consent specified by DP&I.

The noise monitoring program requires biannual noise monitoring surveys. This report presents the results of the noise monitoring survey for the period up to June 2017.

The objectives of the noise monitoring survey for this operating period were as follows:

- Measure the ambient noise levels at four (4) key focus receptor locations surrounding the quarry.
- Qualify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of individual noise sources.
- Assess the noise emissions of Karuah Quarry with respect to the limits contained in the Development Consent.

1.1 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 KARUAH QUARRY DEVELOPMENT CONSENT CONDITIONS

Development Consent Section 5.4.1, Schedule 4, Condition 3 provides the following:

Within 6 months of the date of this consent, the Applicant shall prepare and implement a Noise Monitoring Program, for the development to evaluate compliance with the noise impact assessment criteria in this consent, in consultation with the DEC, and to the satisfaction of the Director-General.

Condition 1 of the Development Consent requires Hunter Quarries to ensure noise generated by the development does not exceed criteria outlined in **Table 1** at any residence, or any noise sensitive receptor on privately owned land.

Table 1 Development Consent Noise Impact Criteria – Karuah Quarry

Time Period	Noise Limit (dBA) - $L_{Aeq(15minute)}$
Day 7:00am to 6:00pm Monday to Friday 7:00am to 1:00pm Saturday	48
Evening 6:00pm to 10:00pm Monday to Friday	47
At All Other Times	46

3 EQUIPMENT OPERATION

Hours of operation of the Karuah Quarry are from 7:00 am to 5:00 pm Monday to Friday and 7:00 am to 12:00 pm Saturday.

Equipment operating hours for Karuah Quarry during the noise monitoring period are presented in **Table 2.**

Table 2 Karuah Quarry Equipment Operation

Equipment Description	Weekday Operation, Monday – Friday (7:00 am – 5:00 pm)	Weekend Operation, Saturday (7:00 am – 12:00 pm)
Front End loader – Komatsu WA 470	✓	✓
Front End loader – CAT 980G	✓	✓
Excavator	✓	✓
Jaw Crusher	✓	✓
Primary Screen	✓	✓
Secondary Crusher/Screen	✓	✓
Dump Trucks	✓	✓

4 NOISE MONITORING METHODOLOGY

4.1 General Requirements

The operational noise monitoring programme was conducted with reference to Development Consent DA 265-10-2004, AS 1055-1997 "*Acoustics - Description and Measurement of Environmental Noise*" and the NSW Industrial Noise Policy (INP).

All acoustic instrumentation employed throughout the monitoring programme has been designed to comply with the requirements of AS IEC 61672 (parts 1 and 2) 2004 *Electroacoustics - Sound Level Meters* and carries current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

4.2 Monitoring Locations

The Karuah Quarry is located just north of Karuah adjacent to the Pacific Highway. The Pacific Highway is situated between residences and Karuah Quarry.

Operator-attended and unattended continuous noise monitoring was conducted at the three (3) nearest residences to the Karuah Quarry as presented in **Table 3** and shown in **Figure 1**.

Table 3 Residential monitoring locations

Noise Monitoring Location	Property Name	Distance from Karuah Quarry
NM1	Lot 3 DP785172 5772 Pacific Hwy, Karuah	317 metres South of the Karuah Quarry
NM2	Lot 2 DP 785172 5760 Pacific Hwy, Karuah	200 metres South of the Karuah Quarry
NM3	Lot 22 DP 1024341	370 metres South-West of the Karuah Quarry

4.2.1 Additional Noise Monitoring Location

Noise monitoring was also undertaken at 1714 Branch Lane, Karuah (Location F) in response to the following comment from the NSW Department of Planning and Environment (DP&E) on the 2015 Annual Review:

> *Further, please undertake noise monitoring to confirm compliance with Condition 1, Schedule 3, which requires that the noise generated by the development does not exceed criteria at any residence on privately owned land, including the residence at 1714 Branch Lane, Karuah.*

The Location F noise monitoring location is provided in **Figure 2**.

Figure 1 Noise Monitoring Locations

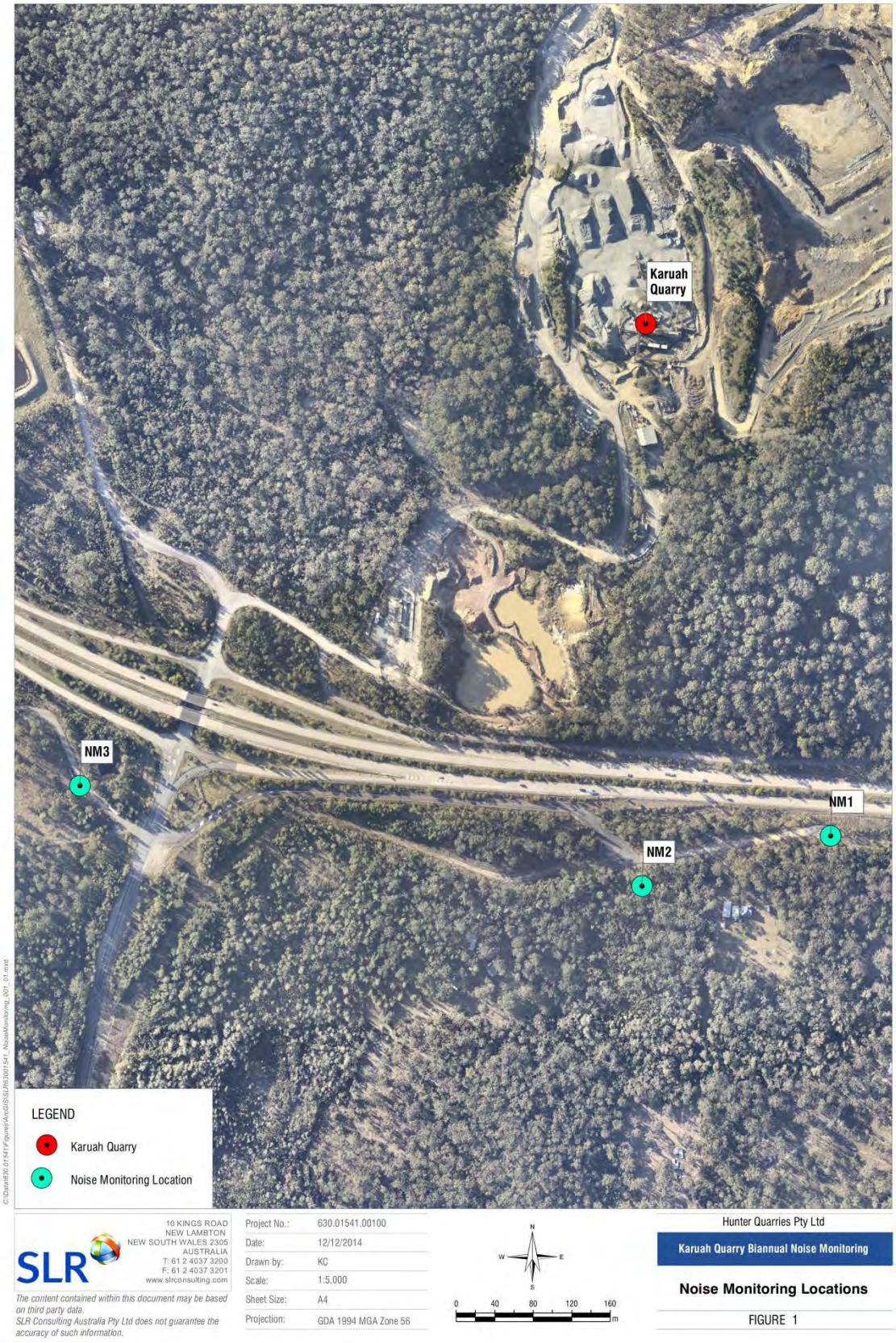
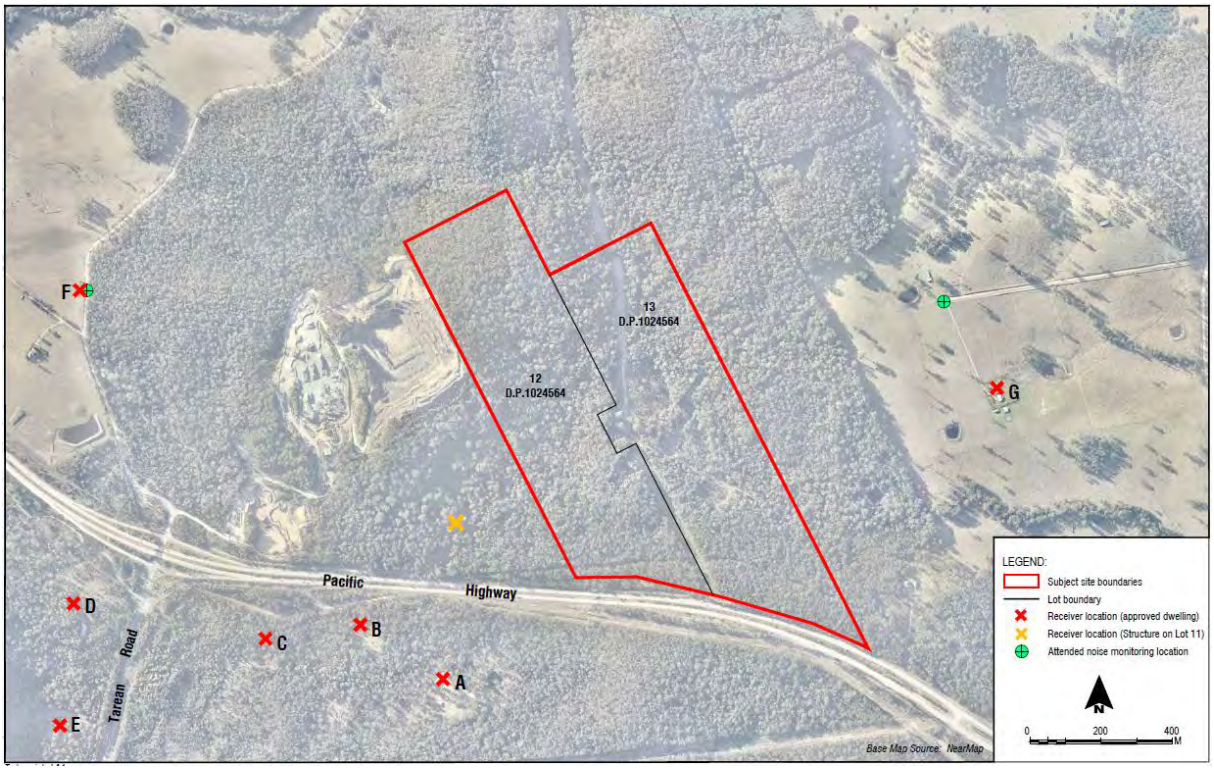


Figure 2 Location F Noise Monitoring Location



4.3 Operator-attended Noise Surveys

An operator-attended noise survey was conducted at each of the four (4) monitoring locations (refer to **Figure 1** and **Figure 2**) on 04 May 2017. The purpose of the noise surveys was to verify the unattended logging results and to determine the character and contribution of noise sources to the total ambient noise level.

The instrument used for the operator attended surveys was a Type 1 SVAN 957 sound level meter (S/N 20669).

4.4 Unattended Continuous Noise Monitoring

Environmental noise loggers were deployed at monitoring location NM1, NM2 and NM3 (refer to **Figure 1**). For each location, noise monitoring was undertaken from Thursday 04 May 2017 to Thursday 11 May 2017, inclusive. Details of the noise loggers used for the unattended continuous noise monitoring are given in **Table 4**.

The environmental noise loggers were programmed to record statistical noise level indices continuously in 15 minute intervals.

Table 4 Noise Logger and Noise Monitoring Locations

Location	Noise Logger Serial Number	Date of Logging
NM1	SVAN 20674	04/05/2017-11/05/2017
NM2	SVAN 20668	04/05/2017-11/05/2017
NM3	ARL EL-316 16-203-530	04/05/2017-11/05/2017

5 OPERATOR ATTENDED NOISE MONITORING

5.1 Results of Operator-attended Noise Monitoring

The results of the operator-attended noise surveys are presented in **Table 5**. Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds, construction activities and quarry operations. The table provides the following information:

- Monitoring location
- Date, start time, Wind velocity (m/s) and Temperature (ºC) at the measurement location; and
- Typical maximum (L_{Amax}) and contributed noise levels.

Quarry contributions listed in the tables are from Karuah Quarry and are stated only when a contribution could be quantified.

Table 5 Operator Attended Noise Survey Results

Location	Date/Start Time/ Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LAmax	LA1	LA10	LA90	LAeq	
NM1 Lot 3 DP785172 Northern Boundary	04/05/2017 15:34 pm Wind: Calm Temp 19ºC	76	73	69	59	66	Pacific Highway ~ 67 -74 Insects ~30 -35 Birdsong ~ 35- 40 Aircraft ~ 54 Quarry inaudible
		Contribution not measurable above background noise.					
NM2 Lot 2 DP 785172 Northern Boundary	04/05/2017 15:01 pm Wind: Calm Temp 20ºC	71	68	64	56	61	Pacific Highway ~ 55 – 71 Insects ~ 35 - 40 Birdsong ~40 Reversing Alarm audible from construction works 45 – 50 Quarry inaudible
		Contribution not measurable above background noise.					
NM3 Lot 22 DP 1024341 Northern Boundary	04/05/2017 14:28 pm Wind: Calm Temp 20ºC	73	69	63	57	61	Pacific Highway ~ 58-73 Birdsong to 45 Construction audible 58 – 63 Quarry inaudible
		Contribution not measurable above background noise					
Location F 1714 Branch Lane, Karuah	04/05/2017 12:59 pm Wind: Clam Temp 19ºC	79	65	50	44	54	Local road traffic 75 - 79 Pacific Highway 43 to 53 Construction 42- 46 Quarry audible in lulls Dumping to 45
		Contribution of Karuah Quarry Operations ~ L_{Aeq} <30 dBA					

5.2 Operator-attended Noise Monitoring Summary

Noise generated by traffic on the Pacific Highway and insect noise dominated ambient noise levels at noise monitoring locations NM1, NM2 and NM3. Noise generated by traffic on the Pacific Highway and Branch Lane dominated ambient noise levels at noise monitoring location F.

The quarry was inaudible and unmeasurable at NM1, NM2 and NM3 monitoring locations due to high ambient noise levels from traffic and nearby construction. Quarry operations were audible at monitoring Location F during lulls in ambient noise levels.

Results of the operational compliance assessment are given in **Table 6**.

Table 6 Compliance Noise Assessment – Operations

Location	Estimated Karuah $L_{Aeq(15minute)}$ Contribution	Consent Conditions $L_{Aeq(15minute)}$	Compliance
	Day	Day	Day
NM1	Inaudible at all times	48	Yes
NM2	Inaudible at all times	48	Yes
NM3	Inaudible at all times	48	Yes
Location F	<30 dBA	48	Yes

Results presented in **Table 6** indicate that compliance with the relevant consent conditions was achieved at all noise monitoring locations.

6 UNATTENDED CONTINUOUS NOISE MONITORING

6.1 Results of Unattended Continuous Monitoring

The unattended ambient noise logger data from monitoring location NM1, NM2 and NM3 are presented graphically on a daily basis and are attached as **Appendix B**, **Appendix C** and **Appendix D**. A summary of the results of the unattended continuous noise monitoring is given in **Table 7**. The ambient noise level data quantifies the overall noise level at a given location independent of its source or character.

The measured ambient noise levels were divided into three periods representing day, evening and night as designated in the INP. The INP time classifications differ slightly from the conditions of consent in that the INP daytime includes weekends; Saturday 7:00 am to 6:00 pm as well as Sunday 8:00 am to 6:00 pm, whereas the allowable operating conditions include only Saturday 7:00 am to 1:00 pm. The evening time classifications are the same and where the conditions of consent refer to all other times, the INP nominates this as “night”.

Precautions can be taken to minimise influences from extraneous noise sources (eg optimum placement of the loggers away from creeks, trees, houses, etc), however, not all these sources or their effects can be eliminated. This is particularly the case during the warmer times of year when noise from insects, frogs, birds and other animals can become quite prevalent.

Weather data was obtained from the Bureau of Meteorology automatic weather station located at Williamtown Airport approximately 22 km south west of the monitoring locations. Unattended noise data corresponding with periods of rainfall and/or wind speeds in excess of 5 m/s (approximately 18km/hr) were discarded in accordance with INP data exclusion methodology.

Table 7 Unattended Continuous Monitoring Ambient Noise Levels

INP Period	LA1	LA10	LA90	LAeq
NM1				
Daytime during Operational Hours[1]	73	69	57	66
Daytime outside Operational Hours[2]	74	70	57	66
Evening[3]	75	70	52	66
Night[4]	75	68	40	64
NM2				
Daytime during Operational Hours[1]	68	63	52	61
Daytime outside Operational Hours[2]	69	64	52	62
Evening[3]	69	64	47	60
Night[4]	69	63	37	58
NM3				
Daytime during Operational Hours[1]	64	61	52	58
Daytime outside Operational Hours[2]	64	61	51	59
Evening[3]	66	63	49	60
Night[4]	66	62	40	58

Note:
1. Daytime - 7.00 am to 5.00 pm Monday to Friday, 8.00 am to 12.00 pm Saturday, not operational on Sunday
2. Daytime - 5.00 pm to 6.00 pm Monday to Friday, 12.00 pm to 6.00 pm Saturday, 8.00 am to 6.00 pm Sunday
3. Evening - 6.00 pm 10.00 pm
4. Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

6.2 Unattended Continuous Monitoring Summary

Ambient noise levels during the daytime period at monitoring locations NM1, NM2 and NM3 outside the quarry's operational hours are consistent with those during operational hours. This indicates that the quarry is not the dominant contributor to ambient noise levels during the daytime. The main contributors to ambient noise levels at all monitoring locations are considered to be traffic along the Pacific Highway and natural sources such as birds and insects.

7 CONCLUSION

SLR was engaged by Hunter Quarries to prepare and implement a noise monitoring program for the Karuah Quarry in accordance with the Conditions of Consent for the operation. This report presents the biannual noise monitoring survey results for the period up to the end of June 2017 in accordance with the noise monitoring program.

Both operator-attended and unattended noise monitoring was conducted at the three (3) nearest residences to determine noise levels produced by Karuah Quarry operations. An additional operator-attended noise survey was conducted at Location F as requested by NSW DP&E.

The noise contribution of Karuah Quarry operations remained significantly lower than that from road traffic on the Pacific Highway during all operator-attended noise surveys. The noise compliance results presented in **Table 6** indicates that compliance with the relevant consent conditions was achieved at all noise monitoring locations during all periods.

Results from the unattended ambient noise measurements conducted at three (3) noise monitoring locations also indicate that the Karuah Quarry is not a major contributor to ambient noise levels at each of these locations.

Acoustic Terminology

1 Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that in common usage 'noise' is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB Linear or dBZ.

3 Sound Power Level

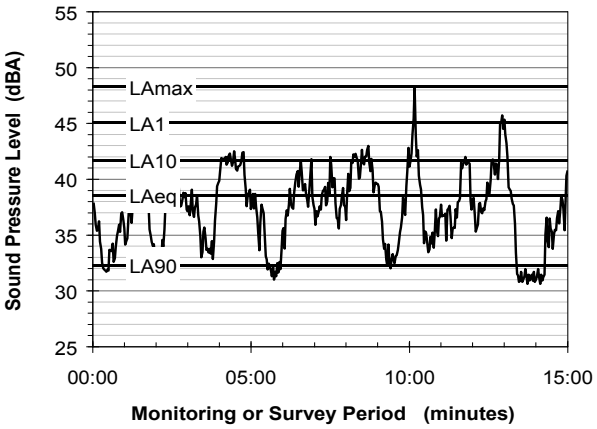
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or L_W, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the 'repeatable minimum' L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or 'average' levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than 'broad band' noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

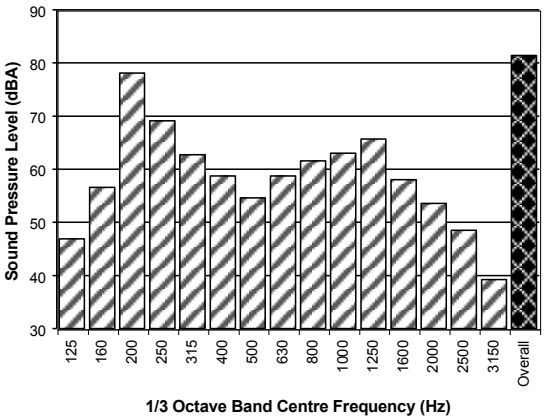
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

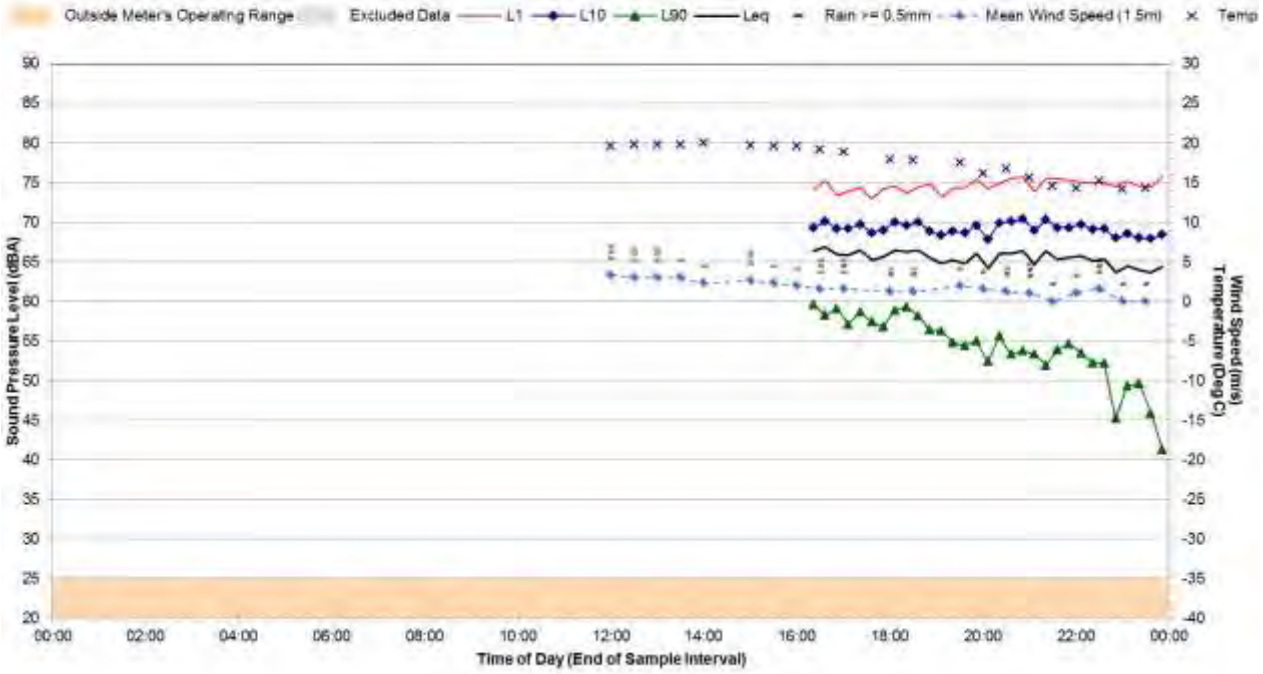
- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.

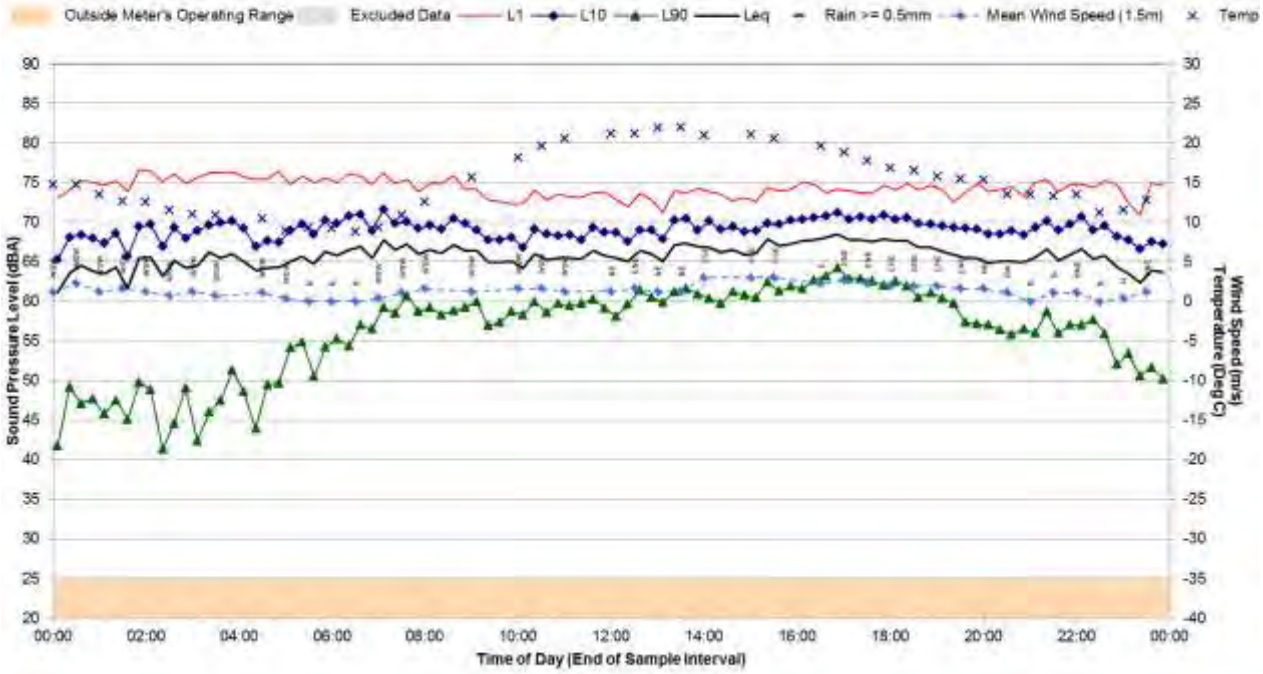


NM1 Continuous Statistical Ambient Noise Monitoring Results

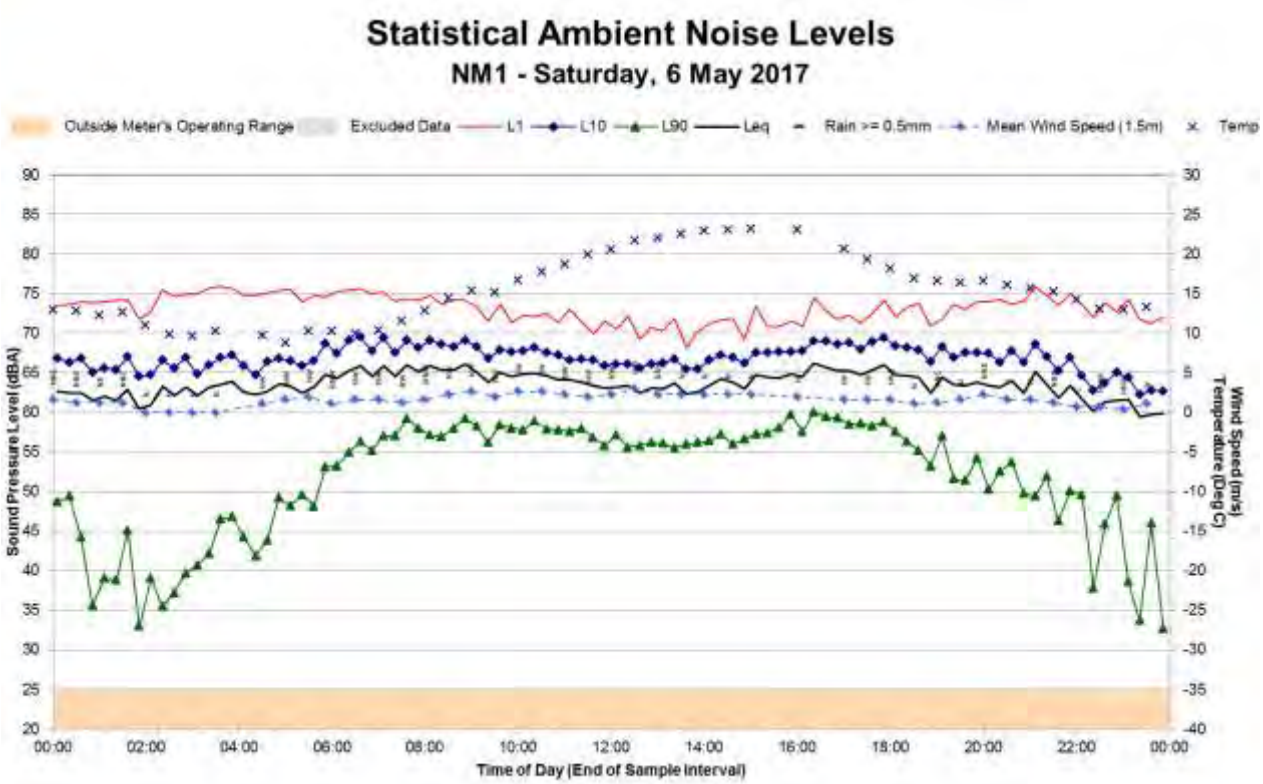
Statistical Ambient Noise Levels
NM1 - Thursday, 4 May 2017

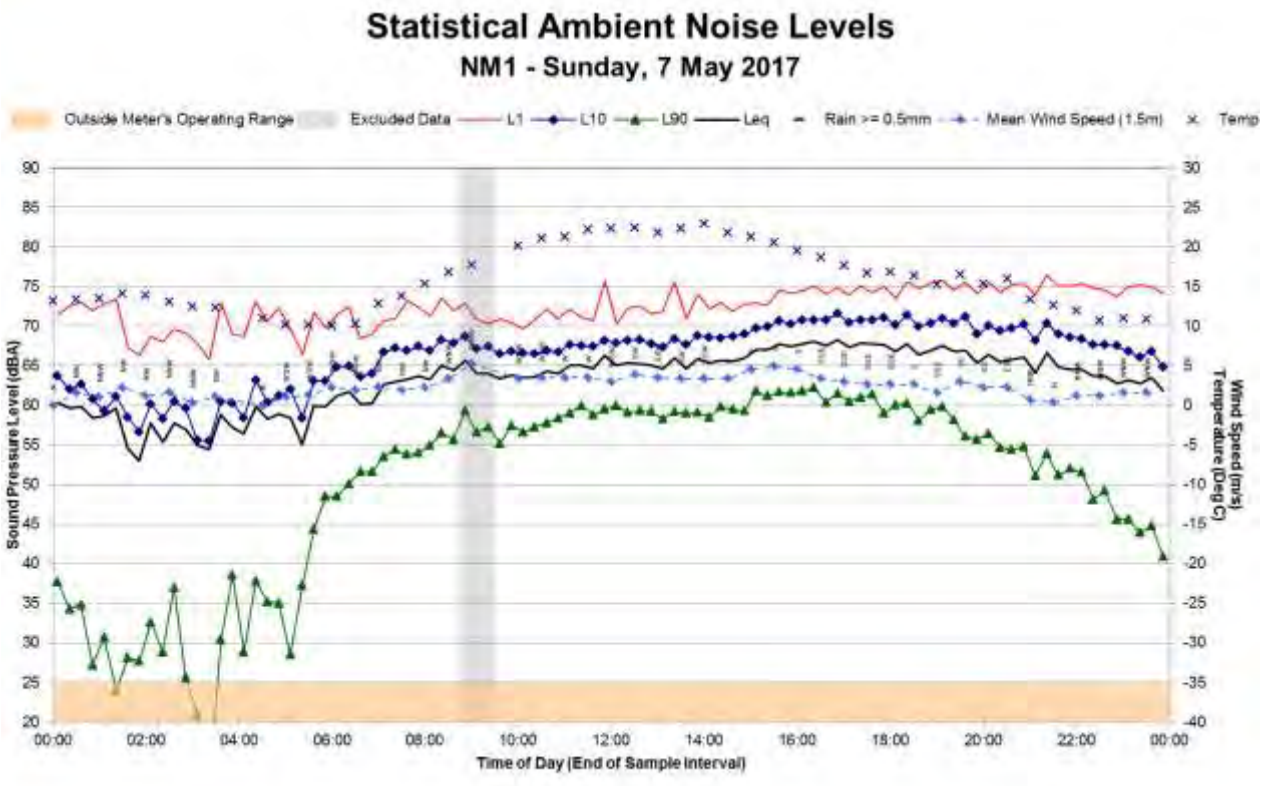


Statistical Ambient Noise Levels
NM1 - Friday, 5 May 2017

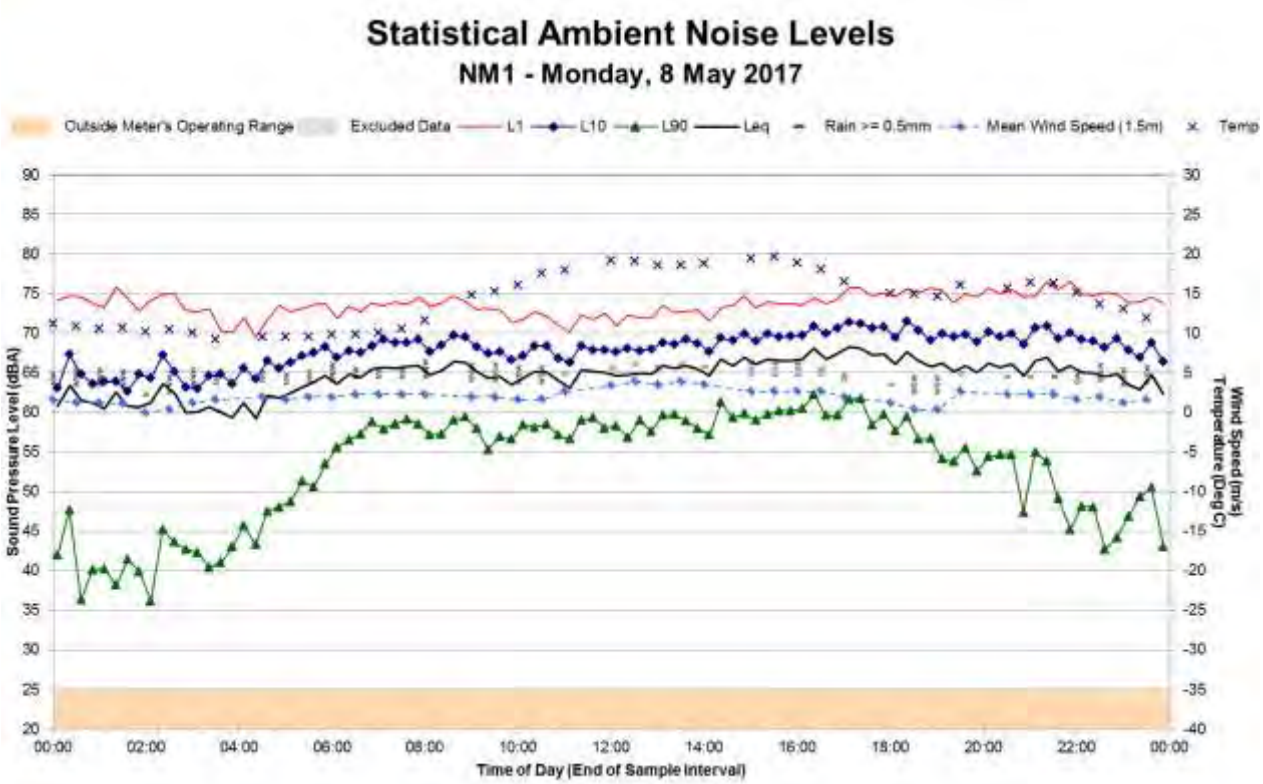


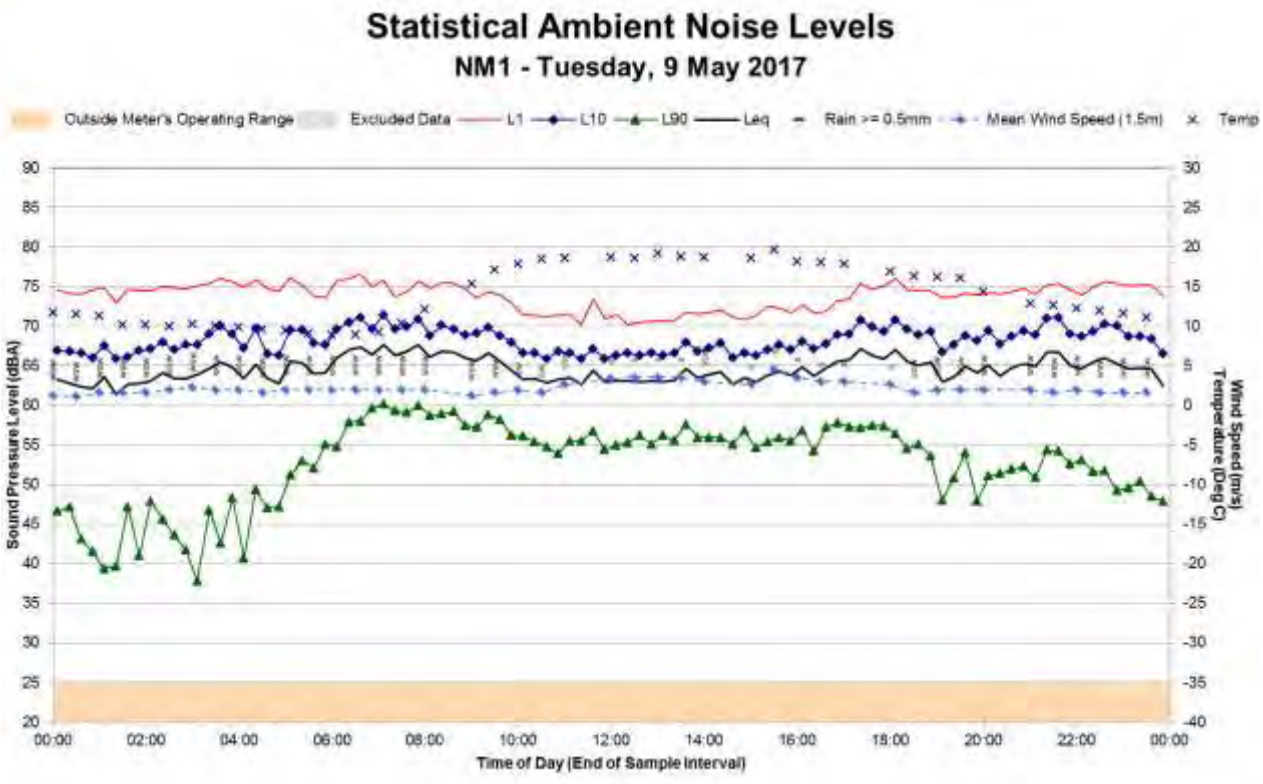
NM1 Continuous Statistical Ambient Noise Monitoring Results





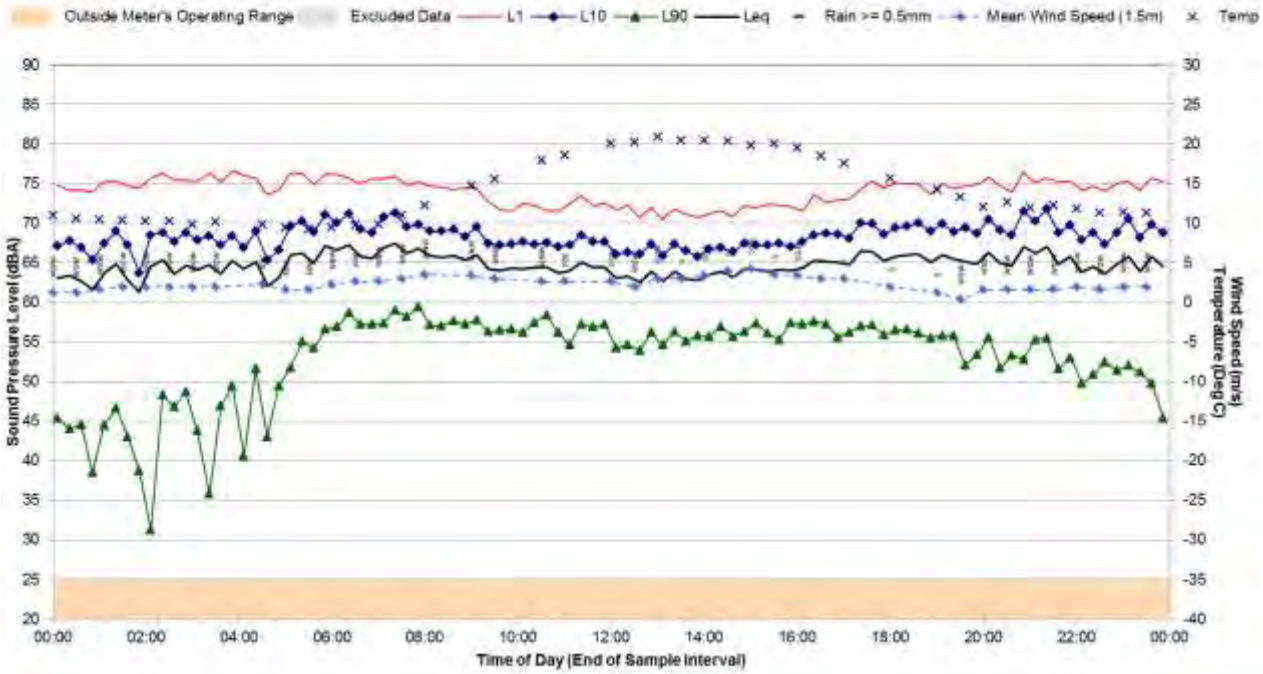
NM1 Continuous Statistical Ambient Noise Monitoring Results



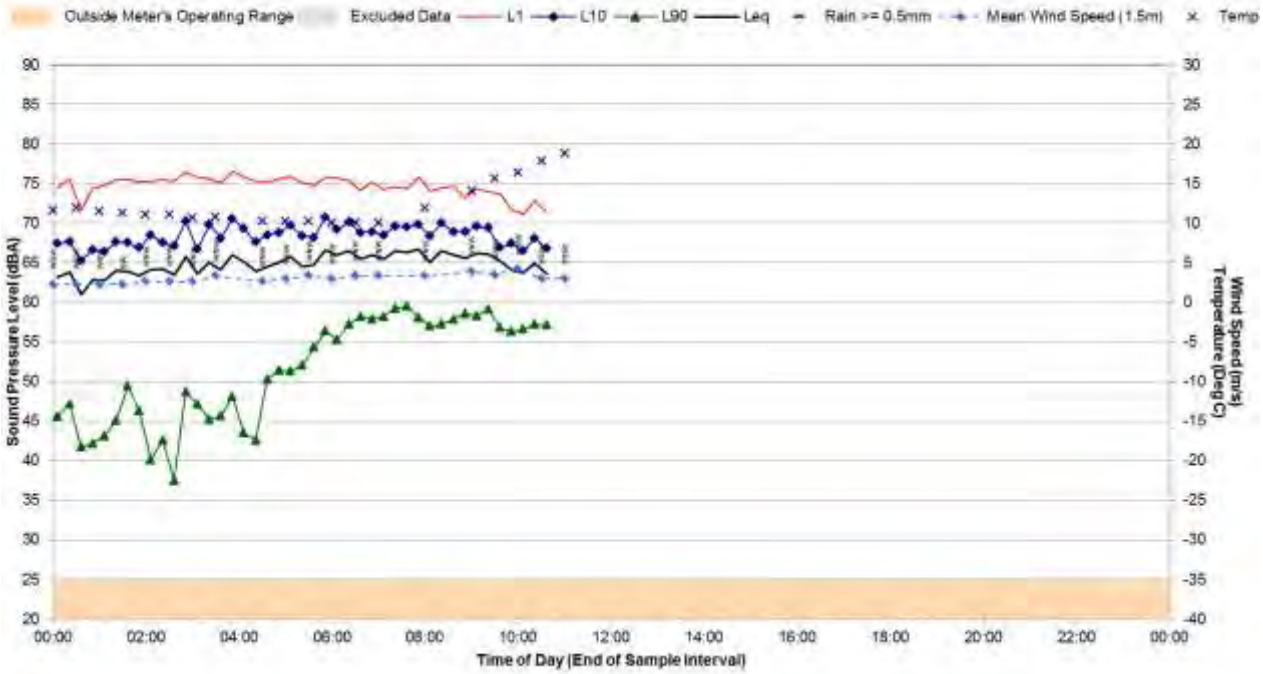


NM1 Continuous Statistical Ambient Noise Monitoring Results

Statistical Ambient Noise Levels
NM1 - Wednesday, 10 May 2017



Statistical Ambient Noise Levels
NM1 - Thursday, 11 May 2017



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Statistical Ambient Noise Levels
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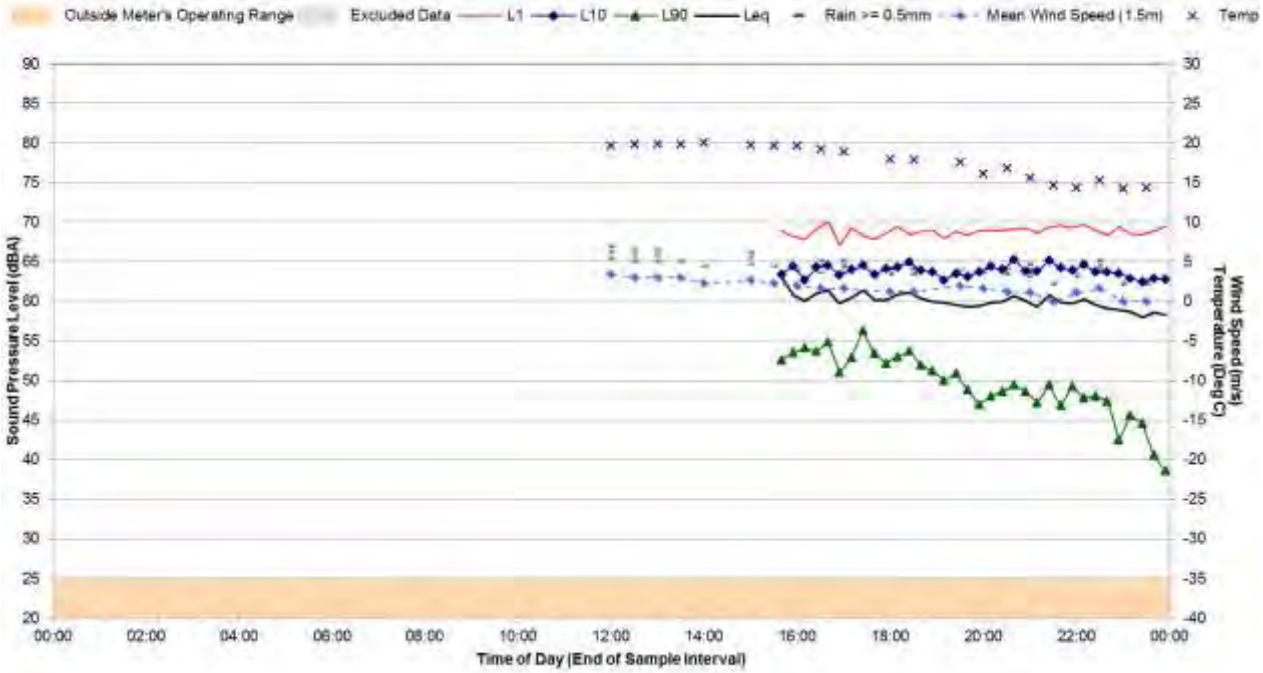

Statistical Ambient Noise Levels
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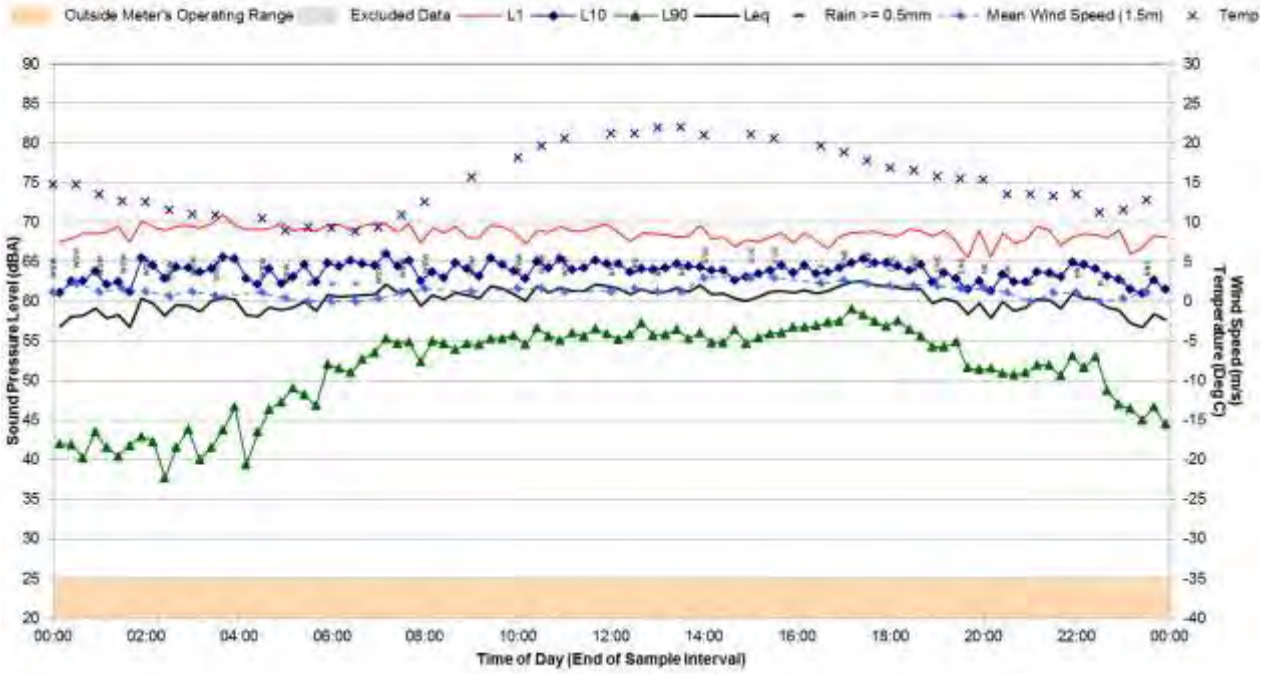
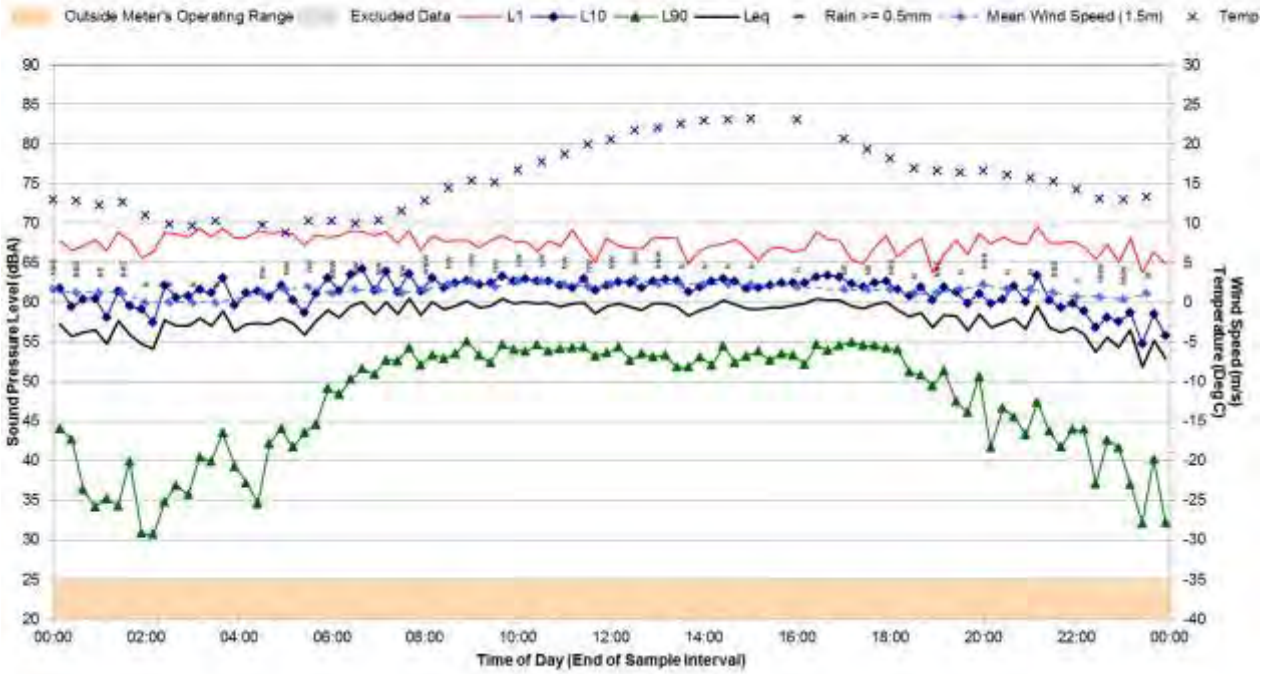
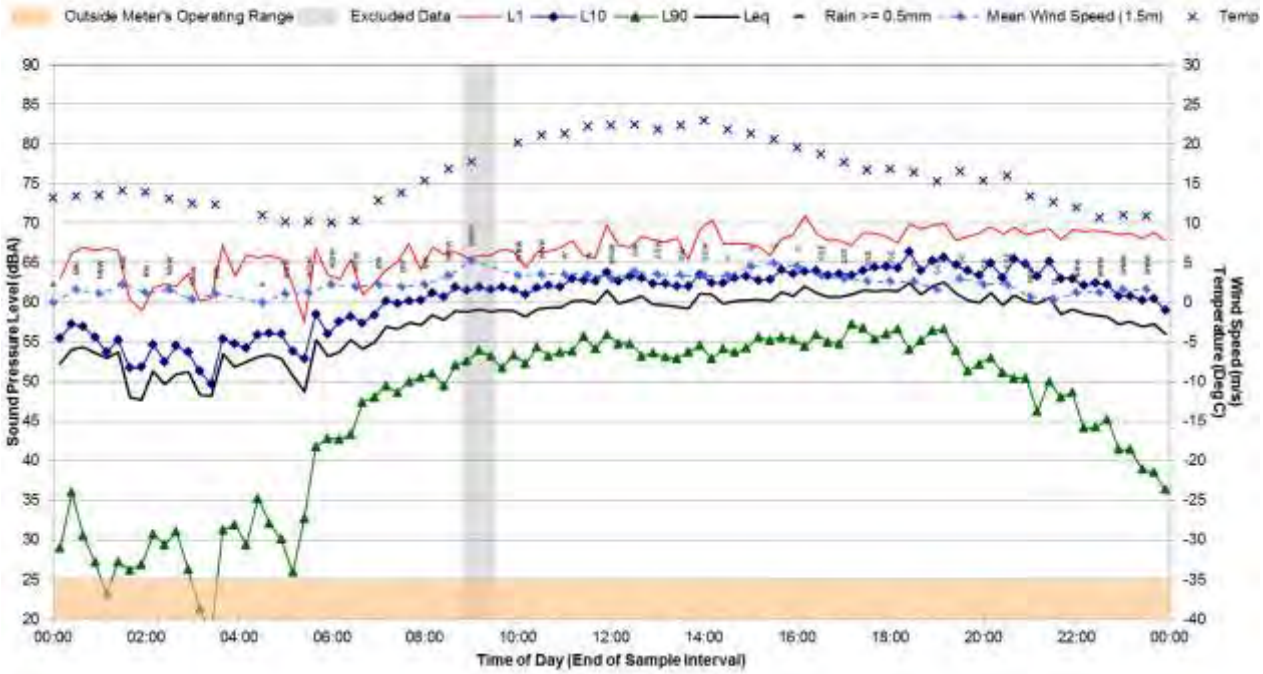


NM2 Continuous Statistical Ambient Noise Monitoring Results

Statistical Ambient Noise Levels
NM2 - Saturday, 6 May 2017

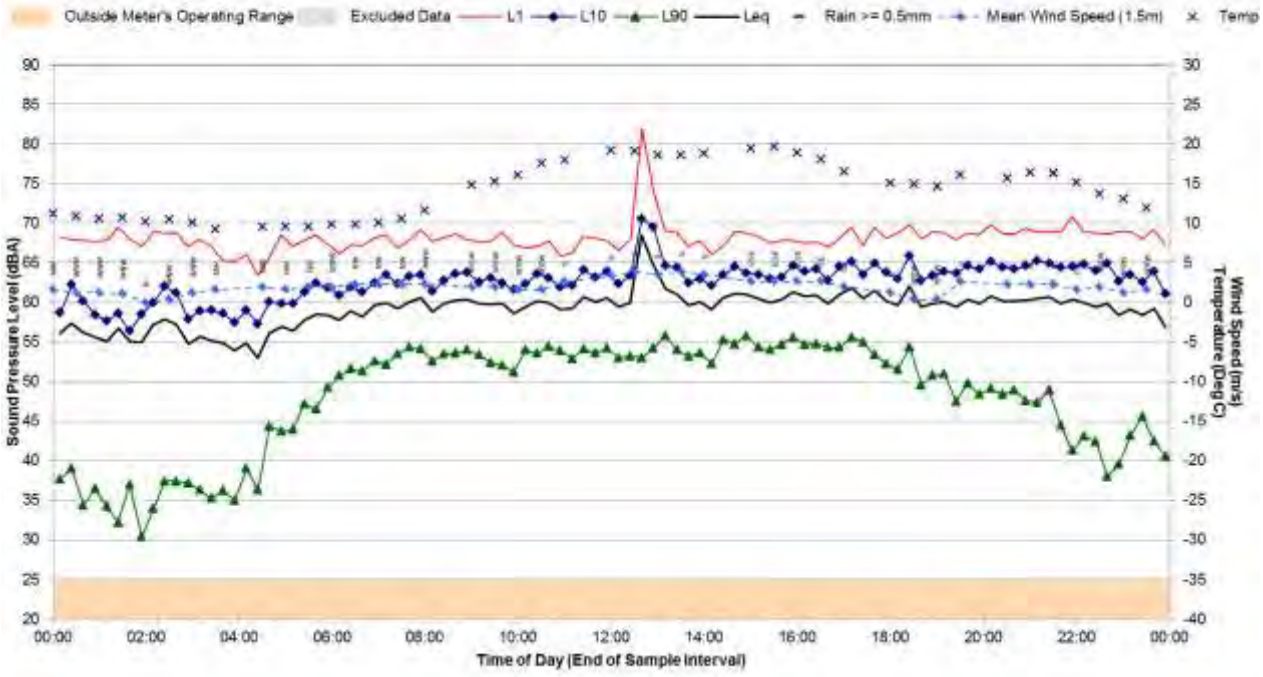


Statistical Ambient Noise Levels
NM2 - Sunday, 7 May 2017

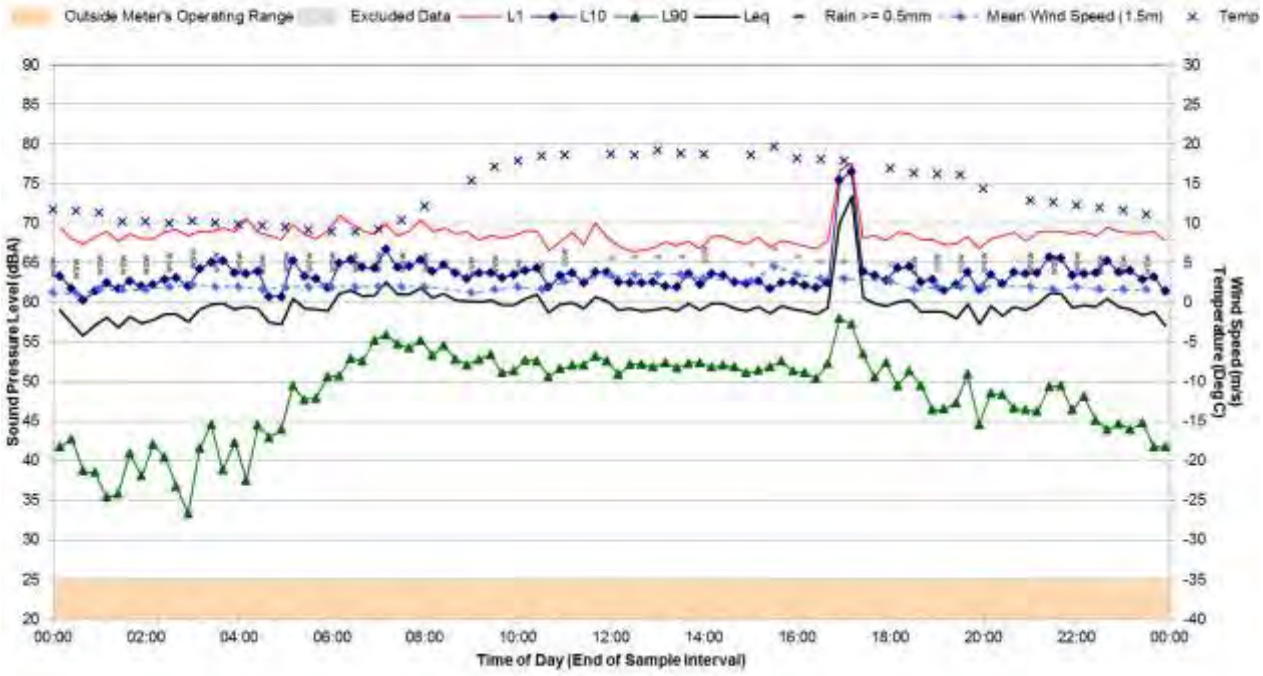


NM2 Continuous Statistical Ambient Noise Monitoring Results

Statistical Ambient Noise Levels
NM2 - Monday, 8 May 2017



Statistical Ambient Noise Levels
NM2 - Tuesday, 9 May 2017



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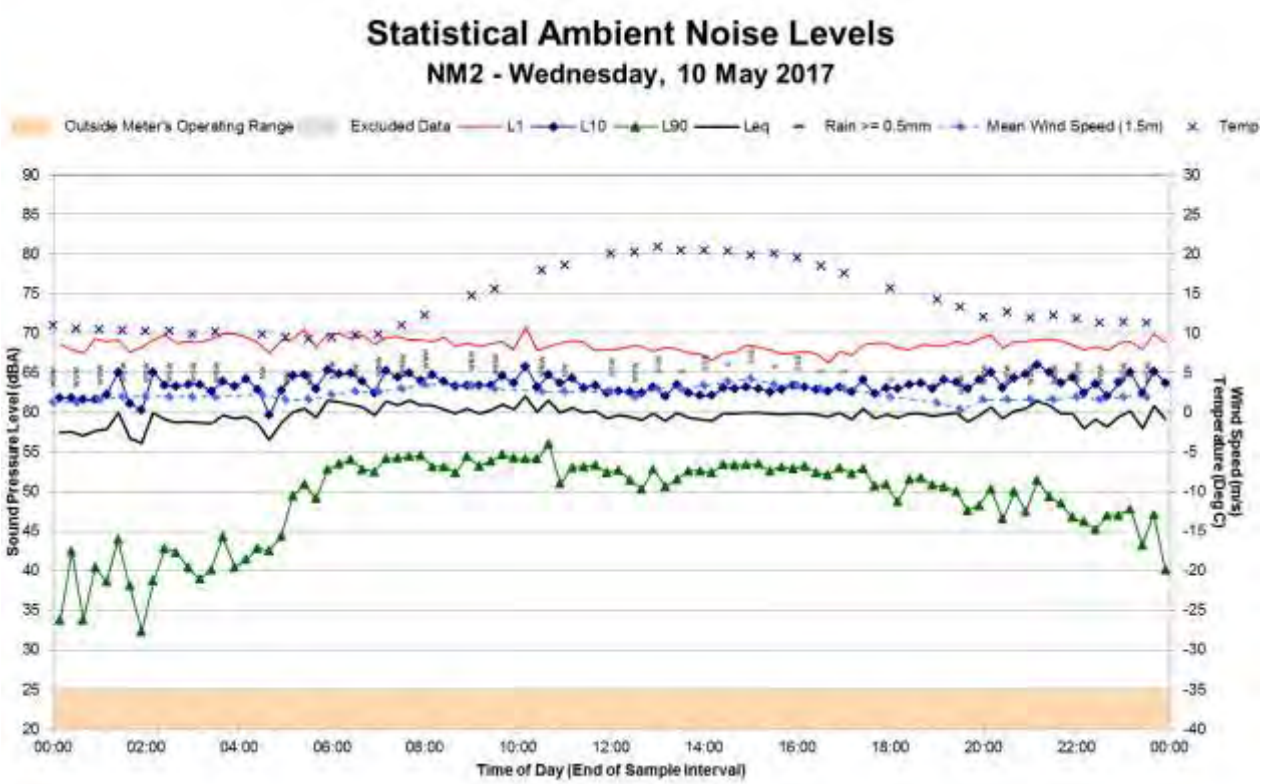

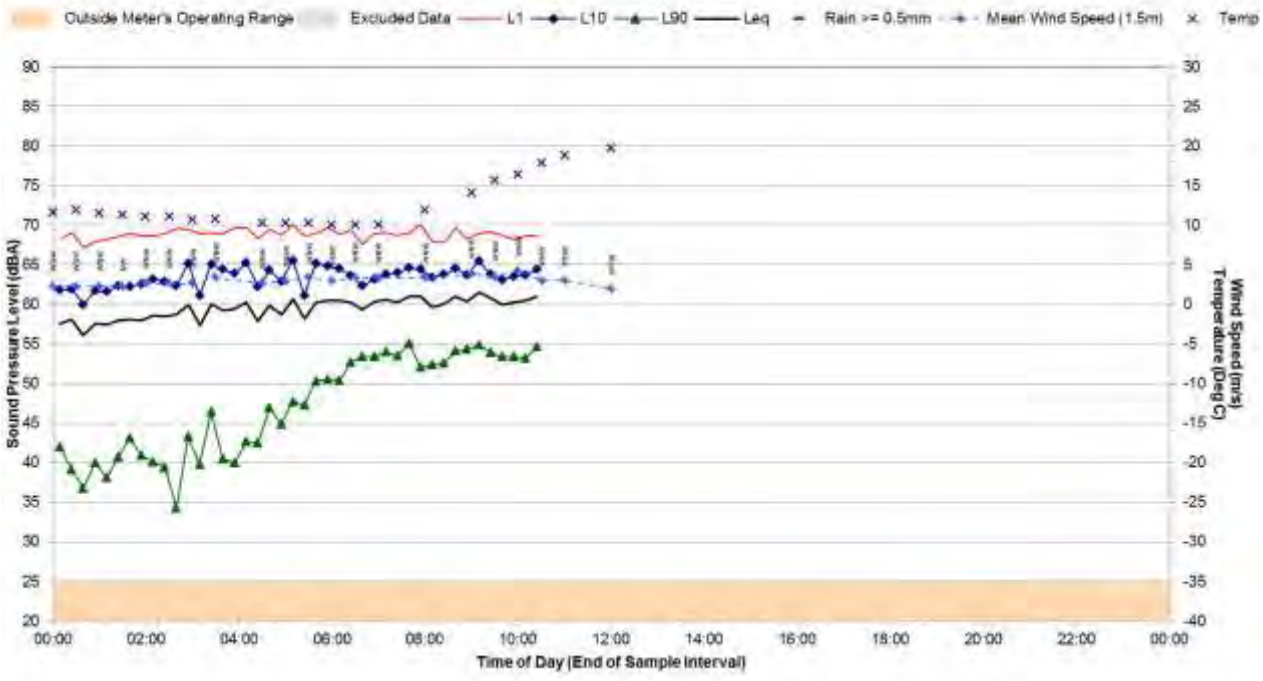

NM3 Continuous Statistical Ambient Noise Monitoring Results

Statistical Ambient Noise Levels
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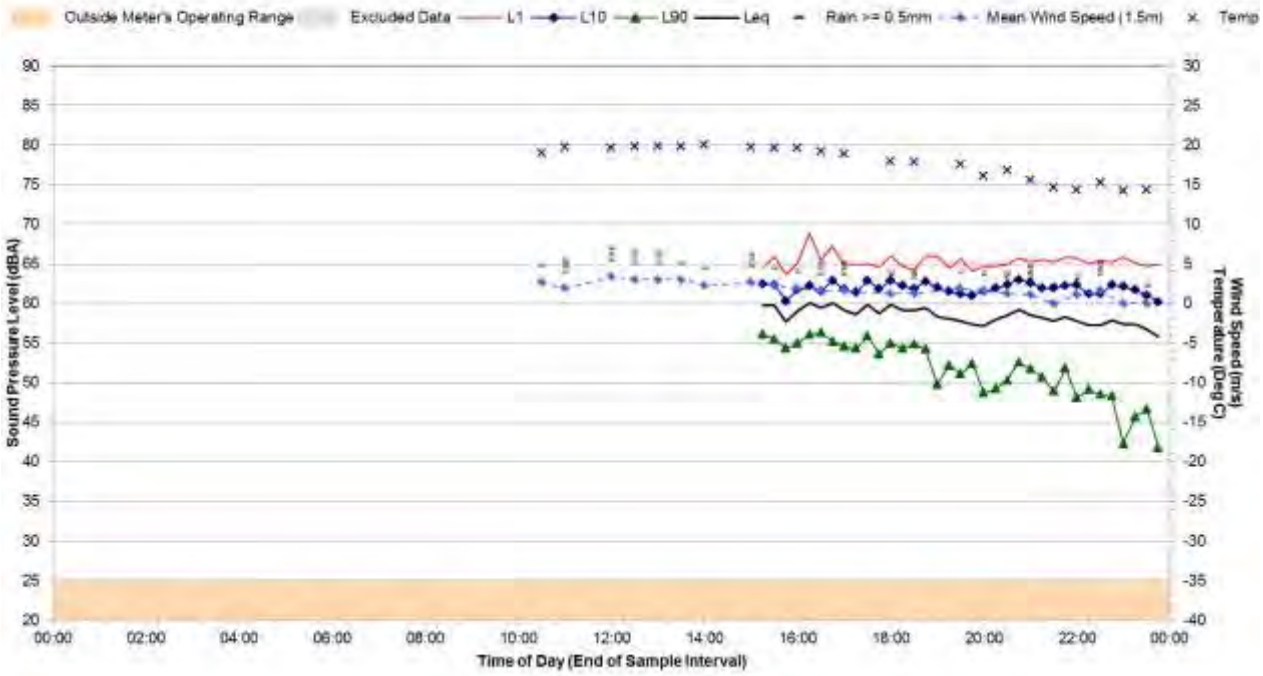

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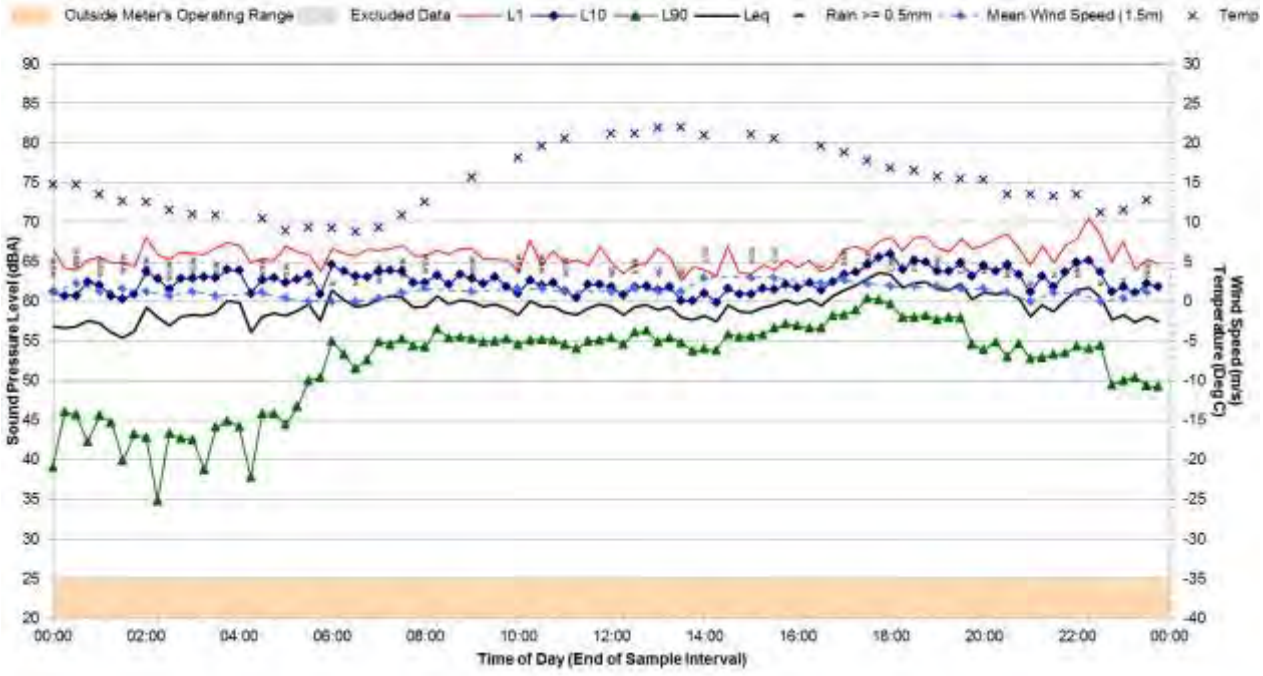
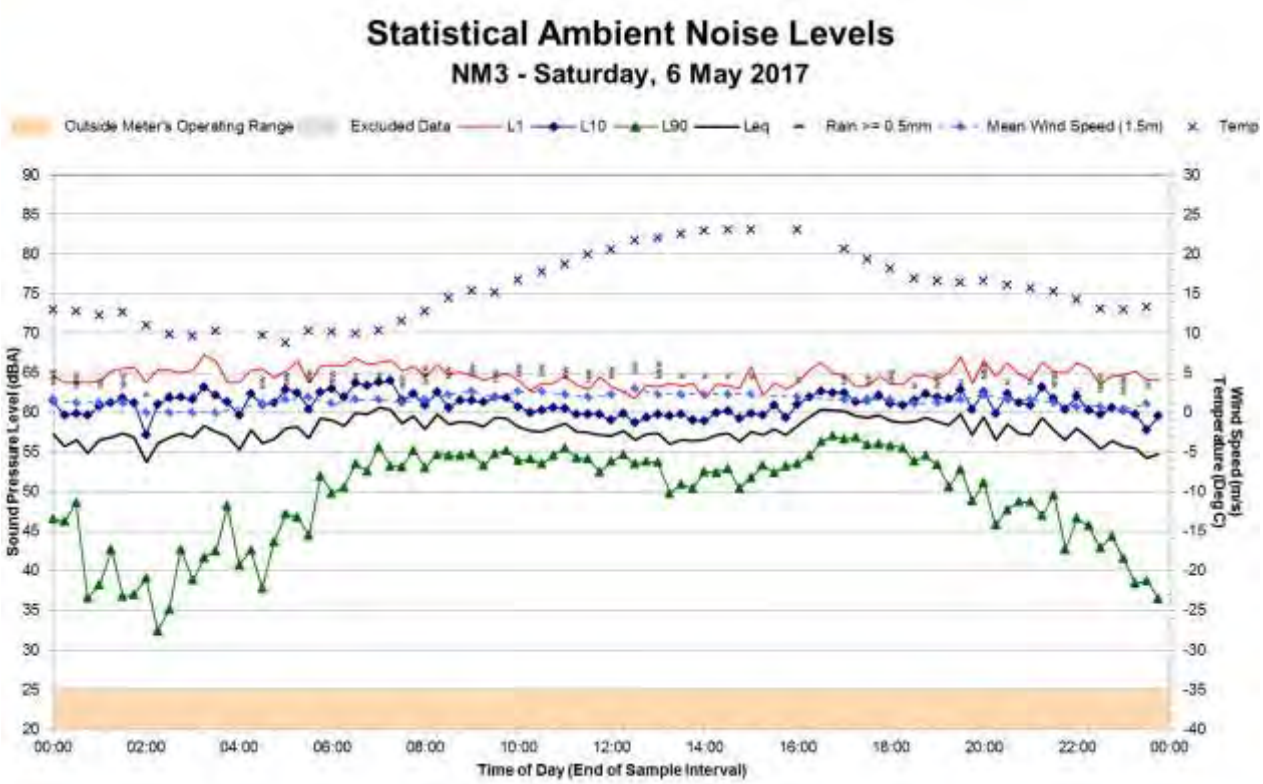
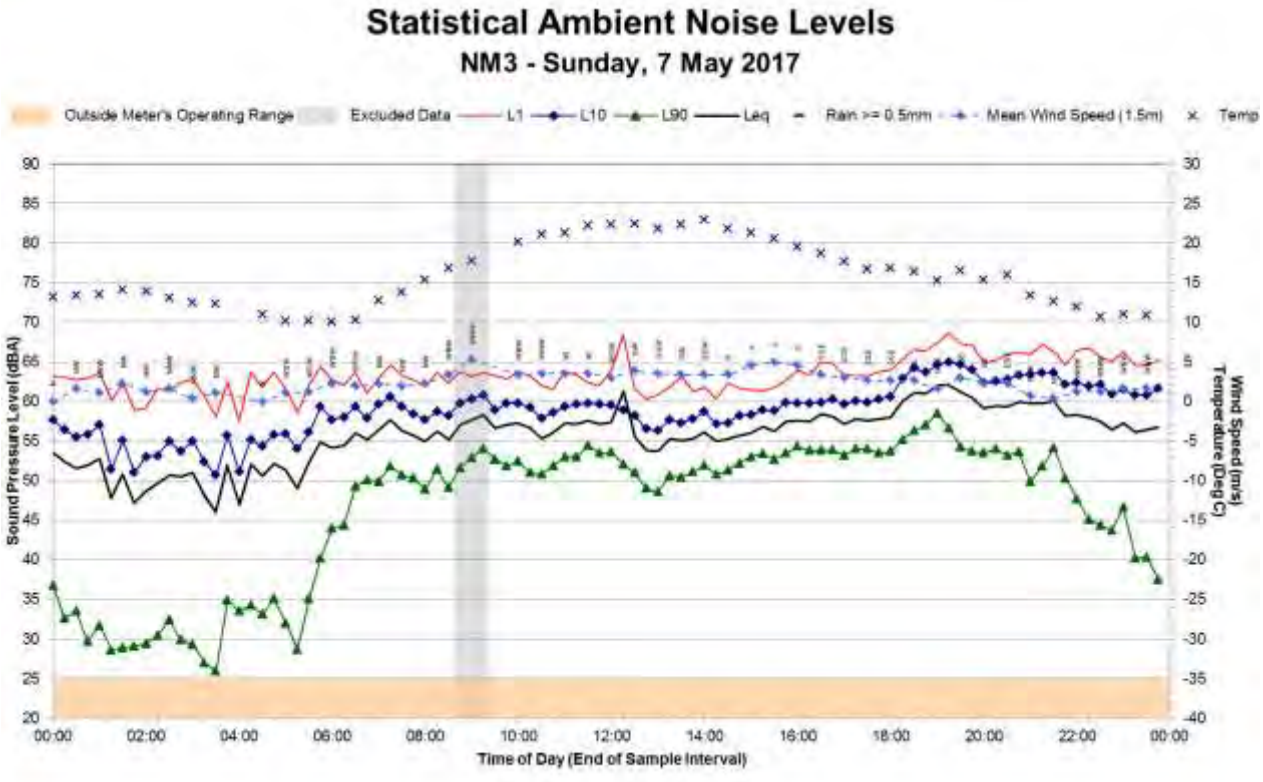
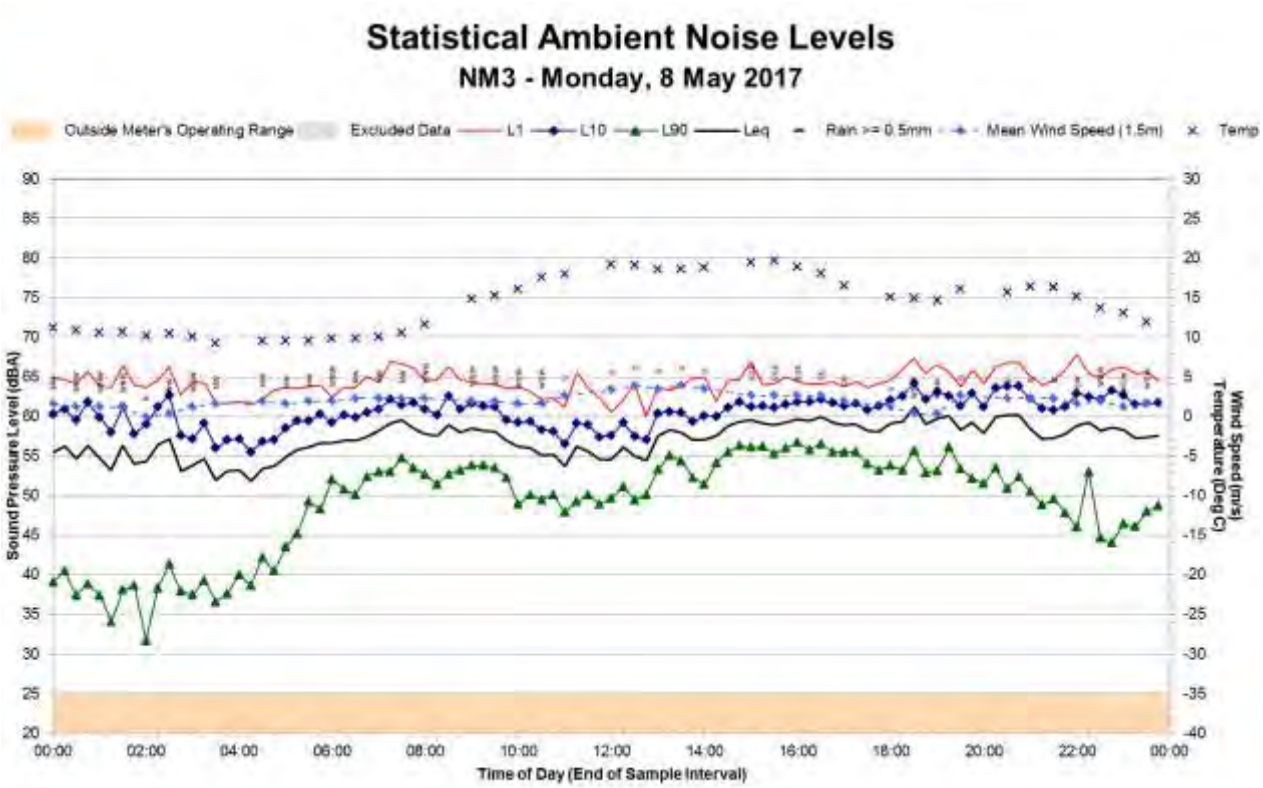
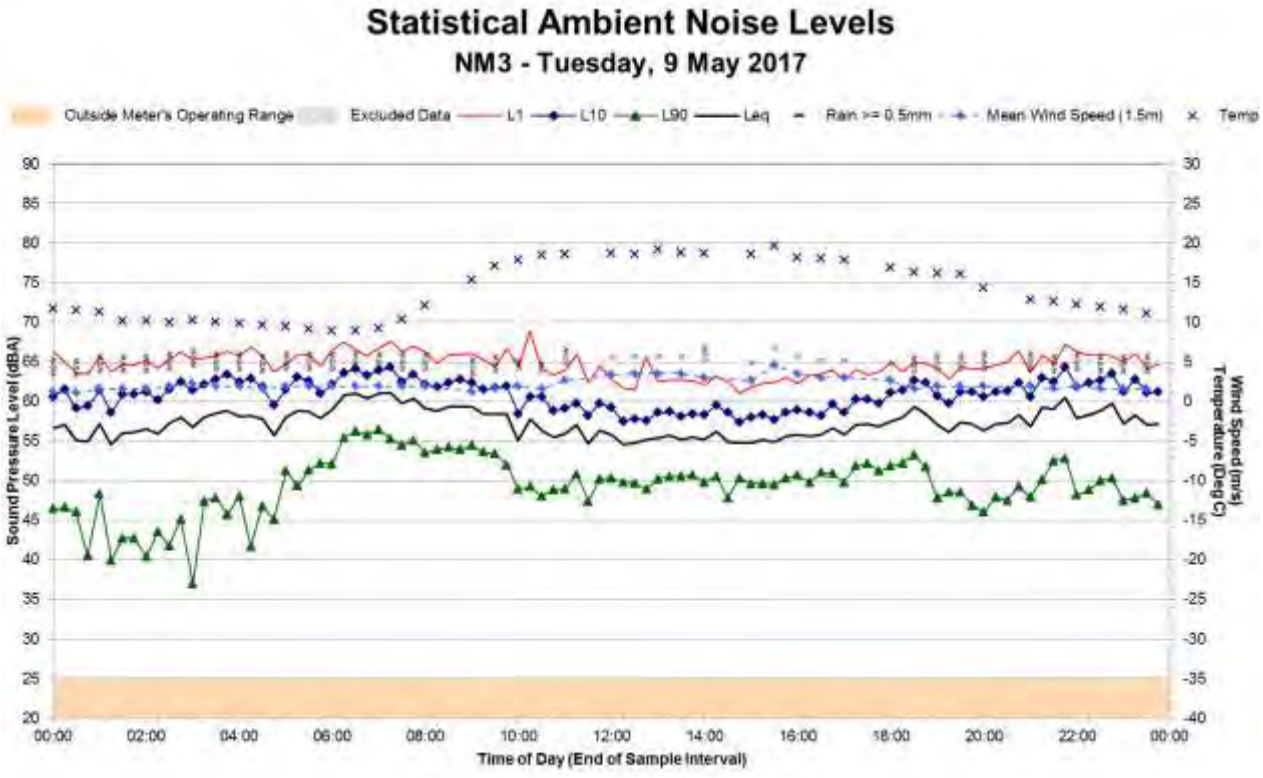
NM3 - Friday, 5 May 2017

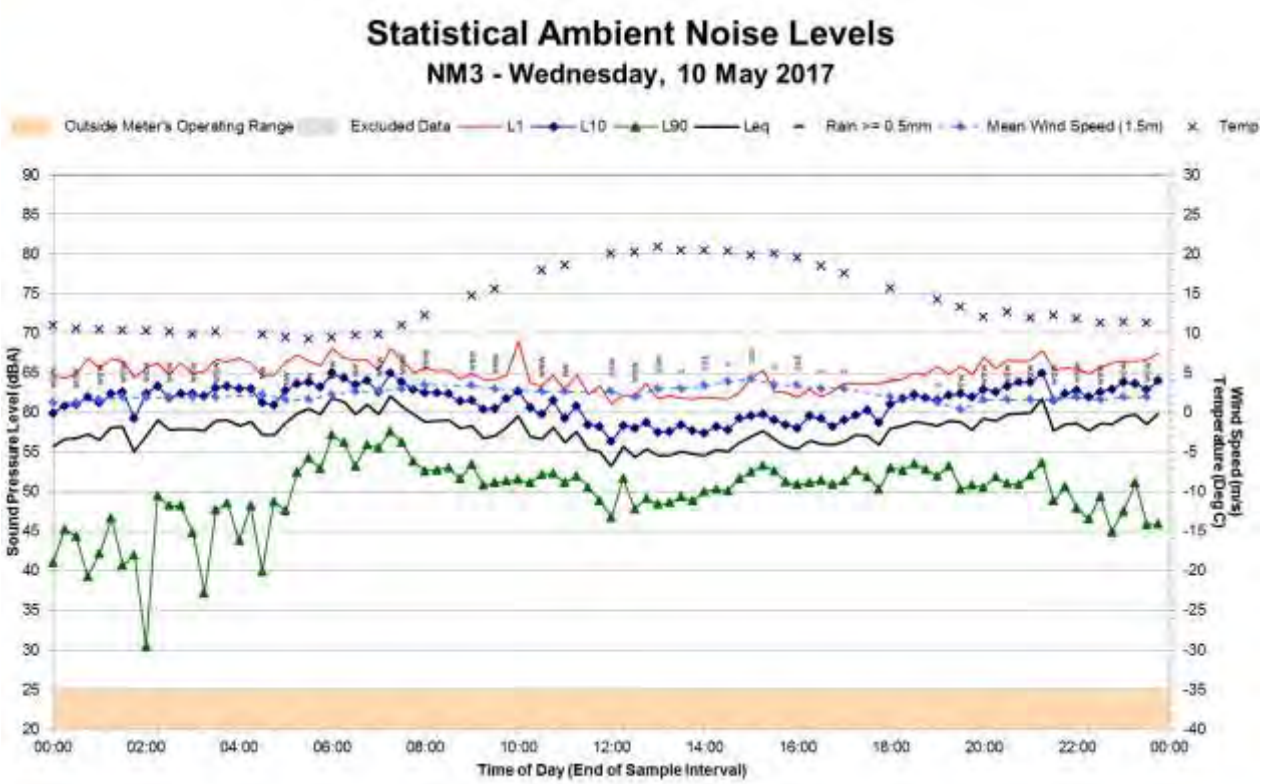


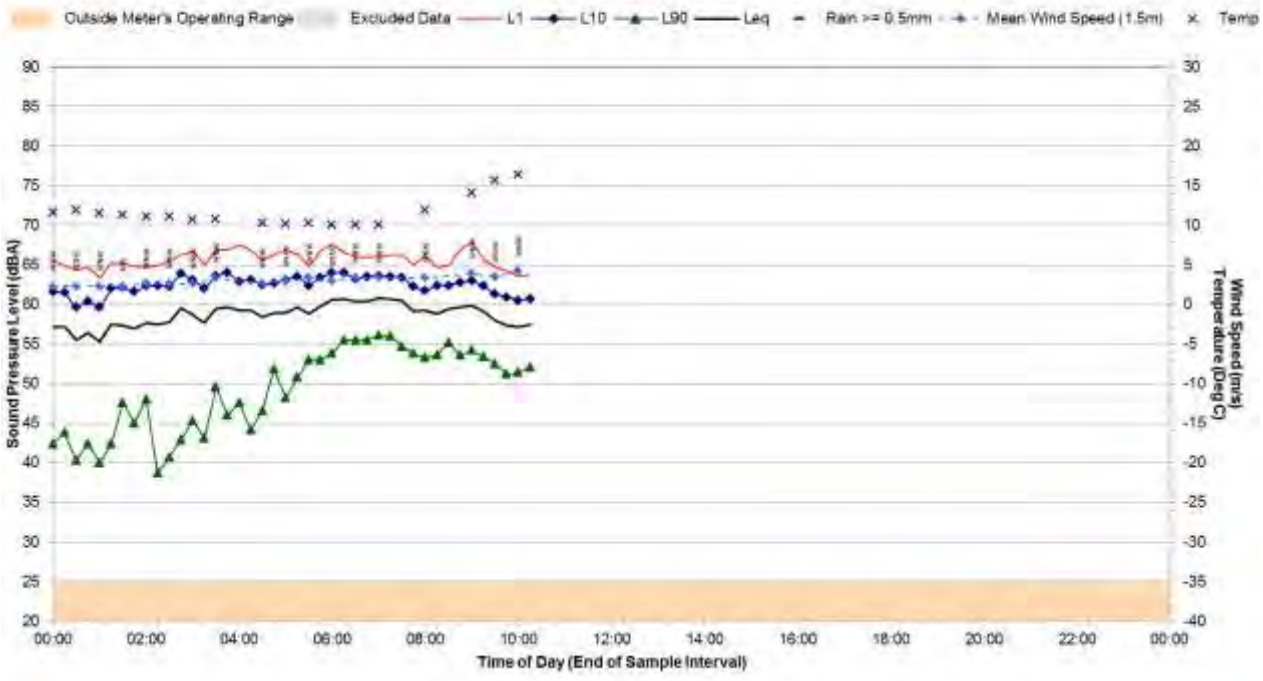

Statistical Ambient Noise Levels
NM3 - Saturday, 6 May 2017
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
NM3 - Sunday, 7 May 2017
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
NM3 - Monday, 8 May 2017
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
NM3 - Tuesday, 9 May 2017
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
NM3 - Wednesday, 10 May 2017
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
NM3 - Thursday, 11 May 2017
Outside Meter's Operating Range
Excluded Data
L1
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Temp
Sound Pressure Level (dBA)
Wind Speed (m/s)
Temperature (Deg C)
Time of Day (End of Sample Interval)

global environmental solutions

Karuah Quarry

Biannual Noise Monitoring Assessment

December 2017

Report Number 630.01541-R23

8 March 2018

Hunter Quarries Pty Ltd

PO Box 3284

THORNTON NSW 2322

Version: -v1.0

Karuah Quarry

Biannual Noise Monitoring Assessment

December 2017

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1 INTRODUCTION

Hunter Quarries Pty Ltd (Hunter Quarries) has operated a hard rock quarry approximately four (4) kilometres north of Karuah since 1997. In October 2004, Hunter Quarries applied to the Department of Planning and Infrastructure (DP&I) for approval to expand the quarry. The Minister for Planning granted development consent on 3 June 2005 (DA 265-10-2004).

Hunter Quarries has commissioned SLR Consulting Australia Pty Ltd (SLR) to prepare and implement a noise monitoring program for the Karuah Quarry in accordance with the conditions of consent specified by DP&I.

The noise monitoring program requires biannual noise monitoring surveys. This report presents the results of the noise monitoring survey for the period up to December 2017.

The objectives of the noise monitoring survey for this operating period were as follows:

- Measure the ambient noise levels at four (4) key focus receptor locations surrounding the quarry.
- Qualify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of individual noise sources.
- Assess the noise emissions of Karuah Quarry with respect to the limits contained in the Development Consent.

1.1 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 KARUAH QUARRY DEVELOPMENT CONSENT CONDITIONS

Development Consent Section 5.4.1, Schedule 4, Condition 3 provides the following:

Within 6 months of the date of this consent, the Applicant shall prepare and implement a Noise Monitoring Program, for the development to evaluate compliance with the noise impact assessment criteria in this consent, in consultation with the DEC, and to the satisfaction of the Director-General.

Condition 1 of the Development Consent requires Hunter Quarries to ensure noise generated by the development does not exceed criteria outlined in **Table 1** at any residence, or any noise sensitive receptor on privately owned land.

Table 1 Development Consent Noise Impact Criteria – Karuah Quarry

Time Period	Noise Limit (dBA) - $L_{Aeq(15minute)}$
Day 7:00am to 6:00pm Monday to Friday 7:00am to 1:00pm Saturday	48
Evening 6:00pm to 10:00pm Monday to Friday	47
At All Other Times	46

3 EQUIPMENT OPERATION

Hours of operation of the Karuah Quarry are from 7:00 am to 5:00 pm Monday to Friday and 7:00 am to 12:00 pm Saturday.

Equipment operating hours for Karuah Quarry during the noise monitoring period are presented in **Table 2**.

Table 2 Karuah Quarry Equipment Operation

Equipment Description	Weekday Operation, Monday – Friday (7:00 am – 5:00 pm)	Weekend Operation, Saturday (7:00 am – 12:00 pm)
Front End loader – Komatsu WA 470	✓	✓
Front End loader – CAT 980G	✓	✓
Excavator	✓	✓
Jaw Crusher	✓	✓
Primary Screen	✓	✓
Secondary Crusher/Screen	✓	✓
Dump Trucks	✓	✓

4 NOISE MONITORING METHODOLOGY

4.1 General Requirements

The operational noise monitoring programme was conducted with reference to Development Consent DA 265-10-2004, AS 1055-1997 "*Acoustics - Description and Measurement of Environmental Noise*" and the NSW Industrial Noise Policy (INP).

All acoustic instrumentation employed throughout the monitoring programme has been designed to comply with the requirements of AS IEC 61672 (parts 1 and 2) 2004 *Electroacoustics - Sound Level Meters* and carries current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

4.2 Monitoring Locations

The Karuah Quarry is located just north of Karuah adjacent to the Pacific Highway. The Pacific Highway is situated between residences and Karuah Quarry.

Operator-attended and unattended continuous noise monitoring was conducted at the three (3) nearest residences to the Karuah Quarry as presented in **Table 3** and shown in **Figure 1**.

Table 3 Residential monitoring locations

Noise Monitoring Location	Property Name	Distance from Karuah Quarry
NM1	Lot 3 DP785172 5772 Pacific Hwy, Karuah	317 metres South of the Karuah Quarry
NM2	Lot 2 DP 785172 5760 Pacific Hwy, Karuah	200 metres South of the Karuah Quarry
NM3	Lot 22 DP 1024341	370 metres South-West of the Karuah Quarry

4.2.1 Additional Noise Monitoring Location

Noise monitoring was also undertaken at 1714 Branch Lane, Karuah (Location F) in response to the following comment from the NSW Department of Planning and Environment (DP&E) on the 2015 Annual Review:

> *Further, please undertake noise monitoring to confirm compliance with Condition 1, Schedule 3, which requires that the noise generated by the development does not exceed criteria at any residence on privately owned land, including the residence at 1714 Branch Lane, Karuah.*

The Location F noise monitoring location is provided in **Figure 2**.

Figure 1 Noise Monitoring Locations

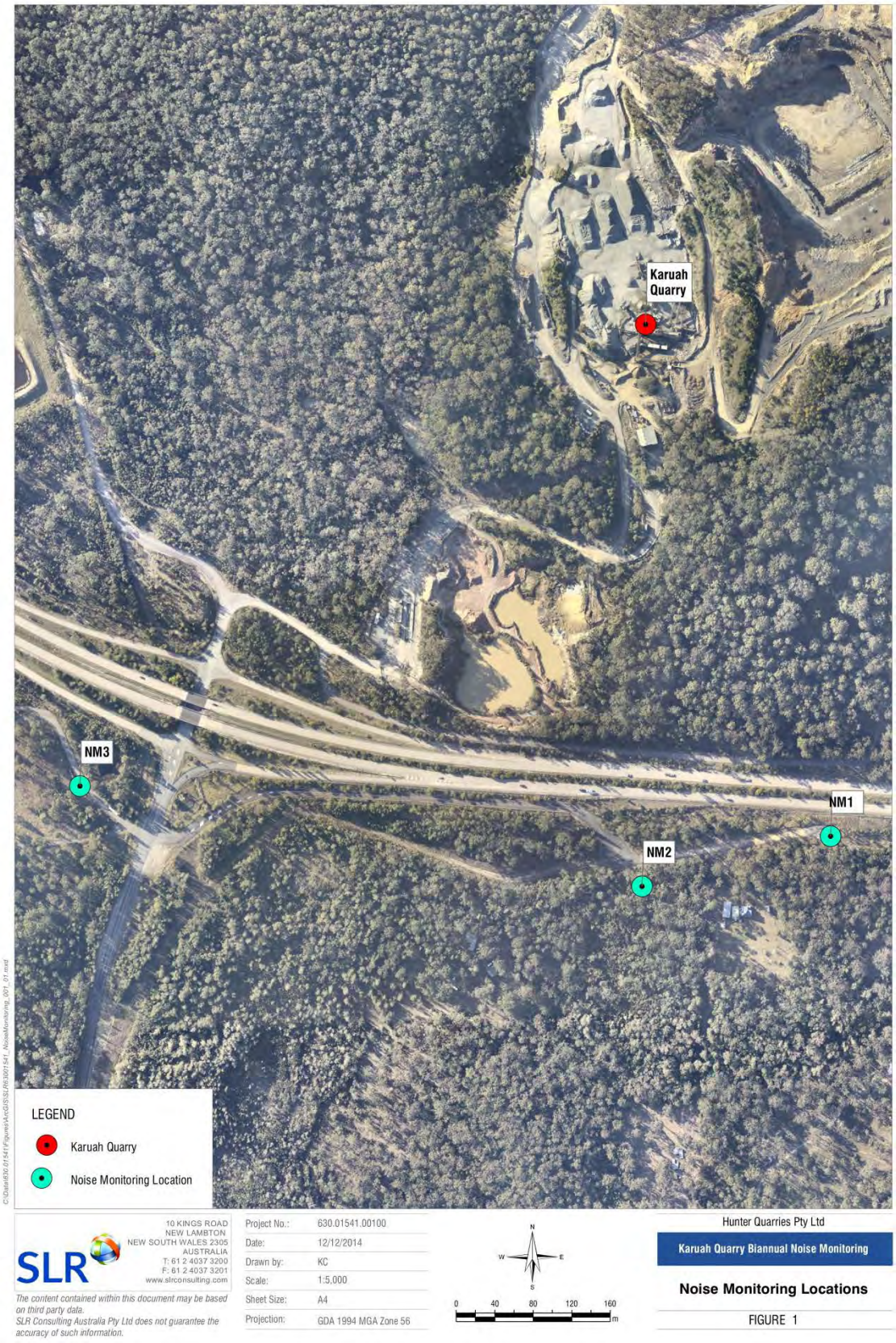
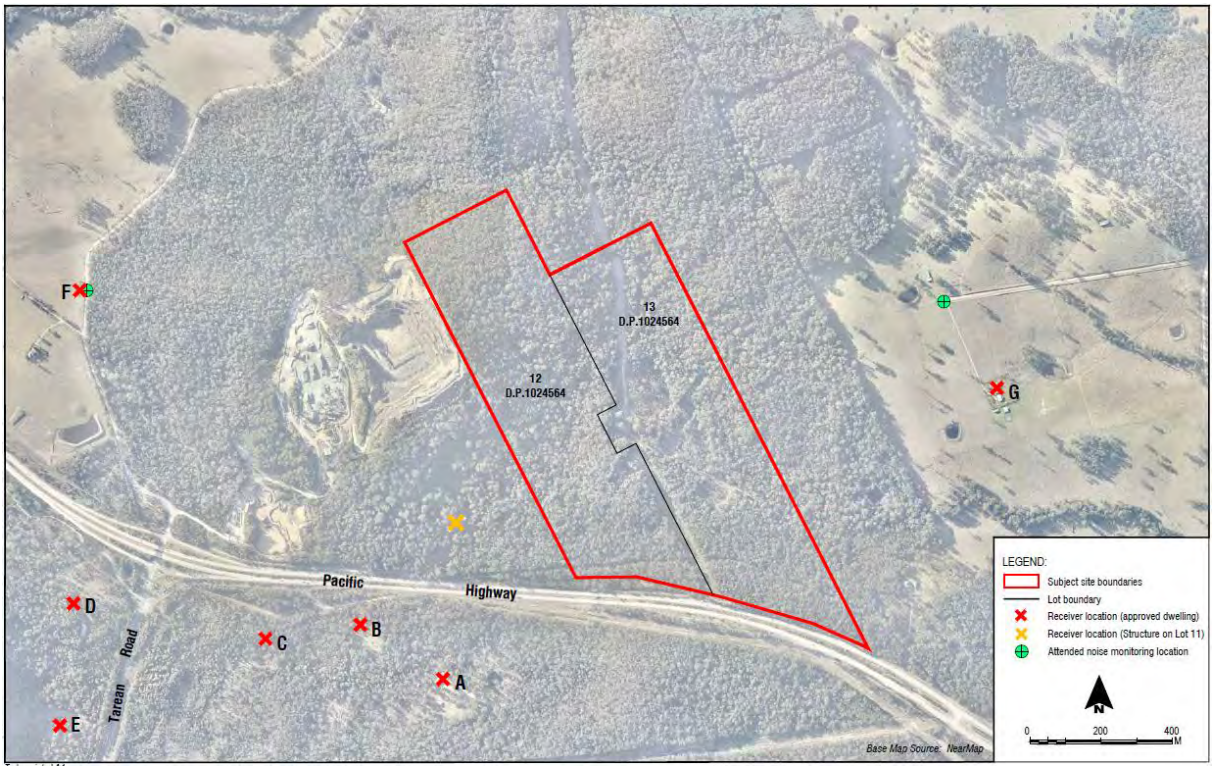


Figure 2 Location F Noise Monitoring Location



4.3 Operator-attended Noise Surveys

An operator-attended noise survey was conducted at each of the four (4) monitoring locations (refer to **Figure 1** and **Figure 2**) on 14 December 2017. The purpose of the noise surveys was to verify the unattended logging results and to determine the character and contribution of noise sources to the total ambient noise level.

The instrument used for the operator attended surveys was a one-third octave integrating Brüel & Kjær Type 2250L Sound Level Meter (s/n 3004636).

4.4 Unattended Continuous Noise Monitoring

Environmental noise loggers were deployed at monitoring locations NM1, NM2, and NM3 (refer to **Figure 1** and **Figure 2**) however due to an unexplained equipment failure no data was available for NM2. For each location, noise monitoring was undertaken from Monday 4 December 2017 to Wednesday 13 December 2017 inclusive. Details of the noise loggers used for unattended continuous noise monitoring are given in **Table 4**.

The environmental noise loggers were programmed to record statistical noise level indices continuously in 15 minute intervals.

Table 4 Noise Logger and Noise Monitoring Locations

Location	Noise Logger Serial Number	Date of Logging
NM1	ARL EL-316 16-203-530	04/12/2017-13/12/2017
NM2	ARL EL-316 16-203-524	04/12/2017-13/12/2017
NM3	ARL EL-316 16-306-039	04/12/2017-13/12/2017

5 OPERATOR ATTENDED NOISE MONITORING

5.1 Results of Operator-attended Noise Monitoring

The results of operator-attended noise monitoring are presented in **Table 5**.

Ambient noise levels given in the tables include all noise sources such as traffic, insects, birds, construction activities and quarry operations. The table provides the following information:

- Monitoring location
- Date, start time, Wind velocity (m/s) and Temperature (ºC) at the measurement location; and
- Typical maximum (L_{Amax}) and contributed noise levels.

Quarry contributions listed in the tables are from Karuah Quarry and are stated only when a contribution could be quantified.

Table 5 Operator Attended Noise Survey Results

Location	Date/Start Time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LAmax	LA1	LA10	LA90	LAeq	
NM1 Lot 3 DP785172 Northern Boundary	13/12/2017 16:03 pm Wind: 4.5 m/s NE Temp 31ºC	80	74	70	63	68	Pacific Highway ~ 55 – 80 Insects ~60 – 65 Quarry inaudible
		Contribution not measurable above background noise.					
NM2 Lot 2 DP 785172 Northern Boundary	13/12/2017 16:21 pm Wind: 4.5 m/s NE Temp 31ºC	75	75	74	69	72	Pacific Highway ~ 55 – 75 Insects 54 – 69 Quarry inaudible
		Contribution not measurable above background noise.					
NM3 Lot 22 DP 1024341 Northern Boundary	13/12/2017 15:16 pm Wind: 4.5 m/s NE Temp 31ºC	72	70	69	59	65	Pacific Highway 54 – 72 Insects 53 – 65 Quarry inaudible
		Contribution not measurable above background noise					
Location F 1714 Branch Lane, Karuah	13/12/2017 15:39 pm Wind: 4.5 m/s NE Temp 31ºC	78	66	51	46	56	Local road traffic 75 - 78 Pacific Highway 38 – 49 Insects 39 – 48 Karuah Quarry Barely audible in lulls Engine Noise 32 - 35 Estimated $L_{Aeq(15minute)}$ noise contribution 34 dBA

5.2 Operator-attended Noise Monitoring Summary

Noise generated by traffic on the Pacific Highway and insect noise dominated ambient noise levels at noise monitoring locations NM1, NM2 and NM3. Noise generated by traffic on the Pacific Highway and Branch Lane dominated ambient noise levels at noise monitoring location F.

The quarry was inaudible and unmeasurable at NM1, NM2 and NM3 monitoring locations due to high ambient noise levels from traffic and nearby construction. Quarry operations were audible at monitoring Location F during lulls in ambient noise levels.

Results of the operational compliance assessment are given in **Table 6**.

Table 6 Compliance Noise Assessment – Operations

Location	Estimated Karuah $L_{Aeq(15minute)}$ Contribution	Consent Conditions $L_{Aeq(15minute)}$	Compliance
	Day	Day	Day
NM1	Inaudible at all times	48	Yes
NM2	Inaudible at all times	48	Yes
NM3	Inaudible at all times	48	Yes
Location F	34 dBA	48	Yes

Results presented in **Table 6** indicate that compliance with the relevant consent conditions was achieved at all noise monitoring locations.

6 UNATTENDED CONTINUOUS NOISE MONITORING

6.1 Results of Unattended Continuous Monitoring

The unattended ambient noise logger data from monitoring location NM1 and NM3 are presented graphically on a daily basis and are attached as **Appendix B** and **Appendix C**. A summary of the results of the unattended continuous noise monitoring is given in **Table 7.** The ambient noise level data quantifies the overall noise level at a given location independent of its source or character.

The measured ambient noise levels were divided into three periods representing day, evening and night as designated in the INP. The INP time classifications differ slightly from the conditions of consent in that the INP daytime includes weekends; Saturday 7:00 am to 6:00 pm as well as Sunday 8:00 am to 6:00 pm, whereas the allowable operating conditions include only Saturday 7:00 am to 1:00 pm. The evening time classifications are the same and where the conditions of consent refer to all other times, the INP nominates this as “night”.

Precautions can be taken to minimise influences from extraneous noise sources (eg optimum placement of the loggers away from creeks, trees, houses, etc), however, not all these sources or their effects can be eliminated. This is particularly the case during the warmer times of year when noise from insects, frogs, birds and other animals can become quite prevalent.

Weather data was obtained from the Bureau of Meteorology automatic weather station located at Williamtown Airport approximately 22 km south west of the monitoring locations. Unattended noise data corresponding with periods of rainfall and/or wind speeds in excess of 5 m/s (approximately 18km/hr) were discarded in accordance with INP data exclusion methodology.

Table 7 Unattended Continuous Monitoring Ambient Noise Levels

INP Period	LA1	LA10	LA90	LAeq
NM1				
Daytime during Operational Hours[1]	69	66	55	67
Daytime outside Operational Hours[2]	68	64	54	62
Evening[3]	66	63	51	59
Night[4]	67	64	52	61
NM3				
Daytime during Operational Hours[1]	75	69	54	66
Daytime outside Operational Hours[2]	74	69	54	64
Evening[3]	75	69	49	65
Night[4]	75	69	39	63

Note:
1. Daytime - 7.00 am to 5.00 pm Monday to Friday, 8.00 am to 12.00 pm Saturday, not operational on Sunday
2. Daytime - 5.00 pm to 6.00 pm Monday to Friday, 12.00 pm to 6.00 pm Saturday, 8.00 am to 6.00 pm Sunday
3. Evening - 6.00 pm 10.00 pm
4. Night - 10.00 pm to 7.00 am pm Monday to Saturday, 10.00 pm to 8.00 am Sunday.

6.2 Unattended Continuous Monitoring Summary

Ambient L_{A90} noise levels during the daytime period at monitoring locations NM1 and NM3 outside the quarry's operational hours are consistent with those during operational hours. This indicates that the quarry is not the dominant contributor to ambient noise levels during the daytime. It is noted that there is a significant drop in the L_{Aeq} at NM1. A review of logging data indicated that this was heavily influenced by insects and other extraneous noise and not Karuah Quarry. The main contributors to ambient noise levels at all monitoring locations are considered to be traffic along the Pacific Highway and natural sources such as birds and insects.

7 CONCLUSION

SLR was engaged by Hunter Quarries to prepare and implement a noise monitoring program for the Karuah Quarry in accordance with the Conditions of Consent for the operation. This report presents the biannual noise monitoring survey results for the period up to the end of June 2017 in accordance with the noise monitoring program.

Operator-attended and unattended noise monitoring was conducted at the three (3) nearest residences to determine noise levels produced by Karuah Quarry operations. An additional operator-attended noise survey was conducted at Location F as requested by NSW DP&E.

The noise contribution of Karuah Quarry operations remained significantly lower than that from road traffic on the Pacific Highway during all operator-attended noise surveys. The noise compliance results presented in **Table 6** indicates that compliance with the relevant consent conditions was achieved at all noise monitoring locations during all periods.

Results from the unattended ambient noise measurements also indicate that the Karuah Quarry is not a major contributor to ambient noise levels at each of these locations.

1 Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that in common usage 'noise' is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB Linear or dBZ.

3 Sound Power Level

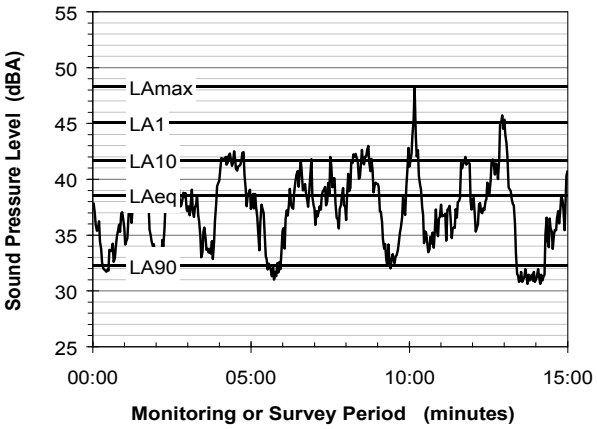
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or L_W, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the 'repeatable minimum' L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or 'average' levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than 'broad band' noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

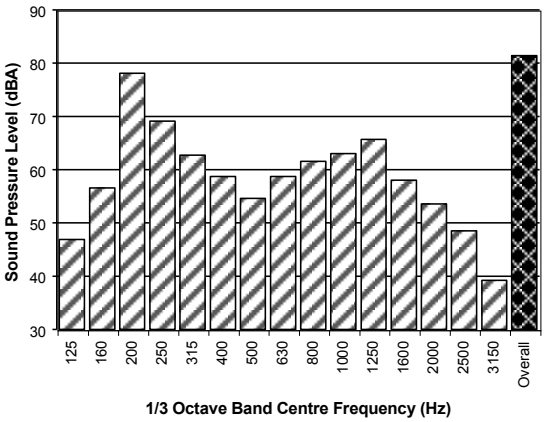
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

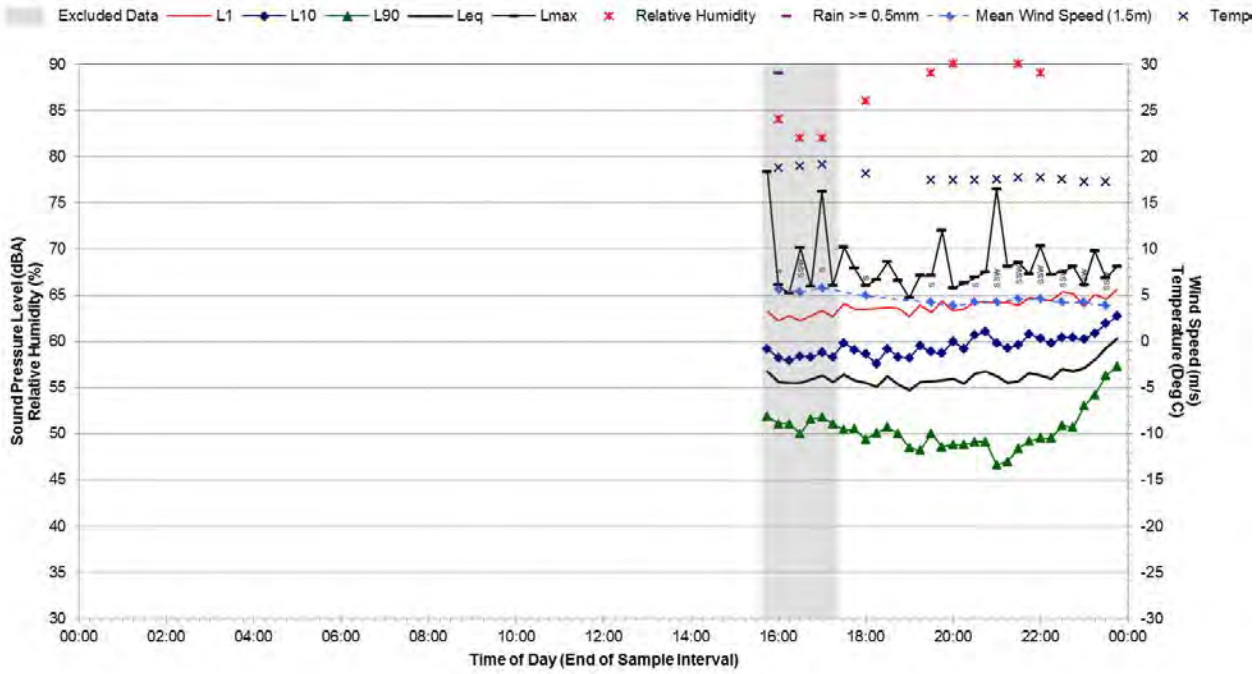
- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.

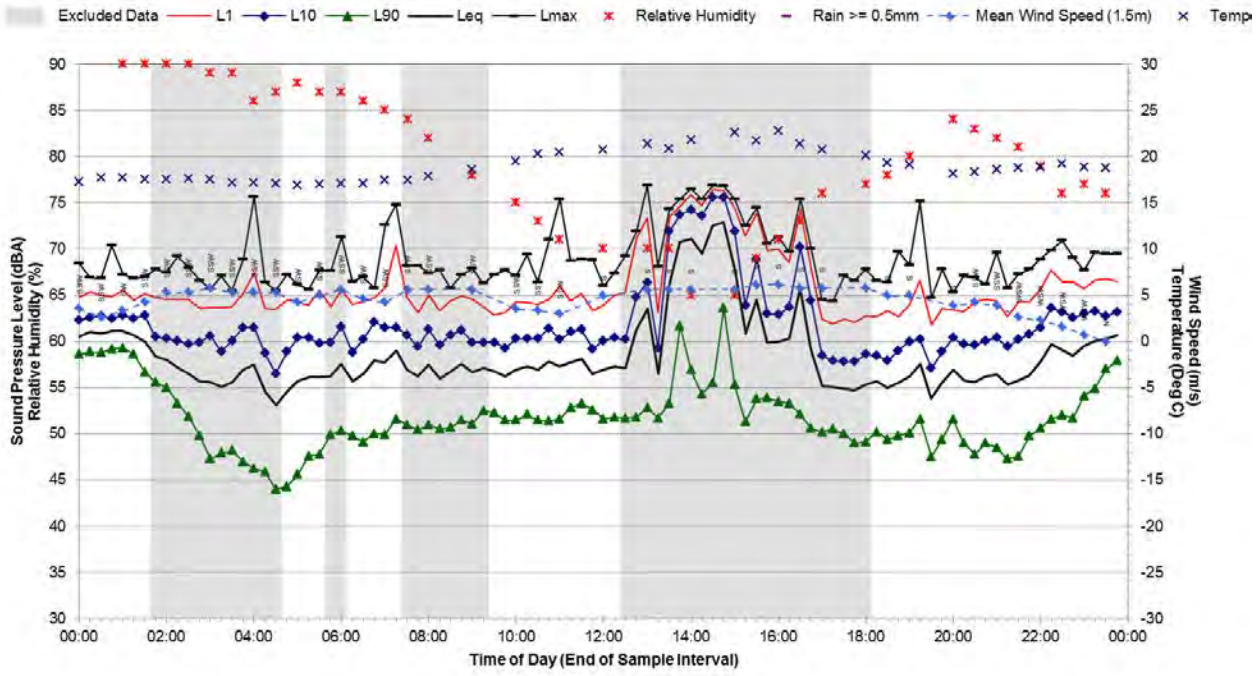


NM1 Continuous Statistical Ambient Noise Monitoring Results

Statistical Ambient Noise Levels
NM1 - Monday, 4 December 2017

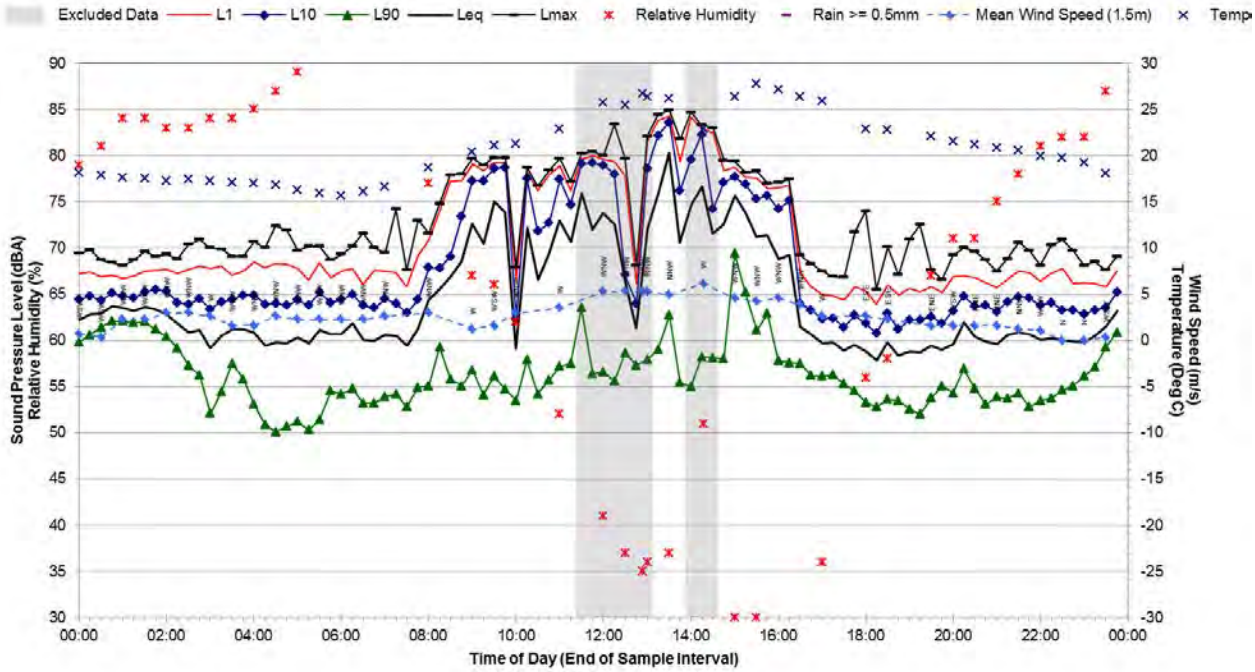


Statistical Ambient Noise Levels
NM1 - Tuesday, 5 December 2017

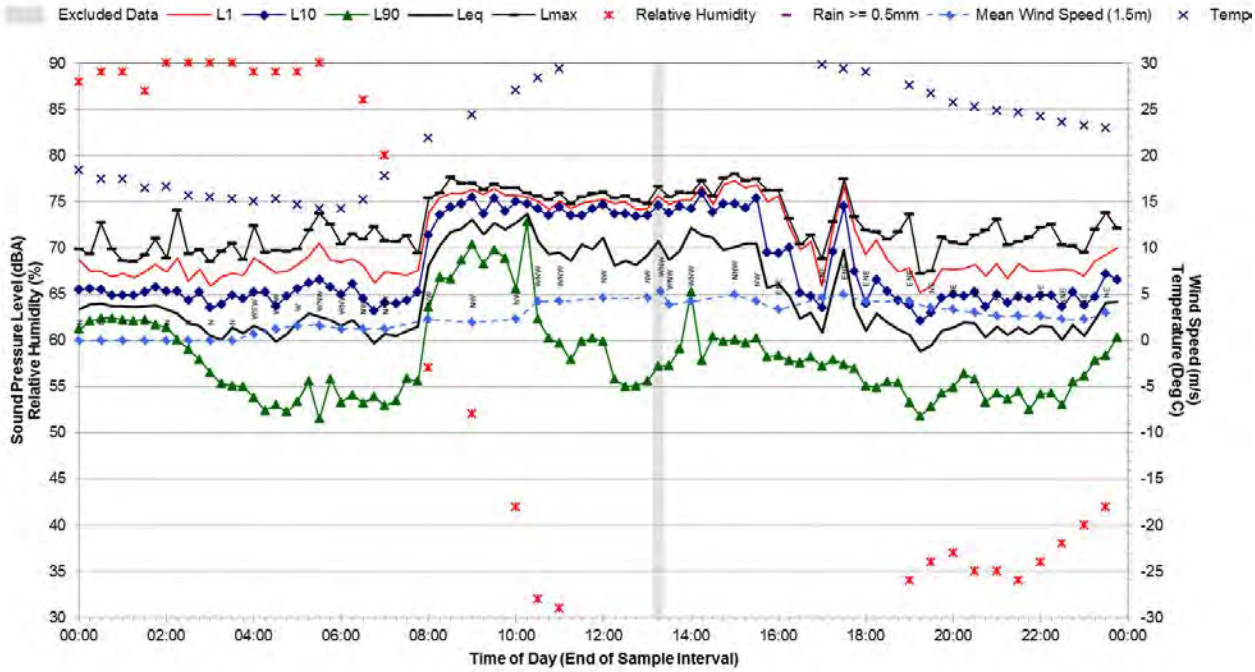


NM1 Continuous Statistical Ambient Noise Monitoring Results

Statistical Ambient Noise Levels
NM1 - Wednesday, 6 December 2017

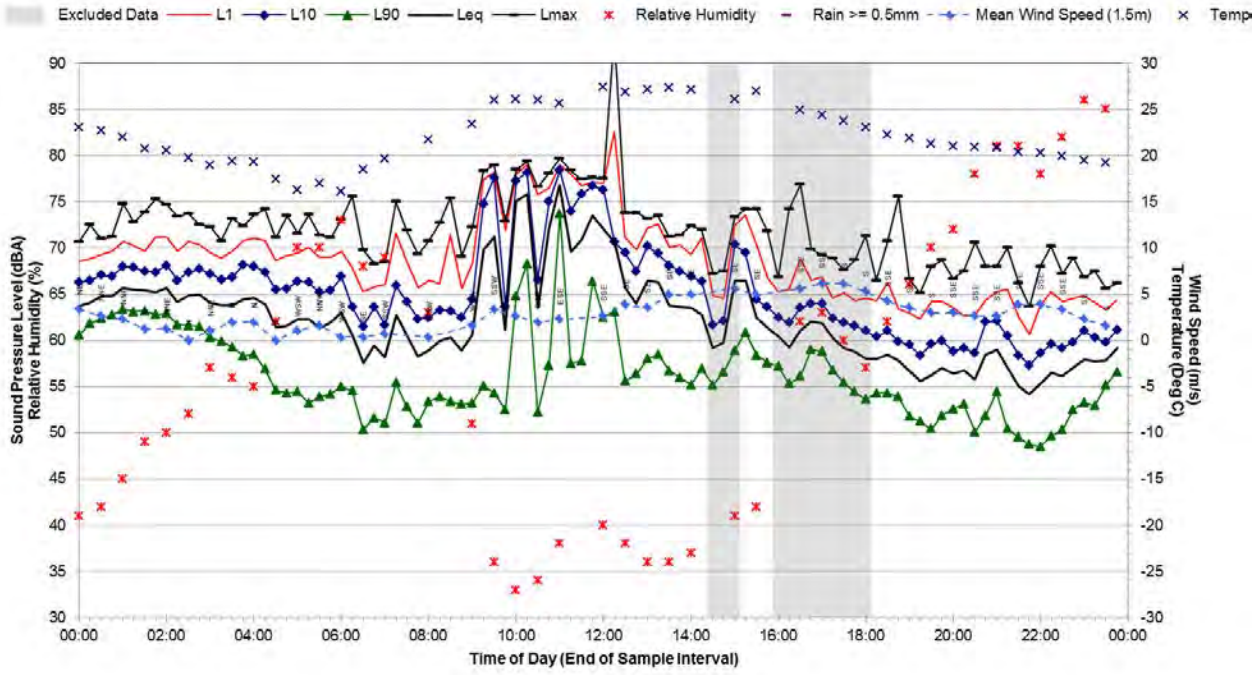


Statistical Ambient Noise Levels
NM1 - Thursday, 7 December 2017

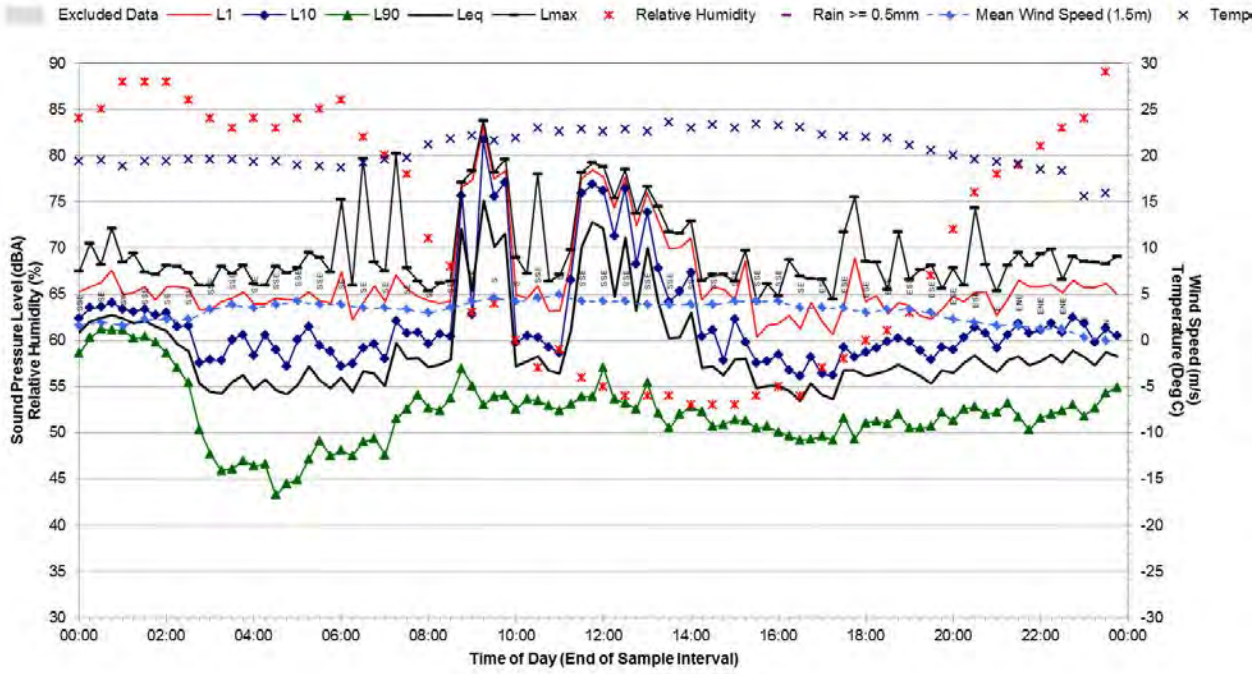


NM1 Continuous Statistical Ambient Noise Monitoring Results

Statistical Ambient Noise Levels
NM1 - Friday, 8 December 2017

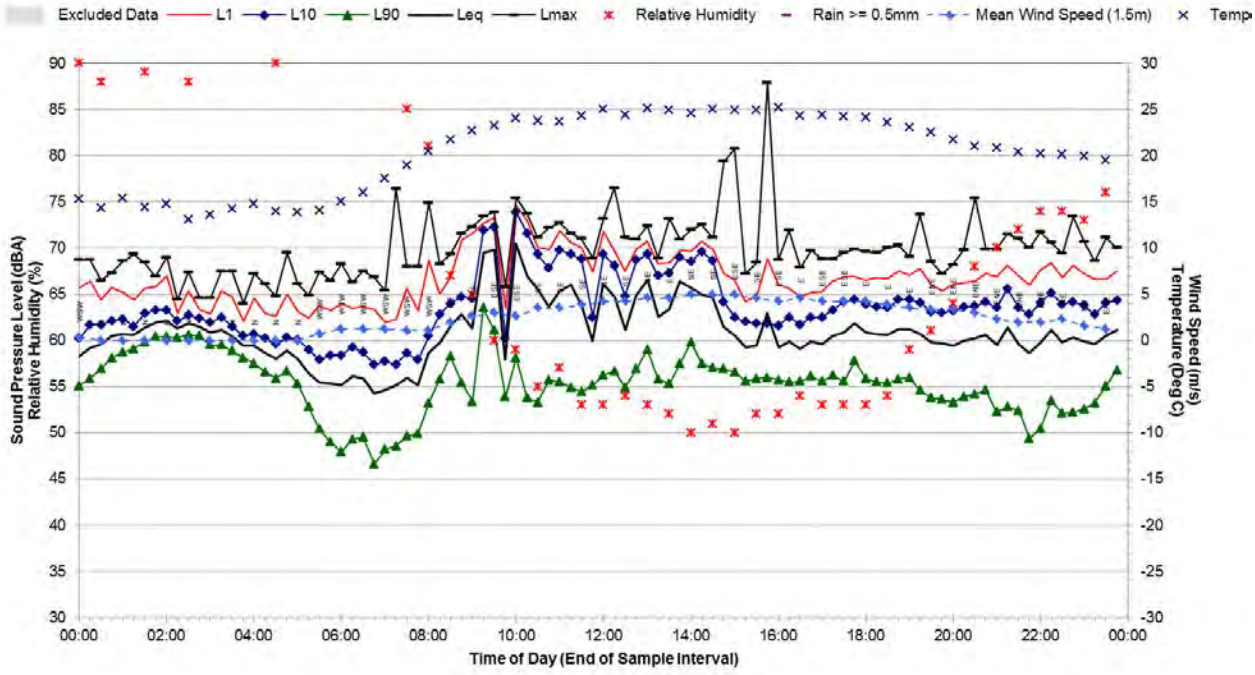


Statistical Ambient Noise Levels
NM1 - Saturday, 9 December 2017

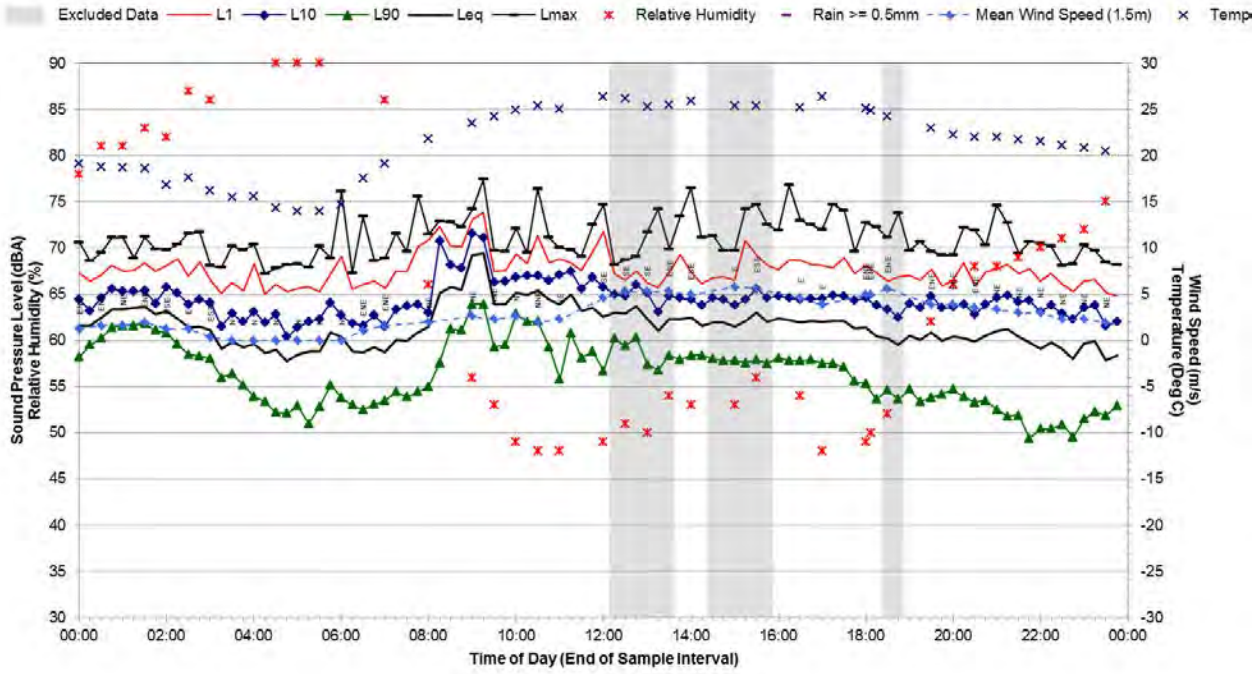


NM1 Continuous Statistical Ambient Noise Monitoring Results

Statistical Ambient Noise Levels
NM1 - Sunday, 10 December 2017

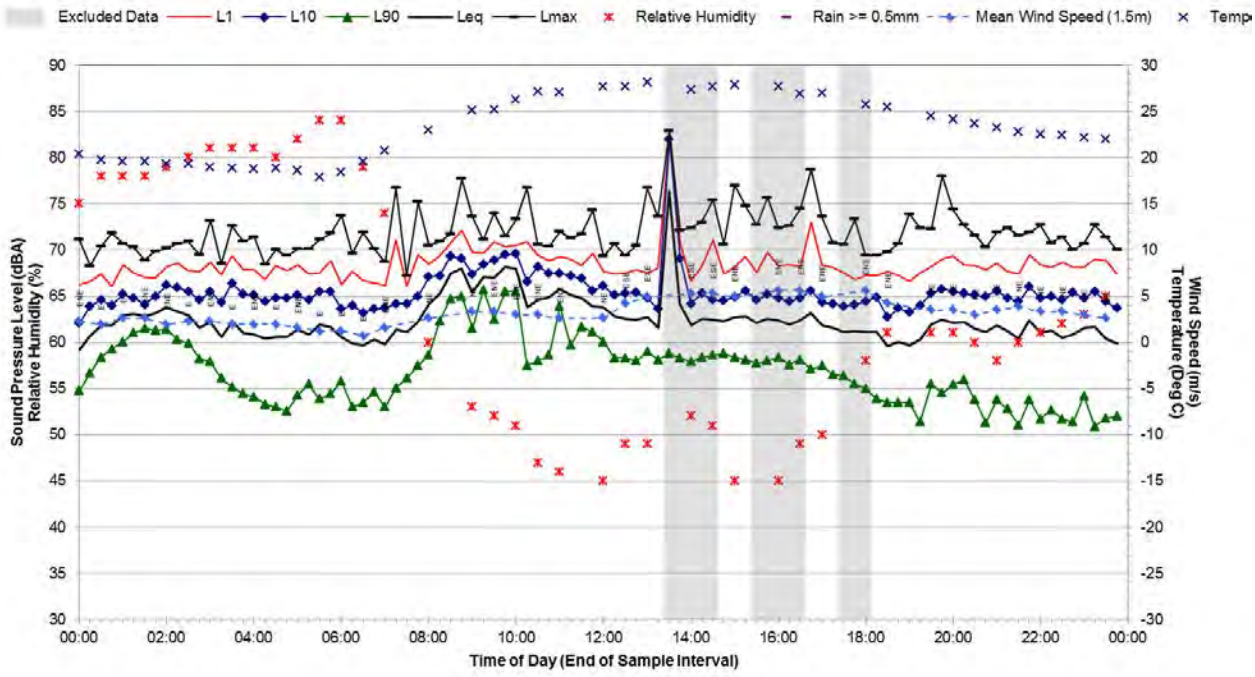


Statistical Ambient Noise Levels
NM1 - Monday, 11 December 2017

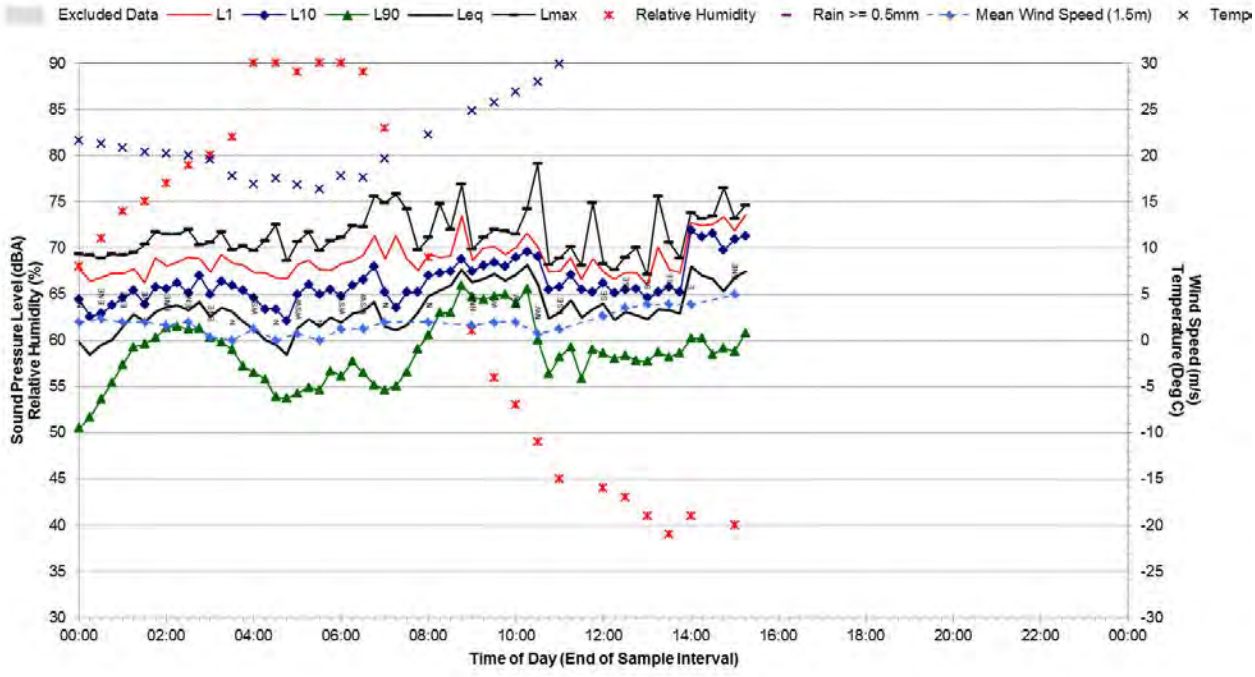


NM1 Continuous Statistical Ambient Noise Monitoring Results

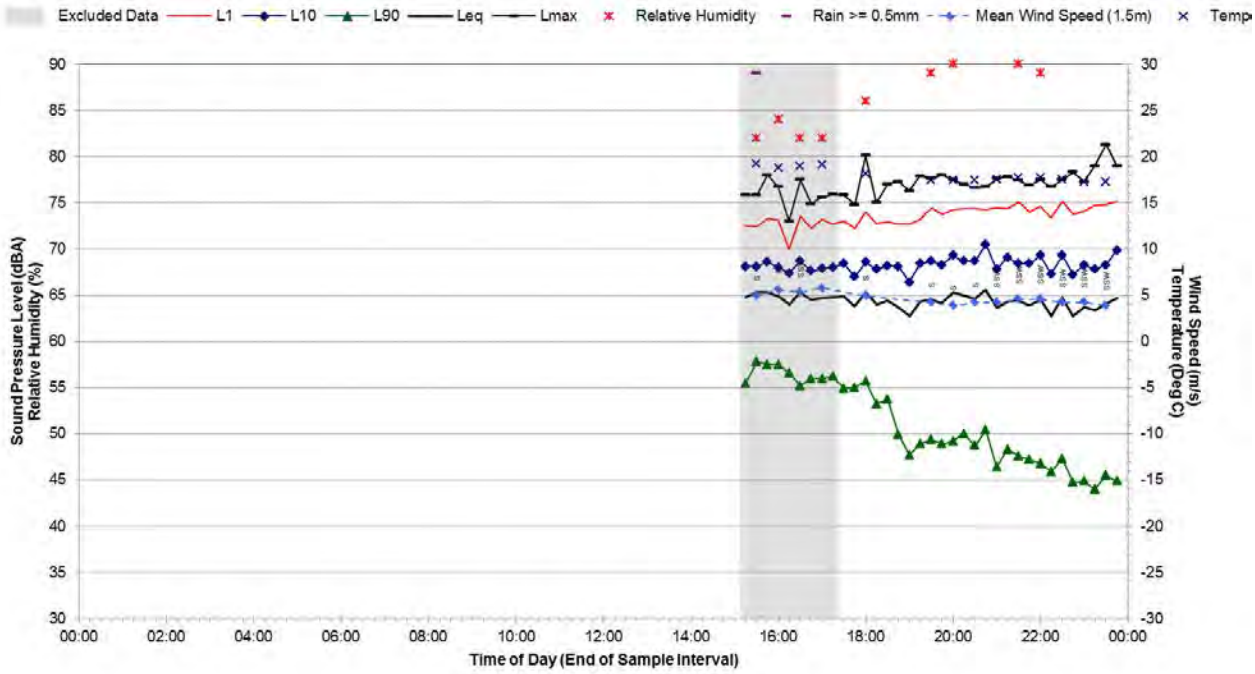
Statistical Ambient Noise Levels
NM1 - Tuesday, 12 December 2017



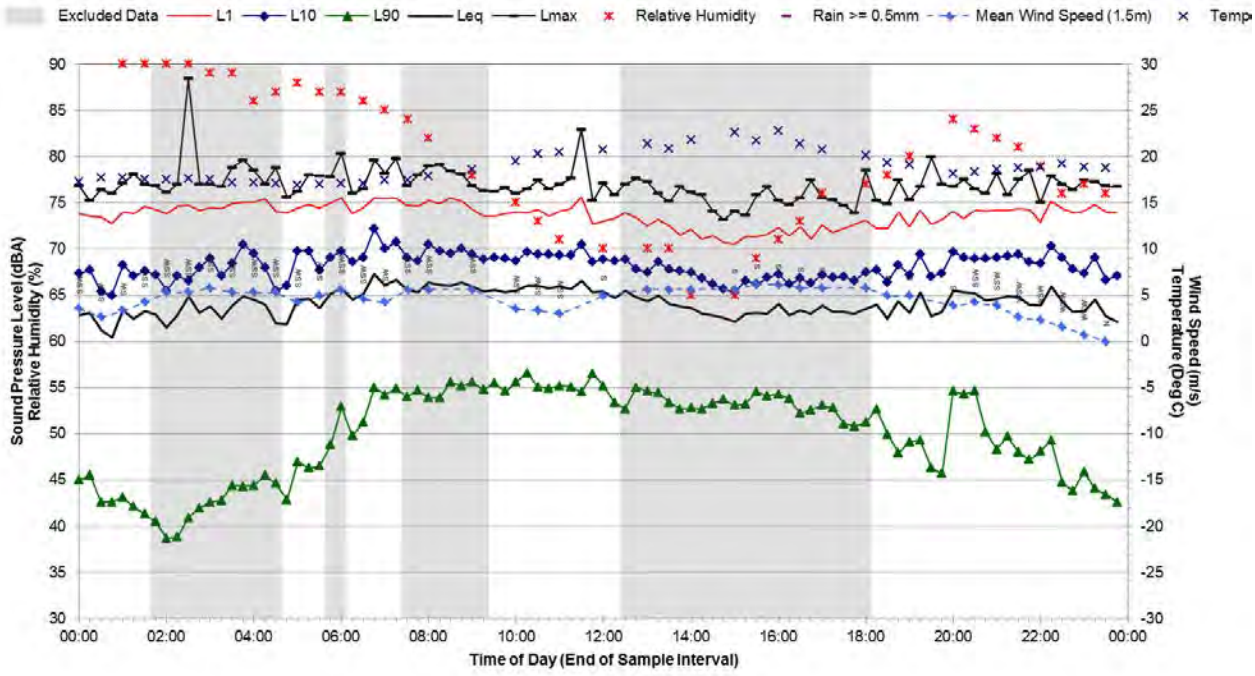
Statistical Ambient Noise Levels
NM1 - Wednesday, 13 December 2017



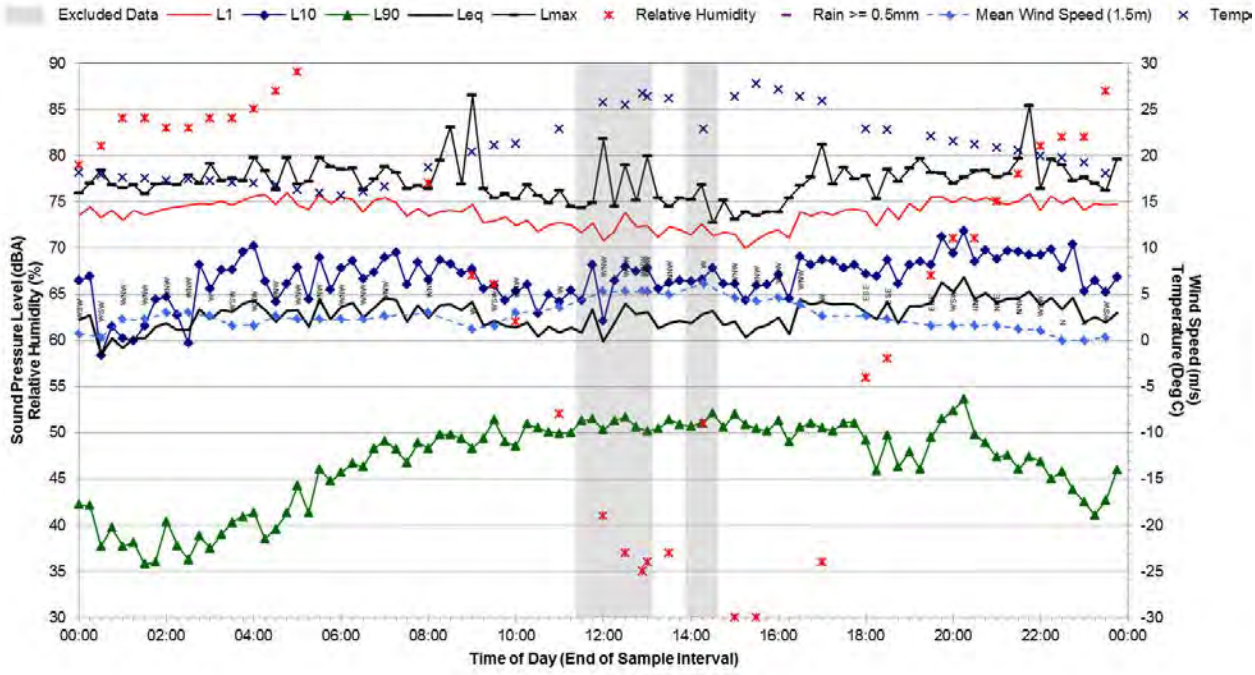
Statistical Ambient Noise Levels
NM3 - Monday, 4 December 2017



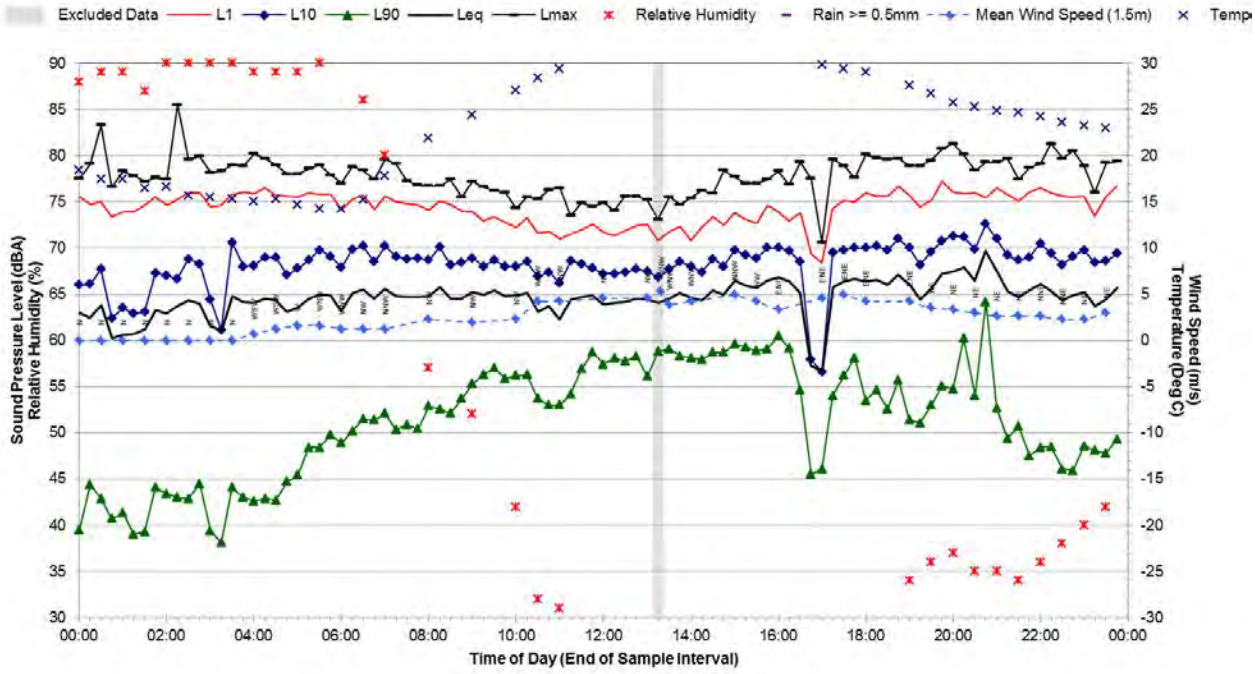
Statistical Ambient Noise Levels
NM3 - Tuesday, 5 December 2017



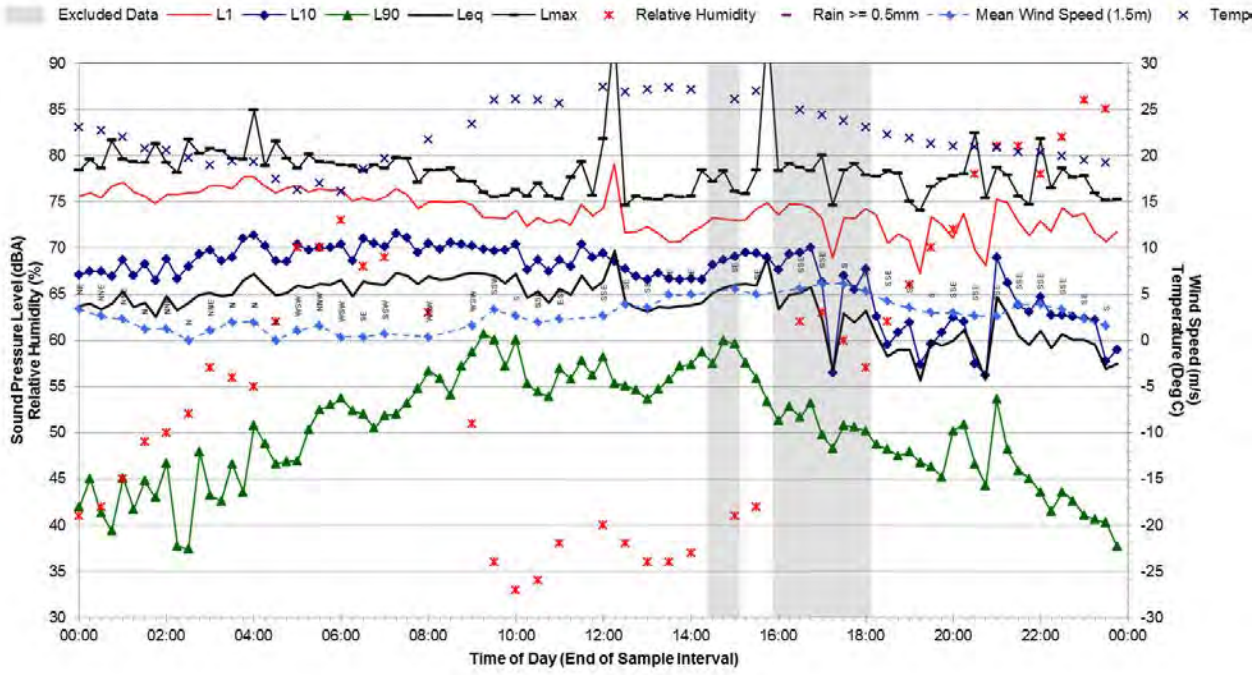
Statistical Ambient Noise Levels
NM3 - Wednesday, 6 December 2017



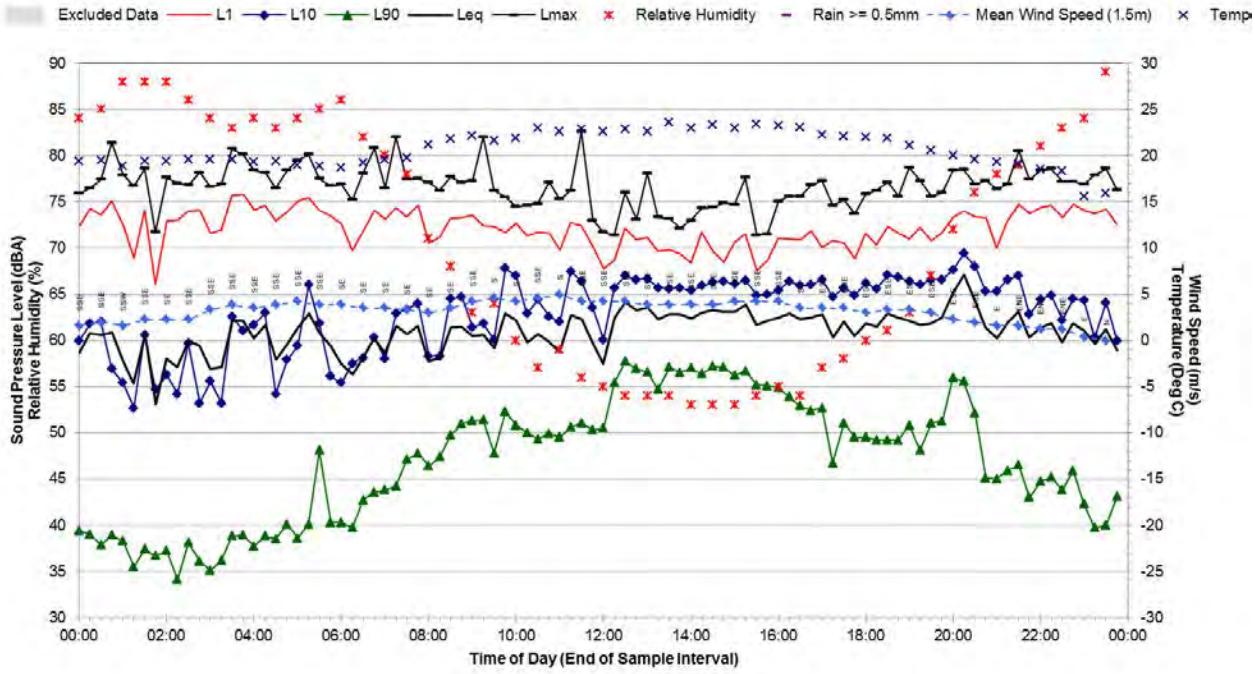
Statistical Ambient Noise Levels
NM3 - Thursday, 7 December 2017



Statistical Ambient Noise Levels
NM3 - Friday, 8 December 2017

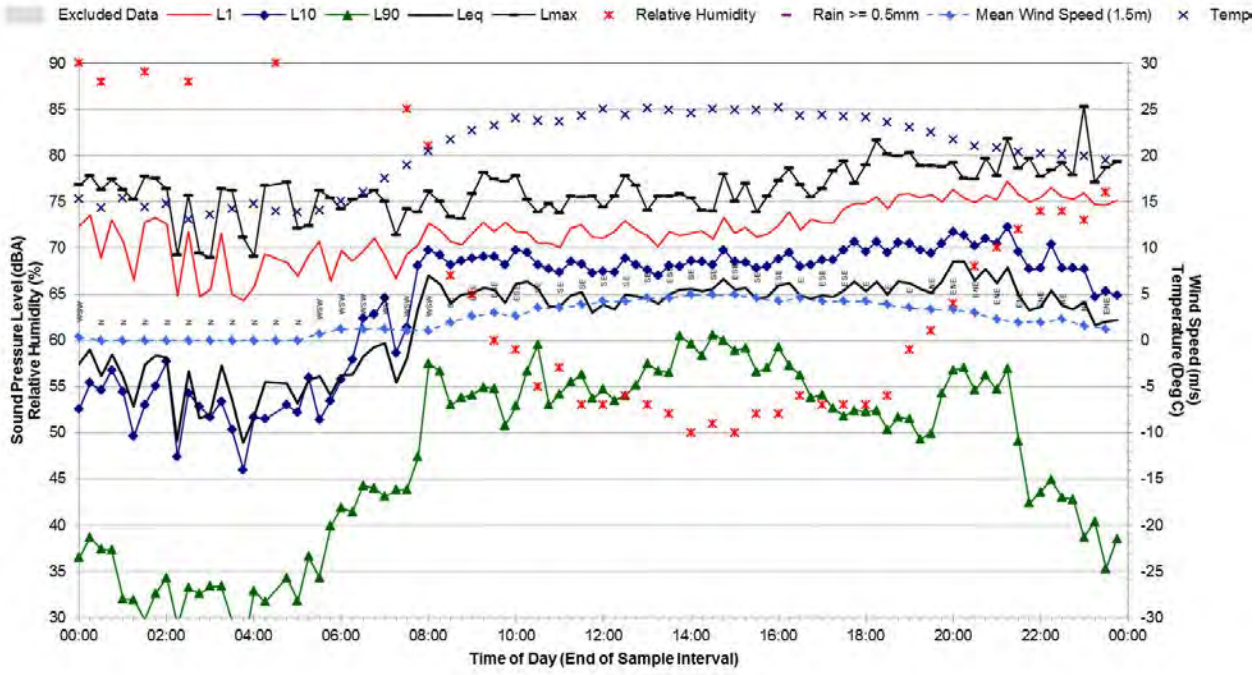


Statistical Ambient Noise Levels
NM3 - Saturday, 9 December 2017

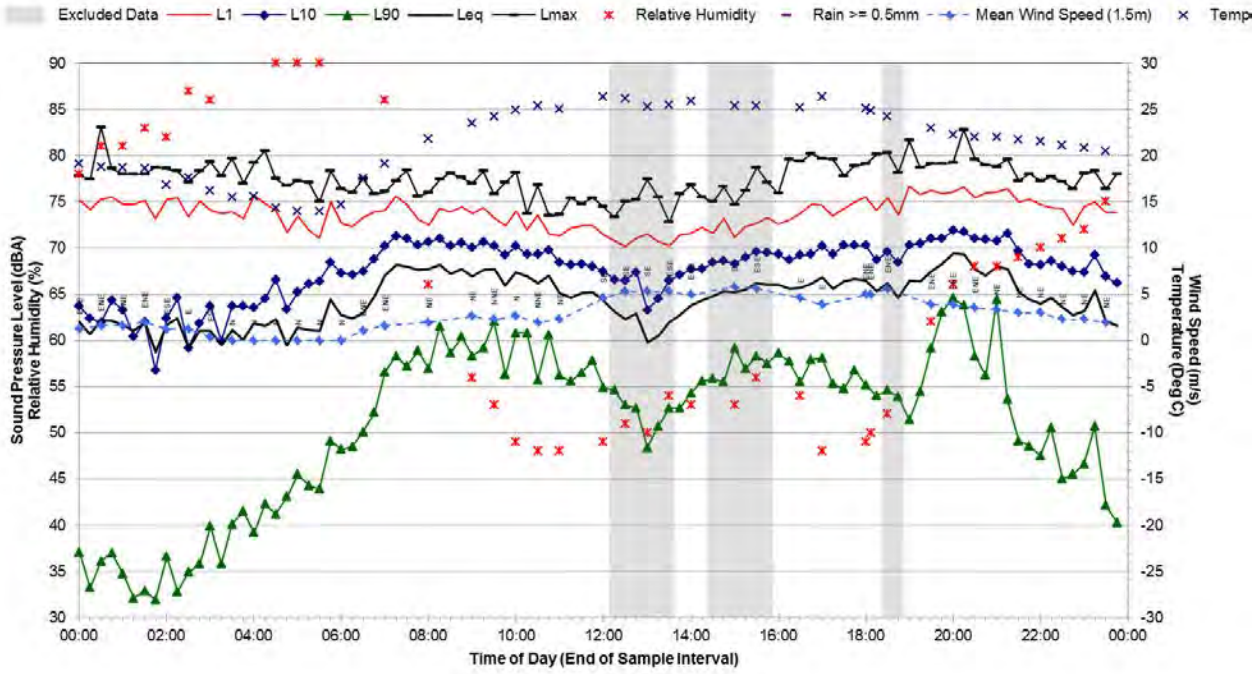


NM3 Continuous Statistical Ambient Noise Monitoring Results

Statistical Ambient Noise Levels
NM3 - Sunday, 10 December 2017



Statistical Ambient Noise Levels
NM3 - Monday, 11 December 2017



Statistical Ambient Noise Levels
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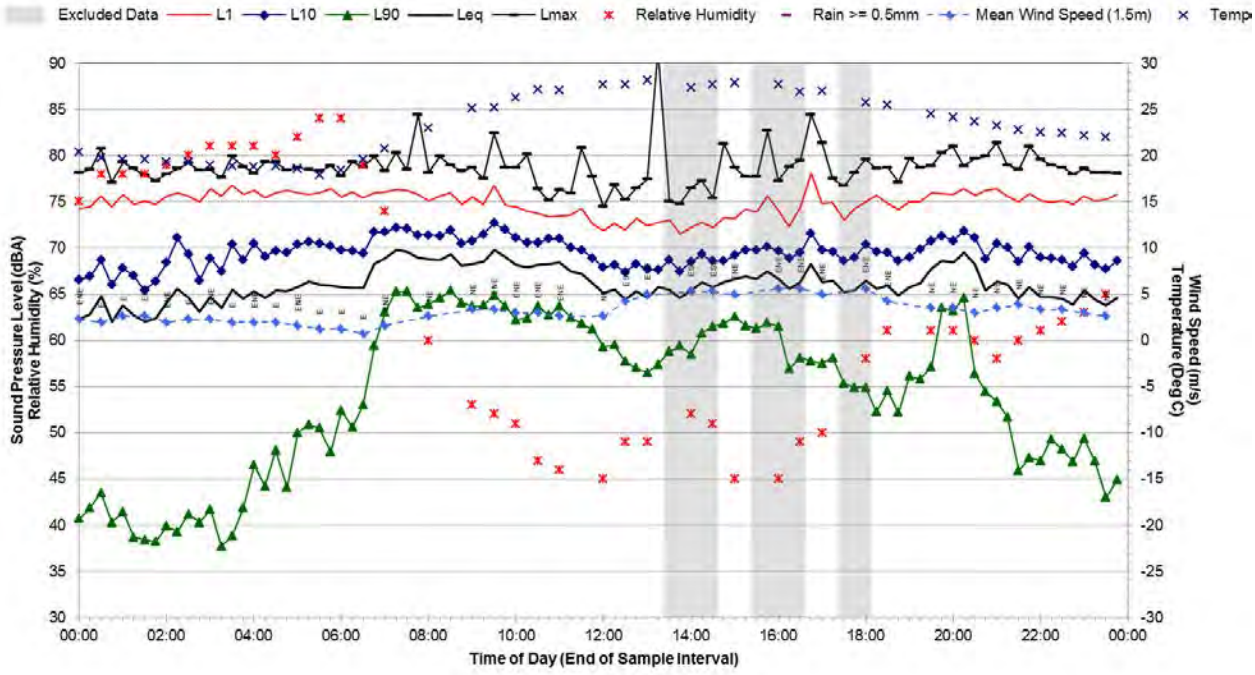

Statistical Ambient Noise Levels
NM3 - Wednesday, 13 December 2017