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Blakebrook Quarry
2017 Annual Monitoring Report

Our Ref: 15/450

Date: 29 March 2018

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

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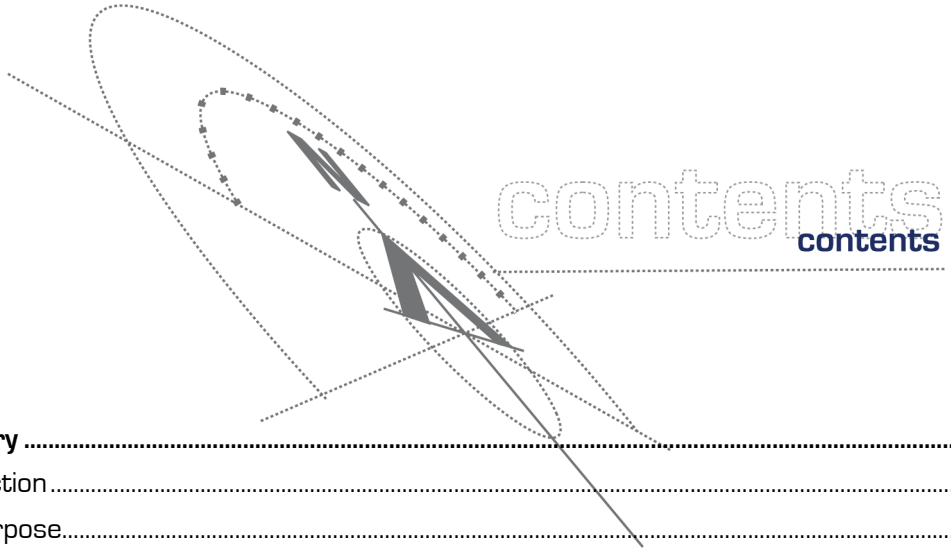

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Attachments:

1. MP 07_0020 Mod 1 – Sept 2017
2. Checklist - Schedule 5 Condition 2

3A. DPE Comments on 2016 Audit

3B. Checklist – DPE Requirements

4. Checklist – MP 07_0020 Mod 1
5. Variation to EPA Licence
6. EPA Caution
7. Truck Movements
8. Noise Monitoring
9. Blast Monitoring
10. Dust Monitoring
11. Ground Water Monitoring
12. Site Water Balance
13. Surface Water Monitoring
14. Water Quality Investigation
15. Bush Regeneration Reports
16. Koala Monitoring Program
17. Community Consultative Committee Minutes
18. Complaints Register

i Preamble

Blakebrook Quarry is a basalt quarry located off Nimbin Road approximately 6 kilometres north-west of Lismore. **Plate i** provides a Location Plan of the quarry, whilst **Plate ii** provides an air view of the quarry, including areas set aside for the purpose of environmental offsets.

The quarry is operated by Northern Rivers Quarry and Asphalt (NRQA) which is a commercial entity operated by Lismore City Council. The quarry is identified as a 'State significant' resource and provides a range of quarry products to northern NSW. Material provided include: aggregates, drainage rock, road base, basalt and argillite products, metal dust, fill material and select fill (overburden).

The quarry initially started operations in 1979 with development consent formally granted by Lismore City Council in 1995. Approval was granted for the expansion of the quarry in November 2009 via Part 3A Approval No. 07_0020. This approval was issued by the Minister for Planning and was subject to an extensive list of consent conditions. In September 2017, approval was issued for Modification 1 to the consent. A copy of the approval (as modified) is provided at **Attachment 1**.

One of the conditions of the approval requires the Quarry Operator to prepare an annual review of the environmental performance of the quarry and submit this documentation to the Department of Planning & Environment (DPE). The current report has been prepared to comply with this requirement.

Note: An Asphalt Plant also operates within the boundary of Blakebrook Quarry. The asphalt plant is subject to a separate development application and has different approval, operating and reporting requirements. The current AEMR therefore relates to the quarry only, and not the Asphalt Plant.

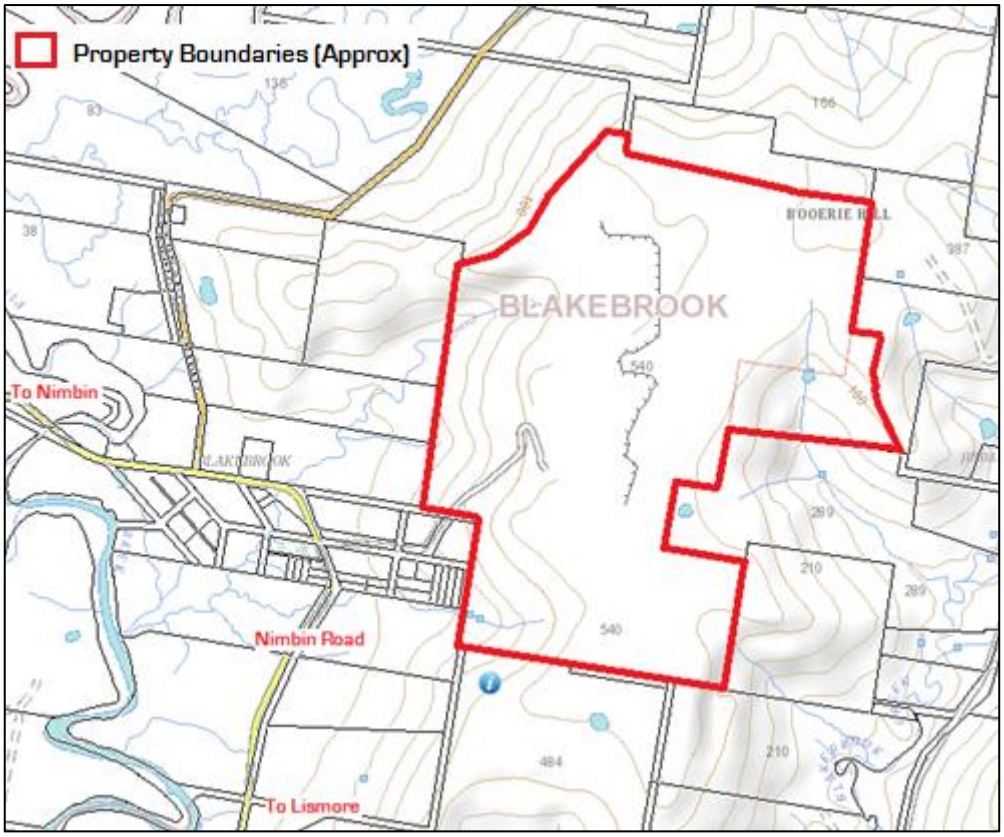


Plate i – Location Plan (Topographic Map Extract)

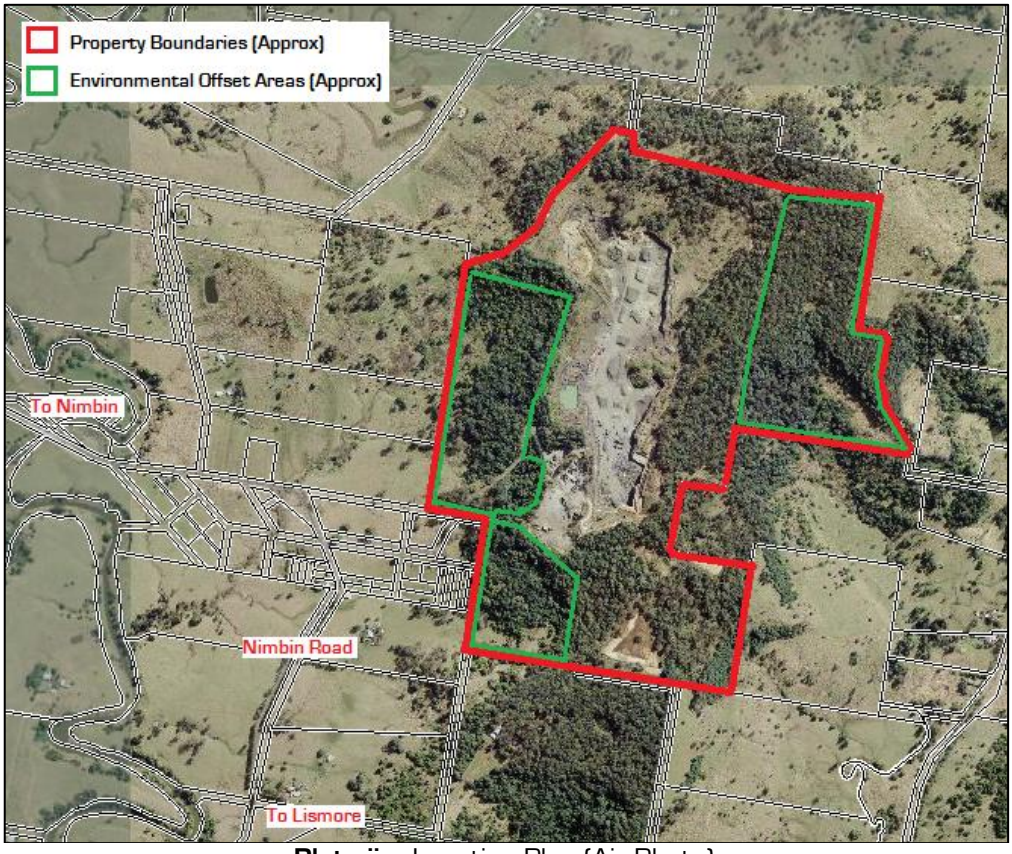


Plate ii – Location Plan (Air Photo)

Part 1 Preliminary

1.1 Introduction

1.1.1 Purpose

Newton Denny Chapelle (NDC) has been engaged by Northern Rivers Quarry and Asphalt (NRQA) to complete the 2017 Annual Environmental Management Report (AEMR) for Blakebrook Quarry. This report is prepared in response to Schedule 5 Condition 11 of the Blakebrook Quarry Part 3A Approval No. 07_0020 (Mod 1) which advises as follows:

Annual Review

11. By the end of March each year, or other timing as may be agreed by the Secretary, the Proponent must submit a review to the Department reviewing the environmental performance of the project to the satisfaction of the Secretary. This review must:
    (a) describe the project (including any progressive rehabilitation) that was carried out in the previous calendar year, and the project that is proposed to be carried out over the current calendar year;
    (b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the:
        - relevant statutory requirements, limits or performance measures/criteria;
        - requirements of any plan or program required under this approval;
        - monitoring results of previous years; and
        - relevant predictions in the documents listed in condition 2(a) of Schedule 2;
    (c) evaluate and report on:
        - the effectiveness of the air quality and noise management systems; and
        - compliance with the performance measures, criteria and operating conditions in this approval.
    (d) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;
    (e) identify any trends in the monitoring data over the life of the project;
    (f) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies;
    (g) escribe what measures will be implemented over the current calendar year to improve the environmental performance of the project.

    The Proponent must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 7 of Schedule 5) and any interested person upon request.

Attachment 2 provides a Schedule illustrating where each of the above requirements have been addressed within the 2017 AEMR.

1.1.2 Reporting Period

This AEMR relates to the reporting period 1 January 2017 to 31 December 2017 and will be submitted to the DPE in March 2018. It details actions taken during 2017, provides a snapshot of progress on compliance issues and elaborates on planned activities for the coming year.

1.1.3 Information Provided

The information contained herewith is provided in accordance with the requirements of Condition 11 of the approval (as modified) and the comments provided by DPE in response to the 2016 annual review. A copy of this advice is provided at **Attachment 3A**, with a table documenting compliance with the DPE requirements provided at **Attachment 3B.**

It is noted that the Asphalt Plant which operates within the quarry footprint does not form part of development approval MP 07_0020 (Mod 1). Rather, the Asphalt Plant is approved and regulated via DA 1990/431 (as amended) approved by Lismore City Council and EPA Licence No.3384. Accordingly, the environmental performance of the Asphalt Plant does not form part of the current AEMR for Blakebrook Quarry.

1.2 Development Approval (Mod 1)

S75W Approval (Modification 1) to Project Approval 07_0020 was approved in September 2017. A copy of the relevant Notice of Modification is provided at **Attachment 1**. The amended approval enabled Quarry Management to mine Cap Rock at the South Pit of Blackbrook Quarry. This rock was extracted as large rock pieces (5 tonne to 8 tonne) and supplied to the Coffs Harbour Breakwall Extension.

Attachment 4 provides a table documenting compliance with the range of conditions of approval as contained within the modified approval notice.

1.3 Relevant Approvals

Blakebrook Quarry is subject to a range of approvals, as summarised in **Table 1.1.**

Table 1.1 – Summary of Approvals Blakebrook Quarry

Approval	Brief Description	Expiry
MP 07_0020 (Mod 1) NSW Minister for Planning **Refer Attachment 1**	Development approval for the ongoing operation of Blakebrook Quarry. Incorporates a range of conditions to be complied with during establishment, operation and rehabilitation of the site.	31/12/39
EPA Licence 3384 NSW Environment Protection Authority **Refer Attachment 5**	Licence issued by the NSW Environment Protection Authority pursuant to the Protection of the Environment Operations Act 1997. Provides details with respect to a range of environmental thresholds to be complied with during the operation of the quarry.	N/a – Renewed Annually in January

1.4 Summary of Activities in 2017

2017 was a year of consolidating quarry operations and procedures. In total 8 blasts occurred resulting in 14253 tonnes of quarry product. Notable events with respect to compliance with the conditions of Part 3A Approval No. 07_0020 in 2017 are summarised below:

- **Annual Environmental Monitoring Report** – In March 2017, the DPE advised that the 2016 AEMR complied with the relevant reporting standards, subject to minor clarification. The Department requested that the 2017 AEMR contain additional information, which has been incorporated into this final document.

- **S75W Approval (Modification 1)** was approved in September 2017. A copy of the relevant Notice of Modification is provided at **Attachment 1**. We note that the amended approval has changed the numbering and content of a number of the terms and conditions. The 2017 AEMR has been updated to reflect these amended requirements.

  The amended approval enabled Quarry Management to mine Cap Rock at the South Pit of Blackbrook Quarry. This rock was extracted as large rock pieces (5 tonne to 8 tonne) and supplied to the Coffs Harbour Breakwall Extension. Conditions of approval required a number of updated Management Plans to be prepared relating to noise, blasting, air quality, soil and water (including expanded site water balance) traffic, Aboriginal heritage and biodiversity & rehabilitation. These reports (other than the water balance) have been submitted to the Department for review. The expanded water balance has recently been lodged with the Department under separate cover and is also provided at **Attachment 6**.

- **EPA Caution Issued –** Following site inspections by the NSW EPA in October 2017, an Official Caution was issued in November 2017 relating to sediment management and erosion control within the quarry. Refer **Section 3.5.8** and **Attachment 6**.

- **Ex Tropical Cyclone Debbie** – This extreme weather event impacted on production throughout the year. In this regard, the heavy wet weather of early 2017 resulted in:

a. significant slowdowns in production in the first half of 2017; and
b. strong demand for product in the second half of the year associated with repair of storm damage.

- **Boundary Adjustment Subdivision** – In September 2017, a development application (DA 2017.379) was lodged with Lismore City Council to adjust the boundaries of the quarry property to ensure that the existing driveway linkage to Nimbin Road is located entirely on the same parcel as the quarry. This application also seeks to create a 'standalone' lot for the asphalt plant located within the quarry footprint to enable a long-term lease to be issued over this business. The application is currently being assessed by Council, with a determination expected early 2018.

Part 2 – Schedule 2

Administrative Conditions

2.1 Extraction Details

2.1.1 Applicable Criteria

Schedule 2 Condition 7

7. The Proponent must not undertake quarrying operations below 55 m AHD in the northern pit or 105 m AHD in the southern pit.

Schedule 2 Condition 8

8. The Proponent must not:
   (a) transport more than 600,000 tonnes of quarry materials from the site per calendar year; or
   (b) dispatch more than 100 laden trucks from the site on any calendar day.

2.1.2 Extraction Limits

We are advised that extraction depths at the quarry have not changed during 2017 as they are 'on hold' pending completion of the groundwater assessments referenced in **Section 3.3**.

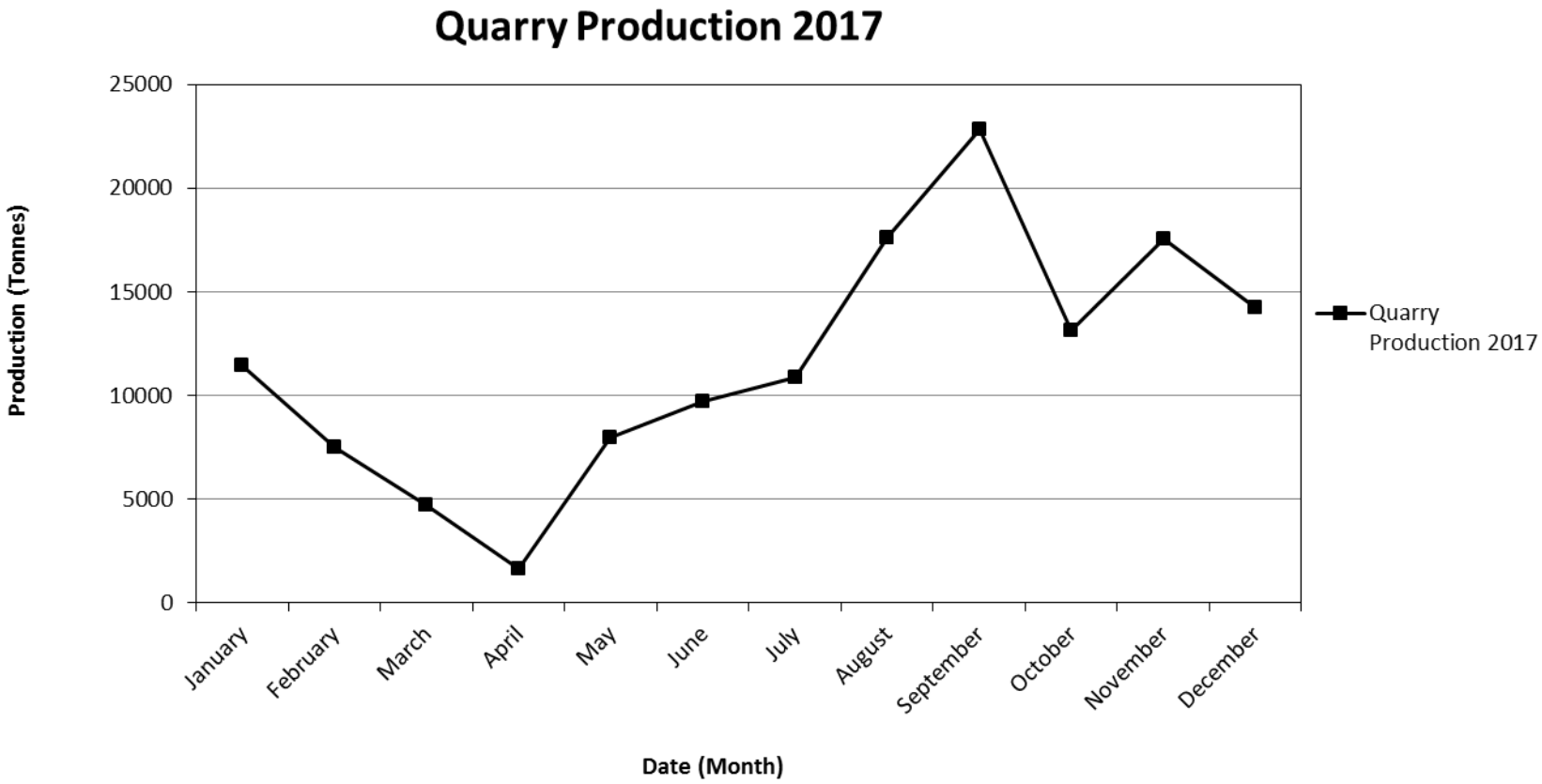
In this regard, quarry depths at South Pit are RL124m AHD. Details with respect to quarry depths in the main pit are somewhat complex (as they link to works completed prior to the approval via MP 07_0020). As outlined in the letter from LCC to DPE dated 23 March 2018 the following information is provided regarding this matter:

Point	Depth	Reasoning
1	104.95	This point is very close to 105 and given the potential error with the GPS reading maybe a suitable depth
2	104.78	This area was mined before the 2009 approval was recieved and have not been mined any deeper since that time.
3	105.12	Depth suitable
6	104.61	This area was mined before the 2009 approval was recieved and have not been mined any deeper since that time.
7	103.46	Water height in sediment control dam
8	104.90	This area was mined before the 2009 approval was recieved and have not been mined any deeper since that time.
9	104.85	This area was mined before the 2009 approval was recieved and have not been mined any deeper since that time.
10	106.76	Depth suitable

2.1.3 2017 Production

Production at the quarry in 2017 amounted to 14253 tonnes comprising a combination of various grades of aggregate, road base, large rock and overburden. This was within the applicable production thresholds for the quarry. Production trends are summarised in **Figure 2.1.**

Figure 2.1 – Quarry Production 2017



2.1.4 2017 Truck Movements

Attachment 7 provides a breakdown of truck movements in the 2017 reporting period with these results summarised in **Table 2.1**. The log indicates that the Quarry has not exceeded the permitted 100 laden trucks from the site on any given day during the reporting period, with the highest number of vehicles (99 per day) occurring on 26th July and 30th November 2017.

Table 2.1 – Summary of Truck Movements 2017

	January	February	March	April	May	June	July	August	September	October	November	December
Highest Number of Trucks / Day	36	27	17	26	55	51	99	58	29	88	99	82

2.2 Hours of Operation

2.2.1 Applicable Criteria

Schedule 3 Condition 1

1. The Proponent must comply with the operating hours set out in Table 1.

Table 1: Operating hours

Activity	***Permissible Hours***
Quarrying operations including loading and dispatch of laden trucks	7 am to 6 pm Monday to Friday
	7 am to 3 pm Saturday
	At no time on Sundays or public holidays
Blasting	10 am to 3 pm Monday to Friday (except public holidays)
	At no time on Sundays or public holidays
Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence

2.2.2 Monitoring Results

The following observations are made with respect to hours of operation of the quarry:

a. Quarry opening hours are provided below:
   - 7am-4pm Monday to Wednesday
   - 7am-3.30pm Thursday and Friday

   As indicated, opening hours are compliant with the approved operating hours for the premises.

b. Blasting operations have occurred within the specified hours (refer also to Section 3.2); and
c. Quarry Management advises that no significant maintenance was completed outside of the nominated operating hours.

Part 3 – Schedule 3

Specific Environmental Conditions

3.1 Noise Generation

3.1.1 Applicable Criteria

Schedule 3 Condition 3

3. The Proponent must ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Noise criteria dB(A)

Receiver	Day $L_{Aeq\ (15\ minute)}$
Location 2	36
All other locations	35

Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the *NSW Industrial Noise Policy*. Appendix 5 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Proponent has an agreement with the relevant landowner to exceed the noise criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

Note: *In early 2016, agreement was reached with the owner of Receiver 9 (located at Lot 8 DP 240441) concerning noise monitoring results at that property. The Department of Planning was advised of this agreement in May 2016. Accordingly, the above assessment criteria do not apply to Receiver 9.*

3.1.2 Environmental Assessment Predictions

The Noise Impact Assessment lodged with the development application included the following predicted operational noise levels.

Table 3: Predicted Operational Noise Levels

Receiver Area	Predicted Noise LA_{eq} dB(A) Scenario			PSNL LA_{eq} dB(A)
	1.	2.	3.	Day
Location 1	33	33	33	38
Location 2	34	36	36	38
Location 3	<30	<30	<30	35
Location 4	<30	<30	<30	35
Location 5	33	33	31	35
Location 6	<30	<30	<30	35
Location 7	35	35	33	35

Notes:

- Scenario 1 – proposed overburden stripping
- Scenario 2 – proposed central operation
- Scenario 3 – proposed northern operation

3.1.3 Monitoring Results

The 2017 annual noise monitoring assessment was completed in November 2017 by Ambience Audio Services. A copy of the report documenting the findings of this assessment is provided at **Attachment 8.** The following extract from the assessment report summarises the measured noise levels at the nominated receiver locations.

Plate 3.1 – Extract Noise Monitoring Report

Summary of Measured Noise Levels at Receivers - 02,07,09 Nov 2017									
Receiver and Measurement #	Date	Start time	Elapsed time	L_{AFmax} [dB]	L_{Ceq} [dB]	L_{Aeq} [dB]	L_{Ceq}-L_{Aeq} [dB]	L_{AF10} [dB]	L_{AF90} [dB]
R1 M1	07/11/2017	09:39:18 AM	0:15:00	67.6	67.0	49.0	18.0	51.7	43.2
R1 M2	09/11/2017	09:18:38 AM	0:15:00	56.5	57.8	43.2	14.6	45.7	38.0
R2	09/11/2017	08:11:54 AM	0:15:00	61.8	55.8	45.4	10.5	48.9	32.7
R3	09/11/2017	08:46:47 AM	0:15:00	66.6	63.1	44.7	18.4	45.7	34.9
R4 M1	02/11/2017	09:02:11 AM	0:15:00	59.8	48.1	39.5	8.5	42.5	31.2
R4 M2	02/11/2017	10:19:33 AM	0:15:00	51.1	47.9	37.6	10.3	41.4	31.5
R4 M3	07/11/2017	08:14:32 AM	0:15:00	64.7	53.2	44.7	8.5	44.7	34.3
R6 M1	07/11/2017	08:45:35 AM	0:15:00	74.2	52.7	44.5	8.2	45.1	35.5
R6 M2	07/11/2017	09:00:54 AM	0:15:00	66.4	56.9	45.5	11.4	46.4	35.7

Note:

The above results are the ambient noise levels and includes noise from the rural surroundings and quarry noise if audible. No tonal, low frequency or impulsive noise characteristics from the quarry operations were observed at the receiver locations.

The discussion within the report goes on to advise as follows:

> *"The measurements were undertaken while the quarry was operating under normal operating conditions... A second noise logger was located above the quarry floor as a reference for quarry crushing operations noise levels.*
>
> *The measured results in Table 3.5 are from the combined noise of the quarry (if audible) and the ambient noises.*
>
> *At Receiver 1, a second recording was conducted on the 9th as the wind had picked up on the 7th and wind in trees noise levels were higher. The background noise levels (LA90,15min) were lower on the 9th but distant traffic from Nimbin Road was underlying for most of the time. There was audible quarry noise (rock crusher) on the 7th with changes in breezes and possibly larger rocks being crushed for several brief periods 10 - 15 seconds during the 15 minute monitoring period. It was observed that noise levels were*

40 – 45 decibels for these brief periods. The quarry was not audible at other times. It is estimated that the quarry LAeq,15 min is below the Project Specific Noise Level of 35 dB(A).

At Receiver 2, quarry noise was just barely audible when no other noises were present. It is estimated that the quarry LAeq,15 min is below 33dB(A).

At Receiver 3, quarry noise was just audible occasionally. Observed levels were 35 – 40 dB(A). Quarry noise appeared to be tipping at the overburden stockpile. It is estimated that the quarry LAeq,15 min is below 33dB(A).

At Receiver 4, two 15 minute periods were recorded on the 2nd when equipment was broken down and the crushing was not operating. The wind conditions were calm and background was 31.2 and 31.5. The quarry was not audible on the 7th when the quarry was operating under load conditions. The LA90,15min had increased approximately 3 decibels to 34.3. It is estimated that the quarry LAeq,15 min is below 33dB(A).

At Receiver 6, the quarry was not audible. LA90,15min was 35.5 and 35.7 due to moving foliage. It is estimated that the quarry LAeq,15 min is below 35dB(A)."

3.2 Blasting

3.2.1 Applicable Criteria

Schedule 3 Condition 6

6. The Proponent must ensure that blasting on site does not cause any exceedance of the criteria in Table 3.

Table 3: Blasting Criteria

Receiver	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Any residence on privately-owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months

However, these criteria do not apply if the Proponent has a written agreement with the relevant owner to exceed the limits in Table 3, and the Proponent has advised the Department in writing of the terms of this agreement.

Schedule 3 Condition 7

Blasting Frequency

7. The Proponent may carry out a maximum of 2 blasts per month, unless an additional blast is required following a blast misfire. This condition does not apply to blasts required to ensure the safety of the quarry or workers on site.

Note: *For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the quarry.*

3.2.2 Environmental Assessment Predictions

The environmental assessments concluded that compliance with the above criteria should be able to be achieved during operation.

3.2.3 Monitoring Results

Blasting occurred on 8 occasions in 2017, with formal blast monitoring occurring at combinations of the following locations:

- MP1 – 484 Nimbin Road
- MP 2 - 356 – 387 Boorie Creek Road
- MP 3 - 464 – 528 Nimbin Road

A summary of the blast monitoring results is provided within **Table 3.1,** with full blast reports contained within **Attachment 9.** As indicated, each of the blasts met the required environmental parameters for Ground Vibration and Airblast Overpressure. Blasting also occurred within:

- the nominated frequency specified within Condition 7; and
- the nominated hours specified within Condition 1.

Table 3.1 – 2017 Blast Monitoring Results

Date	Blast #	Time	Ground Vibration mm/sec *(Limit – 5mm/sec)*			Airblast Overpressure dB(Lin Peak) *(Limit – 115dB(Lin Peak))*		
			Monitor #			Monitor #		
			1	2	3	1	2	3
01/02/17	17	13:04	1.18mm/s	1.38mm/s	-	109.9dB(l)	101.9dB(L)	-
23/03/17	18	13:11	<TL*	<TL*	1.23mm/s	<TL**	-<TL**	109.5bB(L)
24/04/17	21/22	11:45	<TL*	-	<TL***	<TL**	-	<TL***
25/05/17	23****	12:32	-	-	0.773mm/s	-	<TL**	98.8dB(L)
25/05/17	23****	13:02	<TL*	-	-	<TL**	-	-
25/05/17	23****	13:32	-	<TL*	-	-	-	<TL**
13/07/17	25	13:32	1.10mm/s	2.04mm/s	1.20mm/s	106.5dB(L)	109.5dB(L)	107.5dB(L)
04/08/17	26	12:06	<TL*	<TL*	<TL*	<TL**	<TL**	<TL**
09/10/17	27	13:57	0.916mm/s	<TL*	1.16mm/s	108.8dB(L)	<TL**	107.0dB(L)
20/12/17	31	14:49	<TL*	<TL*	<TL*	-<TL**	<TL**	<TL**
			* TL = Equipment Trigger Level (0.51mm/s)			**TL = Equipment Trigger Level (110dBL)		

- **** With respect to Blast 21/22 we note that the monitoring report for Monitor #3 identified that this occurred at 533 Nimbin Road. (rather than 464 – 528 Nimbin Road). We are advised that this is a typographical error and that all blast monitoring throughout the year occurred at one or other of the approved monitoring points.

- ***With respect to Blast 23, we note that there are varying trigger times for this blast. We are advised by the monitoring contractor that this was because there "*were three small blasts around the pit for oversize at different times*". This is considered consistent with the 'note' provided at the end of Condition 7 which advises "*for the purpose of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the quarry*".

3.2.4 Trends

Given varying blast details (location, depth and shot calibration) no discernible trends have been identified within the recorded data.

3.3 Air Quality

3.3.1 Applicable Criteria

Schedule 3 – Condition 10

10. The Proponent must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the project do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.

Table 4: Air quality criteria

Pollutant	*Averaging Period*	*Criterion*	
Particulate matter < 10 µm (PM_{10})	Annual	[a,d] 25 µg/m³	
Particulate matter < 10 µm (PM_{10})	24 hour	[b] 50 µg/m³	
Total suspended particulates (TSP)	Annual	[a,d] 90 µg/m³	
[c] Deposited dust	Annual	[b] 2 g/m²/month	[a,d] 4 g/m²/month

Notes to Table 4:
a Cumulative impact (ie increase in concentrations due to the project plus background concentrations due to all other sources).
[b] Incremental impact (ie increase in concentrations due to the project alone, with zero allowable exceedances of the criteria over the life of the project.
[c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.
[d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.
e "Reasonable and feasible avoidance measures" includes, but is not limited to, the operational requirements in conditions 11, 12 and 13 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.

3.3.2 Monitoring Results

Dust monitoring stations are established at three sites around the Quarry NW, SW and East. Results from the 2017 monitoring period is provided at **Attachment 10** whilst tables illustrating the results 2012 – 2017 is provided in **Figures 3.1 – 3.3**,

Monitoring has been completed in accordance with the required schedule of 30 days (+/- 2 days). Annual results comply with the applicable annual average suspended solids criteria of 4.00g/m²/month.

Quarry Management advises that a foaming agent (Polo Citrus) is now added during rock processing which acts to reduce dust generated on site.

Figure 3.1: Dust Monitoring Trend Sample Point 1

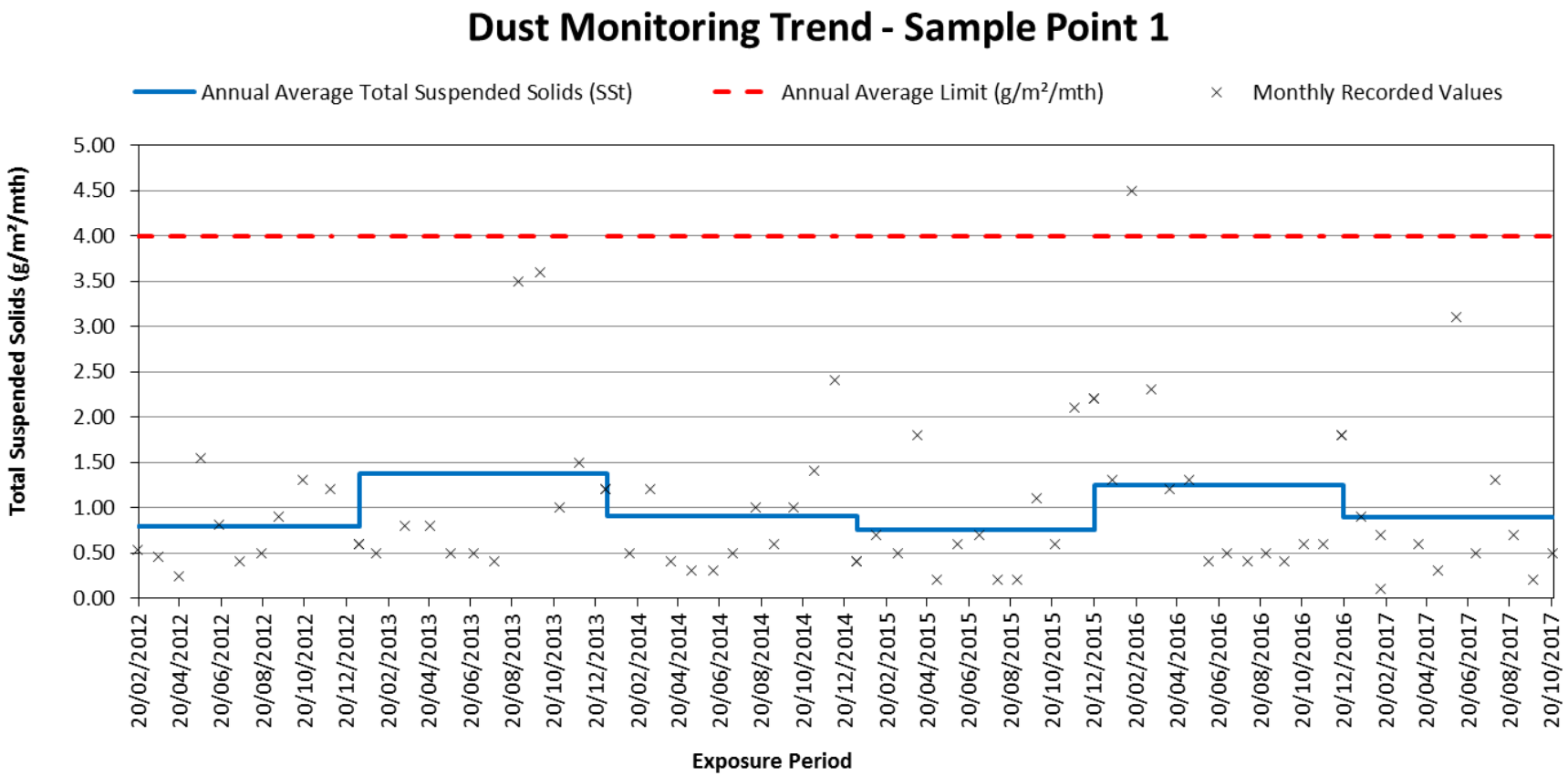


Figure 3.2: Dust Monitoring Trend Sample Point 2

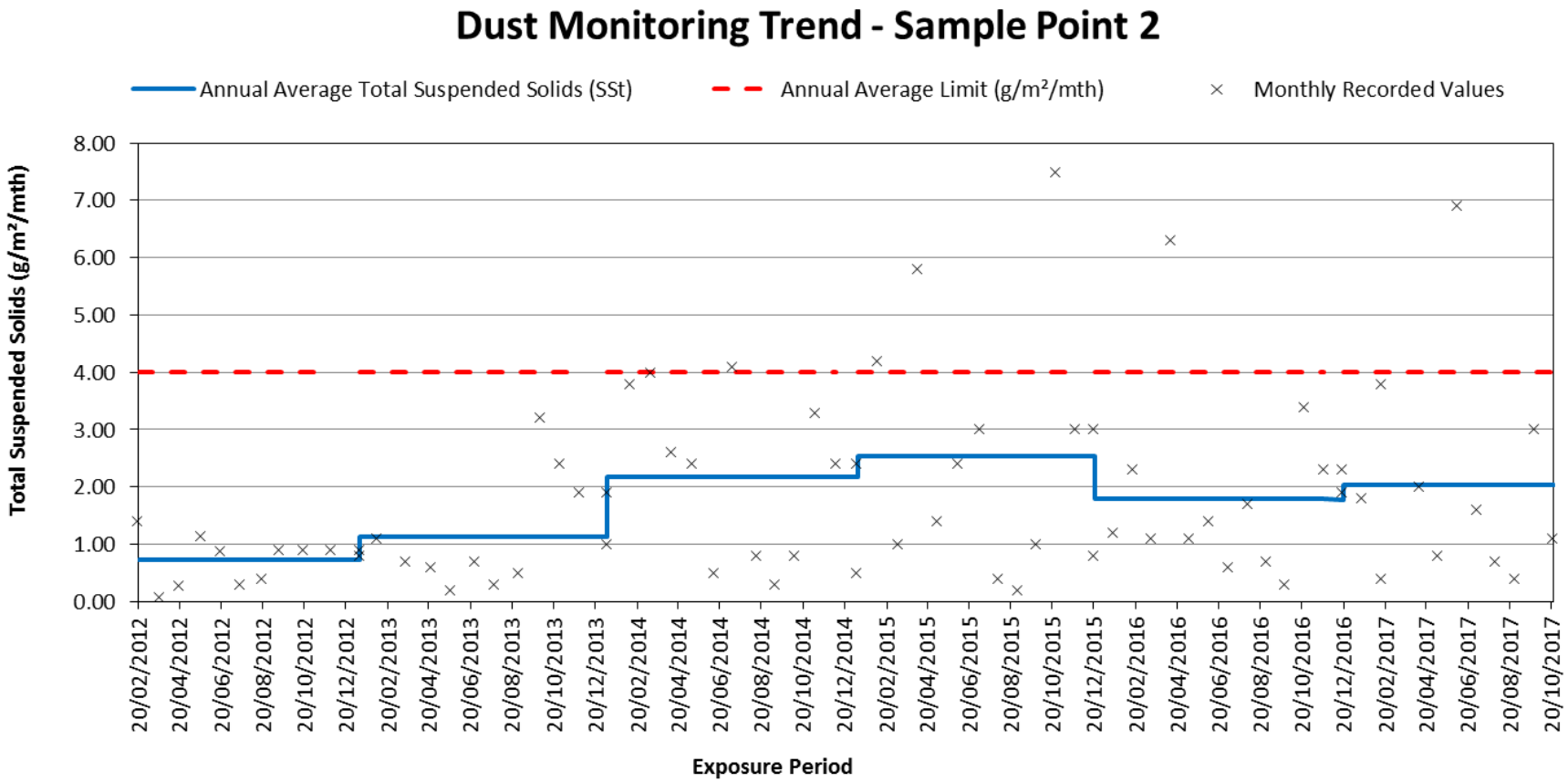
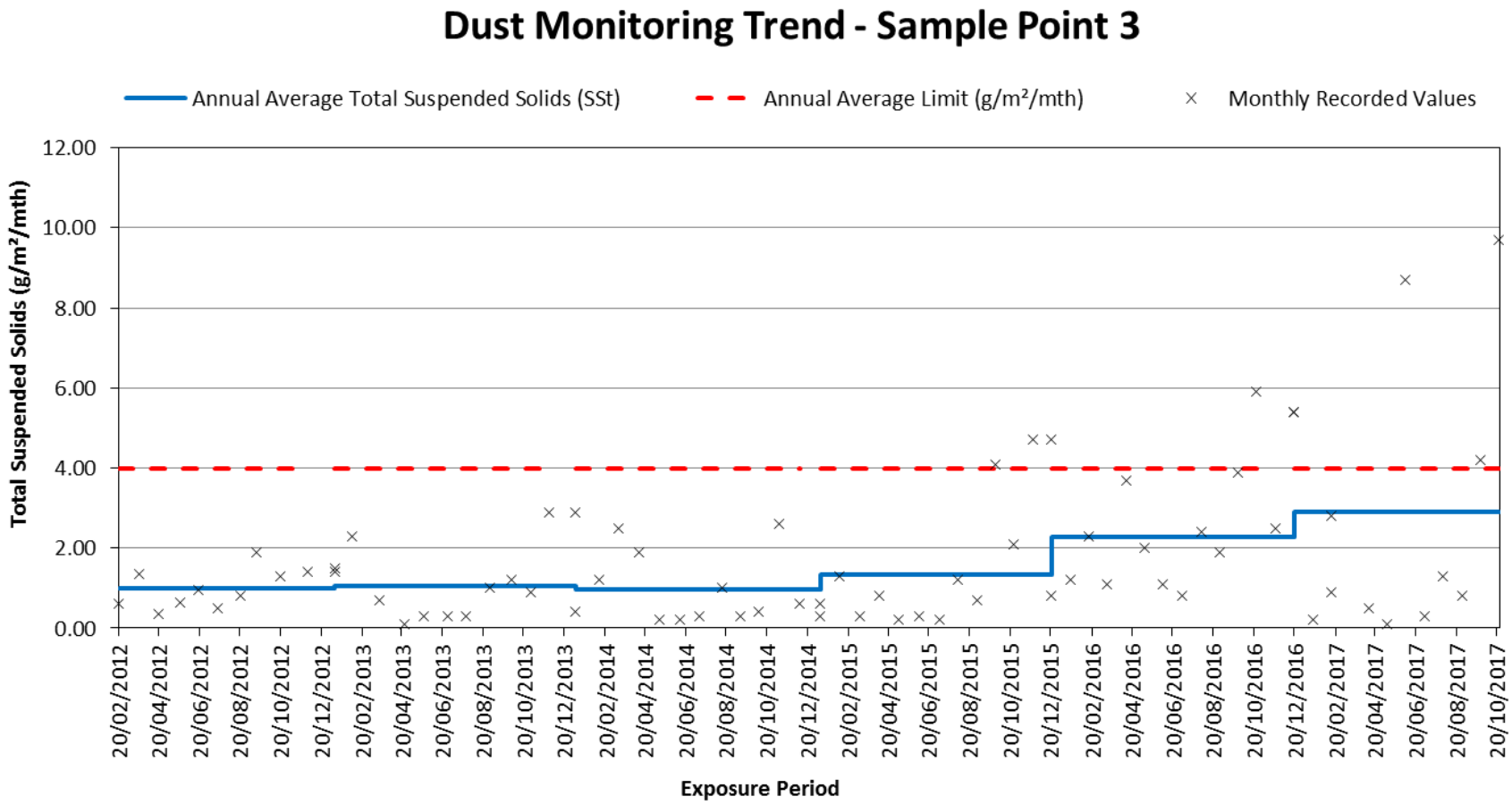


Figure 3.3: Dust Monitoring Trend Sample Point 3



3.4 Ground Water

3.4.1 Applicable Criteria

Schedule 3 – Condition 17

Groundwater Assessment

17. The Proponent must undertake a detailed groundwater assessment to the satisfaction of the Secretary. This assessment must be:
    (a) prepared by a suitably qualified expert in consultation with DPI Water;
    (b) submitted to the Secretary for approval by 30 December 2018;
    (c) approved by the Secretary before any extraction below 105 m AHD in the northern pit or below 118.5 m AHD in the southern pit;
    (d) adequately assess groundwater resources affected by the northern and southern pits, to the proposed full extraction depths of those pits;
    (e) adequately assess all groundwater impacts associated with proposed extraction;
    (f) provide data for predicted groundwater pit inflows during and following extraction; and
    (g) propose management measures to address pit inflows and impacts to groundwater resources.

    The Proponent must implement the management measures proposed in the groundwater assessment to the satisfaction of the Secretary.

3.4.2 Current Status

Gilbert and Sutherland have been engaged by NRQA to complete the required assessments. This has included the installation of new peizometers, which provide for constant monitoring of the groundwater levels in the vicinity of the quarry. These assessments are ongoing in accordance with a timeframe agreed with DPE.

3.4.3 Environmental Assessment Predictions

The ERM Groundwater Monitoring and Management Sub-Plan (April 2011) does not provide 'Environmental Assessment Predictions'. The Sub-plan does however identify the following environmental predictions.

There is presently insufficient data available to calculate statistically-derived site specific trigger levels for the range of analytes measured, and based on the proposed monitoring program, it may some time before sufficient data is available. On this basis, and given the assessed low potential impact on groundwater from future quarrying operations, it is proposed to initially compare the data against criteria from the following published guidelines:

- ANZECC (2000) Australian and New Zealand Guidelines for fresh and marine water quality; and
- NHMRC (National Health and Medical Research Council) (2004) Australian Drinking Water Guidelines.

The assessment criteria for discharge water and groundwater are presented in

Table 7.2 Groundwater Quality Assessment Criteria for Discharge

The need for calculating site specific trigger levels would be reviewed after two years of operations once a larger data set is available.

Table 7.2 Groundwater Assessment Criteria for Discharge

Analysis	ANZECC Trigger Values for Freshwater	NHMRC Drinking Water
pH units	6.5-9.0	6.5-8.5
Conductivity (µs/cm)	1500	n/s
Nitrate (NO_3)	0.7	50
Aluminium (Al)	0.055	0.2*
Total Arsenic (As)	0.024	0.007
Cadmium (Cd)	0.0002	0.002
Total Chromium (Cr)	n/s	n/s
Copper (Cu)	0.0014	2
Mercury (Hg)	0.0006	0.001
Nickel (Ni)	0.011	0.02
Lead (Pb)	0.0034	0.01
Zinc (Zn)	0.008	3*

3.4.4 Monitoring Results

Ground Water Analysis results are provided at **Attachment 11.** Over the coming year, more comprehensive results with be forthcoming as the new monitoring program is rolled out capturing increased data at deeper levels. Refer also Section 3.3.2.

3.5 Surface Water (Including Water Balance)

3.5.1 Background

Schedule 3 Condition 19

19. The Proponent must prepare a Soil and Water Management Plan for the project to the satisfaction of the Secretary. This plan must:
    (a) be prepared by suitably qualified and experienced person/s approved by the Secretary;
    (b) be prepared in consultation with the EPA and DPI Water;
    (c) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; and
    (d) include a:
        (i) Site Water Balance that includes:
            - details of:
                - sources and security of water supply;
                - water use and management on site;
                - any off-site water transfers; and
                - reporting procedures; and
            - measures to be implemented to minimise clean water use on site;
        (ii) Surface Water Management Plan, that includes:
            - a program for obtaining detailed baseline data on surface water flows and quality in water bodies that could potentially be affected by the project;
            - a detailed description of the surface water management system on site including the:
                - clean water diversion system;
                - erosion and sediment controls;
                - dirty water management system; and

3.5.2 Soil and Water Management Plan

Quarry Management engaged Gilbert and Sullivan to prepare the updated Soil and Water Management Plan in accordance with the above requirements. This was provided to the Department under separate cover in March 2018.

The previous 2011 Soil and Water Management Sub-plan identifies that the Monitoring Program will comprise the following:

- *Water quality monitoring will be undertaken in sediment basins prior to these being actively discharged to receiving watercourses.*
- *Water samples will be collected and analysed for pH, Total Suspended Solids (TSS), Heavy Metals and Oil & Grease.*
- *Surface water sampling points will also be established on drainage lines that may receive runoff from the quarry floor or from active site discharges.*
- *Water flow behaviour will be assessed in watercourses discharging from the site.*

3.5.3 Site Water Balance

Quarry Management engaged Gilbert and Sullivan to prepare the 2017 Site Water Balance, a copy of which is provided at **Attachment 12**. The assessment concluded that "*during [the 2017 annual return period] rainfall captured and stored within the quarry catchment provided sufficient supply for all on-site [non-potable] water usage.*"

3.5.4 Environmental Assessment Predictions

The ERM Soil and Water Management Sub-Plan (8 April 2011) identifies the following environmental predictions.

> There is presently insufficient data available to calculate statistically-derived site specific trigger levels for the range of analytes measured, and based on the proposed monitoring program, it may some time before sufficient data is available. On this basis, and given the assessed low potential impact on surface water from future quarrying operations, it is proposed to initially compare the data against criteria from the following published guidelines:
>
> - ANZECC (2000) Australian and New Zealand Guidelines for fresh and marine water quality; and
> - NHMRC (National Health and Medical Research Council) (2004) Australian Drinking Water Guidelines.
>
> The assessment criteria for discharge water and surface water are presented in *Table 7.2*.
>
> The need for calculating site specific trigger levels would be reviewed after two years of operations once a larger data set is available.

Table 7.2 Surface Water Analytical Program

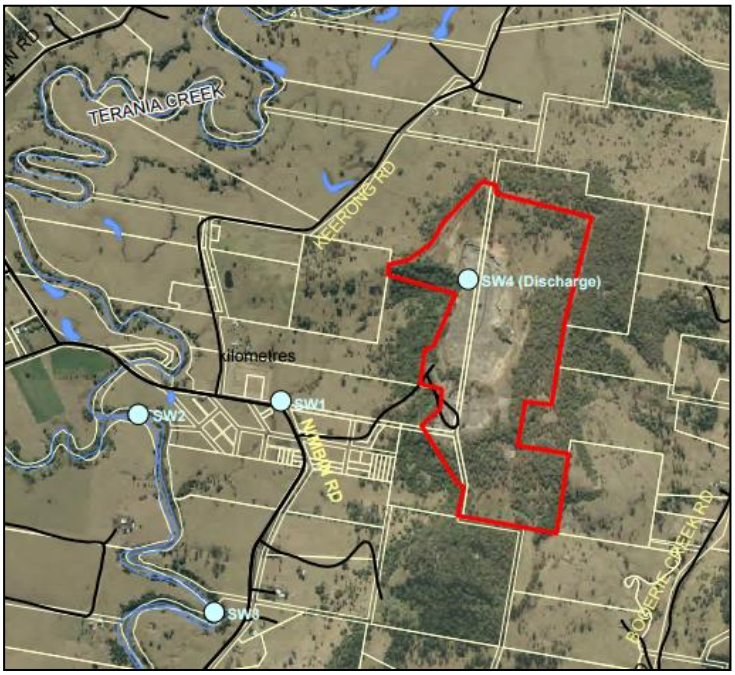
Analysis	ANZECC 2000
	Trigger Values for Freshwater
pH units	6.5-9.0
Conductivity (µs/cm)	1500
Nitrate (NO_3)	0.7
Aluminium (Al)	0.055
Total Arsenic (As)	0.024
Cadmium (Cd)	0.0002
Total Chromium (Cr)	n/s
Copper (Cu)	0.0014
Mercury (Hg)	0.0006
Nickel (Ni)	0.011
Oil and Grease	No visible sheen or detectable odour
Total Suspended Solids (mg/L)	50*
Lead (Pb)	0.0034
Zinc (Zn)	0.008
* maximum trigger level for lowland rivers in slightly disturbed ecosystems in South East Australia.	

3.5.5 Monitoring Results

Monitoring Stations

Surface water monitoring stations were established in June 2012 at four locations on the western side of the quarry in the locations illustrated on **Plate 3.1.**

Plate 3.1 – Water Sampling Points



Sampling Results - SW1, SW2 & SW3

Quarterly sampling was undertaken in 2017 at SW1, SW2 and SW3. **Attachment 13** provides tables documenting the monitoring results. whilst **Figures 3.4 – 3.6** illustrate the key reporting parameters of pH, Total Suspended Solids (TSS), and Oil & Grease for the years 2013 – 2017.

Sampling Results - SW4

SW4 is typically sampled only at time of water discharge. Between 2013-2016 no discharge occurred and, accordingly, no records are provided for this point relating to the earlier monitoring periods. However, in early 2017, monitoring at this site occurred relating an assessment with respect to the levels of Aluminium and other heavy metals in both the surface and ground water monitoring results (refer **Section 3.5.7**). As such, results are available SW4 for the first half of 2017. **Figures 3.7 – 3.9** illustrate the key reporting parameters of pH, TSS, and Oil & Grease for the past reporting period.

Figure 3.4 – Total Suspended Soils Trends 2013-2017

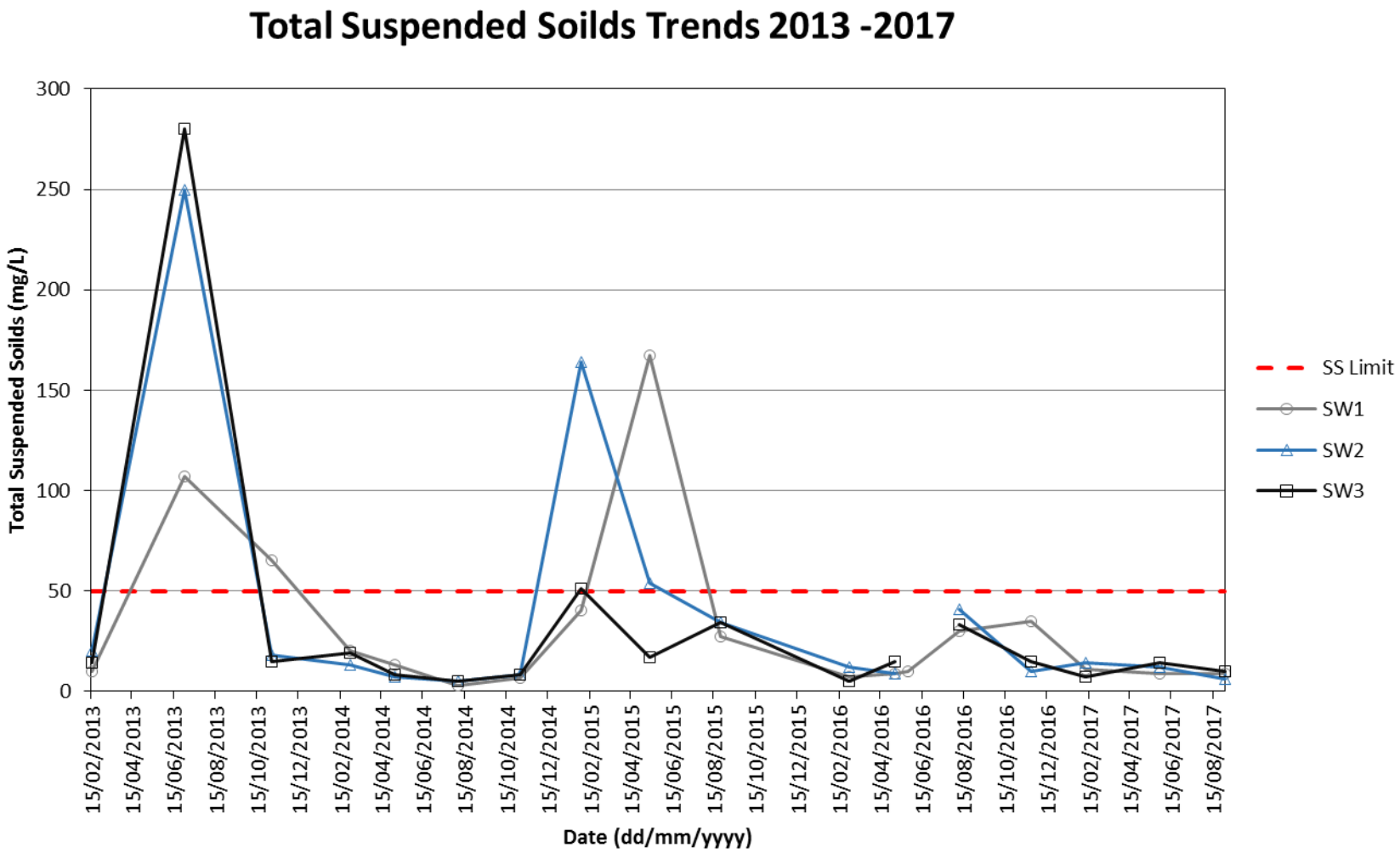


Figure 3.5 – pH Trends 2013-2017

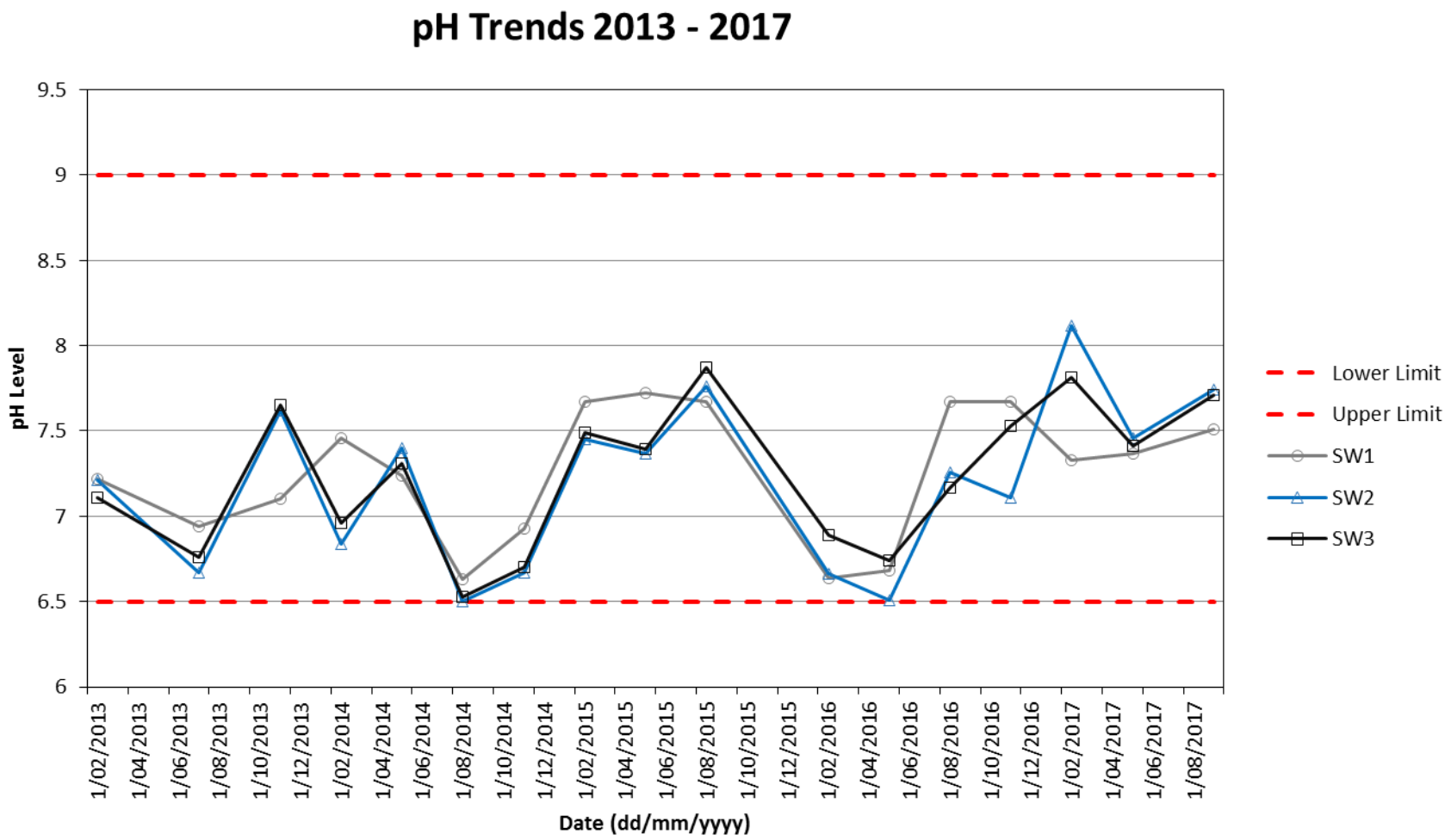


Figure 3.6 – Total Oils and Grease 2013-2017

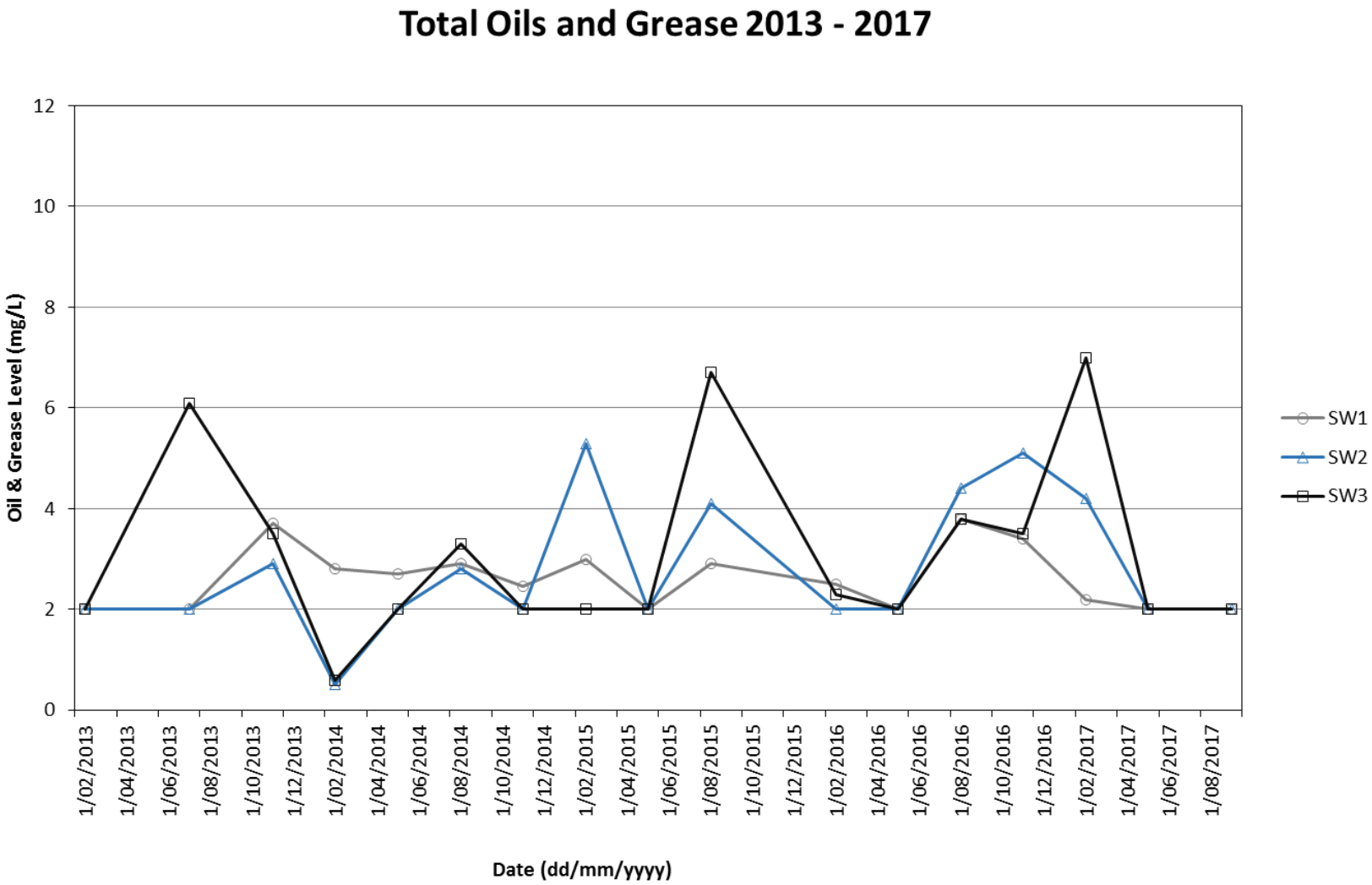


Figure 3.7 – Total Suspended Soilds Trends 2017-SW4

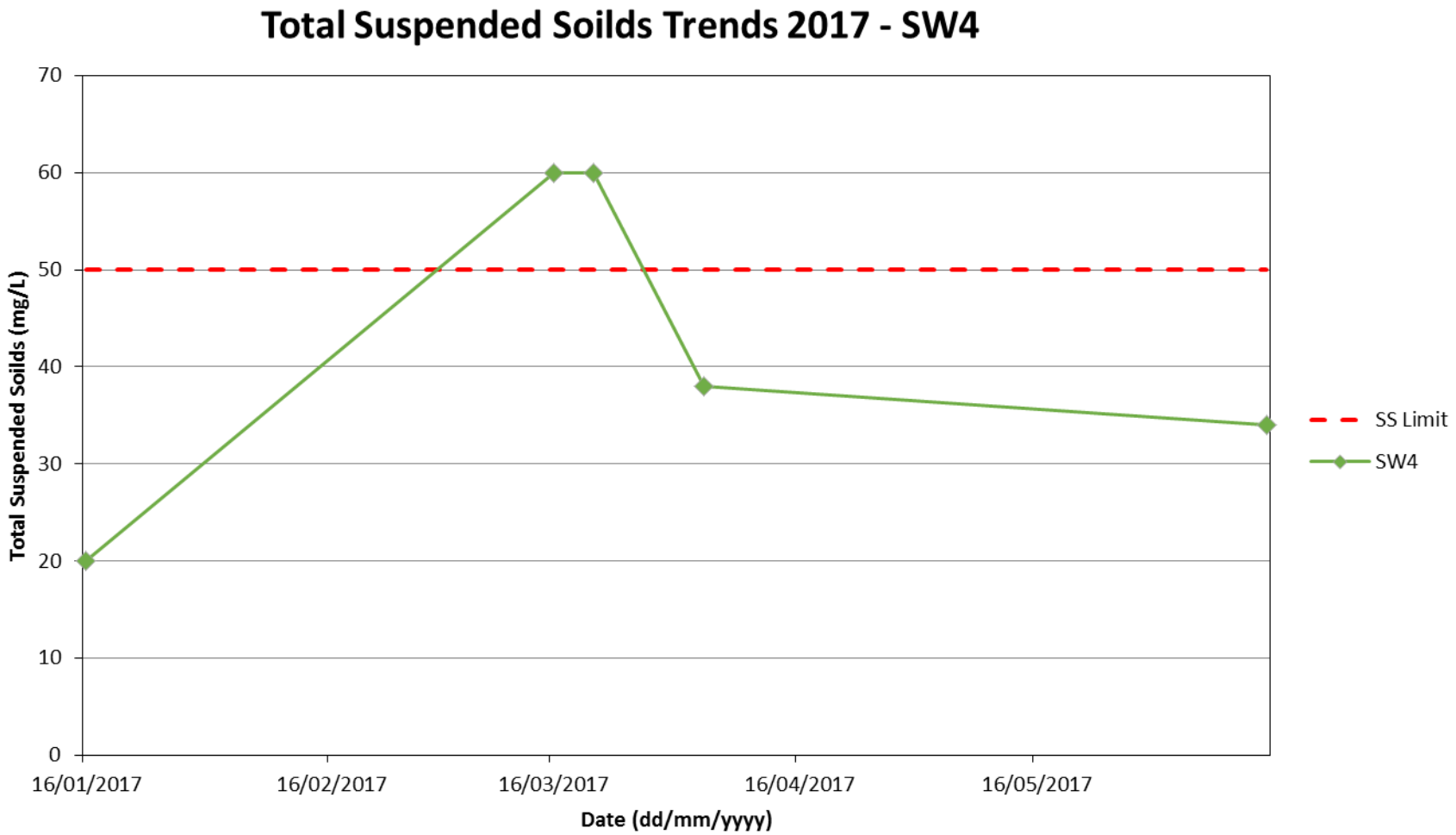


Figure 3.8 – pH Trends 2017-SW4

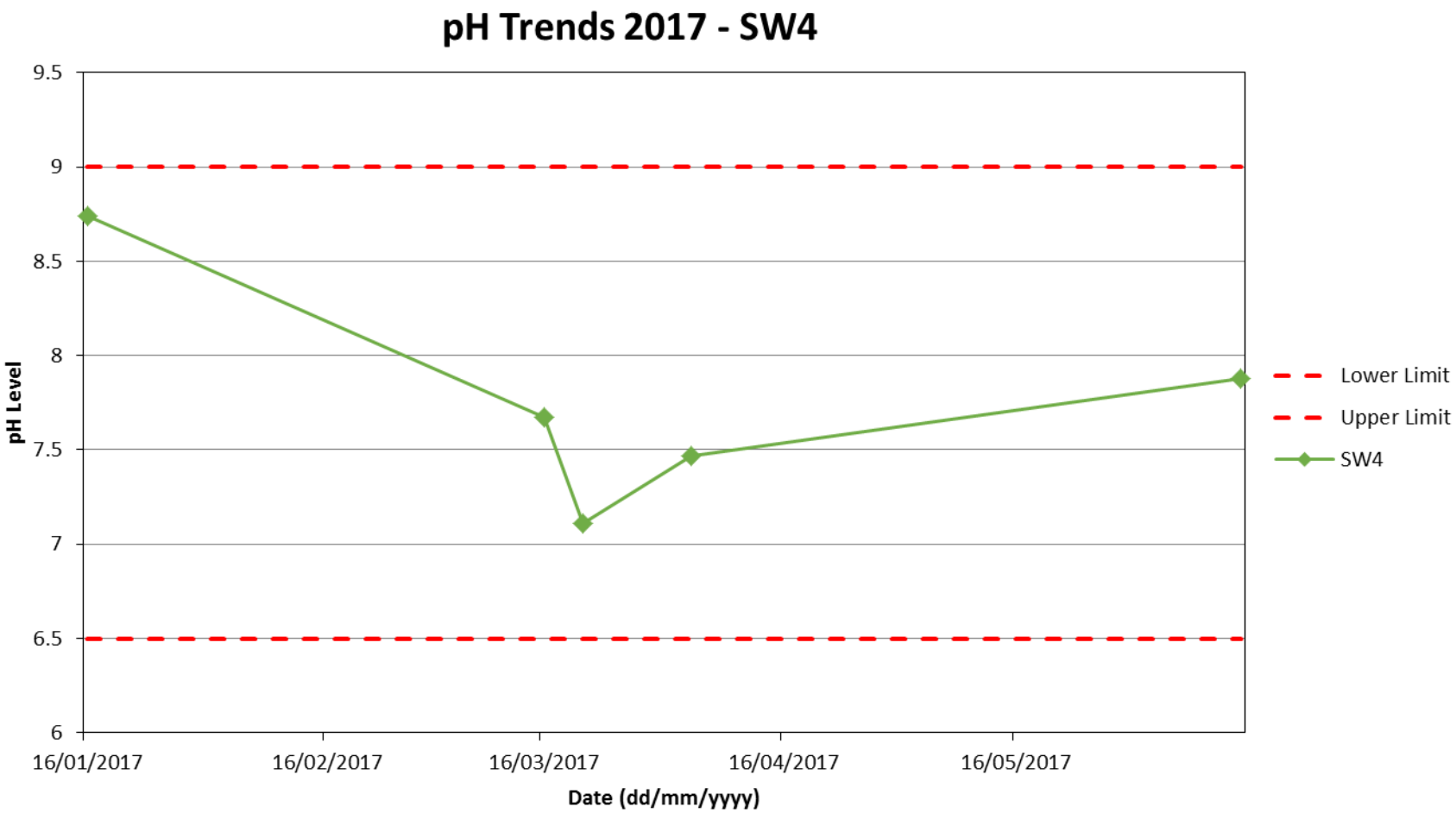
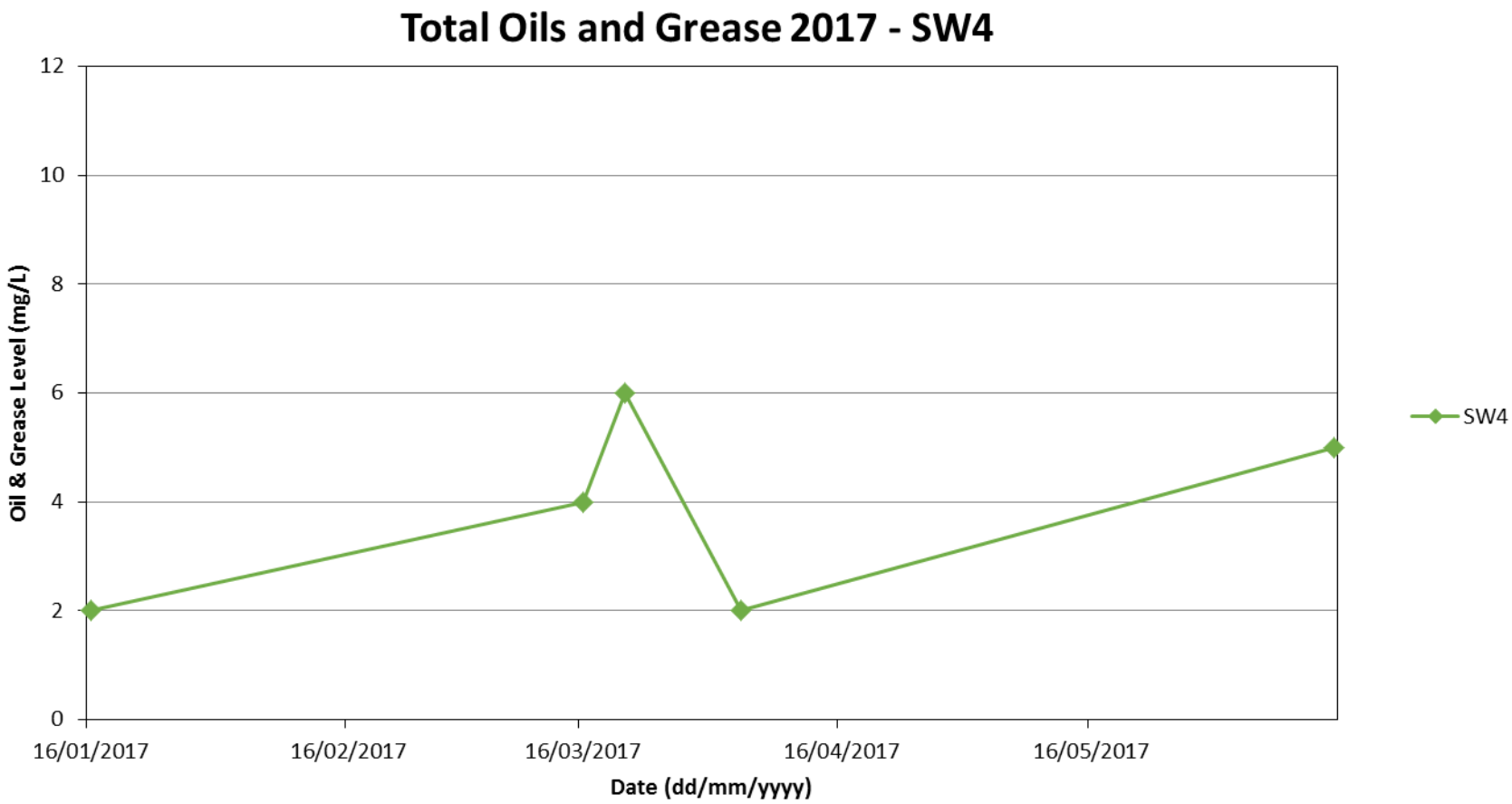


Figure 3.9 – Total Oils and Grease 2017-SW4



3.5.6 Trends and Observations

With the exception of SW4, Total TSS and pH records have remained within the nominated testing range for the 2017 calendar year. SW4 recorded a peak in Suspended Solids correlating with the severe weather event associated with Ex-Tropical Cyclone Debbie. These results must be considered in the context of the characteristics of the discharge point from the quarry – namely an informal dirt gully located within a property utilised for cattle grazing

3.5.7 Heavy Metals (Including Aluminium)

The 2016 Monitoring Report identified that recorded levels of aluminium are above the ANZECC trigger values at all recording stations. It is further that the results have consistently been above the trigger value since February 2013.

In response, NRQA engaged Ecoteam to complete a Preliminary Water Quality Investigation relating to concentrations of aluminium and other metals within the ground and surface water monitoring. This assessment was completed in early 2017 and a copy of the resulting report is provided at **Attachment 14**. In summary, the report advises:

> *"Concentrations of both total and dissolved copper were above ANZECC Guidelines in surface water samples. Concentrations of total aluminium, chromium, copper and zinc results were above ANZECC Guidelines in groundwater samples, however, dissolved concentrations of these metals were all below ANZECC Guideline limits. Soil results were all within NEPM Guideline limits...*
>
> *Elevated concentrations of aluminium and copper in surface water samples is attributed to the local in-situ soils of the Wollongbar landscape which are highly erodible, have high acidity and high aluminium toxicity potential. Elevated concentrations of total metals and suspended solids in groundwater may be attributed to surface water percolating through the surface soils and exposed basalt within the Quarry as well as from naturally occurring soft, muddy soil layers located at various depths. While total metals concentrations are above ANZECC Guideline limits, the discrete sample collected at BQN1-D returned dissolved metal concentrations below the ANZECC Guidelines for Freshwater Aquatic Ecosystems."*

The report goes on to recommend:

...ongoing analysis of total and dissolved metals in groundwater in future monitoring rounds. We also recommend compiling the driller's logs for the five new monitoring wells (installed in 2016) to inform future data analysis and interpretation.

The current site characteristics do not pose a risk to human or environmental health, however, ongoing monitoring and regular interpretation of groundwater results is recommended.

3.5.8 Sediment and Erosion Control

As advised in **Section 1.4**, the NSW EPA issued a formal caution in November 2017 relating to sediment management and erosion control within the quarry. A copy of this caution is provided at **Attachment 6**.

In response, an Action Plan has been developed by NRQA and submitted to the EPA. The EPA has subsequently advised that the Action Plan is satisfactory subject to implementation. Various amendments have been made to quarry operations in response to this caution including improved sediment fencing and diversion drains, repair to overflow points and filling of the southern sediment basin and redirection to the basin within the main pit.

3.6 Transport

3.6.1 Background

Schedule 3 Condition 20

Monitoring of Product Transport

20. The Proponent must keep accurate records of all laden truck movements to and from the site (including time of arrival and dispatch) and publish a summary of records on its website every 6 months.

3.6.2 Monitoring Results

Quarry management has traditionally kept a log of truck vehicle movements exiting the site. A review of the LCC Website on 28 March 2018 confirms that the 2017 data was available on the website. The Mod 1 approval introduced a requirement to also record times that trucks enter the site. NRQA advises that it is reviewing the data capture method to enable truck arrival times to also be provided within this data set.

All major road works associated with the establishment of the Quarry were completed in 2014. Rehabilitation planting associated with the road works is also complete. Accordingly, no assessment is made against these criteria. As advised in **Section 1.4**, a development application has been lodged to realign the property boundaries of the quarry to ensure that the driveway is located wholly on the same parcel as the broader quarry operations.

3.7 Aboriginal Heritage

NRQA advises that no items or places of Aboriginal heritage significance were identified on site in 2017.

3.8 Biodiversity Offsets

The process for transferring the 45 hectares of environmental offsets to the quarry site is complete and Blakebrook Quarry is now located on Lot 201 DP 1227138, Parish of Blakebrook, County of Rous.

3.9 Site Rehabilitation

Given the current phase of quarry production, no site rehabilitation has occurred within 2017.

3.10 Biodiversity and Rehabilitation Management Plan

Quarry Management Advises that the required Biodiversity and Rehabilitation Management Plan was reviewed and submitted to the Department in March 2018.

3.11 Bushland Regeneration Works and Weed Control

Quarry Management advises that bushland regeneration works continue to be carried out in accordance with the adopted Bushland Regeneration Plan for the quarry as resources allow. Reports by 'Roots Down Conservation Contractors' document the works completed in 2017 and are provided at **Attachment 15.**

The report identifies that work has continue to focus on weed control zones 6, 7 and 19. With respect to results, the report advises that

"So far zone 6 has shown a reduction of numbers and health of weed present, reproduction very unlikely…We have found species of passionfruit more persistent in this area than other weeds because of this we have increased emphisis on hand removal of passionfruit during the primary weed control stage. There has also been germination of eucalypts in the southern area through the blady/kangaroo grass area.

Due to the control of the Privet and Camphor Laurel in zone 19 and 7 reducing the density of the canopy, significant extra light is reaching the understorey plants and should allow the increase in native grasses and groundcovers it will also allow the regenerating eucalypts to establish but may encourage the growth of annual weeds and it is expected germination of woody weed seedlings from the seed bank".

2016 Audit Actions

The 2016 Audit foreshadowed the following to occur in 2017:

- Increase the person days spent completing the bush regeneration from 72 to 96.
  Comment: *Contactors have been engaged on the basis of 4 persons 2 days per month. This equates to the foreshadowed 96 person days.*
- A Habitat Enhancement Plan was to be prepared including the new land acquisitions buffering the quarry.
  Comment: *This plan has not been prepared as a 'standalone exercise'. However, the subject land has been incorporated within the Updated Biodiversity and Rehabilitation Plan submitted to DPE. This Plan incorporates information with respect to rehabilitation and revegetation across the quarry site. In addition, a local ecologist has been engaged to prepare a more detailed habitat regeneration plan for the compensatory areas. This work is well advanced and is expected to be finalised in md 2018. The Plan is expected to incorporate a large area of Koala habitat regeneration to the west of the quarry floor.*

3.12 Koala Management

Council staff continue to record koala sightings at the quarry (refer **Attachment 16**). In 2017, 4 koalas were recorded by Council staff compared to 16 in 2016. It is unclear whether this represents a reduction in actual koala numbers, or whether it is reflective of a change in personnel at the quarry. In this regard, 8 of the 15 reported sightings in 2016 were made by just two staff members who are no longer based at Blakebrook Quarry.

The 5 yearly Koala Population Study completed by BioLink Ecological Consultants in 2016 made a number of recommendations. These recommendations, together with quarry management responses are provided below:

1. Continuation of bush regeneration, with a priority on koala activity cells and areas that support koala food trees;
   Response: *Refer comments above.*

2. Additional koala food tree plantings; and
   Response: *Refer comments above.*

3. Ongoing monitoring of koala sightings by quarry staff and also a formal biennial sampling program.
   Response: *Quarry management have reminded all staff of the importance of retaining accurate records with respect to koala sightings.*

3.13 Wild Dog Management

A wild dog baiting program continues to be implemented in conjunction with the Local Land Service. Four rounds of baiting were completed 2017 on the following dates:

Date	Baits Laid
19/09/17	15
27/09/17	10
16/10/17	10
07/11/17	9

General feedback at the Community Consultative Meetings indicates that wild dogs continue to be a problem in the locality. NRQA will continue to partner with the land service and community regarding this matter.

3.14 Visual Impacts

Quarry operations are located below the tree line and do not intrude on the landscape of visual character of the locality.

3.15 Waste

NRQA advises that in 2017 waste management practices at the quarry involved the following:

- Waste generated by staff are separated into general waste and recyclables;
- Lismore City Council 'standard' waste collection service does not extend to the quarry. Accordingly, waste is delivered to the Whyrallah Road Waste Management Facility by quarry staff on an 'as needs' basis'.
- Used oil drums are transported to the Whyrallah Road Waste Management Facility by quarry staff on an 'as needs' basis'
- Crushed glass from the Whyrallah Road Waste Management Facility is mixed with quarry product sold for pipe bedding and road base. Note: Glass has suitable Waste Exemption Certification.
- No waste (other than the exempted glass product referenced above) is stored or processed on site.

3.16 Liquid Storage & Dangerous Goods

NRQA advises that in 2017:

- A 20,000 litre fuel tank is provided on site and is located within a bessa block bund;
- Oils and lubricants are stored in suitable containers with self contained bunding; and
- Chemicals associated with the on-site laboratory are stored within a bessa block bund.

As referenced in **Section 6.4**, upgrades are budgeted in 2018 to provide an improved fuel storage area on site.

3.17 Bushfire

NRQA advises that in 2017:

- The quarry was equipped with both fire extinguishers and water carts, with this equipment maintained on a regular basis.;
- No fires occurred on the quarry grounds; and
- The quarry was not called upon by the RFS to attend to any fires in the vicinity of the quarry.

Part 4 - Schedule 4

Additional Procedures

4.1 Notification of Landholders

No exceedances of monitoring results have occurred in 2017 and accordingly no particular notification of neighbours required.

4.2 Independent Review

No neighbours have requested an independent assessment of the impacts of the development on their land in 2017.

4.3 Property Inspections (Pre-blast Conditions)

Notifications and associated inspections completed prior to 2017.

4.4 Property Investigations (Blast Impacts)

No landholder has requested an independent property investigation in 2017.

Part 5 - Schedule 5

Environmental Management, Reporting & Auditing

5.1 Strategy Development, Implementation and Revision

We are advised that all required Sub-plans have been prepared and submitted to the Department for review in December 2017 and March 2018. This AEMR has not reviewed the processes to develop these documents or the content or adequacy thereof, as it is assumed that the DPE review will assess each subplan in accordance with the applicable conditions of approval.

5.2 Community Consultative Committee

In 2017, the Community Consultative Committee (CCC) met on 1 occasion (11 May 2017). Minutes from this meeting are provided at **Attachment 17.** Mr Tim Heldt was appointed Chair of the CCC following the election of the previous Chair to Lismore City Council during the 2016 Local Government elections.

NRQA advises that the CCC is continuing to providing an effective tool for interested parties to raise any issues or concerns regarding the Quarry operations, thereby avoiding complaints direct to the quarry.

5.3 Incident Reporting

NRQA advises that no environmental incidents occurred in 2017.

5.4 Annual Review

As advised in **Section 1.1**, the current report has been prepared in accordance with the requirements specified in Condition 11 Schedule 5.

5.5 Independent Environmental Audit

Coffey Pty Ltd have previously completed Independent Environmental Audits in 2013 and 2015. The findings of these Audits were discussed in the 2015 AEMR. The next Independent Audit is scheduled for 2018 and Coffey Pty Ltd have once again been engaged to complete this task. Several minor compliance issues were identified within the 2015 AEMR as requiring attention into the future. 2016 & 2017 responses to these issues are outlined below.

Minor Non-Compliance 1 - Blasting Hours

Summary: In 2013 one blast (6 August 2013) was completed outside of the approved blasting hours. This blast was a high volume blast for which setup took longer than expected. Accordingly, it was deemed safer to detonate outside of the approved blasting hours than 'sleeping' the shot overnight. No complaints were received from nearby residents. Coffeys recommend that sufficient time be allocated for set up of high volume blasts to avoid similar timing issues in the future.

2016 Response: *In 2016, all blasts occurred within the approved blasting hours.*

2017 Response: *In 2017, all blasts occurred within the approved blasting hours.*

Minor Non-Compliance 2 – Noise Monitoring Program

Summary: Whilst noise monitoring was completed in 2013 and 2015, no noise monitoring was completed in the 2014 calendar year. Coffeys recommended that a calendar of compliance events be prepared and implemented.

2016 Response: *NRQA have implemented a reporting schedule. Noise Monitoring was completed in November 2016 in accordance with the schedule.*

2017 Response: *Noise Monitoring was completed in November 2017 in accordance with the adopted schedule.*

Minor Non-Compliance 3 – Noise Impact Assessment Criteria

Summary: Noise monitoring results reported exceedances of the approved noise levels provided in Table 3 of the DA. Coffeys noted in its discussion on this matter that no complaints were received from surrounding landholders during the audit period. Coffeys further noted that the April 2015 Community Consultative Committee Meeting indicated that the new bund wall constructed in the southern side of the access road has reduced noise from trucks entering and existing (sic) the quarry site. Coffeys go on to make recommendations with respect to the format and content of the monitoring reports.

2016 Response: *The 2016 Noise Monitoring Report included additional details with respect to monitoring locations and LAeq 15min readings in accordance with the recommendations of the Coffey report.*

2017 Response: *The 2017 Noise Monitoring Report (refer **Attachment 8**) incorporates the recommendations of the Coffey report.*

Observation 4 – Invasive Weed Control

Summary: Site inspections revealed a number of Class 3 and 4 invasive weed species on the quarry site. The imminent transfer of an additional 45 hectares of land to the quarry for environmental offsets will increase the land area for which effective weed management if required. Coffeys recommends the following occur:

- Within 6 months of land acquisition conduct a detailed survey and mapping of weed species and their distribution on the 62.6 biodiversity offset area.
- Within the next 12 months allocate sufficient funds and resources to destroy and remove Class 3 weeds, including Giant Devil's Fig and Groundsel Bush, from the quarry site and adjoining biodiversity offset area.
- Allocate sufficient annual funds and resources to suppress and where possible remove weed species from the quarry site and adjoining biodiversity offset area.
- Continue to monitor and update mapping of weed populations on the quarry site and its biodiversity offset area.

2016 Response:

- *Original Quarry Footprint - External contractors (Roots Down Conservation Contractors) had commence works in accordance with the adopted weed control plan.*
- *Expanded Footprint (Incorporating Offset Areas) - Works had not commenced, with the preparation of the expanded weed management plan expected to be completed in 2017.*

2017 Response:

- *Original Quarry Footprint - External contractors (Roots Down Conservation Contractors) continue weed removal works in accordance with the adopted Plan.*
- *Expanded Footprint (Incorporating Offset Areas) - Works have not commenced on the survey and weed management plan for the expanded (offset area). As outlined in **Section 3.11**, this assessment is currently scheduled to occur in 2018.*

Observation 5 – Vertebrate Pest Control

Summary: Wild dog and fox control is a local issue affecting neighbouring rural landholders. Quarry Management, the Local Land Service and adjoining landholders have commenced discussions concerning the implementation of an ongoing baiting program. The imminent purchase of 45 hectares of land to the quarry will increase resources required to be allocated to this program.

2016 Response: *Information with respect to the dog baiting program was provided within the 2016 Monitoring Report.*
2017 Response: *Refer to* ***Section 3.13****.*

Observation 6 – Dust Monitoring Timing

Summary: On several occasions in 2013 and 2014, dust sampling had occurred outside of the required timeframes. In 2015, this issue appears to have been rectified with no exceedances of the nominated +/- 2 day timeframe.

2016 Response*: Dust monitoring in 2016 has occurred in accordance with the required timeframes.*
2017 Response*: Dust monitoring in 2017 has occurred in accordance with the required timeframes.*

5.6 Access to Information

Schedule 5 – Condition 14

14. Within 3 months of the determination of Modification 1, until the completion of all works, including rehabilitation and remediation the Proponent must:
(a) make the following information publicly available on its website:
- the documents listed in condition 2(a) of Schedule 2;
- current statutory approvals for the project;
- all approved strategies, plans and programs required under the conditions of this approval;
- a comprehensive summary of the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs;
- a complaints register, updated monthly;
- the annual reviews of the project;
- any independent environmental audit as described in condition 12 above, and the Proponent's response to the recommendations in any audit; and
- any other matter required by the Secretary; and

(b) keep this information up-to-date,
to the satisfaction of the Secretary.

Comment: A review of the applicable web site on 28 March 2018 confirmed that the following was available on the Lismore City Council webpage titled 'Blakebrook Quarry Operating Approval Conditions' accessed via https://www.lismore.nsw.gov.au/cp_themes/default/page.asp?p=DOC-RAI-45-38-11:

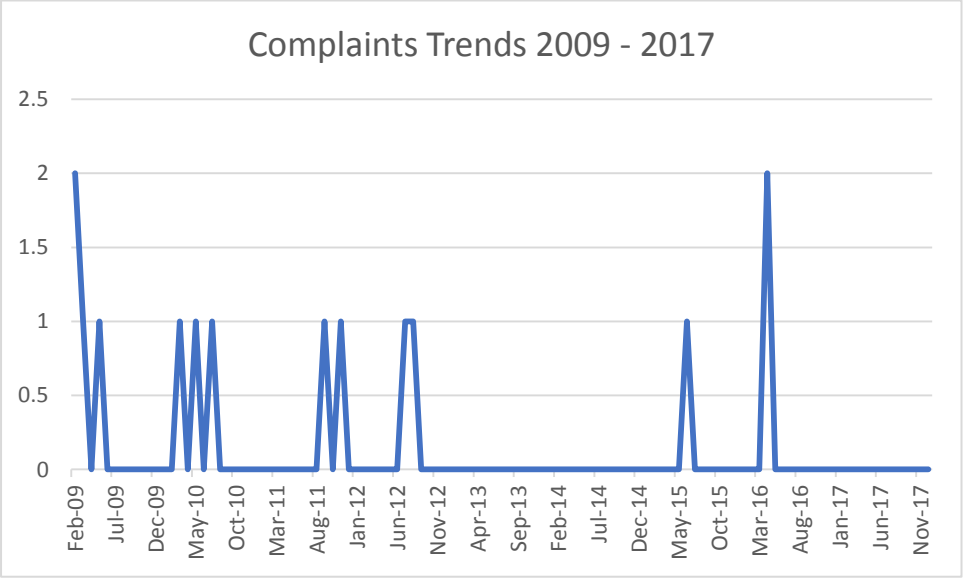
- Current Major Project Approval
- Current EPA Licence
- Strategies, Management Plans and Programs
- Annual Environment Management Reports (2011 – 2016)
- Blast Reports for Blakebrook Quarry (2012 – 2017)

- Noise Monitoring Reports (2012, 2013, 2015 – 2017)
- Dust Monitoring Reports (2012 – 2017)
- Water Monitoring Reports (2012 – 2017)
- Environmental Inspection Reports (Pre-Stripping)
- 3 Yearly External Audits 2013 & 2015
- Complaints Register
- Log of Truck Departure Times

Note: Condition 2(a) of Schedule 2 of the amended approval does not contain a list of documentation to be provided on the Quarry website.

5.7 Complaints Register

A copy of the Quarry's Environmental Complaints Register is provided at **Attachment 18**. As indicated, no complaints have been received in 2017 concerning Blakebrook Quarry. **Figure 5.1** illustrates trends with respect to complaints received since 2013.



We note that complaint numbers are considered low, with the three complaints received since 2012 all relating to the Asphalt Plant operating on the site, rather than the quarry operations.

Part 6 Conclusion

6.1 Summary of Non-Compliance

No significant non-compliances with MP 07_0020 (Mod 1) have been identified within this review.

As outlined in Section 3.6, we note that the truck movement data provided on the LCC website provides only the exit times rather than both entry and exit times as required by Schedule 3 Condition 6 of Mod.1. The requirement to log entry times came into effect with the approval of Mod 1 in September 2017. As such, it is considered reasonable that the 2017 data does not incorporate this information. Our clients are reviewing their data capture methods with the view to also recording truck arrival times. It is intended that this additional data capture will be established as soon as possible and not later than June 2018.

6.2 Actions Identified in 2016 AEMR

The 2016 AEMR identified the following major actions for 2017:

1. Update the Bushland Regeneration Plan to incorporate the 45ha of environmental offsets, with a particular focus on koala habitat.
   Comment: *This task has not been completed in 2017. Quarry Management advises that it is now scheduled for completion in 2018. Associated with this, Quarry Management are also reviewing options with respect to allocating additional resources to implementing the updated Regeneration Plan once completed. Refer* ***Sections 3.8 and 3.11.***

2. Ongoing works associated with the completing the detailed Groundwater Assessment in accordance with Schedule 3 Condition 20 of Part 3A Approval No. 07_0020.
   Comment: *Gilbert and Sullivan have been engaged to complete the required monitoring. Nine wells have been installed within three nests. In addition, a test hole has been drilled and pump test completed. The data collection will be ongoing through 2018, with the aim of providing the final report by December 2018. Refer* ***Section 3.4.2****.*

3. Provide quarry product to service important local construction projects, including the Pacific Highway upgrade.

   Comment: *Material has been provided to a number of significant infrastructure projects on the north coast including the Coffs Harbour Break Wall, Brunswick Heads Marina Upgrade, Possum Creek Slip Rectification and multiple road repairs following damage received via ex-cyclone Debbie in March 2017.*

4. Implementation of a revised organisational structure within the Commercial Services Section of Lismore City Council. This process has commenced and aims, in part, to improve operations and compliance at Blakebrook Quarry.

   Comment: *The revised organisational structure has been implemented. Several key quarry staff are no longer employed by NRQA. Recruitment processes have commenced to fill these positions.*

6.3 Major Activities Planned for 2018

NRQA advises that the major activities planned for the 2018 calendar year are as follows:

1. Update the Bushland Regeneration Plan to incorporate the 45ha of environmental offsets, with a particular focus on koala habitat.
2. Ongoing works associated with the completing the detailed Groundwater Assessment in accordance with Schedule 3 Condition 20 of Part 3A Approval No. 07_0020.
3. Provide quarry product to service important local construction projects, including the Pacific Highway upgrade.

6.4 Improvement Measures 2018

NRQA advises that the following measures will be implemented in 2018 to improve the environmental performance of the quarry:

- Improvements to liquid fuel storage on site. This will occur concurrent with the establishment of a vehicle wash at the quarry; and
- Ongoing Best Practice certification relative to ISO 9001:2008, ISO 14001:2008 and AS/NZS 4801:2001.

6.5 Conclusion

The above report provides a summary of the environmental performance of Blakebrook Quarry for the 2017 calendar year.

This report is prepared in response to Schedule 5 Condition 11 of the Blakebrook Quarry Part 3A Approval No. 07_0020. It details actions taken during 2017, provides a snapshot of progress on compliance issues and elaborates on planned activities for the coming year.

Should you have any queries regarding the above, please do not hesitate to contact Karina Vikstrom of this office.

DAMIAN CHAPELLE
Town Planner. BTP CPP

KARINA VIKSTROM
Town Planner BTP

Date: 29 March 2018

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 1

MP 07_0020 Mod 1 – Sept 2017

Notice of Modification

Section 75W of the *Environmental Planning and Assessment Act 1979*

As delegate of the Minister for Planning, I modify the project approval referred to in Schedule 1, as set out in Schedule 2.

Howard Reed

Howard Reed
Director Resource Assessments

Sydney 18th September 2017

SCHEDULE 1

The Project Approval (MP 07_0020) for the Blakebrook Quarry Project granted by the delegate for the Minister for Planning on 24 November 2009

SCHEDULE 2

1. Delete all words after Schedule 1 and replace with:

TABLE OF CONTENTS

DEFINITIONS

Aboriginal item or object	Any item or object that provides evidence of the use of an area by Aboriginal people, as defined under the *National Parks and Wildlife Act 1974*
Annual Review	The review required by condition 11 of Schedule 5.
AHD	Australian Height Datum
BCA	Building Code of Australia
Biodiversity Offset Strategy	The conservation and enhancement program as described in the EA (see also Table 5 and Appendix 4).
CCC	Community Consultative Committee
Council	Lismore City Council
Day	The period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
OEH	Office of Environment and Heritage
Department	Department of Planning and Environment
DPI Water	Department of Primary Industries - Water
DRG	Division of Resources and Geoscience of the Department
EA	Environmental Assessment titled *Blakebrook Quarry Expansion, Environmental Assessment Report, Final Report*, January 2009, and the Proponent's response to submissions titled *Blakebrook Quarry Expansion, Response to Submissions, Final Report*, August 2009
EA (Mod 1)	Environmental Assessment titled *Blakebrook Quarry Modification Application August 2017*
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPL	Environment Protection Licence under the POEO Act
Evening	The period from 6pm to 10pm
Feasible	Feasible relates to engineering considerations and what is practical to build
Incident	A set of circumstances that: • causes or threatens to cause material harm to the environment; and/or • breaches or exceeds the limits or performance measures/criteria in this approval
INP	*NSW Industrial Noise Policy* (NSW EPA, 2000)
Laden	Trucks transporting quarry products from the site and/or trucks transporting topsoil or mulch to the site
Land	As defined in the EP&A Act, except where the term is used in the noise and air quality conditions in Schedules 3 and 4 of this approval, where it is defined as the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval
Material harm to the environment	Actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial
Minister	Minister for Planning, or delegate
Mitigation	Activities associated with reducing the impacts of the project
Negligible	Small and unimportant, such as to be not worth considering
Night	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 that is not owned by a public agency or the Proponent (or its subsidiary)
Project	The project as described in the documents listed in condition 2(a) of Schedule 2
Proponent	Lismore City Council, or its successors in title
Quarrying operations	The extraction, processing, stockpiling and transportation of extractive materials carried out on the site and the associated removal of vegetation, topsoil and overburden
Quarry products	Includes all saleable quarry products, but excludes tailings, other wastes and rehabilitation material
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements.
RMS	Roads and Maritime Services
SEPP 44	*State Environmental Planning Policy No. 44 – Koala Habitat Protection*
Secretary	Secretary of the Department, or nominee
Site	The land referred to in Schedule 1

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. In addition to meeting the specific performance measures and criteria established under this approval, the Proponent must implement all reasonable and feasible measures to prevent or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.

TERMS OF APPROVAL

2. The Proponent must carry out the project:
   (a) generally in accordance with the EA and EA (Mod 1); and
   (b) in accordance with the conditions of this approval, Project Layout Plan and the Statement of Commitments.

   Notes:
   - *The Project Layout Plan is shown in Appendix 1;*
   - *The Statement of Commitments is reproduced in Appendix 2.*

3. If there is any inconsistency between the documents in condition 2(a), the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.

4. The Proponent must comply with any written requirement/s of the Secretary arising from the Department's assessment of:
   (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted in accordance with this approval (including any stages of these documents);
   (b) any reviews, reports or audits undertaken or commissioned by the Department regarding compliance with this approval;
   (c) and the implementation of any actions or measures contained in these documents.

5. By 30 June 2010, the Proponent shall surrender development consent DA 95/239 to the relevant consent authority to the satisfaction of the Secretary.

LIMITS ON APPROVAL

6. The Proponent may carry out quarrying operations on the site until 31 December 2039.

   Note: Under this approval, the Proponent is required to rehabilitate the site and carry out additional requirements and undertakings to the satisfaction of the Secretary. Consequently, this approval will continue to apply in all respects other than the right to conduct quarrying operations until the rehabilitation of the site and those requirements and undertakings have been carried out to the standard required by the applicable conditions.

7. The Proponent must not undertake quarrying operations below 55 m AHD in the northern pit or 105 m AHD in the southern pit.

   Note: Drainage sumps may be constructed below this level with the agreement of the Secretary.

8. The Proponent must not:
   (a) transport more than 600,000 tonnes of quarry materials from the site per calendar year; or
   (b) dispatch more than 100 laden trucks from the site on any calendar day.

   Note: Dispatch of laden trucks is also controlled under condition 1 of Schedule 3.

STRUCTURAL ADEQUACY

9. The Proponent must ensure that all 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 Proponent is required to obtain construction and occupation certificates for any proposed building works;*
   - *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*

DEMOLITION

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

PROTECTION OF PUBLIC INFRASTRUCTURE

11. Unless the Proponent and the applicable authority agree otherwise the Proponent must:
    (a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the project; and
    (b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the project.

Note: This condition does not apply to damage to roads caused as a result of general road usage or otherwise addressed by contributions required by condition 13 of Schedule 2.

OPERATION OF PLANT AND EQUIPMENT

12. The Proponent must ensure that all the plant and equipment used at the site, or to monitor the performance of the project is:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

SECTION 94 CONTRIBUTIONS

13. The Proponent must pay Council an annual financial contribution toward the maintenance of local roads used for haulage of quarry products. The contribution must be determined in accordance with the *Lismore City Council Section 94 Contribution Plan*, 2004, or any subsequent relevant contributions plan adopted by Council.

PRODUCTION DATA

14. The Proponent must:
    (a) from the commencement of quarrying operations provide calendar year annual quarry production data to DRG using the standard form for that purpose; and
    (b) include a copy of this data in the Annual Review.

COMPLIANCE

15. The Proponent must ensure that all employees, contractors and sub-contractors are aware of, and comply with, the conditions of this approval relevant to their respective activities.

IDENTIFICATION OF BOUNDARIES

16. The Proponent must ensure that the boundaries of the approved limits of extraction are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.

SCHEDULE 3
SPECIFIC ENVIRONMENTAL CONDITIONS

NOISE

Hours of Operation

1. The Proponent must comply with the operating hours set out in Table 1.

Table 1: Operating hours

Activity	***Permissible Hours***
Quarrying operations including loading and dispatch of laden trucks	7 am to 6 pm Monday to Friday
	7 am to 3 pm Saturday
	At no time on Sundays or public holidays
Blasting	10 am to 3 pm Monday to Friday (except public holidays)
	At no time on Sundays or public holidays
Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence

2. The following activities may be carried out outside the hours specified in condition 1 above:
   (a) delivery or dispatch of materials as requested by Police or other public authorities; and
   (b) emergency work to avoid the loss of lives, property or to prevent environmental harm.

   In such circumstances, the Proponent must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

3. The Proponent must ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Noise criteria dB(A)

Receiver	***Day*** $L_{Aeq\ (15\ minute)}$
Location 2	36
All other locations	35

Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the *NSW Industrial Noise Policy*. Appendix 5 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Proponent has an agreement with the relevant landowner to exceed the noise criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

Operating Conditions

4. The Proponent must:
   (a) implement best practice management to minimise the construction, operational and road transportation noise of the project;
   (b) minimise the noise impacts of the project during meteorological conditions when the noise criteria in this approval do not apply (see Appendix 5);
   (c) carry out noise monitoring (at least every 3 months or as otherwise agreed with the Secretary) to determine whether the project is complying with the relevant conditions of this approval; and
   (d) regularly assess noise monitoring data and modify and/or stop operations on site to ensure compliance with the relevant conditions of this approval,

   to the satisfaction of the Secretary.

   Note: Required frequency of noise monitoring may be reduced if approved by the Secretary.

Noise Management Plan

5. The Proponent must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;

(b) be submitted to the Secretary within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary;
(c) describe the measures to be implemented to ensure:
- compliance with the noise criteria and operating conditions of this approval;
- best practice management is being employed; and
- the noise impacts of the project are minimised during meteorological conditions under which the noise criteria in this approval do not apply (see Appendix 5);

(d) describe the proposed noise management system; and
(e) include a monitoring program to be implemented to measure noise from the project against the noise criteria in Table 2.

The Proponent must implement the Noise Management Plan as approved from time to time by the Secretary.

BLASTING

Blasting Impact Assessment Criteria

6. The Proponent must ensure that blasting on site does not cause any exceedance of the criteria in Table 3.

Table 3: Blasting Criteria

Receiver	***Airblast overpressure (dB(Lin Peak))***	***Ground vibration (mm/s)***	***Allowable exceedance***
Any residence on privately-owned land	*120*	*10*	*0%*
	115	*5*	*5% of the total number of blasts over a period of 12 months*

However, these criteria do not apply if the Proponent has a written agreement with the relevant owner to exceed the limits in Table 3, and the Proponent has advised the Department in writing of the terms of this agreement.

Blasting Frequency

7. The Proponent may carry out a maximum of 2 blasts per month, unless an additional blast is required following a blast misfire. This condition does not apply to blasts required to ensure the safety of the quarry or workers on site.

Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the quarry.

Operating Conditions

8. During blasting operations, the Proponent must:
(a) implement best practice management to:
- protect the safety of people and livestock;
- protect public or private infrastructure and property from damage; and
- minimise the dust and fume emissions;

(b) operate a suitable system to enable the local community to get up-to-date information on the proposed blasting schedule on site; and
(c) carry out regular monitoring to determine whether the project is complying with the relevant conditions of this approval,
to the satisfaction of the Secretary.

Blast Management Plan

9. The Proponent must prepare a Blast Management Plan for the project to the satisfaction of the Secretary. This plan must:
(a) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary;
(b) describe the measures to be implemented to ensure compliance with the blast criteria and operating conditions of this approval;
(c) include measures to manage flyrock to ensure the safety or people and livestock and to protect property;
(d) include a monitoring program for evaluating and reporting on compliance with the blasting criteria in this approval;
(e) include local community notification procedures for the blasting schedule, in particular to nearby residences; and

(f) include a protocol for investigating and responding to complaints related to blasting operations.

The Proponent must implement the Blast Management Plan as approved from time to time by the Secretary.

AIR QUALITY

Air Quality Impact Assessment Criteria

10. The Proponent must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the project do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.

Table 4: Air quality criteria

Pollutant	***Averaging Period***	***Criterion***	
Particulate matter < 10 µm (PM_{10})	Annual	[a,d] 25 µg/m^3	
Particulate matter < 10 µm (PM_{10})	24 hour	[b] 50 µg/m^3	
Total suspended particulates (TSP)	Annual	[a,d] 90 µg/m^3	
[c] Deposited dust	Annual	[b] 2 g/m^2/month	[a,d] 4 g/m^2/month

Notes to Table 4:
a Cumulative impact (ie increase in concentrations due to the project plus background concentrations due to all other sources).
b Incremental impact (ie increase in concentrations due to the project alone, with zero allowable exceedances of the criteria over the life of the project.
c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.
d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.
e "Reasonable and feasible avoidance measures" includes, but is not limited to, the operational requirements in conditions 11, 12 and 13 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.

Operating Conditions

11. The Proponent must:
(a) implement best practice management to minimise the dust emissions of the project;
(b) regularly assess meteorological and air quality monitoring data and relocate, modify and/or stop operations on site to ensure compliance with the air quality criteria in this approval;
(c) minimise the air quality impacts of the project during adverse meteorological conditions and extraordinary events (see note d under Table 4);
(d) monitor and report on compliance with the relevant air quality conditions in this approval; and
(e) minimise the area of surface disturbance and undertake progressive rehabilitation of the site,
to the satisfaction of the Secretary.

Air Quality Management Plan

12. The Proponent must prepare an Air Quality Management Plan for the project to the satisfaction of the Secretary. This plan must:
(a) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary;
(b) describe the measures to be implemented to ensure:
- compliance with the air quality criteria and operating conditions of this approval;
- best practice management is being employed; and
- the air quality impacts of the project are minimised during adverse meteorological conditions and extraordinary events;

(c) describe the proposed air quality management system;
(d) include an air quality monitoring program that:
- is capable of evaluating the performance of the project;
- includes a protocol for determining any exceedances of the relevant conditions of approval; and
- effectively supports the air quality management system.

The Proponent must implement the approved Air Quality Management Plan as approved from time to time by the Secretary.

Meteorological Monitoring

13. For the life of the project, the Proponent must ensure that there is a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales* guideline.

Greenhouse Gas Emissions

14. The Proponent must implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site.

SOIL AND WATER

Water Supply

15. The Proponent must ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of operations under the approval to match its available water supply, to the satisfaction of the Secretary.

Water Discharges

16. The Proponent must comply with the discharge limits in any EPL, or with section 120 of the POEO Act.

Groundwater Assessment

17. The Proponent must undertake a detailed groundwater assessment to the satisfaction of the Secretary. This assessment must be:
    (a) prepared by a suitably qualified expert in consultation with DPI Water;
    (b) submitted to the Secretary for approval by 30 December 2018;
    (c) approved by the Secretary before any extraction below 105 m AHD in the northern pit or below 118.5 m AHD in the southern pit;
    (d) adequately assess groundwater resources affected by the northern and southern pits, to the proposed full extraction depths of those pits;
    (e) adequately assess all groundwater impacts associated with proposed extraction;
    (f) provide data for predicted groundwater pit inflows during and following extraction; and
    (g) propose management measures to address pit inflows and impacts to groundwater resources.

    The Proponent must implement the management measures proposed in the groundwater assessment to the satisfaction of the Secretary.

Soil and Water Management

18. If groundwater is encountered during quarrying operations in the South Pit under EA (Mod 1), the Proponent must cease quarrying operations until authorised to recommence by the Secretary.

19. The Proponent must prepare a Soil and Water Management Plan for the project to the satisfaction of the Secretary. This plan must:
    (a) be prepared by suitably qualified and experienced person/s approved by the Secretary;
    (b) be prepared in consultation with the EPA and DPI Water;
    (c) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; and
    (d) include a:
        (i) Site Water Balance that includes:
            - details of:
                - sources and security of water supply;
                - water use and management on site;
                - any off-site water transfers; and
                - reporting procedures; and
            - measures to be implemented to minimise clean water use on site;
        (ii) Surface Water Management Plan, that includes:
            - a program for obtaining detailed baseline data on surface water flows and quality in water bodies that could potentially be affected by the project;
            - a detailed description of the surface water management system on site including the:
                - clean water diversion system;
                - erosion and sediment controls;
                - dirty water management system; and

- water storages; and
- a program to monitor and report on:
  - any surface water discharges;
  - the effectiveness of the water management system,
  - the quality of water discharged from the site to the environment;
  - surface water flows and quality in local watercourses;

(iii) Groundwater Management Plan that includes:

- a provision that requires the Proponent to obtain appropriate water licence(s) to cover the volume of any unforeseen groundwater inflows into the quarry from the quarry face or floor; and
- a monitoring program to manage potential impacts, if any, on any alluvium and associated surface water source near the proposed extraction area that includes:
  - identification of a methodology for determining threshold water level criteria;
  - contingency measures in the event of a breach of thresholds; and
  - a program to regularly report on monitoring.

The Proponent must implement the approved Soil and Water Management Plan as approved from time to time by the Secretary.

TRANSPORT

Monitoring of Product Transport

20. The Proponent must keep accurate records of all laden truck movements to and from the site (including time of arrival and dispatch) and publish a summary of records on its website every 6 months.

Road Upgrades

21. The Proponent must undertake the following road upgrade works generally in accordance with the recommendations in the EA, and to the satisfaction of the RMS:
    (a) upgrade the intersection of the Quarry Access and Nimbin Road to a 'Type AUR Intersection Treatment', prior to 31 December 2010;
    (b) upgrade the guard rails on the approaches to Booerie Creek Bridge prior to 31 December 2010;
    (c) upgrade the Booerie Creek Road and Nimbin Road intersection to a 'Type BAR Right Turn Treatment on the Through Road' prior to 31 December 2010;
    (d) upgrade the Wilson Street and Nimbin Road intersection to a 'Type CHR Right Turn Bay Treatment' prior to 31 December 2010; and
    (e) re-align Nimbin Road and the Quarry Access intersection to meet the AUSTROADS sight distance requirements for vehicles travelling in both directions through the intersection prior to 31 December 2011.

Note: The road works must be constructed in accordance with the relevant RMS or AUSTROADS standards, and signposted and lit in accordance with AS:1742 – Manual of Uniform Traffic Control Devices and AS/NZ 1158:2005 – Lighting for Roads and Public Spaces.

Operating Conditions

22. The Proponent must:
    (a) restrict truck movements from the quarry to an average of 50 laden trucks a day until all road upgrades works required by condition 20 of Schedule 3, are met or unless otherwise approved by the Secretary;
    (b) ensure that all laden trucks entering or exiting the site have their loads covered, with the exception of loads consisting solely of boulders greater than one tonne in weight;
    (c) ensure that all laden trucks exiting the site are cleaned of material that may fall from vehicles, before leaving the site; and
    (d) use its best endeavours to ensure that appropriate signage is displayed on all trucks used to transport product from the project so they can be easily identified by road users.

Traffic Management Plan

23. The Proponent must prepare a Traffic Management Plan for the project to the satisfaction of the Secretary. This plan must:
    (a) be prepared in consultation with the RMS and Council;
    (b) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary;
    (c) describe the processes in place for the control of truck movements entering and exiting the site;
    (d) include a Drivers' Code of Conduct that details the safe and quiet driving practices that must be used by drivers transporting products to and from the quarry;

(e) describe the measures to be put in place to ensure compliance with the Drivers' Code of Conduct; and
(f) propose measures to minimise the transmission of dust and tracking of material onto the surface of the public road from vehicles leaving the quarry.

The Proponent must implement the approved Traffic Management Plan as approved from time to time by the Secretary.

ABORIGINAL HERITAGE

Aboriginal Heritage Management Plan

24. The Proponent must prepare an Aboriginal Heritage Management Plan for the project to the satisfaction of the Secretary. The plan must:
(a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary;
(b) be prepared in consultation with OEH and the Registered Aboriginal Parties;
(c) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; and
(d) include a description of the measures that would be implemented to:
- protect, monitor and manage known sites of archaeological significance;
- manage any new Aboriginal objects or relics that are discovered;
- store Aboriginal heritage items salvaged on site; and
- ensure ongoing consultation and involvement of the Registered Aboriginal Parties in the conservation and management of Aboriginal cultural heritage on the site.

The Proponent must implement the approved Aboriginal Heritage Management Plan as approved from time to time by the Secretary.

25. If any item or object of Aboriginal heritage significance is identified on site, the Proponent must ensure that:
(a) all work in the immediate vicinity of the suspected Aboriginal item or object ceases immediately;
(b) a 10 m buffer area around the suspected item or object is cordoned off; and
(c) the OEH is contacted immediately.

Work in the immediate vicinity of the Aboriginal item or object may only recommence in accordance with the provisions of Part 6 of the *National Parks and Wildlife Act 1974*.

BIODIVERSITY AND REHABILITATION

Biodiversity Offset Strategy

5. The Proponent must:
(a) implement the Biodiversity Offset Strategy (see Table 5);
(b) ensure that adequate resources are dedicated towards the implementation of this strategy;
(c) provide appropriate long term security for the offset area; and
(d) provide a timetable for the implementation of the offset strategy prior to 30 June 2010, or as otherwise agreed by the Secretary,
to the satisfaction of the Secretary.

Table 5: Biodiversity Offset Strategy

Offset Areas	***Minimum Size***
On-site offset (Protection Zone in Appendix 4)	17.6 hectares
Off-site offset (within Lismore local government area, and not already within a conservation area)	45 hectares
Total	62.6 hectares

Note: Mechanisms to provide appropriate long-term security to the land within the Biodiversity Offset Strategy in accordance with the NSW Biodiversity Offset Policy for Major Projects 2014, include a BioBanking Agreement, Voluntary Conservation Agreement or an alternative mechanism that provides for a similar conservation outcome.

Rehabilitation Objectives

26. The Proponent must rehabilitate the site to the satisfaction of the Secretary. This rehabilitation must be generally consistent with the rehabilitation strategy in the EIS and must comply with the objectives in Table 6.

Table 6: Rehabilitation Objectives

Feature	Objective
All areas of the site affected by the project	• Safe • Hydraulically and geotechnically stable • Non-polluting • Fit for the intended post-mining land use(s) • Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land
Surface Infrastructure	• Decommissioned and removed, unless otherwise agreed by the Secretary
Quarry benches and pit floor	• Landscaped and vegetated using native tree and understorey species
Final Void	• Minimise the size, depth and slope of the batters of the final void • Minimise the drainage catchment of the final void

Progressive Rehabilitation

27. The Proponent must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active and which are not ready for final rehabilitation.

Note: It is accepted that parts of the site that are progressively rehabilitated may be subject to future re-disturbance.

Biodiversity and Rehabilitation Management Plan

28. The Proponent must prepare a Biodiversity and Rehabilitation Management Plan for the project to the satisfaction of the Secretary. This plan must:
    (a) be prepared by a suitably qualified expert;
    (b) be prepared in consultation with OEH and Council;
    (c) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary;
    (d) provide details of the conceptual final landform and associated land uses for the site;
    (e) describe how the implementation of the Biodiversity Offset Strategy will be integrated with the overall rehabilitation of the site;
    (f) include a Koala Management Plan prepared in accordance with SEPP 44;
    (g) include detailed performance and completion criteria for evaluating the performance of the Biodiversity Offset Strategy and rehabilitation of the site (including progressive rehabilitation), including triggers for any necessary remedial action;
    (h) describe the short, medium and long term measures to be implemented to:
        - manage remnant vegetation and habitat on site, including within the Biodiversity Offset Strategy area; and
        - ensure compliance with the rehabilitation objectives and progressive rehabilitation obligations in this approval;
    (i) include a detailed description of the measures described in paragraph (h) to be implemented over the next 3 years (to be updated for each 3 year period following initial approval of the plan) including the procedures to be implemented for:
        - maximising the salvage of environmental resources within the approved disturbance area, including tree hollows, vegetative and soil resources, for beneficial reuse in the enhancement of the offset area or site rehabilitation;
        - restoring and enhancing the quality of native vegetation and fauna habitat in the biodiversity offset and rehabilitation areas through assisted natural regeneration, targeted vegetation establishment and the introduction of fauna habitat features;
        - protecting vegetation and fauna habitat outside the approved disturbance area on-site, including core Koala habitat;
        - minimising the impacts on native fauna, including undertaking pre-clearance surveys;
        - establishing vegetation screening to minimise the visual impacts of the site on surrounding receivers;
        - ensuring minimal environmental consequences for threatened species, populations and habitats;
        - collecting and propagating seed;
        - controlling weeds and feral pests;
        - controlling erosion; and
        - managing bushfire risk;

(j) include a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;
(k) identify the potential risks to the successful implementation of the Biodiversity Offset Strategy, and include a description of the contingency measures to be implemented to mitigate these risks; and
(l) include details of who is responsible for monitoring, reviewing, and implementing the plan.

The Proponent must implement the Biodiversity and Rehabilitation Management Plan as approved from time to time by the Secretary.

Biodiversity and Rehabilitation Bond

29. Within 6 months of the approval of the Biodiversity and Rehabilitation Management Plan, the Proponent must lodge a Biodiversity and Rehabilitation Bond with the Department to ensure that the Biodiversity Offset Strategy and rehabilitation of the site are implemented in accordance with the performance and completion criteria set out in the plan and the relevant conditions of this approval. The sum of the bond must be determined by:
(a) calculating the full cost of implementing the Biodiversity Offset Strategy;
(b) calculating the cost of rehabilitating all disturbed areas of the site, taking into account the likely surface disturbance over the next 3 years of quarrying operations; and
(c) employing a suitably qualified quantity surveyor or other expert to verify the calculated costs,
to the satisfaction of the Secretary.

Notes:

- *Alternative funding arrangements for long term management of the Biodiversity Offset Strategy, such as provision of capital and management funding as agreed by OEH as part of a BioBanking Agreement, or transfer to conservation reserve estate can be used to reduce the liability of the Biodiversity and Rehabilitation Bond.*
- *If capital and other expenditure required by the Biodiversity and Rehabilitation Management Plan is largely complete, the Secretary may waive the requirement for lodgement of a bond in respect of the remaining expenditure.*
- *If the Biodiversity Offset Strategy and/or rehabilitation of the site area are completed (or partially completed) to the satisfaction of the Secretary, then the Secretary will release the bond (or relevant part of the bond). If the Biodiversity Offset Strategy and rehabilitation of the site are not completed to the satisfaction of the Secretary, then the Secretary will call in all or part of the bond, and arrange for the completion of the relevant works.*

30. Within 3 months of each Independent Environmental Audit (see condition 12 of Schedule 5), the Proponent must review, and if necessary revise, the sum of the Biodiversity and Rehabilitation Bond to the satisfaction of the Secretary. This review must consider the:
(a) effects of inflation;
(b) likely cost of implementing the Biodiversity Offset Strategy and rehabilitating all disturbed areas of the site (taking into account the likely surface disturbance over the next 3 years of the project); and
(c) performance of the implementation of the Biodiversity Offset Strategy and rehabilitation of the site to date.

VISUAL

31. The Proponent must implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the project to the satisfaction of the Secretary.

WASTE

32. The Proponent must:
(a) manage on-site sewage treatment and disposal in accordance with the requirements of its EPL, and to the satisfaction of the EPA and Council;
(b) minimise the waste generated by the project;
(c) ensure that the waste generated by the project is appropriately stored, handled, and disposed of; and
(d) report on waste management and minimisation in the Annual Review,
to the satisfaction of the Secretary.

33. Except as expressly permitted in an EPL, the Proponent must not receive waste at the site for storage, treatment, processing, reprocessing or disposal.

LIQUID STORAGE

34. The Proponent must ensure that all tanks and similar storage facilities (other than for water) are protected by appropriate bunding or other containment, in accordance with the relevant Australian Standards.

DANGEROUS GOODS

35. The Proponent must ensure that the storage, handling, and transport of dangerous goods is done in accordance with the relevant Australian Standards, particularly AS1940 and AS1596, and the *Dangerous Goods Code*.

BUSHFIRE

36. The Proponent must:
    (a) ensure that the project is suitably equipped to respond to any fires on site; and
    (b) assist the Rural Fire Service and emergency services to the extent practicable if there is a fire in the vicinity of the site.

SCHEDULE 4
ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. As soon as practicable, and no longer than 7 days, after obtaining monitoring results showing:
   (a) an exceedance of any criteria in Schedule 3, the Proponent must notify the affected landowners in writing of the exceedance, and provide regular monitoring results, at least every 3 months, to each affected landowner until the project is again complying with the relevant criteria; and
   (b) an exceedance of any air quality criteria in Schedule 3, the Proponent must send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners and current tenants of the land (including the tenants of land which is not privately-owned).

INDEPENDENT REVIEW

2. If an owner of privately-owned land considers the project to be exceeding the relevant criteria in Schedule 3, then he/she may ask the Secretary in writing for an independent review of the impacts of the project on his/her land.

   If the Secretary is satisfied that an independent review is warranted, then within 2 months of the Secretary's decision, the Proponent must:
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to:
      - consult with the landowner to determine his/her concerns;
      - conduct monitoring to determine whether the project is complying with the relevant criteria in Schedule 3; and
      - if the project is not complying with these criteria, then identify measures that could be implemented to ensure compliance with the relevant criteria; and
   (b) give the Secretary and landowner a copy of the independent review; and
   (c) comply with any written requests made by the Secretary to implement any findings of the review.

PROPERTY INSPECTIONS

3. Prior to 30 June 2010, the Proponent must advise all owners of privately-owned land within 2 kilometres of proposed blasting activities, and any other landowner nominated by the Secretary, that they are entitled to a property inspection to establish the baseline condition of the property.

4. If the Proponent receives a written request for a property inspection from any such landowner, the Proponent must:
   (a) commission a suitably qualified person, whose appointment has been approved by Secretary, to inspect and report on the condition of any building or structure on the land, and recommend measures to mitigate any potential blasting impacts; and
   (b) give the landowner a copy of this property inspection report.

   Note: It is preferable for the property inspection to be carried out prior to the commencement of blasting activities on the site, and the Proponent should facilitate this occurring wherever possible.

PROPERTY INVESTIGATIONS

5. If any owner of privately-owned land within 2 kilometres of proposed blasting activities, or any other landowner nominated by the Secretary, claims that his/her property, including vibration-sensitive infrastructure such as water supply or underground irrigation mains, has been damaged as a result of blasting at the project, the Proponent shall within 3 months of receiving this request:
   (a) commission a suitably qualified person whose appointment has been approved by the Secretary to investigate the claim and prepare a property investigation report; and
   (b) give the landowner a copy of the report.

   If this independent investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damage to the satisfaction of the Secretary.

   If the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Proponent must prepare an Environmental Management Strategy for the project to the satisfaction of the Secretary. This strategy must:
   (a) be submitted to the Secretary for approval within 6 months of the Secretary requiring preparation of the strategy by notice to the Proponent;
   (b) provide the strategic framework for environmental management of the project;
   (c) identify the statutory approvals that apply to the project;
   (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
   (e) describe the procedures to be implemented to:
      - keep the local community and relevant agencies informed about the operation and environmental performance of the project;
      - receive, record, handle and respond to complaints;
      - resolve any disputes that may arise during the course of the project;
      - respond to any non-compliance;
      - respond to emergencies; and
   (a) include:
      - copies of any strategies, plans and programs approved under the conditions of this approval; and
      - a clear plan depicting all the monitoring to be carried out under the conditions of this approval.

   The Proponent must implement any Environmental Management Strategy as approved from time to time by the Secretary.

Evidence of Consultation

2. Where consultation with any State or local agency is required by the conditions of this approval, the Proponent must:
   (a) consult with the relevant agency prior to submitting the required document to the Secretary for approval;
   (b) submit evidence of this consultation as part of the relevant document;
   (c) describe how matters raised by the agency have been addressed and any matters not resolved; and
   (d) include details of any outstanding issues raised by the agency and an explanation of disagreement between any agency and the Proponent.

Management Plan Requirements

3. The Proponent must ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:
   (a) detailed baseline data;
   (b) a description of:
      - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
      - any relevant limits or performance measures/criteria; and
      - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;
   (c) a description of the measures that to be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
   (d) a program to monitor and report on the:
      - impacts and environmental performance of the project; and
      - effectiveness of any management measures (see (c) above);
   (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;
   (f) a program to investigate and implement ways to improve the environmental performance of the project over time;
   (g) a protocol for managing and reporting any:
      - incidents;
      - complaints;
      - non-compliances with statutory requirements; and
      - exceedances of the impact assessment criteria and/or performance criteria; and

(h) a protocol for periodic review of the plan.

Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.

Application of Existing Management Plans

4. The Proponent must continue to apply existing approved management plans, strategies or monitoring programs that have most recently been approved under this approval, until the approval of a similar plan, strategy or program under this approval.

Revision of Strategies, Plans & Programs

4. Within 3 months of the submission of an:
   (a) incident report under condition 9 below;
   (b) Annual Review under condition 11 below;
   (c) audit report under condition 12 below; and
   (d) any modifications to this approval,

   the Proponent must review the strategies, plans and programs required under this approval, to the satisfaction of the Secretary. The proponent must notify the Department in writing of any such review being undertaken. Where this review leads to revisions in any such document, then within 6 weeks of the review the revised document must be submitted for the approval of the Secretary.

   Note: The purpose of this condition is to ensure that strategies, plans and programs are regularly updated to incorporate any measures recommended to improve environmental performance of the project.

Updating and Staging of Strategies, Plans or Programs

5. To ensure that strategies, plans or programs required under this approval are updated on a regular basis, and that they incorporate any appropriate additional measures to improve the environmental performance of the project, the Proponent may at any time submit revised strategies, plans or programs for the approval of the Secretary. With the agreement of the Secretary, the Proponent may also submit any strategy, plan or program required by this approval on a staged basis.

   The Secretary may approve a revised strategy, plan or program required under this approval, or the staged submission of any of these documents, at any time. With the agreement of the Secretary, the Proponent may prepare the revised or staged strategy, plan or program without undertaking consultation with all parties nominated under the applicable condition in this approval.

   While any strategy, plan or program may be submitted on a staged basis, the proponent will need to ensure that the operations associated with the project are covered by suitable strategies, plans or programs at all times.

   If the submission of any strategy, plan or program is to be staged; then the relevant strategy, plan or program must clearly describe the specific stage/s of the project to which the strategy, plan or program applies; the relationship of this stage/s to any future stages; and the trigger for updating the strategy, plan or program.

Adaptive Management

6. The Proponent must assess and manage project-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedule 3. Any exceedance of these criteria and/or performance measures constitutes a breach of this approval and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

   Where any exceedance of these criteria and/or performance measures has occurred, the Proponent must as soon as becoming aware of any exceedance:
   (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not reoccur;
   (b) consider all reasonable and feasible options for remediation (where relevant);
   (c) within 14 days of the exceedance occurring, submit a report to the Secretary describing these remediation options and any preferred remediation measures or other course of action; and
   (d) implement remediation measures as directed by the Secretary;

   to the satisfaction of the Secretary.

COMMUNITY CONSULTATIVE COMMITTEE

7. The Proponent must establish and operate a Community Consultative Committee (CCC) for the project to the satisfaction of the Secretary. The CCC must be operated in general accordance with the Department's *Community Consultative Committee Guidelines, November 2016* (or later version).

Notes:

- *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval.*
- *In accordance with the guidelines, the Committee should comprise an independent chair and appropriate representation from the Proponent, Council and the local community.*

REPORTING

Incident Reporting

8. The Proponent must immediately notify the Secretary (using the contact name, email address and phone number provided by the Department from time to time) and any other relevant agencies of any incident.

9. Within 7 days of the date of the incident, the Proponent must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested. This report must include the time and date of the incident, details of the incident, measures implemented to prevent re-occurrence and must identify any non-compliance with this approval.

Regular Reporting

10. The Proponent must provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval.

Annual Review

11. By the end of March each year, or other timing as may be agreed by the Secretary, the Proponent must submit a review to the Department reviewing the environmental performance of the project to the satisfaction of the Secretary. This review must:
    (a) describe the project (including any progressive rehabilitation) that was carried out in the previous calendar year, and the project that is proposed to be carried out over the current calendar year;
    (b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the:
        - relevant statutory requirements, limits or performance measures/criteria;
        - requirements of any plan or program required under this approval;
        - monitoring results of previous years; and
        - relevant predictions in the documents listed in condition 2(a) of Schedule 2;
    (c) evaluate and report on:
        - the effectiveness of the air quality and noise management systems; and
        - compliance with the performance measures, criteria and operating conditions in this approval.
    (d) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;
    (e) identify any trends in the monitoring data over the life of the project;
    (f) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies;
    (g) escribe what measures will be implemented over the current calendar year to improve the environmental performance of the project.

    The Proponent must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 7 of Schedule 5) and any interested person upon request.

INDEPENDENT ENVIRONMENTAL AUDIT

12. Within three years of the date of grant of this project approval, and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent must commission, commence and pay the full cost of an Independent Environmental Audit of the project. This audit must:
    (a) be led and conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
    (b) include consultation with the relevant agencies and the CCC;
    (c) assess the environmental performance of the project and whether it is complying with the relevant requirements in this approval and any relevant EPL or necessary water licences for the project (including any assessment, strategy, plan or program required under these approvals);
    (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals;

(e) recommend appropriate measures or actions to improve the environmental performance of the project, and/or any assessment, strategy, plan or program required under the abovementioned approvals; and
(f) be conducted and reported to the satisfaction of the Secretary.

13. Within 12 weeks of commencing this audit, or as otherwise agreed by the Secretary, the Proponent must submit a copy of the audit report to the Secretary and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of these recommendations as required. The Proponent must implement these recommendations, to the satisfaction of the Secretary.

ACCESS TO INFORMATION

14. Within 3 months of the determination of Modification 1, until the completion of all works, including rehabilitation and remediation the Proponent must:
(a) make the following information publicly available on its website:
- the documents listed in condition 2(a) of Schedule 2;
- current statutory approvals for the project;
- all approved strategies, plans and programs required under the conditions of this approval;
- a comprehensive summary of the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs;
- a complaints register, updated monthly;
- the annual reviews of the project;
- any independent environmental audit as described in condition 12 above, and the Proponent's response to the recommendations in any audit; and
- any other matter required by the Secretary; and

(b) keep this information up-to-date,
to the satisfaction of the Secretary.

APPENDIX 1
PROJECT LAYOUT PLAN

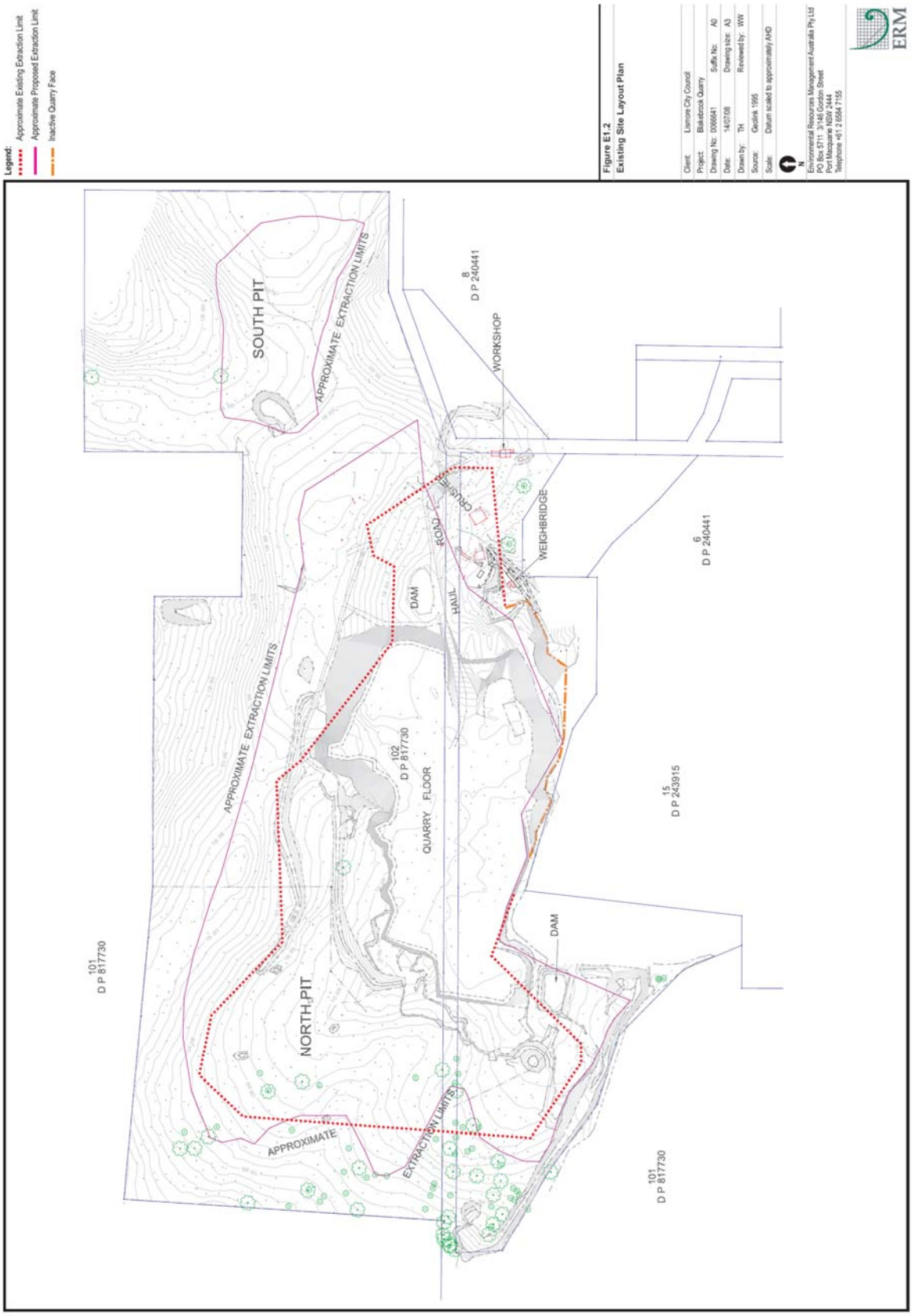


Table 3.1 Statement of Commitments

Item Number	Item	Commitment	Responsibility	Timing
1	Scope of Development			
1.1		The development will be carried out as outlined in the documentation and plans listed below, except where amended by other items of this Statement of Commitments. • Environmental Assessment (EA), prepared by ERM, 2009 and supporting reports; and • Quarry Plans (refer *Figures 2.3 to 2.5* of the EA (ERM, 2009).	Lismore City Council and/or its successors	Ongoing
2	Roads			
2.1		The proponent shall provide the following roadworks with associated stormwater drainage structures that have been designed and constructed in accordance with Council's Development, Design and Construction Manual (as amended). The proponent shall be responsible for any costs, including maintenance, for a period of six months from the date of approval of completion of the work. Required roadworks include:	Lismore City Council	Prior to the operation of the expanded quarry.
2.1.1		Construction of a type CHR intersection layout at the junction of the quarry access and Nimbin Road in accordance with AUSTROADS Pt 5 "Intersections at Grade" giving particular attention to sight distance. The access road will remain sealed from at least 50m back from Nimbin Road to prevent fouling of the road surface, as per existing conditions.	Lismore City Council	Prior to the operation of the expanded quarry.
2.1.2		Construction of a type CHR intersection layout at the junction of Nimbin Road and Wilson Street in accordance with AUSTROADS Pt 5 "Intersections at Grade".	Lismore City Council	Prior to the operation of the expanded quarry.

Item Number	Item	Commitment	Responsibility	Timing
2.1.3		Construction of a 1m wide gravel shoulder and repair existing pavement of Nimbin Road for a length of 200 metres at a location 2.8 kilometres north of the intersection of Nimbin Road and Wilson Street as recommended within Appendix G, Traffic Impact Study, of the Environmental Assessment.	Lismore City Council	Prior to the operation of the expanded quarry.
2.1.4		Installation of guard rail in accordance with the relevant standard at Booerie Creek Bridge approaches as recommended within Appendix G, Traffic Impact Study, of the Environmental Assessment.	Lismore City Council	Prior to the operation of the expanded quarry.
2.1.5		Works identified in Tables 1 and 2 of Appendix G, Traffic Impact Study, of the Environmental Assessment that have not been individually detailed within conditions of consents.	Lismore City Council	Prior to the operation of the expanded quarry.
Prior to the operation of the expanded quarry the applicant shall obtain a certificate of completion for the above works from Council. Prior to obtaining this certificate a practicing qualified surveyor or engineer shall submit to Council for approval, a "works-as-executed" set of plans, completed asset record forms and construction certification. The certification shall certify that all roads, drainage and civil works required by this development consent and the approved design plans have been completed in accordance with Council's Development and Construction Manual (as amended).				
2.2		The proponent shall provide the following roadworks with associated stormwater drainage structures that have been designed and constructed in accordance with Council's Development, Design and Construction Manual (as amended). The proponent shall be responsible for any costs, including maintenance, for a period of six months from the date of approval of completion of the work. Required roadworks include:		
2.2.1		Construction of a type BAR intersection layout at the junction of Nimbin Road and Booerie Creek Road in accordance with AUSTROADS Pt 5 "Intersections at Grade".	Lismore City Council	Once production rates reach 350,000 tonnes/ annum.
Prior to exceeding an annual extraction rate of 350,000 tonnes in any one year the applicant shall obtain a certificate of completion for the above works from Council. Prior to obtaining this certificate a practicing qualified surveyor or engineer shall submit to Council for approval, a "works-as-executed" set of plans, completed asset record forms and construction certification. The certification shall certify that all roads, drainage and civil works required by this development consent and the approved design plans have been completed in accordance with Council's Development and Construction Manual (as amended).				

Item Number	Item	Commitment	Responsibility	Timing
2.3		Prior to the operation of the expanded quarry a review of the Road Safety Audit contained within Tables 1 and 2 of Appendix G, Traffic Impact Study, of the Environmental Assessment shall be undertaken. All required works identified within the review that are not individually detailed within conditions of consents shall be completed prior to operation of the expanded quarry.	Lismore City Council	Prior to the operation of the expanded quarry.
2.4		Prior to the operation of the expanded quarry hinged "Truck Entering" warning signage, W5-22 signs, shall be erected at suitable locations, approximately 200 metres either side of the access, upon Nimbin Road advising of the traffic hazard. Signs shall be displayed during hours of haulage operations only.	Lismore City Council	Prior to the operation of the expanded quarry.
2.5		**Prior to the commencement of works required by the above conditions** the applicant shall obtain approval under section 138 of the Roads Act for the works upon the public road. For this approval full design plans of the proposed engineering works required upon the public road shall be submitted to and approved by Council. Plans shall include details of works required to satisfy condition(s) RD1. Such plans shall be accompanied with the fee, as adopted at the time of the relevant payment as indicated in Councils Fees and Charges.	Lismore City Council	Prior to the commencement of works required by the above conditions.
2.6		**Prior to the issue of the section 138 approval for works upon the public road** the proponent shall have approved by Council a plan of management for the construction of all civil works outside the real property boundaries of the proposed development. The plan shall table scheduling of works so as to be completed in the shortest possible time with minimal impact on the general community. Such plan shall include a Traffic Control Plan prepared by an RTA accredited person. All works shall comply with the Occupational Health and Safety Act.	Lismore City Council	Prior to the issue of the section 138 approval for works upon the public road.
2.7		The plan of management for the operation of the quarry shall incorporate a code of practice for trucking operations associated with the development. This code shall include a requirement for the use of CB radios for communication with buses and garbage trucks within all haulage vehicles as recommended within Appendix G, Traffic Impact Study, of the Environmental Assessment.	Lismore City Council	Prior to the issue of the section 138 approval for works upon the public road.

Item Number	Item	Commitment	Responsibility	Timing
2.8		The development shall provide adequate on site parking for all vehicles, plant and equipment associated with the development.	Lismore City Council	Prior to the operation of the expanded quarry.
2.9		The proposed access shall be sealed for the first 50 metre length from Nimbin Road. Driveways, access aisles and parking areas shall be provided with a suitable pavement, constructed and maintained in accordance with Council's Development, Design and Construction Manual (as amended).	Lismore City Council	Prior to the operation of the expanded quarry.
2.10		All loading and unloading shall take place within the property boundaries, as will the parking of construction and private vehicles associated with the development.	Lismore City Council	Ongoing.
2.11		Vehicles using any off street loading/unloading and/or parking area must enter and leave in a forward direction in accordance with Councils Development Control Plan No.1, Part A, Chapter 7 – Off Street Parking Requirements. All driveways and turning areas shall be kept clear of obstructions that prevent compliance with this condition.	Lismore City Council	Ongoing.
2.12		The proponent shall provide Council, on or before January 31, April 30, July 31 and October 31 in each year, with extraction figures detailing quantities of all material removed from the site for the previous quarter of operations.	Lismore City Council	Ongoing.
2.13		Annual payment of contributions levied under Section 94 of the Environmental Planning and Assessment Act and Lismore City Council S94 Contributions Plan 2004 (as amended) are required. Such levies shall contribute towards the provision of public services and/or amenities identified. Such levies shall be calculated utilising extraction returns as required by the above **condition**. The rates and amounts applying at the date of this notice for the approved extraction rate of 600,000 tonnes, totalling **$560,628** annually, have been calculated as set out below for your information. Levies set out below shall be increased in accordance with the percentage increase as notified by the Consumer Price Index (Sydney) annually. Levies shall be paid within 30 days of the Council issuing an assessment for the preceding year.	Lismore City Council	Ongoing

Item Number	Item	Commitment	Responsibility	Timing
		The contributions set out in the schedule are exclusive of any GST (if any) and where the provision of any services or the construction of any infrastructure or any other thing with those contributions occurs, then in addition to the amount specified above the Applicant will pay to the Council the GST (as defined below) which is payable by the Council in respect of the provision of such services or the construction of any infrastructure or any other thing. GST means any tax levy charge or impost under the authority of any GST law (as defined by the GST Act) and includes GST within the meaning of the GST Act. The GST Act means A New Tax System (Goods and Services Tax) Act 1999 or any amending or succeeding legislation. The levy shall be calculated in accordance with Councils adopted section 94 plan as at this date and be based on the following information: • Road construction cost of $369,000 per kilometre indexed for CPI annually from December 2003) • Average haulage distance of 15 kilometres • For use in calculations a conversion factor of 1.7 from m^3 to tonnes has been adopted • The first 5,000m^3 (8,500 tonnes) per annum shall be exempt from levies. Levy calculation for yearly extraction will be: ($369,000/6.74x10^6) x 15km x (Annual tonnage extracted – 8,500) x 1.025 x CPI = (369,000/6.74x10^6) x 15km x (600,000 – 8,500) x 1.025 x 1.126 = $560,628		

Item Number	Item	Commitment	Responsibility	Timing
2.14		A Traffic Noise Management Strategy (TNMS) be developed by the proponent to ensure that feasible and reasonable noise management strategies for vehicle movements associated with the facility are identified and applied, that include but are not necessarily limited to the following:	Lismore City Council	Prior to the operation of the expanded quarry.
2.14.1		Driver training to ensure that noisy practices such as the use of compression engine brakes are not unnecessarily used near sensitive receivers;		
2.14.2		Best noise practice in the selection and maintenance of vehicle fleets;		
2.14.3		Movement scheduling where practicable to reduce impacts during sensitive times of the day;		
2.14.4		Communication and management strategies for non licensee/proponent owned and operated vehicles to ensure the provision of the TNMS are implemented;		
2.14.5		A system of audited management practices that identifies non conformances, initiates and monitors corrective and preventative action (including disciplinary action for breaches of noise minimisation procedures) and assesses the implementation and improvement of the TNMS;		
2.14.6		Specific procedures to minimise impacts to identified sensitive receivers;		
2.14.7		Clauses in conditions of employment, or in contracts, of drivers that require adherence to noise minimisation procedures and facilitate effective implementation of the disciplinary actions for breaches of the procedures.		
3	**Ecological Considerations**			
3.1		The vegetation o the site will be cleared and managed in accordance with the Vegetation and Habitat Management Plan provided as Appendix 4 to the *Ecological Site Assessment* (Conacher Environmental Group, 2008) (refer to *Appendix F*), including the following: • Revegetation in *Management Area A*; • Regeneration in *Management Area B*; • Protected Habitat in *Management Area C*; and	Lismore City Council	Ongoing.

Item Number	Item	Commitment	Responsibility	Timing
		Vegetation removal in *Management Area D*.		
3.2		The Koala Plan of Management prepared by Conacher Travers (2006) (refer to *Appendix F*) will be implemented including: • Habitat protection works; • Habitat restoration works; • Traffic management controls; • Dog/ Feral Animal Management measures; and • Bushfire Management.	Lismore City Council	Ongoing.
3.3		Lismore City Council will provide at least 45 hectares of mature, vegetated land to be retained to offset the 10.2 hectares to be lost as a result of the proposed development. The offset will be provided at a rate of approximately 4:1. The 45 hectares will be the same vegetation type as that to be removed (Tall Open Forest) or a type of higher ecological significance (such as Lowland Rainforest EEC or Koala Habitat) and may be located at a single site or numerous sites that Council own in the LGA, which are suitable to be set aside for ecological preservation. Lismore City Council will undertake ecological assessments of any land proposed to be identified as a vegetation offset site and develop an offset strategy for submission to the DoP and DECC for approval, taking into consideration DECC's document *Principles for the Use of Biodiversity Offsets in NSW*. The provision of nest and roost boxes will only be a short term measure, that is, provided as a measure for the protection and conservation of fauna during felling of hollow-bearing trees.	Lismore City Council	Prior to the removal of the existing vegetation.
4	**Aboriginal Heritage**			
4.1		All site employees/contractors will undergo site induction training that includes stop work procedures if archaeological sites are discovered.	Lismore City Council	Ongoing.

Item Number	Item	Commitment	Responsibility	Timing
4.2		Information regarding heritage requirements will be made available on site for employees/contractors.	Lismore City Council	Ongoing.
4.3		If an Aboriginal item is found all work will cease and the police, relevant Aboriginal community groups and a suitably qualified archaeologist contacted.	Lismore City Council	Ongoing.
5	Noise			
5.1		The quarry will operate according to the following hours: • Monday to Friday: 7.00am to 6.00pm; and • Saturday: 7.00am to 3.00pm. No work will be undertaken on Sundays or public holidays.	Lismore City Council	Ongoing.
5.2		Speed limits within the quarry site will be restricted to 40km/h and compression braking prohibited.	Lismore City Council	Ongoing.
5.3		4 metre earth bunds will be constructed to the north east and south west of the new southern quarry pit and a 5 metre earth bund will be constructed to the south of the existing Jaw Crusher as illustrated in Figures C.2 and C.3 in Annex C of the revised Noise Assessment (ERM, 2009[1]) provided as Annex B to the report. During the short construction period for these bunds, the noise limits will be relaxed. Nearby residents will be notified when this work will take place.	Lismore City Council	Prior to the operation of the expanded quarry.
5.4		Attended noise monitoring and plant equipment audits will be undertaken.	Lismore City Council	Annually.
5.5		Plant will be relocated to greater pit depths as the floor of the quarry gets deeper.	Lismore City Council	Ongoing.

Item Number	Item	Commitment	Responsibility	Timing
5.6		Noise Management Plan – the licensee must develop a Noise Management Plan for the quarry which must incorporate but not be limited to, the following: • noise compliance; • noise limits; • blasting noise; and • road traffic noise.	Lismore City Council	Prior to the operation of the expanded quarry.
5.7		A noise compliance assessment (including airblast overpressure and ground vibration from blasting) shall be submitted to the DECC within three (3) months of commencement of expanded operations at the premises. The assessment shall be prepared by a suitable qualified and experienced acoustical consultant and shall assess compliance with noise and blasting limits presented in conditions 5.8 and 6.1 - 6.4.	Lismore City Council	Within 3 months of commencement of expanded operations.

Item Number	Item	Commitment	Responsibility	Timing
5.8		Noise from the premises must not exceed the sound pressure level (noise) limits presented in the Table below. Note: the limits represent the sound pressure level (noise) contribution at the nominated receiver locations in the table.	Lismore City Council	Ongoing.

Noise Limits (dB(A))

Location (1)	Day(3)	Evening(4)	Night(5)	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
1 Nimbin Road, Blakebrook & 122 Keerrong Road, Blakebrook	38	N/A	N/A	N/A
145 Pinchin Road, Goolmanger, 190 Keerrong Road, Blakebrook, 365 Booerie Creek Road, Booerie Creek, 210 Booerie Creek Road & 484 Nimbin Road, Blakebrook.	35	N/A	N/A	N/A

(1) Receiver locations as identified in *Blakebrook Quarry Expansion – Environmental Assessment Report – Final Report Volume 1 (Report No. 0066641), Appendix C, ERM 2008.'*

(2) Noise limits may be exceeded by no more than 2dB(A) for a maximum of ten days in any reporting period during operation of the permanent jaw crusher.

(3) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;

(4) Evening is defined as the period from 6pm to 10pm on any day;

(5) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

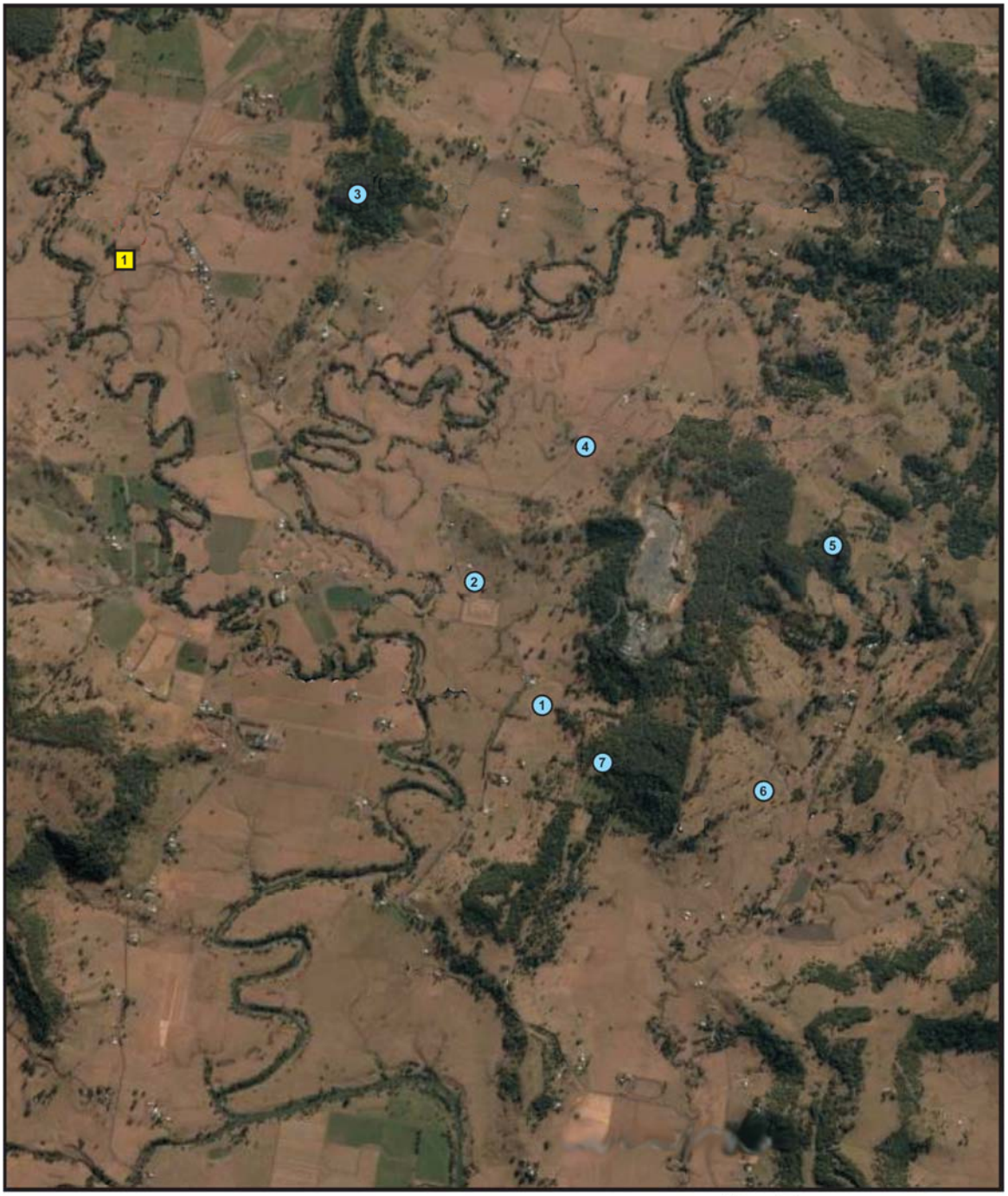
Item Number	Item	Commitment	Responsibility	Timing
5.9		Noise from Blakebrook Quarry is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise level limits in Condition 5.8 unless otherwise stated.	Lismore City Council	Ongoing.
5.10		Where it can be demonstrated that direct measurement of noise from the Blakebrook Quarry is impractical, the DECC may accept alternative means of determining compliance. See Chapter 11 of the NSW Industrial Noise Policy. The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.	Lismore City Council	Ongoing.
5.11		The noise emission limits identified in Condition 5.8 apply under meteorological conditions of wind speed up to 3 metres per second at 10 metres above ground level.	Lismore City Council	Ongoing.
6	**Blasting Limits**			
6.1		The overpressure level from blasting operations at the Blakebrook Quarry must not exceed 115dB (Lin Peak) for more than 5 per cent of the total blasts over each reporting period of 12 months. Error margins associated with any monitoring equipment used to measure this area are not to be taken into account in determining whether or not the limit has been exceeded.	Lismore City Council	Ongoing.
6.2		The overpressure level from blasting operations at the Blakebrook Quarry must not exceed 120dB (Lin Peak) at any time. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	Lismore City Council	Ongoing.
6.3		Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5mm/sec for more than 5 per cent of the total number of blasts over each reporting period of 12 months. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	Lismore City Council	Ongoing.

Item Number	Item	Commitment	Responsibility	Timing
6.4		Blasting operations at the premises may only take place between 9.00am-5.00pm Monday to Friday. (Where compelling safety reasons exist, the Authority may permit a blast to occur outside the abovementioned hours. Prior written (or facsimile) notification of any such blast must be made to the Authority. To determine compliance with Conditions 6.1-6.4: a) airblast overpressure and ground vibration levels must be measured and electronically recorded at the closest and potentially most exposed receiver location in L6.1 to the blast activity for all blasts carried out in or on the premises; and b) Instrumentation used to measure the airblast overpressure and ground vibration levels must meet the requirements of Australian Standard AS 2187.2-2006.	Lismore City Council	Ongoing.
7	**Air Quality**			
7.1		All unsealed haul routes on the site will be watered at a rate of 2 l/m²/minute as required.	Lismore City Council	Ongoing.
7.2		Water sprays will be used on all mobile crushing, stockpiles and screening equipment to minimise airborne particulate matter.	Lismore City Council	Ongoing.
7.3		All road trucks must have tarpaulin covers in place prior to leaving the weighbridge.	Lismore City Council	Ongoing.
7.4		A dust deposition gauge network will be developed to ensure compliance with cumulative dust deposition criteria.	Lismore City Council	At or before production rates at the quarry reach 337,500 tonnes/ annum.
7.5		Stockpiles are to be seeded to minimize the potential for fugitive dust.	Lismore City Council	Ongoing
8	**Groundwater Management**			

Item Number	Item	Commitment	Responsibility	Timing
8.1		A detailed groundwater assessment will be undertaken prior to the commencement of vertical extraction. This will involve the installation of nested ground water monitoring wells. The wells will be installed to at least two depths at a minimum of three separate locations around the perimeter of the quarry in order to intercept identified distinct water bearing zones.	Lismore City Council	Following approval of the quarry expansion and prior to the commencement of vertical extraction
8.2		A quarterly groundwater monitoring program will be undertaken as detailed in *Section 8.4.1* of the EA (ERM, 2009) and will involve analysis by a NATA laboratory.	Lismore City Council	Quarterly following approval of the quarry expansion and prior to the commencement of vertical extraction
8.3		Should it be determined that environmental flows from springs are being reduced by extraction activities, investigation will commence on supplementing flows using water collected in the quarry pit. Water collected in the quarry will have to meet water quality criteria before it is discharged, with discharge to be licensed under the DECC.	Lismore City Council	Ongoing.
9	**Surface Water Management**			
9.1		Clean run-off from the surround small sub-catchments will be diverted away from the quarry pits to existing ephemeral water courses. Water collected within the pits will be stored in in-pit dams and used for processing and dust suppression purposes. No quarry water is proposed to be discharged from the site as part of the proposed expansion activities.	Lismore City Council	Ongoing.

Item Number	Item	Commitment	Responsibility	Timing
10	Quarry Rehabilitation			
10.1		A progressive rehabilitation approach will be undertaken to make safe the site and to rehabilitate the site and benches to tie into the surrounding woodland. All on-site infrastructure will be removed.	Lismore City Council	Ongoing and on completion of quarrying.
10.2		Lismore City Council will commit to the ongoing allocation of funds for the progressive rehabilitation of the Quarry in the determination of its annual operational budget. The allocation of funds will be tied to demand and the output of the Quarry, with the allocation to be in the order of $30 000 to $50 000. The allocated money will be accumulated pending the availability of areas to be rehabilitated. The budget allocation may also be increased over the lifetime of the quarry to reflect inflationary changes and rehabilitation needs as necessary.	Lismore City Council	Ongoing and on completion of quarrying
10.3		A suitably qualified and experienced professional will be engaged to carry out on-going maintenance and monitoring. This will involve activities such as bushland rehabilitation, weed removal and nest box erection.	Lismore City Council	Upon commencement of rehabilitation activities and upon completion of quarrying.
10.4		The success of the rehabilitation program will be monitored in accordance with the *Mine Rehabilitation Handbook*.	Lismore City Council	Upon commencement of rehabilitation activities and upon completion of quarrying.

APPENDIX 3
RECEIVER LOCATION PLAN



Legend

Noise Logger

Noise Assessment Locations

Figure 2.1

Noise Assessment and Logging Locations

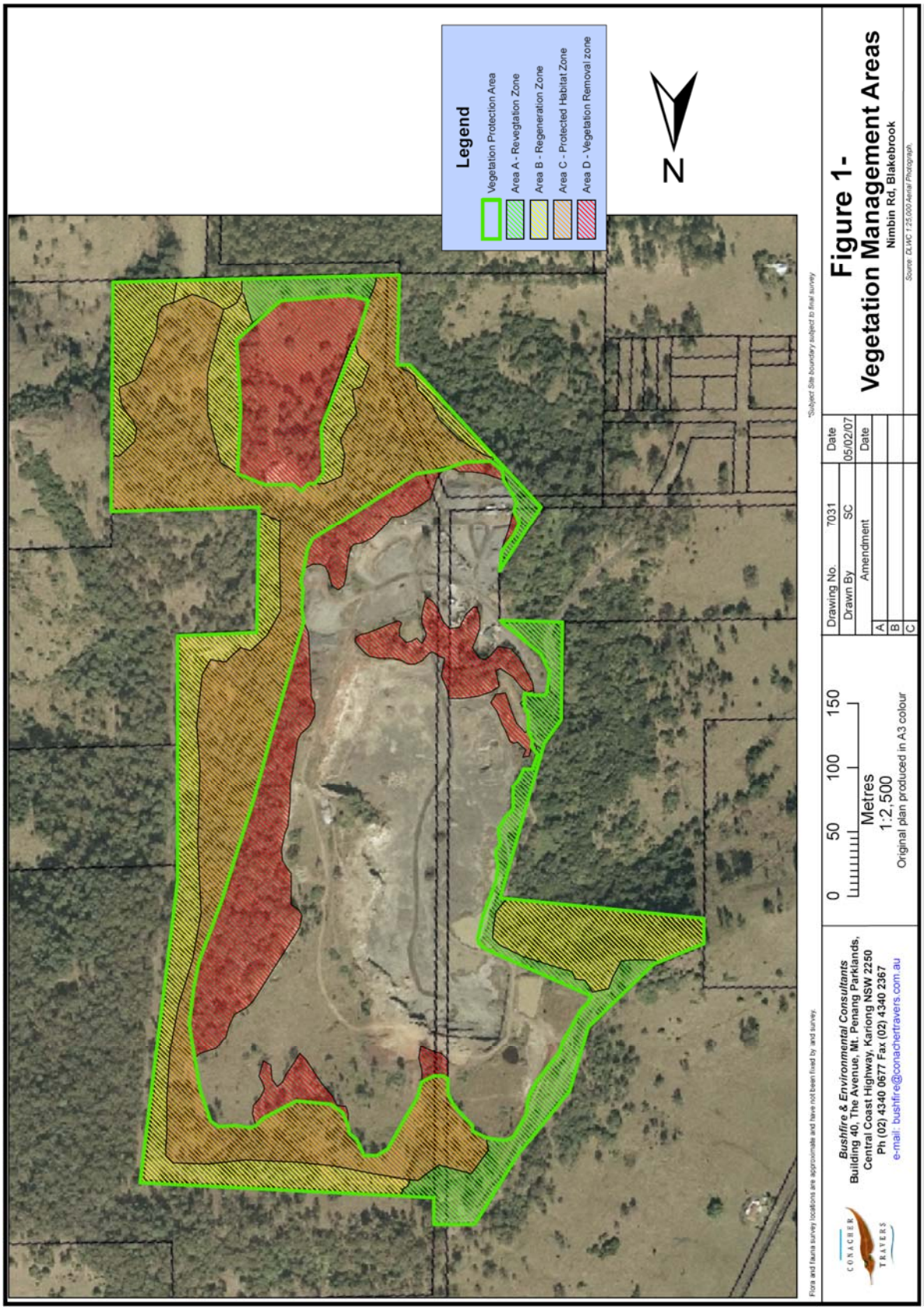
Client:	Lismore City Council	
Project:	Blakebrook Quarry Noise Assessment	
Drawing No:	0066641s_01_R1	
Date:	11/06/2009	Drawing size: A4
Drawn by:	GC	Reviewed by: MS
Source:	-	
Scale:	Not to Scale	

N

Environmental Resources Management Australia Pty Ltd
Building C, 33 Saunders St, Pyrmont, NSW 2009
Telephone +61 2 8584 8888

ERM

APPENDIX 4
BIODIVERSITY OFFSET STRATEGY



APPENDIX 5
NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 are to apply under all meteorological conditions except the following:
   (a) wind speeds greater than 3 m/s at 10 m above ground level; or
   (b) temperature inversion conditions between 1.5°C and 3°C/100 m and wind speed greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3°C/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station required under condition 13 of Schedule 3.

Compliance Monitoring

3. A noise compliance assessment must be undertaken within two months of commencing mining operations under EA (Mod 1). The assessment must be conducted by a suitably qualified and experienced acoustical practitioner and must assess compliance with the noise criteria in Table 2. A report must be provided to the Secretary and EPA within 1 month of the assessment.

4. Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:
   (a) monitoring locations for the collection of representative noise data;
   (b) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment;
   (c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration; and
   (d) the use of an appropriate modifying factor for low frequency noise to be applied during compliance testing at any individual residence if low frequency noise is present (in accordance with the INP) and before comparison with the specified noise levels in the approval.

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 2

Checklist – Schedule 5 Condition 2

Schedule 5 Condition 11 Requirements for AEMR

Condition	AEMR Reference
By the end of March each year, or other timing as may be agreed by the Secretary, the Proponent must submit a review to the Department reviewing the environmental performance of the project to the satisfaction of the Secretary. This review must:	The AEMR will be submitted to the Department in February 2017.
(a) describe the project (including any progressive rehabilitation) that was carried out in the previous calendar year, and the project that is proposed to be carried out over the current calendar year;	Section 1.4 and 5
(b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the: • relevant statutory requirements, limits or performance measures/criteria; • requirements of any plan or program required under this approval; • monitoring results of previous years; and • relevant predictions in the documents listed in condition 2(a) of Schedule 2;	• Noise –Section 3.1 • Blast Impacts – Section 3.2 • Air Quality – Section 3.3 • Ground Water – Section 3.4 • Surface Water –Section 3.5 • Traffic Movements – Section 3.6
(c) evaluate and report on: • the effectiveness of the air quality and noise management systems; and • compliance with the performance measures, criteria and operating conditions in this approval.	• Noise –Section 3.1 • Air Quality – Section 3.3
(d) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;	Section 6.1
(e) identify any trends in the monitoring data over the life of the project;	• Noise –Section 3.1 • Blast Impacts – Section 3.2 • Air Quality – Section 3.3 • Ground Water – Section 3.4 • Surface Water –Section 3.5 • Traffic Movements – Section 3.6

(f) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies;	• Noise –Section 3.1 • Blast Impacts – Section 3.2 • Air Quality – Section 3.3 • Ground Water – Section 3.4 • Surface Water –Section 3.5 • Traffic Movements – Section 3.6
(g) describe what measures will be implemented over the current calendar year to improve the environmental performance of the project.	Section 6.4
The Proponent must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 7 of Schedule 5) and any interested person upon request.	Once approved, the AEMR will be placed on the Lismore City Council website

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 3A

DPE Comments on 2016 Audit

NSW GOVERNMENT | Planning & Environment

Contact: Stewart Mclachlan
Phone: 02 6575 3405
Email: stewart.mclachlan@planning.nsw.gov.au

Lismore City Council
Att: Phil Klepzig
Manager Commercial Services
PO Box 23A
LISMORE NSW 2480

Blakebrook Quarry – PA 07_0020
2016 Annual Environmental Management Report

Dear Phil

Reference is made to the Blakebrook Quarry (the Quarry) 2016 Annual Environmental Management Report (AEMR) for the period 1 December 2016 to 31 December 2016 submitted to the Department of Planning and Environment (the Department) on 3 February 2017 as required under Schedule 5, Condition 4, of PA07_0020 (the approval).

The Department has reviewed the 2016 AEMR and considers it to be generally in accordance with the approval. However, prior to publishing of the AEMR in accordance with Schedule 5, Condition 9, the Department requests that the AEMR be updated with the following minor changes and resubmitted for the Department's records by no later than close of business **10 March 2016**:

a) Change the title page and signature page to reflect 2017 instead of 2016; and
b) Update Section 16 of the AEMR to reflect the two complaints listed in Attachment 14.

The Department notes that the 2016 AEMR reports in Section 16 that there were no complaints for the 2016 period, however Attachment 14 identifies two complaints which occurred on 15 and 18 April 2016 in relation to night time Asphalting works. As such, the Department requests that the Quarry provide further information in relation to these works by no later than close of business **31 March 2017.** This information should include an aerial image with the approximate location of the works overlaid with sensitive receivers as outlined in Appendix 3 of the approval, as well as a description of the works that occurred and the time the works occurred.

Further, for future Annual Reviews the Secretary requests the following inclusions in accordance with Schedule 2 Condition 4:

1. A statement of compliance against each condition of the approval (a tabulated conditions of approval document with status of compliance against each relevant condition);
2. A tabulated approval list, which includes details of all approvals held, a brief description of the nature of each approval and expiry date of approval, if applicable;
3. Complaint trending across reporting periods;
4. A standalone section which summarises any non-compliances identified in the statement of compliance and describes what actions were, or are being undertaken to ensure compliance;
5. A brief introduction outlining the Quarry operations to assist in community readability of the AEMR. This should include a locality map with project approval and offset areas boundaries clearly overlaid; and
6. Section references against each item listed in Schedule 5, Condition 4 which clearly articulates where each matter is addressed.

The above Department requests (1-6) should be tabulated within the next Annual Review, with specific section references as to where each point has been addressed within the document.

NSW GOVERNMENT | Planning & Environment

Lastly, the Department notes that the Quarry anticipates to update the Bushland Regeneration Plan following successful purchase of 45 hectares of vegetation offsets for the Quarry. The Department requests that any such update includes specific focus on koala activity cells and feed tree as per the recommendation in the Koala Population Study dated 22 December 2016.

Should you have any queries on this matter, please do not hesitate to contact Stewart Mclachlan, as per the details above.

Yours sincerely

27/02/2017

Leah Cook
Team Leader – Compliance
As nominee of the Secretary

Department of Planning & Environment
L1, Suite 14, 1 Civic Avenue Singleton NSW 2330 | PO Box 3145 Singleton NSW 2330 | T 02 6575 3405 | cmpliance@planning.nsw.gov.au | **www.planning.nsw.gov.au**

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 3B

Checklist – DPE Requirements

Department of Planning and Environment Requirements

Requirement	AEMR Reference
1. A Statement of compliance against each condition of approval (a tabulated conditions of approval document with status of compliance against each relevant condition).	Attachment 4
2. A tabulated approval list which includes details of all approvals held a brief description of each approval and expiry date of approval, if applicable.	Section 1.3
3. Complaint trending across reporting periods.	Section 5.8
4. A standalone section which summarises any non-compliances identified in the statement of compliance and describes what actions were, or are being undertaken to ensure compliance.	Section 6.1
5. A brief introduction outlining the Quarry operations to assist in community readability of the AEMR. This should include a locality map with project approval and offset areas boundaries clearly shown.	Preamble
6. Section references against each item listed in Schedule 5, Condition 4 which clearly articulates where each matter is addressed. *Note, This requirement predated Modification 1 of the approval. With the issue of the modified approval notice, come changes to condition numbers has occurred. The equivalent condition within the modified consent is Schedule 5 Condition 11.*	Attachment 2

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 4

Checklist – MP 07_0020 Mod 1

Blakebrook Quarry - MP_07_0020 (Mod 1) Compliance Checklist		
#	**Condition**	**Comment./ Reference**
SCHEDULE 2 - ADMINISTRATIVE CONDITIONS		
OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT		
1	In addition to meeting the specific performance measures and criteria established under this approval, the Proponent must implement all reasonable and feasible measures to prevent or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.	Noted
TERMS OF APPROVAL		
2	The Proponent must carry out the project: (a) generally in accordance with the EA and EA (Mod 1); and (b) in accordance with the conditions of this approval, Project Layout Plan and the Statement of Commitments. *Notes:* • *The Project Layout Plan is shown in Appendix 1;* • *The Statement of Commitments is reproduced in Appendix 2.*	Noted
3	If there is any inconsistency between the documents in condition 2(a), the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.	Noted
4	The Proponent must comply with any written requirement/s of the Secretary arising from the Department's assessment of: (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted in accordance with this approval (including any stages of these documents); (b) any reviews, reports or audits undertaken or commissioned by the Department regarding compliance with this approval; (c) and the implementation of any actions or measures contained in these documents.	Noted The Department's requirements specified in it's response to the 2016 Audit have been incorporated into the 2017 document. Refer **Section 1.1.3.**
5	By 30 June 2010, the Proponent shall surrender development consent DA 95/239 to the relevant consent authority to the satisfaction of the Secretary.	Completed

LIMITS ON APPROVAL		
6	The Proponent may carry out quarrying operations on the site until 31 December 2039. *Note: Under this approval, the Proponent is required to rehabilitate the site and carry out additional requirements and undertakings to the satisfaction of the Secretary. Consequently, this approval will continue to apply in all respects other than the right to conduct quarrying operations until the rehabilitation of the site and those requirements and undertakings have been carried out to the standard required by the applicable conditions.*	Noted
7	The Proponent must not undertake quarrying operations below 55 m AHD in the northern pit or 105 m AHD in the southern pit. *Note: Drainage sumps may be constructed below this level with the agreement of the Secretary.*	Refer **Section 2.1.2**.
8	The Proponent must not: (a) transport more than 600,000 tonnes of quarry materials from the site per calendar year; or (b) dispatch more than 100 laden trucks from the site on any calendar day. *Note: Dispatch of laden trucks is also controlled under condition 1 of Schedule 3.*	Refer **Section 2.1.3** and **2.1.4**
STRUCTURAL ADEQUACY		
9	The Proponent must ensure that all 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 Proponent is required to obtain construction and occupation certificates for any proposed building works;* • *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*	Noted
DEMOLITION		
10	The Proponent must ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.	Noted

PROTECTION OF PUBLIC INFRASTRUCTURE		
11	Unless the Proponent and the applicable authority agree otherwise the Proponent must: (a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the project; and (b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the project. *Note: This condition does not apply to damage to roads caused as a result of general road usage or otherwise addressed by contributions required by condition 13 of Schedule 2.*	Noted
OPERATION OF PLANT AND EQUIPMENT		
12	The Proponent must ensure that all the plant and equipment used at the site, or to monitor the performance of the project is: (a) maintained in a proper and efficient condition; and (b) operated in a proper and efficient manner.	Noted. Monitoring largely completed by contractors. Condition of engagement that a regular maintenance program completed for all monitoring equipment.
SECTION 94 CONTRIBUTIONS		
13	The Proponent must pay Council an annual financial contribution toward the maintenance of local roads used for haulage of quarry products. The contribution must be determined in accordance with the *Lismore City Council Section 94 Contribution Plan*, 2004, or any subsequent relevant contributions plan adopted by Council.	S94 fees monthly.
PRODUCTION DATA		
14	The Proponent must: (a) from the commencement of quarrying operations provide calendar year annual quarry production data to DRG using the standard form for that purpose; and (b) include a copy of this data in the Annual Review.	Annual production data provided to the Department of Trade XXX. Copy of data provided at **Attachment 6**.
COMPLIANCE		
15	The Proponent must ensure that all employees, contractors and sub-contractors are aware of, and comply with, the conditions of this approval relevant to their respective activities.	NRQA advises that staff are briefed on approval requirements (relevant to their responsibilities) as part of the induction process.
IDENTIFICATION OF BOUNDARIES		
16	The Proponent must ensure that the boundaries of the approved limits of extraction are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.	NRQA advises extraction boundaries clearly identified on site.

<table>
<tr><td colspan="3">SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS</td></tr>
<tr><td colspan="3">NOISE</td></tr>
<tr><td colspan="3">Hours of Operation</td></tr>
<tr><td>1</td><td>The Proponent must comply with the operating hours set out in Table 1.

Table 1: Operating hours<table><tr><th>Activity</th><th>Permissible Hours</th></tr><tr><td rowspan="3">Quarrying operations including loading and dispatch of laden trucks</td><td>7 am to 6 pm Monday to Friday</td></tr><tr><td>7 am to 3 pm Saturday</td></tr><tr><td>At no time on Sundays or public holidays</td></tr><tr><td rowspan="2">Blasting</td><td>10 am to 3 pm Monday to Friday (except public holidays)</td></tr><tr><td>At no time on Sundays or public holidays</td></tr><tr><td>Maintenance</td><td>May be conducted at any time, provided that these activities are not audible at any privately-owned residence</td></tr></table></td><td>Refer Section 2.2.</td></tr>
<tr><td>2</td><td>The following activities may be carried out outside the hours specified in condition 1 above:
(a) delivery or dispatch of materials as requested by Police or other public authorities; and
(b) emergency work to avoid the loss of lives, property or to prevent environmental harm.

In such circumstances, the Proponent must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.</td><td>Noted.

NRQA advises that no emergency works completed in 2017.</td></tr>
<tr><td>3</td><td>The Proponent must ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Noise criteria dB(A)<table><tr><th>Receiver</th><th>Day
$L_{Aeq\ (15\ minute)}$</th></tr><tr><td>Location 2</td><td>36</td></tr><tr><td>All other locations</td><td>35</td></tr></table>Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy. Appendix 5 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Proponent has an agreement with the relevant landowner to exceed the noise criteria, and the Proponent has advised the Department in writing of the terms of this agreement.</td><td>Refer Section 3.1.</td></tr>
</table>

Operating Conditions		
4	The Proponent must: (a) implement best practice management to minimise the construction, operational and road transportation noise of the project; (b) minimise the noise impacts of the project during meteorological conditions when the noise criteria in this approval do not apply (see Appendix 5); (c) carry out noise monitoring (at least every 3 months or as otherwise agreed with the Secretary) to determine whether the project is complying with the relevant conditions of this approval; and (d) regularly assess noise monitoring data and modify and/or stop operations on site to ensure compliance with the relevant conditions of this approval, to the satisfaction of the Secretary. *Note: Required frequency of noise monitoring may be reduced if approved by the Secretary.*	Refer **Section 3.1.**
Noise Management Plan		
5	The Proponent must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must: (a) be prepared in consultation with the EPA; (b) be submitted to the Secretary within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; (c) describe the measures to be implemented to ensure: • compliance with the noise criteria and operating conditions of this approval; • best practice management is being employed; and • the noise impacts of the project are minimised during meteorological conditions under which the noise criteria in this approval do not apply (see Appendix 5); (d) describe the proposed noise management system; and (e) include a monitoring program to be implemented to measure noise from the project against the noise criteria in Table 2. The Proponent must implement the Noise Management Plan as approved from time to time by the Secretary.	Updated Noise Management Sub-plan submitted to DPE in December 2017.
BLASTING		
Blasting Impact Assessment Criteria		
6	The Proponent must ensure that blasting on site does not cause any exceedance of the criteria in Table 3.	Complies. Refer **Section 3.2**.

	Table 3: Blasting Criteria **Receiver** / **Airblast overpressure (dB(Lin Peak))** / **Ground vibration (mm/s)** / **Allowable exceedance** Any residence on privately-owned land: 120 / 10 / 0% Any residence on privately-owned land: 115 / 5 / 5% of the total number of blasts over a period of 12 months However, these criteria do not apply if the Proponent has a written agreement with the relevant owner to exceed the limits in Table 3, and the Proponent has advised the Department in writing of the terms of this agreement.	
Blasting Frequency		
7	The Proponent may carry out a maximum of 2 blasts per month, unless an additional blast is required following a blast misfire. This condition does not apply to blasts required to ensure the safety of the quarry or workers on site. *Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the quarry.*	Refer **Section 3.2**.
Operating Conditions		
8	During blasting operations, the Proponent must: (a) implement best practice management to: • protect the safety of people and livestock; • protect public or private infrastructure and property from damage; and • minimise the dust and fume emissions; (b) operate a suitable system to enable the local community to get up-to-date information on the proposed blasting schedule on site; and (c) carry out regular monitoring to determine whether the project is complying with the relevant conditions of this approval, to the satisfaction of the Secretary.	NRQA advise that blast operations occur in accordance with the adopted Blast Management Sub-plan.
Blast Management Plan		
9	The Proponent must prepare a Blast Management Plan for the project to the satisfaction of the Secretary. This plan must: (a) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; (b) describe the measures to be implemented to ensure compliance with the blast criteria and operating conditions of this approval; (c) include measures to manage flyrock to ensure the safety or people and livestock and to protect property; (d) include a monitoring program for evaluating and reporting on compliance with the blasting criteria in this approval; (e) include local community notification procedures for the blasting schedule, in particular to nearby residences; and (f) include a protocol for investigating and responding to complaints related to blasting operations. The	Updated Blast Management Sub-plan submitted to DPE in December 2017.

<table>
<tr><td></td><td>Proponent must implement the Blast Management Plan as approved from time to time by the Secretary.</td><td></td></tr>
<tr><td colspan="3">AIR QUALITY</td></tr>
<tr><td colspan="3">Air Quality Impact Assessment Criteria</td></tr>
<tr><td>10</td><td>The Proponent must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the project do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.

Table 4: Air quality criteria
<table><tr><th>Pollutant</th><th>Averaging Period</th><th colspan="2">Criterion</th></tr><tr><td>Particulate matter < 10 µm (PM_{10})</td><td>Annual</td><td colspan="2">[a,d] 25 µg/m³</td></tr><tr><td>Particulate matter < 10 µm (PM_{10})</td><td>24 hour</td><td colspan="2">[b] 50 µg/m³</td></tr><tr><td>Total suspended particulates (TSP)</td><td>Annual</td><td colspan="2">[a,d] 90 µg/m³</td></tr><tr><td>[c] Deposited dust</td><td>Annual</td><td>[b] 2 g/m²/month</td><td>[a,d] 4 g/m²/month</td></tr></table>
Notes to Table 4:
a) Cumulative impact (i.e. increase in concentrations due to the project plus background concentrations due to all other sources).
b) Incremental impact (i.e. increase in concentrations due to the project alone, with zero allowable exceedances of the criteria over the life of the project.
c) Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003:
Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter - Deposited Matter -
Gravimetric Method.
d) Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.
e) “Reasonable and feasible avoidance measures” includes, but is not limited to, the operational requirements in conditions 11, 12 and 13 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.</td><td>Refer Section 3.3.</td></tr>
<tr><td colspan="3">Operating Conditions</td></tr>
<tr><td>11</td><td>The Proponent must:
(a) implement best practice management to minimise the dust emissions of the project;
(b) regularly assess meteorological and air quality monitoring data and relocate, modify and/or stop operations on site to ensure compliance with the air quality criteria in this approval;
(c) minimise the air quality impacts of the project during adverse meteorological conditions and extraordinary events (see note d under Table 4);
(d) monitor and report on compliance with the relevant air quality conditions in this approval; and</td><td>NRQA advise that activities at the quarry occur in accordance with the adopted Air Quality Management Sub-plan.</td></tr>
</table>

	(e) minimise the area of surface disturbance and undertake progressive rehabilitation of the site, to the satisfaction of the Secretary.	
Air Quality Management Plan		
12	The Proponent must prepare an Air Quality Management Plan for the project to the satisfaction of the Secretary. This plan must: (a) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; (b) describe the measures to be implemented to ensure: • compliance with the air quality criteria and operating conditions of this approval; • best practice management is being employed; and • the air quality impacts of the project are minimised during adverse meteorological conditions and extraordinary events; (c) describe the proposed air quality management system; (d) include an air quality monitoring program that: • is capable of evaluating the performance of the project; • includes a protocol for determining any exceedances of the relevant conditions of approval; and • effectively supports the air quality management system. The Proponent must implement the approved Air Quality Management Plan as approved from time to time by the Secretary.	Updated Air Quality Management Sub-plan submitted to DPE in December 2017
Meteorological Monitoring		
13	For the life of the project, the Proponent must ensure that there is a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales* guidelines.	Complies New meteorological station installed in month 2017.
Greenhouse Gas Emissions		
14	The Proponent must implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site.	Greenhouse emissions form a selection criteria within purchase decisions at the quarry. Lismore City Council aims to be carbon neutral.
SOIL AND WATER		
Water Supply		
15	The Proponent must ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of operations under the approval to match its available water supply, to the satisfaction of the Secretary.	Refer **Section 3.5.**

Water Discharges		
16	The Proponent must comply with the discharge limits in any EPL, or with section 120 of the POEO Act.	Complies Refer **Section 3.5**
Groundwater Assessment		
17	The Proponent must undertake a detailed groundwater assessment to the satisfaction of the Secretary. This assessment must be: (a) prepared by a suitably qualified expert in consultation with DPI Water; (b) submitted to the Secretary for approval by 30 December 2018; (c) approved by the Secretary before any extraction below 105 m AHD in the northern pit or below 118.5 m AHD in the southern pit; (d) adequately assess groundwater resources affected by the northern and southern pits, to the proposed full extraction depths of those pits; (e) adequately assess all groundwater impacts associated with proposed extraction; (f) provide data for predicted groundwater pit inflows during and following extraction; and (g) propose management measures to address pit inflows and impacts to groundwater resources. The Proponent must implement the management measures proposed in the groundwater assessment to the satisfaction of the Secretary.	Refer **Section 3.4** Gilbert and Sutherland engaged to complete required assessment which is due for lodgement with DPE by end 2018.
Soil and Water Management		
18	If groundwater is encountered during quarrying operations in the South Pit under EA (Mod 1), the Proponent must cease quarrying operations until authorised to recommence by the Secretary.	Noted.
19	The Proponent must prepare a Soil and Water Management Plan for the project to the satisfaction of the Secretary. This plan must: (a) be prepared by suitably qualified and experienced person/s approved by the Secretary; (b) be prepared in consultation with the EPA and DPI Water; (c) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; and (d) include a: (i) Site Water Balance that includes: • details of: o sources and security of water supply; o water use and management onsite; o any off-site water transfers; and o reporting procedures; and	Updated Soil and Water Management Sub-plan submitted to DPE in December 2017. Updated water balance for site provided as **Attachment 12** to AEMR.

	• measures to be implemented to minimise clean water use on site; (ii) Surface Water Management Plan, that includes: • a program for obtaining detailed baseline data on surface water flows and quality in water bodies that could potentially be affected by the project; • a detailed description of the surface water management system on site including the: o clean water diversion system; o erosion and sediment controls; o dirty water management system; and o water storages; and • a program to monitor and report on: o any surface water discharges; o the effectiveness of the water management system, o the quality of water discharged from the site to the environment; o surface water flows and quality in local watercourses; (iii) Groundwater Management Plan that includes: • a provision that requires the Proponent to obtain appropriate water licence(s) to cover the volume of any unforeseen groundwater inflows into the quarry from the quarry face or floor; and • a monitoring program to manage potential impacts, if any, on any alluvium and associated surface water source near the proposed extraction area that includes: o identification of a methodology for determining threshold water level criteria; o contingency measures in the event of a breach of thresholds; and o a program to regularly report on monitoring. The Proponent must implement the approved Soil and Water Management Plan as approved from time to time by the Secretary.	
TRANSPORT		
Monitoring of Product Transport		
20	The Proponent must keep accurate records of all laden truck movements to and from the site (including time of arrival and dispatch) and publish a summary of records on its website every 6 months.	Refer **Section 3.6**
Road Upgrades		
21	The Proponent must undertake the following road upgrade works generally in accordance with the recommendations in the EA, and to the satisfaction of the RMS: a) upgrade the intersection of the Quarry Access and Nimbin Road to a 'Type AUR Intersection	Complete

	Treatment', prior to 31 December 2010; b) upgrade the guard rails on the approaches to Booerie Creek Bridge prior to 31 December 2010; c) upgrade the Booerie Creek Road and Nimbin Road intersection to a 'Type BAR Right Turn Treatment on the Through Road' prior to 31 December 2010; d) upgrade the Wilson Street and Nimbin Road intersection to a 'Type CHR Right Turn Bay Treatment' prior to 31 December 2010; and e) re-align Nimbin Road and the Quarry Access intersection to meet the AUSTROADS sight distance requirements for vehicles travelling in both directions through the intersection prior to 31 December 2011. *Note: The road works must be constructed in accordance with the relevant RMS or AUSTROADS standards, and signposted and lit in accordance with AS:1742 – Manual of Uniform Traffic Control Devices and AS/NZ 1158:2005 – Lighting for Roads and Public Spaces.*	
Operating Conditions		
22	The Proponent must: (a) restrict truck movements from the quarry to an average of 50 laden trucks a day until all road upgrades works required by condition 20 of Schedule 3, are met or unless otherwise approved by the Secretary; (b) ensure that all laden trucks entering or exiting the site have their loads covered, with the exception of loads consisting solely of boulders greater than one tonne in weight; (c) ensure that all laden trucks exiting the site are cleaned of material that may fall from vehicles, before leaving the site; and (d) use its best endeavours to ensure that appropriate signage is displayed on all trucks used to transport product from the project so they can be easily identified by road users.	NRQA advise that activities at the quarry occur in accordance with the adopted Traffic Management Sub-plan.
Traffic Management Plan		
23	The Proponent must prepare a Traffic Management Plan for the project to the satisfaction of the Secretary. This plan must: a) be prepared in consultation with the RMS and Council; b) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; c) describe the processes in place for the control of truck movements entering and exiting the site; d) include a Drivers' Code of Conduct that details the safe and quiet driving practices that must be	Updated Traffic Management Sub-plan submitted to DPE in December 2017.

	used by drivers transporting products to and from the quarry; e) describe the measures to be put in place to ensure compliance with the Drivers' Code of Conduct; and f) propose measures to minimise the transmission of dust and tracking of material onto the surface of the public road from vehicles leaving the quarry. The Proponent must implement the approved Traffic Management Plan as approved from time to time by the Secretary.	
ABORIGINAL HERITAGE		
Aboriginal Heritage Management Plan		
24	The Proponent must prepare an Aboriginal Heritage Management Plan for the project to the satisfaction of the Secretary. The plan must: (a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary; (b) be prepared in consultation with OEH and the Registered Aboriginal Parties; (c) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; and (d) include a description of the measures that would be implemented to: • protect, monitor and manage known sites of archaeological significance; • manage any new Aboriginal objects or relics that are discovered; • store Aboriginal heritage items salvaged on site; and • ensure ongoing consultation and involvement of the Registered Aboriginal Parties in the conservation and management of Aboriginal cultural heritage on the site. The Proponent must implement the approved Aboriginal Heritage Management Plan as approved from time to time by the Secretary.	Updated Aboriginal Heritage Management Sub-plan submitted to DPE in December 2017.
25	If any item or object of Aboriginal heritage significance is identified on site, the Proponent must ensure that: (a) all work in the immediate vicinity of the suspected Aboriginal item or object ceases immediately; (b) a 10 m buffer area around the suspected item or object is cordoned off; and (c) the OEH is contacted immediately. Work in the immediate vicinity of the Aboriginal item or	No items or objects of Aboriginal heritage significance identified on site in 2017.

<table>
<tr><td></td><td>object may only recommence in accordance with the provisions of Part 6 of the National Parks and Wildlife Act 1974.</td><td></td></tr>
<tr><td colspan="3">BIODIVERSITY AND REHABILITATION</td></tr>
<tr><td colspan="3">Biodiversity Offset Strategy</td></tr>
<tr><td>5</td><td>The Proponent must:
(a) implement the Biodiversity Offset Strategy (see Table 5);
(b) ensure that adequate resources are dedicated towards the implementation of this strategy;
(c) provide appropriate long term security for the offset area; and
(d) provide a timetable for the implementation of the offset strategy prior to 30 June 2010, or as otherwise agreed by the Secretary, to the satisfaction of the Secretary.

Table 5: Biodiversity Offset Strategy<table><tr><th>Offset Areas</th><th>Minimum Size</th></tr><tr><td>On-site offset (Protection Zone in Appendix 4)</td><td>17.6 hectares</td></tr><tr><td>Off-site offset (within Lismore local government area, and not already within a conservation area)</td><td>45 hectares</td></tr><tr><td>Total</td><td>62.6 hectares</td></tr></table>
Note: Mechanisms to provide appropriate long-term security to the land within the Biodiversity Offset Strategy in accordance with the NSW Biodiversity Offset Policy for Major Projects 2014, include a BioBanking Agreement, Voluntary Conservation Agreement or an alternative mechanism that provides for a similar conservation outcome.</td><td>Acquisition of offset areas completed in 2017.</td></tr>
<tr><td colspan="3">Rehabilitation Objectives</td></tr>
<tr><td>26</td><td>The Proponent must rehabilitate the site to the satisfaction of the Secretary. This rehabilitation must be generally consistent with the rehabilitation strategy in the EIS and must comply with the objectives in Table 6.

Table 6: Rehabilitation Objectives<table><tr><th>Feature</th><th>Objective</th></tr><tr><td>All areas of the site affected by the project</td><td>• Safe
• Hydraulically and geotechnically stable
• Non-polluting
• Fit for the intended post-mining land use(s)
• Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land</td></tr><tr><td>Surface Infrastructure</td><td>• Decommissioned and removed, unless otherwise agreed by the Secretary</td></tr><tr><td>Quarry benches and pit floor</td><td>• Landscaped and vegetated using native tree and understorey species</td></tr><tr><td>Final Void</td><td>• Minimise the size, depth and slope of the batters of the final void
• Minimise the drainage catchment of the final void</td></tr></table></td><td>Not relevant to current operating phase.</td></tr>
<tr><td colspan="3">Progressive Rehabilitation</td></tr>
<tr><td>27</td><td>The Proponent must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active and which are not ready for final rehabilitation.

Note: It is accepted that parts of the site that are progressively rehabilitated may be subject to future re-</td><td>Not relevant to current operating phase.</td></tr>
</table>

	disturbance	
Biodiversity and Rehabilitation Management Plan		
28	The Proponent must prepare a Biodiversity and Rehabilitation Management Plan for the project to the satisfaction of the Secretary. This plan must: (a) be prepared by a suitably qualified expert; (b) be prepared in consultation with OEH and Council; (c) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; (d) provide details of the conceptual final landform and associated land uses for the site; (e) describe how the implementation of the Biodiversity Offset Strategy will be integrated with the overall rehabilitation of the site; (f) include a Koala Management Plan prepared in accordance with SEPP 44; (g) include detailed performance and completion criteria for evaluating the performance of the Biodiversity Offset Strategy and rehabilitation of the site (including progressive rehabilitation), including triggers for any necessary remedial action; (h) describe the short, medium and long term measures to be implemented to: o manage remnant vegetation and habitat on site, including within the Biodiversity Offset Strategy area; and o ensure compliance with the rehabilitation objectives and progressive rehabilitation obligations in this approval; (i) include a detailed description of the measures described in paragraph (h) to be implemented over the next 3 years (to be updated for each 3 year period following initial approval of the plan) including the procedures to be implemented for: o maximising the salvage of environmental resources within the approved disturbance area, including tree hollows, vegetative and soil resources, for beneficial reuse in the enhancement of the offset area or site rehabilitation; o restoring and enhancing the quality of native vegetation and fauna habitat in the biodiversity offset and rehabilitation areas through assisted natural regeneration, targeted vegetation establishment and the introduction of fauna habitat features; o protecting vegetation and fauna habitat outside the approved disturbance area	Updated Biodiversity and Rehabilitation Management Sub-plan submitted to DPE in December 2017.

	on-site, including core Koala habitat; o minimising the impacts on native fauna, including undertaking pre-clearance surveys; o establishing vegetation screening to minimise the visual impacts of the site on surrounding receivers; o ensuring minimal environmental consequences for threatened species, populations and habitats; o collecting and propagating seed; o controlling weeds and feral pests o controlling erosion; and o managing bushfire risk; (j) include a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria; (k) identify the potential risks to the successful implementation of the Biodiversity Offset Strategy, and include a description of the contingency measures to be implemented to mitigate these risks; and (l) include details of who is responsible for monitoring, reviewing, and implementing the plan. The Proponent must implement the Biodiversity and Rehabilitation Management Plan as approved from time to time by the Secretary.	
Biodiversity and Rehabilitation Bond		
29	Within 6 months of the approval of the Biodiversity and Rehabilitation Management Plan, the Proponent must lodge a Biodiversity and Rehabilitation Bond with the Department to ensure that the Biodiversity Offset Strategy and rehabilitation of the site are implemented in accordance with the performance and completion criteria set out in the plan and the relevant conditions of this approval. The sum of the bond must be determined by: (a) calculating the full cost of implementing the Biodiversity Offset Strategy; (b) calculating the cost of rehabilitating all disturbed areas of the site, taking into account the likely surface disturbance over the next 3 years of quarrying operations; and (c) employing a suitably qualified quantity surveyor or other expert to verify the calculated costs, to the satisfaction of the Secretary. *Notes:* • *Alternative funding arrangements for long term management of the Biodiversity Offset Strategy, such as provision of capital and management funding as agreed by OEH as part of a BioBanking*	Bond originally paid in 2016. Updated bond to be submitted in accordance with required schedule.

	Agreement, or transfer to conservation reserve estate can be used to reduce the liability of the Biodiversity and Rehabilitation Bond. • *If capital and other expenditure required by the Biodiversity and Rehabilitation Management Plan is largely complete, the Secretary may waive the requirement for lodgement of a bond in respect of the remaining expenditure.* • *If the Biodiversity Offset Strategy and/or rehabilitation of the site area are completed (or partially completed) to the satisfaction of the Secretary, then the Secretary will release the bond (or relevant part of the bond). If the Biodiversity Offset Strategy and rehabilitation of the site are not completed to the satisfaction of the Secretary, then the Secretary will call in all or part of the bond, and arrange for the completion of the relevant works.*	
30	Within 3 months of each Independent Environmental Audit (see condition 12 of Schedule 5), the Proponent must review, and if necessary revise, the sum of the Biodiversity and Rehabilitation Bond to the satisfaction of the Secretary. This review must consider the: (a) effects of inflation; (b) likely cost of implementing the Biodiversity Offset Strategy and rehabilitating all disturbed areas of the site (taking into account the likely surface disturbance over the next 3 years of the project); and (c) performance of the implementation of the Biodiversity Offset Strategy and rehabilitation of the site to date.	Bond originally paid in 2016. Updated bond to be submitted in accordance with required schedule.
VISUAL		
31	The Proponent must implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the project to the satisfaction of the Secretary.	Refer **Section 3.14**
WASTE		
32	The Proponent must: (a) manage on-site sewage treatment and disposal in accordance with the requirements of its EPL, and to the satisfaction of the EPA and Council; (b) minimise the waste generated by the project; (c) ensure that the waste generated by the project is appropriately stored, handled, and disposed of; (d) and report on waste management and minimisation in the Annual Review, to the satisfaction of the Secretary.	Refer **Section 3.15**
33	Except as expressly permitted in an EPL, the Proponent must not receive waste at the site for storage, treatment, processing, reprocessing or disposal.	Refer **Section 3.15**

LIQUID STORAGE		
34	The Proponent must ensure that all tanks and similar storage facilities (other than for water) are protected by appropriate bunding or other containment, in accordance with the relevant Australian Standards.	Noted. Refer **Section 3.16**.
DANGEROUS GOODS		
35	The Proponent must ensure that the storage, handling, and transport of dangerous goods is done in accordance with the relevant Australian Standards, particularly AS1940 and AS1596, and the Dangerous Goods Code.	Noted. Refer Section **X**.
BUSHFIRE		
36	The Proponent must: (a) ensure that the project is suitably equipped to respond to any fires on site; and (b) assist the Rural Fire Service and emergency services to the extent practicable if there is a fire in the vicinity of the site.	Noted Refer **Section 3.17**

SCHEDULE 4 - ADDITIONAL PROCEDURES		
NOTIFICATION OF LANDOWNERS		
1	As soon as practicable, and no longer than 7 days, after obtaining monitoring results showing: • an exceedance of any criteria in Schedule 3, the Proponent must notify the affected landowners in writing of the exceedance, and provide regular monitoring results, at least every 3 months, to each affected landowner until the project is again complying with the relevant criteria; and • an exceedance of any air quality criteria in Schedule 3, the Proponent must send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners and current tenants of the land (including the tenants of land which is not privately-owned).	No reportable instances occurred in 2017.
INDEPENDENT REVIEW		
2	If an owner of privately-owned land considers the project to be exceeding the relevant criteria in Schedule 3, then he/she may ask the Secretary in writing for an independent review of the impacts of the project on his/her land. If the Secretary is satisfied that an independent review is warranted, then within 2 months of the Secretary's decision, the Proponent must: (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to: • consult with the landowner to determine his/her concerns; • conduct monitoring to determine whether the project is complying with the relevant criteria in Schedule 3; and • if the project is not complying with these criteria, then identify measures that could be implemented to ensure compliance with the relevant criteria; and (b) give the Secretary and landowner a copy of the independent review; and (c) comply with any written requests made by the Secretary to implement any findings of the review.	No adjoining landowners have requested a review of quarry impacts in 2017.
PROPERTY INSPECTIONS		
3	Prior to 30 June 2010, the Proponent must advise all owners of privately-owned land within 2 kilometres of proposed blasting activities, and any other landowner nominated by the Secretary, that they are entitled to a property inspection to establish the baseline condition of the property.	Not applicable to current stage of quarry operations.
4	If the Proponent receives a written request for a property inspection from any such landowner, the Proponent must: (a) commission a suitably qualified person, whose	Not applicable to current stage of quarry operations.

	appointment has been approved by Secretary, to inspect and report on the condition of any building or structure on the land, and recommend measures to mitigate any potential blasting impacts; and (b) give the landowner a copy of this property inspection report. *Note: It is preferable for the property inspection to be carried out prior to the commencement of blasting activities on the site, and the Proponent should facilitate this occurring wherever possible.*	
PROPERTY INVESTIGATIONS		
5	If any owner of privately-owned land within 2 kilometres of proposed blasting activities, or any other landowner nominated by the Secretary, claims that his/her property, including vibration-sensitive infrastructure such as water supply or underground irrigation mains, has been damaged as a result of blasting at the project, the Proponent shall within 3 months of receiving this request: (a) commission a suitably qualified person whose appointment has been approved by the Secretary to investigate the claim and prepare a property investigation report; and (a) give the landowner a copy of the report. If this independent investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damage to the satisfaction of the Secretary. If the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.	No adjoining landowners have requested an investigation of blast impacts in 2017.

SCHEDULE 5 - ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING		
ENVIRONMENTAL MANAGEMENT		
Environmental Management Strategy		
1	The Proponent must prepare an Environmental Management Strategy for the project to the satisfaction of the Secretary. This strategy must: (a) be submitted to the Secretary for approval within 6 months of the Secretary requiring preparation of the strategy by notice to the Proponent; (b) provide the strategic framework for environmental management of the project; (c) identify the statutory approvals that apply to the project; (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project; (e) describe the procedures to be implemented to: • keep the local community and relevant agencies informed about the operation and • environmental performance of the project; • receive, record, handle and respond to complaints; • resolve any disputes that may arise during the course of the project; • respond to any non-compliance; • respond to emergencies; and (a) include: • copies of any strategies, plans and programs approved under the conditions of this approval; and • a clear plan depicting all the monitoring to be carried out under the conditions of this approval. The Proponent must implement any Environmental Management Strategy as approved from time to time by the Secretary.	A range of Environmental Sub Plans have been prepared for the quarry. As required by Schedule 5 Condition 4, these sub plans have been updated and are currently with the DPE for endorsement.
Evidence of Consultation		
2	Where consultation with any State or local agency is required by the conditions of this approval, the Proponent must: (a) consult with the relevant agency prior to submitting the required document to the Secretary for approval; (b) submit evidence of this consultation as part of the relevant document; (c) describe how matters raised by the agency have been addressed and any matters not resolved; and (d) include details of any outstanding issues raised by the agency and an explanation of disagreement between any agency and the Proponent.	Noted. DPE to determine whether updated management plans are compliant with requirements.

Management Plan Requirements		
3	The Proponent must ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include: (a) detailed baseline data; (b) a description of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • any relevant limits or performance measures/criteria; and • the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures; (c) a description of the measures that to be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria; (d) a program to monitor and report on the: • impacts and environmental performance of the project; and • effectiveness of any management measures (see (c) above); (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (f) a program to investigate and implement ways to improve the environmental performance of the project over time; (g) a protocol for managing and reporting any: • incidents; • complaints; • non-compliances with statutory requirements; and • exceedances of the impact assessment criteria and/or performance criteria; and (h) a protocol for periodic review of the plan. *Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*	Noted. DPE to determine whether updated management plans are compliant with requirements.
Application of Existing Management Plans		
4	The Proponent must continue to apply existing approved management plans, strategies or monitoring programs that have most recently been approved under this approval, until the approval of a similar plan, strategy or program under this approval.	The current adopted management plans are implemented by quarry management.

Revision of Strategies, Plans & Programs		
4	Within 3 months of the submission of an: (a) incident report under condition 9 below; (b) Annual Review under condition 11 below; (c) audit report under condition 12 below; and (d) any modifications to this approval, the Proponent must review the strategies, plans and programs required under this approval, to the satisfaction of the Secretary. The proponent must notify the Department in writing of any such review being undertaken. Where this review leads to revisions in any such document, then within 6 weeks of the review the revised document must be submitted for the approval of the Secretary. *Note: The purpose of this condition is to ensure that strategies, plans and programs are regularly updated to incorporate any measures recommended to improve environmental performance of the project.*	As required by Schedule 5 Condition 4, these sub plans have been updated and are currently with the DPE for endorsement.
Updating and Staging of Strategies, Plans or Programs		
5	To ensure that strategies, plans or programs required under this approval are updated on a regular basis, and that they incorporate any appropriate additional measures to improve the environmental performance of the project, the Proponent may at any time submit revised strategies, plans or programs for the approval of the Secretary. With the agreement of the Secretary, the Proponent may also submit any strategy, plan or program required by this approval on a staged basis. The Secretary may approve a revised strategy, plan or program required under this approval, or the staged submission of any of these documents, at any time. With the agreement of the Secretary, the Proponent may prepare the revised or staged strategy, plan or program without undertaking consultation with all parties nominated under the applicable condition in this approval. While any strategy, plan or program may be submitted on a staged basis, the proponent will need to ensure that the operations associated with the project are covered by suitable strategies, plans or programs at all times. If the submission of any strategy, plan or program is to be staged; then the relevant strategy, plan or program must clearly describe the specific stage/s of the project to which the strategy, plan or program applies; the relationship of this stage/s to any future stages; and the trigger for updating the strategy, plan or program.	Noted

Adaptive Management		
6	The Proponent must assess and manage project-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedule 3. Any exceedance of these criteria and/or performance measures constitutes a breach of this approval and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation. Where any exceedance of these criteria and/or performance measures has occurred, the Proponent must as soon as becoming aware of any exceedance: (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not reoccur; (b) consider all reasonable and feasible options for remediation (where relevant); (c) within 14 days of the exceedance occurring, submit a report to the Secretary describing these remediation options and any preferred remediation measures or other course of action; and (d) implement remediation measures as directed by the Secretary; to the satisfaction of the Secretary.	Noted
COMMUNITY CONSULTATIVE COMMITTEE		
7	The Proponent must establish and operate a Community Consultative Committee (CCC) for the project to the satisfaction of the Secretary. The CCC must be operated in general accordance with the Department's Community Consultative Committee Guidelines, November 2016 (or later version). *Notes:* • *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval.* • *In accordance with the guidelines, the Committee should comprise an independent chair and appropriate representation from the Proponent, Council and the local community.*	Refer **Section 5.2**
REPORTING		
Incident Reporting		
8	The Proponent must immediately notify the Secretary (using the contact name, email address and phone number provided by the Department from time to time) and any other relevant agencies of any incident.	Noted. No reportable incidents occurred in 2017.
9	Within 7 days of the date of the incident, the Proponent must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested. This report must include the time and date of the incident, details of the incident, measures implemented to prevent re-occurrence and must identify any non-compliance with this approval.	Noted. No reportable incidents occurred in 2017.

Regular Reporting		
10	The Proponent must provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval.	Refer **Section 5.7**
Annual Review		
11	By the end of March each year, or other timing as may be agreed by the Secretary, the Proponent must submit a review to the Department reviewing the environmental performance of the project to the satisfaction of the Secretary. This review must: (a) describe the project (including any progressive rehabilitation) that was carried out in the previous calendar year, and the project that is proposed to be carried out over the current calendar year; (b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the: • relevant statutory requirements, limits or performance measures/criteria; • requirements of any plan or program required under this approval; • monitoring results of previous years; and • relevant predictions in the documents listed in condition 2(a) of Schedule 2; (c) evaluate and report on: • the effectiveness of the air quality and noise management systems; and • compliance with the performance measures, criteria and operating conditions in this approval. (d) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance; (e) identify any trends in the monitoring data over the life of the project; (f) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; (g) escribe what measures will be implemented over the current calendar year to improve the (h) environmental performance of the project. The Proponent must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 7 of Schedule 5) and any interested person upon request.	Noted. 2017 Annual Review submitted to DPE in March 2018. **Attachments 2 & 4** contain a checklist documenting compliance with the requirements of Condition 11.

INDEPENDENT ENVIRONMENTAL AUDIT		
12	Within three years of the date of grant of this project approval, and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent must commission, commence and pay the full cost of an Independent Environmental Audit of the project. This audit must: (a) be led and conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary; (b) include consultation with the relevant agencies and the CCC; (c) assess the environmental performance of the project and whether it is complying with the relevant requirements in this approval and any relevant EPL or necessary water licences for the project (including any assessment, strategy, plan or program required under these approvals); (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; (e) recommend appropriate measures or actions to improve the environmental performance of the project, and/or any assessment, strategy, plan or program required under the abovementioned approvals; and (f) be conducted and reported to the satisfaction of the Secretary.	Refer **Section 5.6**
13	Within 12 weeks of commencing this audit, or as otherwise agreed by the Secretary, the Proponent must submit a copy of the audit report to the Secretary and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of these recommendations as required. The Proponent must implement these recommendations, to the satisfaction of the Secretary.	Noted.
ACCESS TO INFORMATION		
14	Within 3 months of the determination of Modification 1, until the completion of all works, including rehabilitation and remediation the Proponent must: (a) make the following information publicly available on its website: • the documents listed in condition 2(a) of Schedule 2; • current statutory approvals for the project; • all approved strategies, plans and programs required under the conditions of this approval; • a comprehensive summary of the monitoring results of the project, reported in accordance • with the specifications in any conditions of this approval, or any approved plans and programs; • a complaints register, updated monthly;	Refer **Section 5.7**

	• the annual reviews of the project; • any independent environmental audit as described in condition 12 above, and the Proponent's • response to the recommendations in any audit; and • any other matter required by the Secretary; and (b) keep this information up-to-date, to the satisfaction of the Secretary.	

APPENDIX 5 - NOISE COMPLIANCE ASSESSMENT		
Applicable Meteorological Conditions		
1	The noise criteria in Table 2 are to apply under all meteorological conditions except the following: (a) wind speeds greater than 3 m/s at 10 m above ground level; or (b) temperature inversion conditions between 1.5°C and 3°C/100 m and wind speed greater than 2 m/s at 10 m above ground level; or (c) temperature inversion conditions greater than 3°C/100 m.	Noted
Determination of Meteorological Conditions		
2	Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station required under condition 13 of Schedule 3.	Noted November 2017 assessment utilises weather records at Lismore Airport. 2018 assessment will utilise records from onsite meteorological station.
Compliance Monitoring		
3	A noise compliance assessment must be undertaken within two months of commencing mining operations under EA (Mod 1). The assessment must be conducted by a suitably qualified and experienced acoustical practitioner and must assess compliance with the noise criteria in Table 2. A report must be provided to the Secretary and EPA within 1 month of the assessment.	Noise assessment completed in November 2017 (refer **Attachment 8**) Noise assessment forwarded to DPE and EPA on XXX.
4	Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to: (a) monitoring locations for the collection of representative noise data; (b) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; (c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration; and (d) the use of an appropriate modifying factor for low frequency noise to be applied during compliance testing at any individual residence if low frequency noise is present (in accordance with the INP) and before comparison with the specified noise levels in the approval.	Noted. Noise assessment completed in accordance with the NSW Industrial Noise Policy.

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 5

Variation to EPA Licence

Section 58(5) Protection of the Environment Operations Act 1997

Licence Variation

Licence - 3384

LISMORE CITY COUNCIL
ABN 60 080 932 837
PO BOX 23A
GOONELLABAH NSW 2480

Attention: Kevin Trustum

Notice Number	1558031
File Number	EF13/3226
Date	27-Nov-2017

NOTICE OF VARIATION OF LICENCE NO. 3384

BACKGROUND

A. LISMORE CITY COUNCIL ("the licensee") is the holder of Environment Protection Licence No. 3384 ("the licence") issued under the *Protection of the Environment Operations Act 1997* ("the Act"). The licence authorises the carrying out of activities at NIMBIN ROAD, BLAKEBROOK, NSW, 2480 ("the premises").

B. Following an inspection of the premises on 17 October 2017 and the issue of a Show Cause letter on the 25 October 2017; the EPA issued an Official Caution on 15 November 2017 in relation to a lack of erosion and sediment controls at the premises and specifically in the area of the south pit.

C. An inspection carried out on 20 November 2017 identified that little action had been taken to correct the deficiencies that resulted in the issue of the Official Caution.

D. A letter was sent on 24 November outlining that urgent rectification and maintenance actions are required at the premises.

E. The licence has been updated to include a new Pollution Reduction Plan (PRP) to require the preparation, submission of a Soil and Water Management Plan by 18 December 2017 and its implementation by 13 January 2018.

F. The Soil and Water Management Plan is to apply to the whole of the premises. The Soil and Water Management Plan should include details on the type, design and location of controls as well as appropriate sizing and operational management. The Soil and Water Management Plan must extend beyond the urgent rectification works detailed in the EPA's letter dated 24 November 2017.

G. The licence had recorded the premises as being located at Lot 102 DP 817730. This has been updated to record the premises as being located on Lot 201 DP 1227138.

H. Changes to the operating hours for the premises have been altered to reflect the operating hours contained in Project Approval MP07_0020 and development consent 5.1990.341.3

Licence Variation

I. The draft licence was forwarded for comment on 17 November 2017 and confirmation received on 24 November 2017 that the licensee agreed with the proposed changes.

VARIATION OF LICENCE NO. 3384

1. By this notice the EPA varies licence No. 3384. The attached licence document contains all variations that are made to the licence by this notice.
2. The following variations have been made to the licence:
   - Condition A2.1 has been updated to include Lot 201 DP 1227138.
   - Previous condition L5.1 has been removed and limits for blasting times included in condition L6.1
   - Condition L6.1 has been reviewed to reflect the hours of operation established by the consents operating for the premises.
   - Condition L6.2 has been changed to better reflect permissible out of hours activities.
   - Condtion U1.1 has been included to require the preparation, submission and implementation of a Soil and Water Management Plan.

.....

Graeme Budd
Head Environmental Management Unit
North - North Coast
(by Delegation)

INFORMATION ABOUT THIS NOTICE

- This notice is issued under section 58(5) of the Act.
- Details provided in this notice, along with an updated version of the licence, will be available on the EPA's Public Register (http://www.epa.nsw.gov.au/prpoeo/index.htm) in accordance with section 308 of the Act.

Appeals against this decision

- You can appeal to the Land and Environment Court against this decision. The deadline for lodging the appeal is 21 days after you were given notice of this decision.

When this notice begins to operate

- The variations to the licence specified in this notice begin to operate immediately from the date of this notice, unless another date is specified in this notice.

- If an appeal is made against this decision to vary the licence and the Land and Environment Court directs that the decision is stayed the decision does not operate until the stay ceases to have effect or the Land and Environment Court confirms the decision or the appeal is withdrawn (whichever occurs first).

Environment Protection Licence

Licence - 3384

Licence Details	
Number:	3384
Anniversary Date:	17-January

Licensee
LISMORE CITY COUNCIL
PO BOX 23A
GOONELLABAH NSW 2480

Premises
LISMORE OR BLAKEBROOK QUARRY
NIMBIN ROAD
BLAKEBROOK NSW 2480

Scheduled Activity
Extractive activities

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

Region
North - North Coast
NSW Govt Offices, 49 Victoria Street GRAFTON NSW 2460
Phone: (02) 6640 2500
Fax: (02) 6642 7743
PO Box 498
GRAFTON NSW 2460

Environment Protection Licence

Licence - 3384

Environment Protection Licence

Licence - 3384

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).

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:

LISMORE CITY COUNCIL
PO BOX 23A
GOONELLABAH NSW 2480

subject to the conditions which follow.

Environment Protection Licence

Licence - 3384

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
Extractive activities	Land-based extractive activity	> 100000 - 500000 T annual capacity to extract, process or store

A1.2 This licence regulates water pollution resulting from the activity/ies carried out at the premises specified in A2.

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
LISMORE OR BLAKEBROOK QUARRY
NIMBIN ROAD
BLAKEBROOK
NSW 2480
LOT 201 DP 1227138

A3 Other activities

A3.1 This licence applies to all other activities carried on at the premises, including:

Ancillary Activity
Bitumen Pre-mix or Hot-mix Industries

A4 Information supplied to the EPA

A4.1 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.

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	Wet weather overflow	Wet weather overflow	Spillway of the settlement dam at the southern end of the site nearest the weighbridge as identified on site map entitled Blake Brook Quarry Water Management dated 21 July 2005

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.

L1.2 Discharge of TSS to waters from Point 1 is permitted when the discharge occurs solely as a result of rainfall at the premises exceeding a total of 60.2 millimetres over any consecutive five day period.

L1.3 The licensee must take all practical measures to avoid or minimise generation of total suspended solids

L2 Concentration limits

L2.1 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.2 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 (Wet)	milligrams per litre				10
pH	pH				6.5 -8.5
Total suspended solids	milligrams per litre				50

L2.3 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.

L2.4 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

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.

L4 Noise limits

L4.1 Noise from the licenced premise must not exceed an LAeq (15 minute) noise emission criterion of 36db(A) at Location 2 and 35db(A) at all other locations as stated in Section 4 of Schedule 3 within the Department of Planning - Section 75J of the Environmental Planning & Assessment Act 1979 - Blakebrook Quarry Project - Project No. 07_0020 , except as expressly provided by this licence.

L4.2 The noise limits set out in the preceding conditions apply under all meteorological conditions except for the following:

Wind speeds greater than 3 meters/second at 10 meters above ground level; or
Temperature inversion conditions greater than 3ºC/100 meters.

L5 Blasting

L5.1 The airblast overpressure level from blasting operations in or on the premises must not exceed:
a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and
b) 120 dB (Lin Peak) at any time.
as measured at the nearest sensitive receiver

L5.2 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed:

a) 5mm/s for more than 5% of the total number of blasts carried out on the premises during each reporting period; and
b) 10 mm/s at any time.

At the most affected residence or noise sensitive location that is not owned by the licensee or subject to a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative ground vibration level .

L5.3 All sensitive receivers are to be given at least 24 hours notice when blasting is to be undertaken.

L6 Hours of operation

L6.1 Activities covered by this licence must be in accordance with the operating hours set out in the table below

Activity	Permissible Hours
Quarrying activities including loading and dispatch of trucks	07:00 to 18:00 Monday to Friday; 07:00 to 15:00 on Saturday and at no time on Sundays and Public Holidays
Blasting	10:00 to 15:00 Monday to Friday and at no time on Saturday, Sunday and Public Holidays
Asphalt plant	06:00 to 17:30 Monday to Saturday and at no time on Sundays and Public Holidays
Maintenance	May be conducted at any time provided that these activities are not audible at any privately-owned residence

L6.2 The following activities may be carried out outside the hours specified in Condition L6.1 above:

- delivery or despatch of material outside the hours of as requested by police or other public authorities
- emergency work to avoid the loss of lives, property or to prevent environmental harm
- operation of the asphalt plant with the permission of Lismore City Council for emergency or specific works where a traffic management problem is involved.

In such circumstances, prior notification must be provided to the EPA and affected residents as prior to undertaking the activity or as soon as possible thereafter.

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 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

O4 Processes and management

O4.1 Sediment Basins shall be treated, if required, to reduce the Total Suspended Solids level to the licenced concentration limit before being discharged to the environment. Treatment can be with gypsum or any other material that has been approved by the EPA.

O4.2 The licensee must maximise the diversion of run-on waters from lands upslope and around the site whilst land disturbance activities are being undertaken.

O4.3 The licensee must maximise the diversion of stormwater runoff containing suspended solids to sediment basins installed on the premises.

O4.4 Where sediment basins are necessary, all sediment basins and associated drainage must be installed and commissioned prior to the commencement of any clearing or grubbing works within the catchment area of the sediment basin that may cause sediment to leave the site.

O4.5 The licensee must ensure the design storage capacity of the sediment basins installed on the premises is reinstated within 5 days of the cessation of a rainfall event that causes runoff to occur on or from the premises.

O4.6 The licensee must ensure that sampling point(s) for water discharged from the sediment basin(s) are provided and maintained in an appropriate condition to permit:
a) the clear identification of each sediment basin and discharge point;
b) the collection of representative samples of the water discharged from the sediment basin(s); and
c) access to the sampling point(s) at all times by an authorised officer of the EPA.

O4.7 The licensee must endeavour to maximise the reuse of captured stormwater on the premises.

O4.8 Each sedimentation basin must have a marker (the "sedimentation basin marker") that identifies the upper level of the sediment storage zone.

O4.9 Whenever the level of liquid and other material in any sedimentation basin exceeds the level indicated by the sedimentation basin marker, the licensee must take all practical measures as soon as possible to reduce the level of liquid and other material in the sedimentation basin.

O4.10 The sediment basins must meet the design and operational standards of Managing Urban Stormwater Soils and Construction: Volume 1 and Volume 2 E. Mines and quarries. The sediment basin sizes have been calculated to total 20.05 ML as outlined in the Blakebrook Quarry Expansion - Soil and Water Management Sub-Plan - April 2011, prepared byEnvironmental Resources Management Australia on behalf of Lismore City Council

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.

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 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	milligrams per kilogram	Special Frequency 1	Grab sample
pH	pH	Special Frequency 1	Grab sample
Total suspended solids	micrograms per litre	Special Frequency 1	Grab sample

M2.3 For the purposes of the table(s) above Special Frequency 1 means the collection of samples once during each discharge event arising from rainfall not exceeding the 90 percentile five day rainevent of 60.2mm falling in total over a period of up to five days..

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.

M4 Environmental monitoring

M4.1 The licensee is required to install and maintain a rainfall depth measuring device.

M4.2 Rainfall at the premises must be measured and recorded in millimetres per 24 hour period, at the same time each day.

M5 Recording of pollution complaints

M5.1 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.

M5.2 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.

M5.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M5.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M6 Telephone complaints line

M6.1 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.

M6.2 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.

M6.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

M7 Blasting

M7.1 To determine compliance with condition(s) L5.2 and L5.3:
a) Airblast overpressure and ground vibration levels must be measured at the most affected residence or noise sensitive location that is not owned by the licensee or subject to a private agreement between the owner of the residence or noise sensitive location and the licensee as to an alternative level - for all blasts carried out in or on the premises; and
b) Instrumentation used to measure the airblast overpressure and ground vibration levels must meet the requirements of Australian Standard AS 2187.2-2006.

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.

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.

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.

R1.8 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.

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.

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

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.

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.

8 Pollution Studies and Reduction Programs

U1 Soil and Water Management Plan

U1.1 A Soil and Water Management Plan (SWMP) must be prepared and submitted to the EPA by 18 December 2017 and implemented by 13 January 2018. The plan must describe the measures that will be employed to minimise soil erosion and the discharge of sediment and other pollutants from the premises. The SWMP must be prepared in accordance with the requirements of the *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th edition, March 2004* Landcom (the Blue Book) and *Managing Urban Stormwater: Soils and Construction, Volume 2E Mines and Quarries*, 2008, DECC.

Environment Protection Licence

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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

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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 described 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

Mr Nigel Sargent

Environment Protection Authority

(By Delegation)

Date of this edition: 28-August-2000

Environment Protection Licence

Licence - 3384

End Notes

1	Licence varied by notice 1012134, issued on 02-Apr-2002, which came into effect on 27-Apr-2002.
2	Licence varied by notice 1017834, issued on 03-Jun-2002, which came into effect on 28-Jun-2002.
3	Licence varied by notice 1020616, issued on 12-Sep-2002, which came into effect on 07-Oct-2002.
4	Licence varied by notice 1026159, issued on 31-Mar-2003, which came into effect on 25-Apr-2003.
5	Licence varied by notice 1031250, issued on 03-Oct-2003, which came into effect on 28-Oct-2003.
6	Licence varied by notice 1045315, issued on 11-Mar-2005, which came into effect on 05-Apr-2005.
7	Licence varied by notice 1049382, issued on 25-Aug-2005, which came into effect on 19-Sep-2005.
8	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
9	Licence varied by notice 1508293 issued on 22-Aug-2012
10	Licence varied by notice 1525659 issued on 30-Nov-2015

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 6

EPA Caution

Official Caution

Licence - 3384

It is an offence under section 64 of the *Protection of the Environment Operations Act 1997* for a person to fail to comply with a condition of the licence. This offence carries a maximum penalty of $1,000,000 and, in the case of a continuing offence, to a further penalty not exceeding $120,000 for each day the offence continues for a corporation.

The Environment Protection Authority ("**EPA**") may prosecute a corporation for committing either of these offences. Alternatively, EPA may issue a corporation that commits this offence with a penalty notice, which carries a fine of $15,000.

The EPA has reasonable grounds to believe that LISMORE CITY COUNCIL committed an offence under section 64 and section 120 of the *Protection of the Environment Operations Act 1997* by discharging sediment laden waters from an unlicensed discharge point in the premises on 17 October 2017 ("**the alleged offence**"). Further, the EPA believes that there is sufficient evidence to prove the alleged offence.

Having regard to the *Attorney General's Caution Guidelines under the Fines Act 1996*, the EPA considers it appropriate to issue LISMORE CITY COUNCIL with this Official Caution for the alleged offence.

The licensee should take immediate action to ensure that further discharges from the unlicensed basin in the south pit do not occur. All activities in the area of the south pit should cease until such time as an updated Soil and Water Management Plan has been prepared to the satisfaction of the EPA.

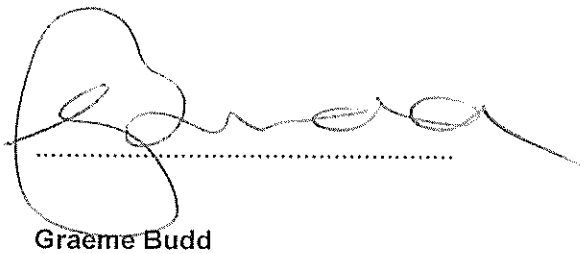
At the next inspection of the premises, the EPA will also review site practices relating to erosion and sediment control including basin management (specifically conditions O4.5, O4.6 and O4.8 and the EPA's letter dated 16 June 2016 regarding basin management practices).

Please note that EPA will retain a copy of this Official Caution on file. If LISMORE CITY COUNCIL commits an offence in future, EPA may take into account this Official Caution in determining the most appropriate enforcement action. Such action may involve the issue of a penalty notice or the commencement of a prosecution.

The issuing of this Official Caution does not prevent EPA from taking alternative enforcement action for the alleged offence, if it becomes apparent that an alternative response is more appropriate.

If you have any questions or wish to discuss this matter, please contact Janelle Bancroft on 6640 2513.

Yours sincerely



Graeme Budd

PO Box 498 Grafton NSW 2460
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ABN 43 692 285 758
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Official Caution

Licence - 3384

Head Environmental Management Unit
North - North Coast
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Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 7

Truck Movements

Date	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
1st		40	24	95	58							
2nd	130	58		0	48							
3rd	11	34	97	0	42	333						
4th	17	31	11	13		41		105				
5th	10		14	19	177	99		18				
6th	10	194	6	14	21	91		68				
7th	4	20	4		67	40		45				
8th	0	31	1	46	45	63	23	53				
9th	52	19	0	6	66		72					
10th	29	25	36	30	54	334	86					
11th	44	5	4	27		53	41	184				
12th	34		10	30	253	74	32					
13th	19	100	19	6	48	57						
14th	24	8	20		96	69	254					
15th		10		99	83	42	70					
16th	150	30		7	67		56					
17th	35	30	53	8	25	295	35					
18th	34	11	18	10		82	66	0				
19th	24		13	13	319	39	60					
20th	31	89	20	6	20	21						
21st	26	34	9		51	6	287					
22nd		44	14	44	93	10	50					
23rd	150	22		40	90		34					
24th	17	31	74	25	39	158	21					
25th	29	4	19	88			99	0				
26th	99		29	75	293		ph					
27th	32	135	29	40	52							
28th	18	32	15		86		204					
29th		11	3	268	96		35					
30th	195	9		29	99		55					
31st	31	21				0	15					
Total	123	199	429	177	726	468	432	289	0	0	0	0
Avg	4.73	7.65	16.50	6.56	27.92	17.33	16.62	11.56	0.00	0.00	0.00	0.00
	indicates weekly truck movements											

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 8

Noise Monitoring

Ambience Audio Services
Acoustic Measurement and Analysis

15 Tamarind Close
Richmond Hill NSW 2480

Phone: 02 6625 1733
Mobile: 0429 405 070

Results of Noise Monitoring

Blakebrook Quarry
186A Keerrong Road
Blakebrook NSW 2480

Prepared for

Northern Rivers Quarry & Asphalt
186A Keerrong Road
Blakebrook NSW 2480

Prepared by
Garry Hall
November 14th 2017

Table of Contents

1 INTRODUCTION

Ambience Audio Services conducted noise monitoring of quarry operations for Northern Rivers Quarry & Asphalt at Blakebrook via Lismore, northern NSW. The noise monitoring was requested by the Commercial Services Co-ordinator for NRQA, Mr Kurt Bezjak, to measure and report on quarry operational noise levels at the closest affected residential receiver locations.

Noise monitoring was conducted on the 7th and 9th of November 2017 with full quarry operating conditions and suitable weather conditions. Measurements were conducted over 2 days due to excessive wind on the 7th being unable to complete all receiver locations. Measurements were also attempted on the 2nd but a breakdown occurred so measurements without the quarry operating were conducted at one of the receiver locations.

Quarry operations while noise monitoring was conducted included crushing and stockpiling on the eastern side of the quarry floor, asphalt production at the mobile plant at the top of the quarry and trucks and loaders on the internal haul roads. A diagram of equipment operating on the quarry floor during noise monitoring at residential receivers is provided in Appendix D

To assist with the interpretation of some of the terminology used in this report, Appendix A provides definitions of acoustic terms. Appendix B is a chart of everyday sound pressure levels.

2 NOISE MONITORING REQUIREMENTS

The noise monitoring requirements for the Blakebrook Quarry are outlined in Section 6.2 of the Noise, Vibration and Blasting Sub Plan 08/04/11 prepared by Environmental Resources Management Australia (ERM).

Extracts of the relevant parts are copied below.

6.2.2 *Noise and Vibration and Blasting Monitoring Locations*

Noise, vibration and blasting monitoring will be undertaken at the nearest residential receptors marked as locations 1 to 6 on ***Figure 6.1***.

6.2.4 *Noise, Vibration and Blasting Monitoring Methodology*

Operator - attended noise measurements shall be conducted at Locations 1 to 4, Location 6 and Location 9 (refer *Figure 6.1*) to quantify and characterise the maximum (LAmax), the energy equivalent (LAeq), and background (LA90) noise levels from ambient noise sources and quarrying operations over a 15 minute measurement period.

The operator shall quantify noise emissions and estimate the LAeq(Period) noise contribution during day time activities from each of the quarrying operations, as well as the overall level of ambient noise.

During attended monitoring, digital recordings will be conducted to allow for additional post analysis of the quarry noise levels and source identification.

All acoustic instrumentation employed throughout the monitoring program shall meet with the requirements of AS 1259.2-1990, "Sound Level Meters".

Instrument calibration shall be checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

To measure blasts a blast monitor will be employed that records air blast and vibration levels once triggered by an electronic trigger connected to shot firing switch. That is, when the shot is fired, the monitor will be triggered by means of a hardwire switch and will start recording and capture the blast event. This will ensure that the event captured is the blast, significantly reducing the influence of other extraneous sources that could affect the measurement.

6.2.5 *Meteorological Parameters*

All noise measurements shall be accompanied by both qualitative description (including cloud cover, approximate wind direction and speed) and quantitative measurements of prevailing local weather conditions throughout the survey period.

6.2.7 *Assessment Criteria*

The purpose of the noise, vibration and blasting monitoring program is to track potential impacts of operations over time as quarrying continues, to demonstrate that quarrying is not impacting on residential receptors.

Currently the EPL No 3384 for Blakebrook Quarry has in place existing conditions for noise, blasting and vibration levels which are as follows:

L6.1 Noise from the premises must not exceed:

(a) 35dB(A) LAeq(15 minute) during the day (7am to 6pm) Monday to Saturday;

Where LAeq means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

The closest noise sensitive receivers and required noise monitoring locations are indicated in figure 6.1 from the ERM Noise, Vibration and Blasting Sub Plan, which is copied on the following page.

Noise monitoring at locations 1,2,3 and 4 were conducted within 30m of the residential dwelling in the direction of the quarry. Location 6 was conducted at the road frontage.

In April 2016, the owner and permanent resident at Location 9 provided the NSW Department of Planning and Environment a signed letter confirming a private agreement between Blakebrook Quarry and Sensitive Receiver No.9, that they agree to exceedances in noise levels from quarry operations. No noise monitoring was conducted at Location 9.

Table 2.1 Noise Monitoring Receiver Locations

Receiver Location	Street Address
1	28 Keerrong Rd Blakebrook
2	166 Keerrong Rd Blakebrook
3	190 Keerrong Rd Blakebrook
4	365 Booerie Creek Road Booerie Creek
6	289 Booerie Creek Rd Booerie Creek

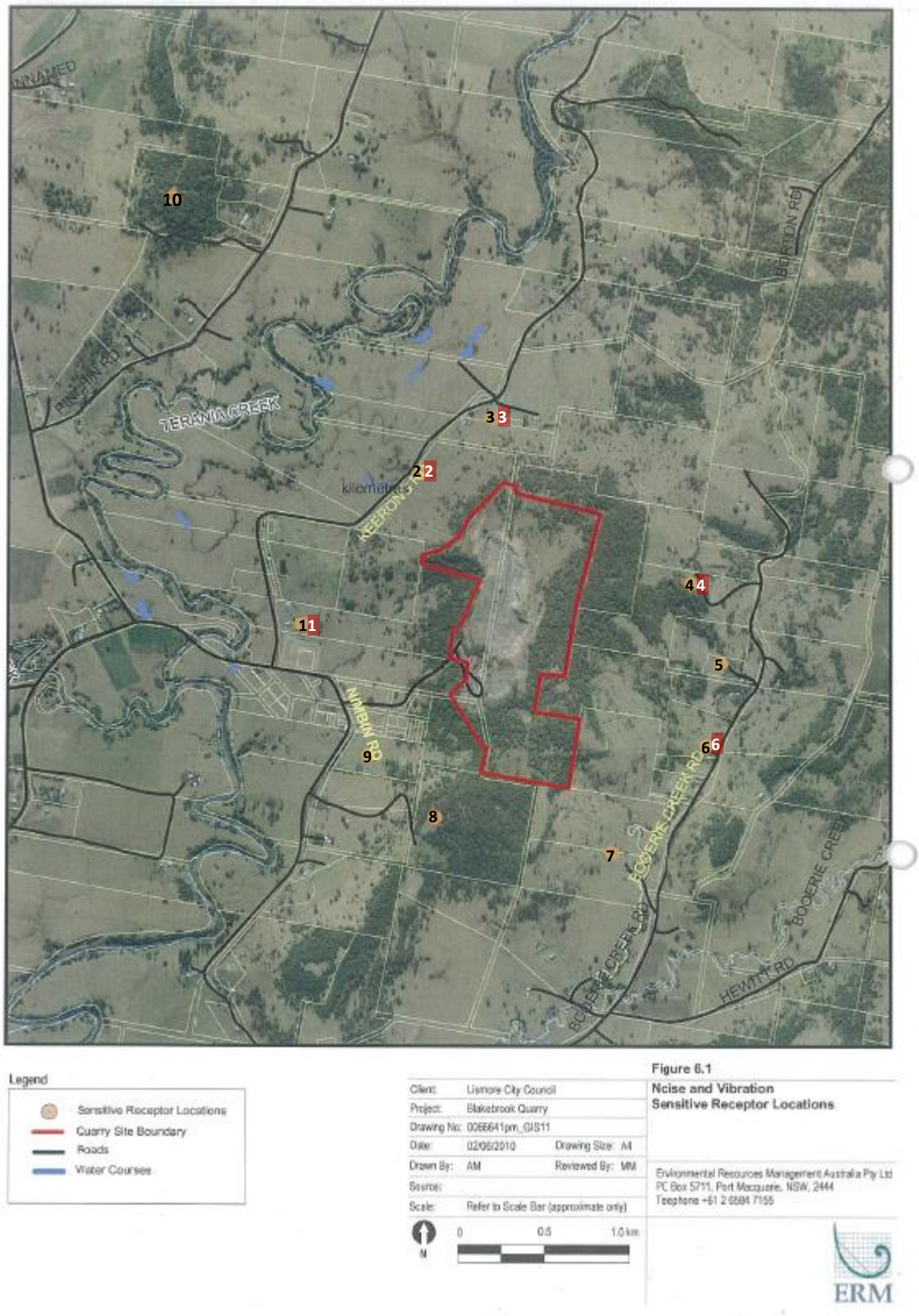
Note:

Some street addresses on Keerrong Road have been changed from the previous assessments due to updated surveying.

Receiver 1 was 122 now 28

Receiver 2 was 126 now 166

Figure 2.1 Noise Monitoring Locations



3 MEASUREMENT PROCEDURE AND RESULTS

3.1 Instrumentation

Table 3.1 Instrumentation for Noise Monitoring

Instrument	Serial #	Calibration Date
Brüel and Kjær 2250 Sound Level Meter	2449940	October 2016
Brüel and Kjær 2250 Sound Level Meter	3006868	September 2017
Brüel and Kjær Acoustical Calibrator model 4231	2292735	October 2017

The sound level meters (SLM) used during the noise survey conform to Australian Standard 1259 "Acoustics - Sound Level Meters", (1990) as type 1 precision sound level meters and have an accuracy suitable for both field and laboratory use.
The meters' calibrations were checked before and after the measurement periods with a Brüel and Kjær acoustical calibrator model 4231. No significant system drift occurred over the measurement periods.

The SLMs and calibrator have been checked, adjusted and aligned to conform to the Brüel and Kjær factory specifications and issued with conformance certificates. The internal test equipment used is traceable to the National Measurement Laboratory at CSIRO, Lindfield, NSW.

3.2 Measurement Procedures

Measurements were made in general accordance with procedures laid down in:

1. **Australian Standard AS 1055.1-1997: '**Acoustics - Description and measurement of environmental noise - General procedures';

2. **The NSW Government Industrial Noise Policy (2000) EPA 00/1 (INP).**

The microphone of a B&K 2250 SLM was mounted on a 1.5m high tripod and a Bruel and Kjær outdoor windscreen fitted to the microphone. The SLM was located on a flat area of land above the cliff face where the working equipment was used, to monitor noise levels while measurements were being conducted at the receiver locations (*see Appendix D*). The SLM was set to record continuously for the duration of receiver monitoring with 1 second samples. A sound recording was conducted simultaneously.

The microphone of another B&K 2250 SLM was mounted on a 1.5m high tripod and a Bruel and Kjær outdoor windscreen fitted to the microphone. The SLM was used at the various receiver locations to monitor noise levels while the quarry was operating under full load conditions. The noise monitoring location was within 30m of the residential dwelling in the general direction of the quarry depending on vegetation and cattle in paddocks.

A 15 minute period was recorded at each location with 1 second samples with a simultaneous sound recording.

3.3 Weather Conditions

Weather conditions were generally good for acoustic measurements. Observations were taken at each receiver location.

Table 3.2 Observed Weather Conditions at Receiver Locations

Weather Conditions at Receiver Locations Nov 2017								
Date	Time	Receiver	Temp	Relative Humidity	Wind	Wind Dir	Cloud	
			℃	%	Speed (m/s)		Cover	
2-Nov	9:05am	4	22	70	Calm		2/8	Scattered high cloud
2-Nov	10:30am	4	24	64	Calm		3/8	Scattered high cloud
7-Nov	8:15am	4	21	80	Calm		7/8	Low Clouds
7-Nov	8:45am	6	22	75	1 - 1.5	SSW	7/8	Low Clouds
7-Nov	9:00am	6	22	75	1 - 2	SSW	7/8	Low Clouds
7-Nov	9:40am	1	23	66	2 - 3.5	SSE	8/8	Low Clouds
9-Nov	8:10am	2	20	60	0 - 1	SE	0/8	
9-Nov	8:50am	3	21	65	0.5 - 1.5	SW	1/8	Scattered high cloud
9-Nov	9:15am	1	22	55	1.5 - 2.5	S	2/8	Scattered high cloud

The meteorological data for Lismore Airport (approximately 7kms to the south) for the monitoring period was downloaded from the Bureau of Meteorology website and is provided in Tables 3.3 and 3.4.

Table 3.3 Weather Observations at Lismore Airport 07/11/2017

Lismore Airport Tuesday 07/11/2017					
Date /Time	Temp ℃	Rel. Humidity %	Wind		
			Dir.	Speed	
				km/h	m/s
07/10:00am	22.9	65	SSE	26	7.2
07/09:30am	21.6	69	SSE	26	7.2
07/09:00am	21.4	73	SSE	22	6.1
07/08:30am	21.3	81	S	19	5.3
07/08:00am	20.6	82	S	19	5.3

Table 3.4 Weather Observations at Lismore Airport 09/11/2017

Lismore Airport Tuesday 09/11/2017					
Date /Time	Temp ℃	Rel. Humidity %	Wind		
			Dir.	Speed	
				km/h	m/s
07/10:00am	20.1	65	SW	13	3.6
07/09:30am	18.9	67	SW	17	4.7
07/09:00am	19.1	68	SSW	19	5.3
07/08:30am	17.7	68	SSE	17	4.7
07/08:00am	16.7	70	SSW	15	4.2

3.3 Measurement Results

The measurements were conducted over 3 days due to equipment breakdown and inclement weather.

Table 3.5 Measurement Results

Summary of Measured Noise Levels at Receivers - 02,07,09 Nov 2017									
Receiver and Measurement #	**Date**	**Start time**	**Elapsed time**	L_{AFmax} [dB]	L_{Ceq} [dB]	L_{Aeq} [dB]	L_{Ceq}-L_{Aeq} [dB]	L_{AF10} [dB]	L_{AF90} [dB]
R1 M1	07/11/2017	09:39:18 AM	0:15:00	67.6	67.0	49.0	18.0	51.7	43.2
R1 M2	09/11/2017	09:18:38 AM	0:15:00	56.5	57.8	43.2	14.6	45.7	38.0
R2	09/11/2017	08:11:54 AM	0:15:00	61.8	55.8	45.4	10.5	48.9	32.7
R3	09/11/2017	08:46:47 AM	0:15:00	66.6	63.1	44.7	18.4	45.7	34.9
R4 M1	02/11/2017	09:02:11 AM	0:15:00	59.8	48.1	39.5	8.5	42.5	31.2
R4 M2	02/11/2017	10:19:33 AM	0:15:00	51.1	47.9	37.6	10.3	41.4	31.5
R4 M3	07/11/2017	08:14:32 AM	0:15:00	64.7	53.2	44.7	8.5	44.7	34.3
R6 M1	07/11/2017	08:45:35 AM	0:15:00	74.2	52.7	44.5	8.2	45.1	35.5
R6 M2	07/11/2017	09:00:54 AM	0:15:00	66.4	56.9	45.5	11.4	46.4	35.7

Note:

The above results are the ambient noise levels and includes noise from the rural surroundings and quarry noise if audible. No tonal, low frequency or impulsive noise characteristics from the quarry operations were observed at the receiver locations.

Table 3.6 Noise Observations at Receiver Locations

Noise Observations at Receiver Locations (All measurements 15 mins)				
Receiver and Measurement #	**Date**	**Start time**	**Observed Noise Sources**	**Quarry Noise**
R1 M1	07/11/2017	09:39:18 AM	Birds, distant traffic on Nimbin Road, local traffic on Keerrong Rd, dog barking, wind in trees, cattle	Quarry, audible at times – rock crusher – breeze dependant
R1 M2	09/11/2017	09:18:38 AM	Birds, distant traffic on Nimbin Road, local traffic on Keerrong Rd, dog barking, wind in trees	Quarry not audible
R2	09/11/2017	08:11:54 AM	Birds, local traffic on Keerrong Rd, distant cattle, distant overhead aircraft	Quarry just barely audible
R3	09/11/2017	08:46:47 AM	Birds, local traffic on Keerrong Rd, distant overhead aircraft, insects, wind in trees	Quarry just audible occasionally
R4 M1	02/11/2017	09:02:11 AM	Birds, distant overhead aircraft, insects, very distant noise to south from roadworks	Quarry not operating
R4 M2	02/11/2017	10:19:33 AM	Birds, distant overhead aircraft, insects, distant people talking	Quarry not operating
R4 M3	07/11/2017	08:14:32 AM	Birds, distant overhead aircraft, insects, very distant road noise at times	Quarry not audible
R6 M1	07/11/2017	08:45:35 AM	Birds, wind in trees, distant people talking	Quarry not audible
R6 M2	07/11/2017	09:00:54 AM	Birds, local traffic on Booerie Creek Rd, distant dog barking, wind in trees, cattle, distant overhead aircraft	Quarry not audible

4 DISCUSSION OF RESULTS

The measurements were undertaken while the quarry was operating under normal operating conditions (*see Appendix D for diagram for location of equipment*). A second noise logger was located above the quarry floor as a reference for quarry crushing operations noise levels.

The measured results in Table 3.5 are from the combined noise of the quarry (if audible) and the ambient noises.

At Receiver 1, a second recording was conducted on the 9th as the wind had picked up on the 7th and wind in trees noise levels were higher. The background noise levels ($L_{A90,15min}$) were lower on the 9th but distant traffic from Nimbin Road was underlying for most of the time. There was audible quarry noise (rock crusher) on the 7th with changes in breezes and possibly larger rocks being crushed for several brief periods 10 -15 seconds during the 15 minute monitoring period. It was observed that noise levels were 40 – 45 decibels for these brief periods. The quarry was not audible at other times. It is estimated that the quarry $L_{Aeq,15\ min}$ is below the Project Specific Noise Level of 35 dB(A).

At Receiver 2, quarry noise was just barely audible when no other noises were present. It is estimated that the quarry $L_{Aeq,15\ min}$ is below 33dB(A).

At Receiver 3, quarry noise was just audible occasionally. Observed levels were 35 – 40 dB(A). Quarry noise appeared to be tipping at the overburden stockpile. It is estimated that the quarry $L_{Aeq,15\ min}$ is below 33dB(A).

At Receiver 4, two 15 minute periods were recorded on the 2nd when equipment was broken down and the crushing was not operating. The wind conditions were calm and background was 31.2 and 31.5. The quarry was not audible on the 7th when the quarry was operating under load conditions. The $L_{A90,15min}$ had increased approximately 3 decibels to 34.3. It is estimated that the quarry $L_{Aeq,15\ min}$ is below 33dB(A).

At Receiver 6, the quarry was not audible. $L_{A90,15min}$ was 35.5 and 35.7 due to moving foliage. It is estimated that the quarry $L_{Aeq,15\ min}$ is below 35dB(A).

5 SUMMARY

A noise monitoring survey was conducted to assess compliance of quarry operational noise levels at the Northern Rivers Quarry and Asphalt quarry at Blakebrook. Measurements were undertaken with calibrated noise monitoring equipment and conducted in general accordance with procedures laid down in Australian Standard AS 1055.1-1997 and the NSW Industrial Noise Policy.

The Blakebrook Quarry operates under EPL No. 3384. Condition L6.1 stipulates that noise from the premises must not exceed 35dB(A) $L_{Aeq,15min}$ during the day (7am to 6pm) Monday to Saturday.

Measurements were conducted at 5 receiver locations while the quarry was operating under load conditions. The quarry was not audible at Receiver locations 4 and 6. The quarry was just barely audible at Receiver location 2 and just audible for brief periods at Receiver locations 1 and 3.

The quarry operational noise levels ($L_{Aeq,15min}$) were not able to be accurately assessed at residential receiver monitoring locations as the quarry noise was not audible or just audible for short periods of time.

It is estimated from the recorded $L_{A90,15\ min}$ levels and observations that the quarry noise levels are below the Project Specific Noise Level of 35 dB(A) $L_{eq,15mins}$ at Receiver locations 1, 2, 3, 4 and 6.

Garry Hall

Acoustic Consultant

Ambience Audio Services

APPENDIX A
Definitions of Terms

Sound pressure level (SPL): A measurable quantity of the size or amplitude of the pressure fluctuations (sound waves) above and below normal atmospheric pressure. Sound pressure levels are measured in decibels.

Decibels (dB): a ratio of energy flows. When used with sound measurement, it is the ratio between a measured quantity and an agreed reference level. The dB scale is logarithmic and uses the threshold of hearing of 20 μPa (micro pascals) as the reference level. This reference level is defined as 0 dB.

One useful aspect of the decibel scale is that it gives a much better approximation to the human perception of relative loudness than the Pascal scale. This is because the ear reacts to a logarithmic change in level, which corresponds to the decibel scale where 1 dB is the same relative change every on the scale. *Refer Appendix B*

Tonality: Noise containing a prominent frequency and characterized by a definite pitch.

Spectral characteristics: The frequency content of noise.

"A" frequency weighting: The method of frequency weighting the electrical signal within a noise-measuring instrument to simulate the way the human ear responds to a range of acoustic frequencies. The symbols for the noise parameters often include the letter "A" (e.g., L_{Aeq}, dBA) to indicate that frequency weighting has been included in the measurement.

Fast, Slow and Impulse time weightings: Standardised response times to help define fluctuating noise levels. Impulsive noises have high peak levels with a very short duration (e.g., gun shot), or a sequence of such peaks. Slow helps average out the fluctuations and is used to for better visual indication of the noise source. Environmental assessment standards usually specify the time weighting (**F**, **S**, or **I**) to use.

L_{Aeq}: The A-weighted continuous noise level. A widely used noise parameter that calculates a constant level of noise with the same energy content as the varying noise signal being measured. The time in minutes, which the measurement was sampled, is indicated with a following number. e.g. L_{Aeq15} is a 15 minute sample.

L_{AN}: The A-weighted sound pressure level that is exceeded for N per cent of the time over which a given sound is measured. e.g. **L_{A90}** is the A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured. **L_{A90}** is commonly used to describe the **background noise level** for community noise assessments.
Ambient noise: The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.

Extraneous noise: Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods and by events such as concerts or sporting events. Normal daily traffic is not to be considered extraneous.

Background noise: The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the **L_{A90}** descriptor.

Intrusive Noise: Refers to noise that intrudes above the background level by more than 5 decibels.

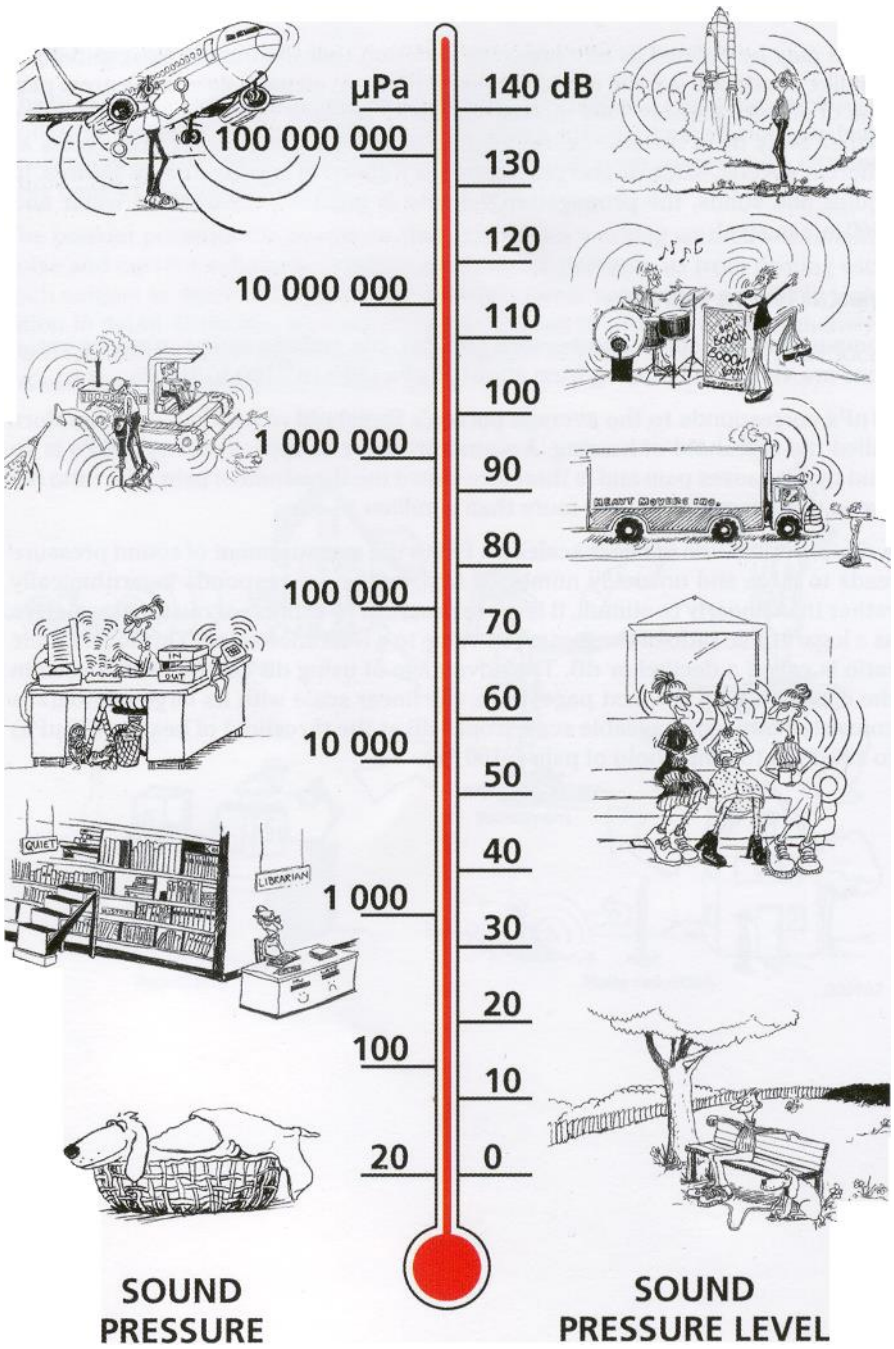
References:

Measuring Sound Brüel and Kjær Sound & Vibration Measurements A/S September 1984

Environmental Noise Brüel and Kjær Sound & Vibration Measurements A/S 2000, 2001

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

APPENDIX B
Comparison of Sound Pressure Levels



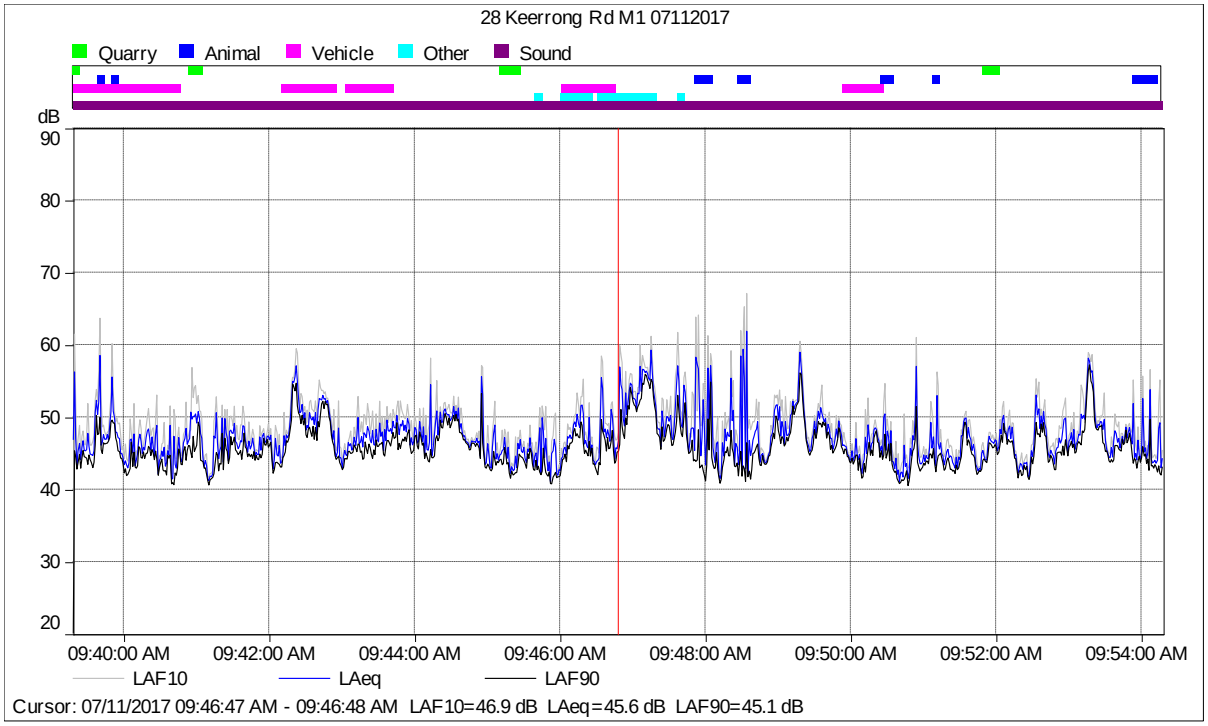
Our hearing covers a wide range of sound pressures – a ratio of over a million to one. The dB scale makes the numbers manageable.

Reproduced from

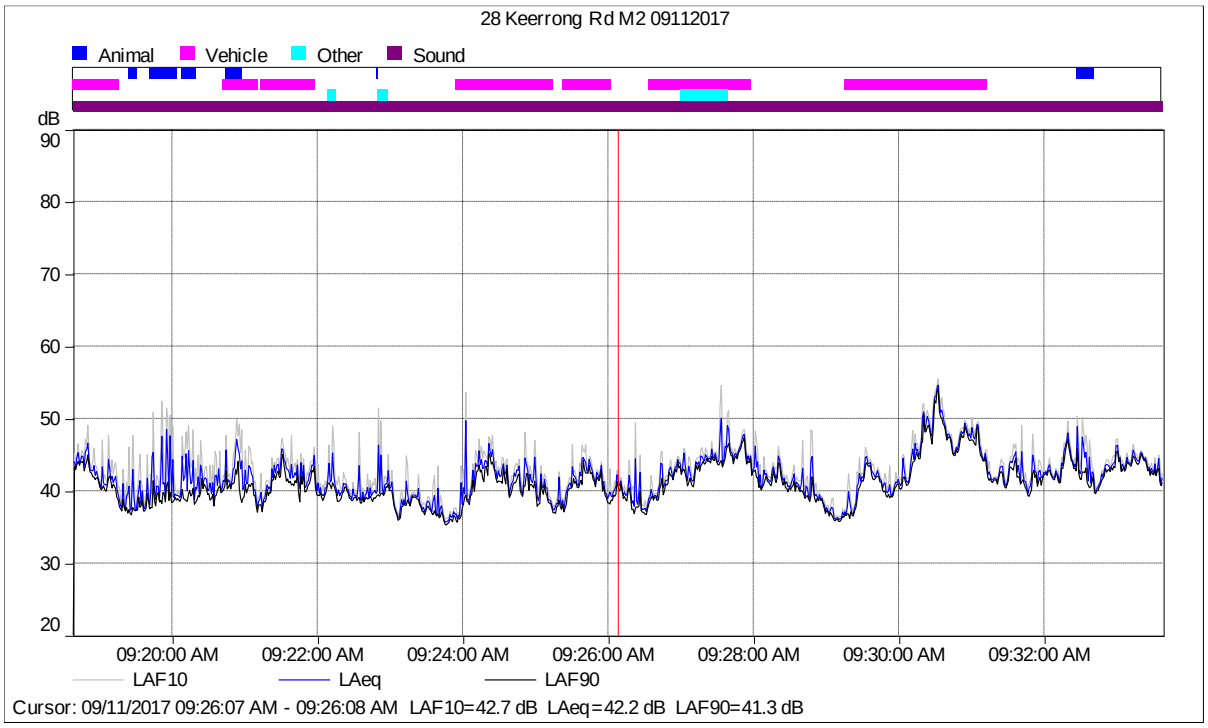
Environmental Noise Brüel and Kjær Sound & Vibration Measurements A/S 2000, 2001

APPENDIX C
Logged Levels at Receiver Locations – Graphs

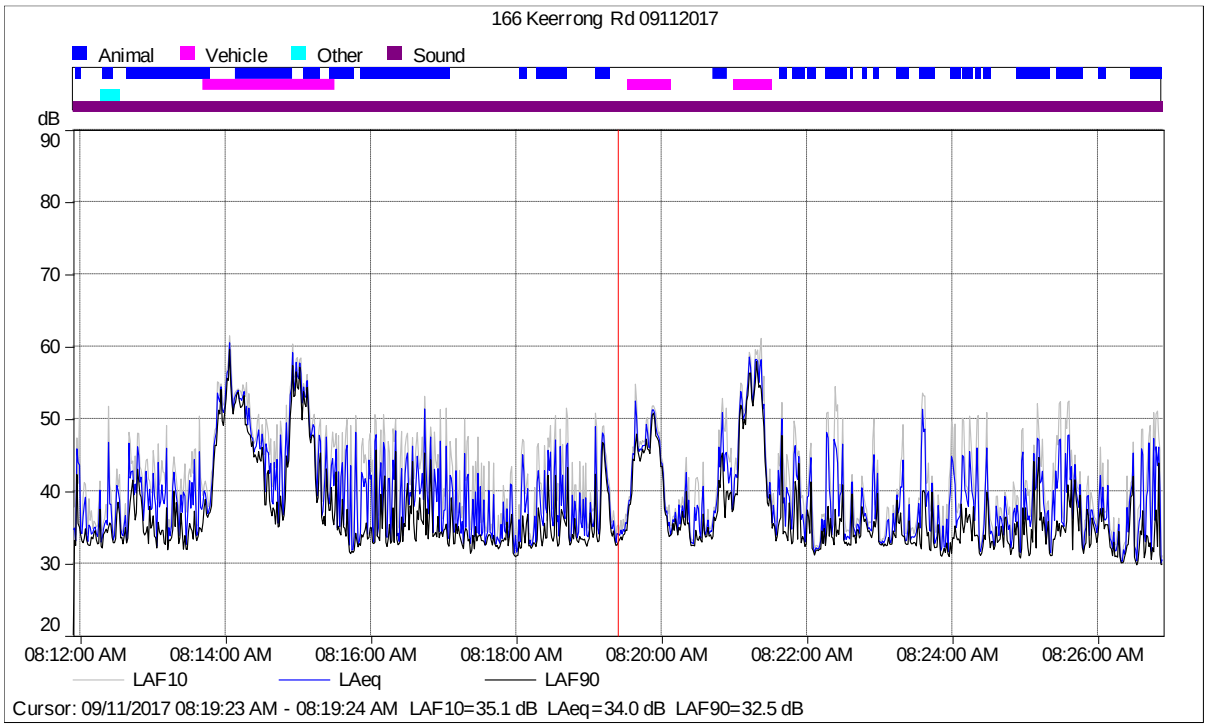
Graph C.1 Receiver 1 07/11/2017



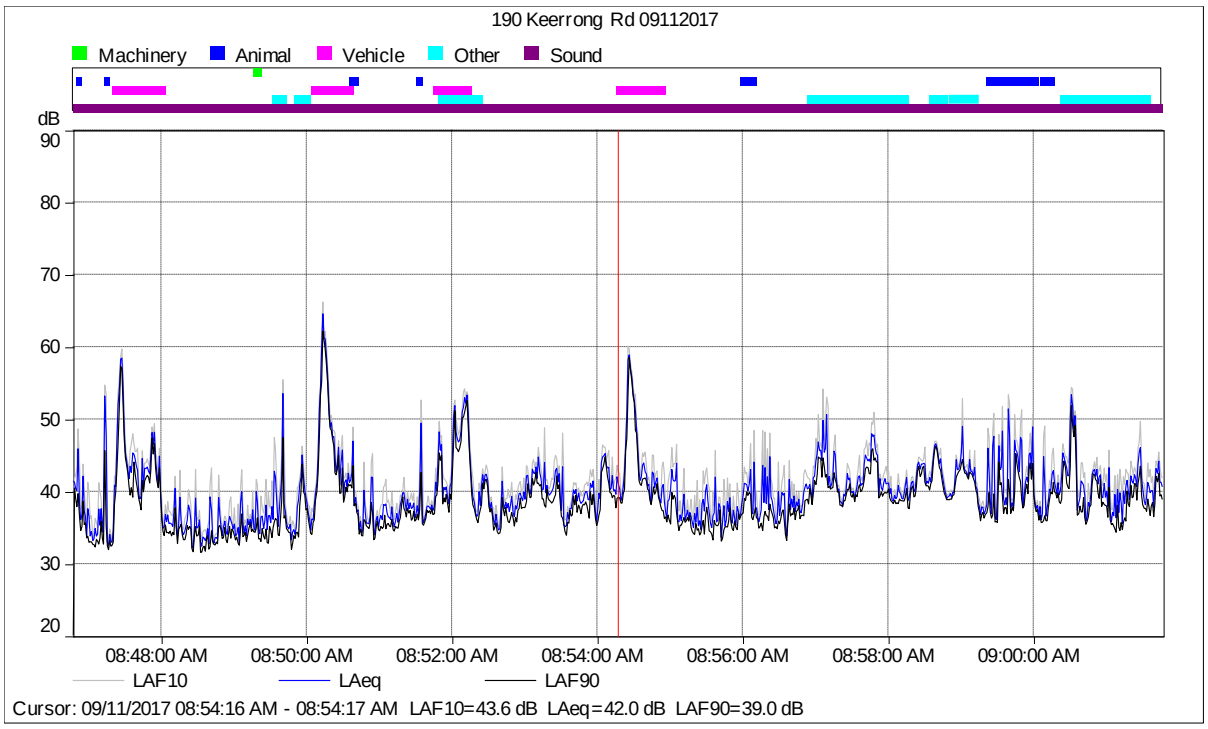
Graph C.2 Receiver 1 09/11/2017



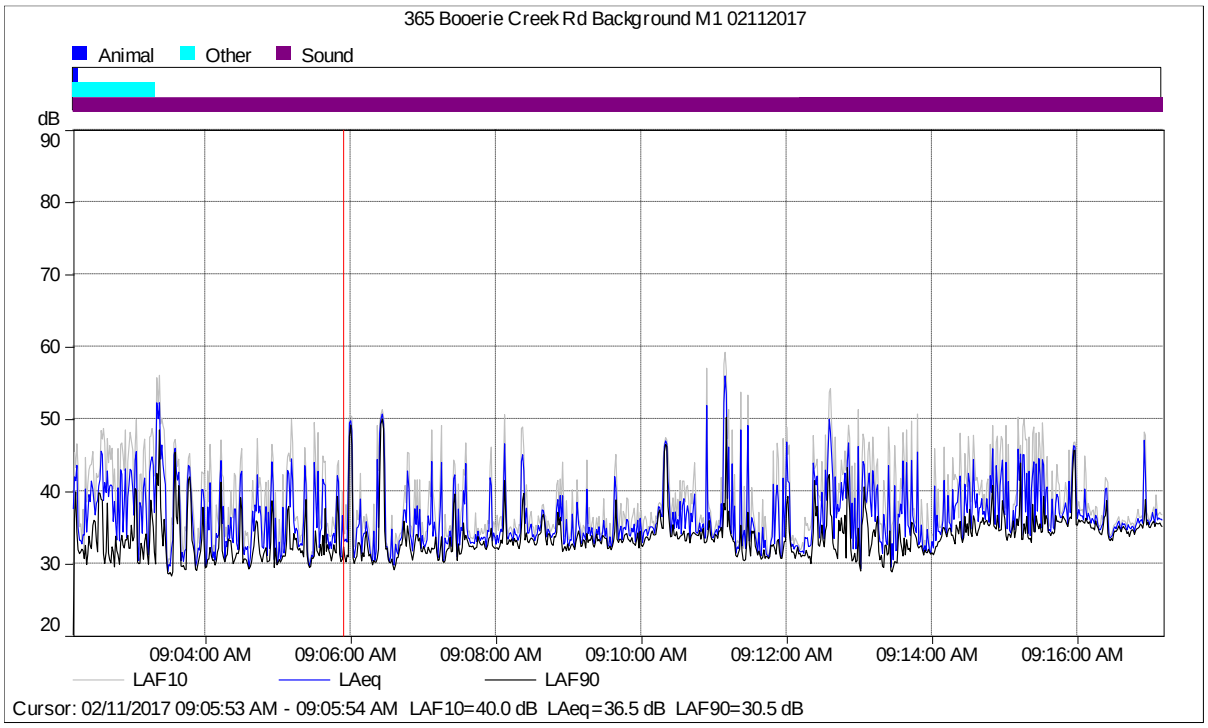
Graph C.3 Receiver 2 09/11/2017



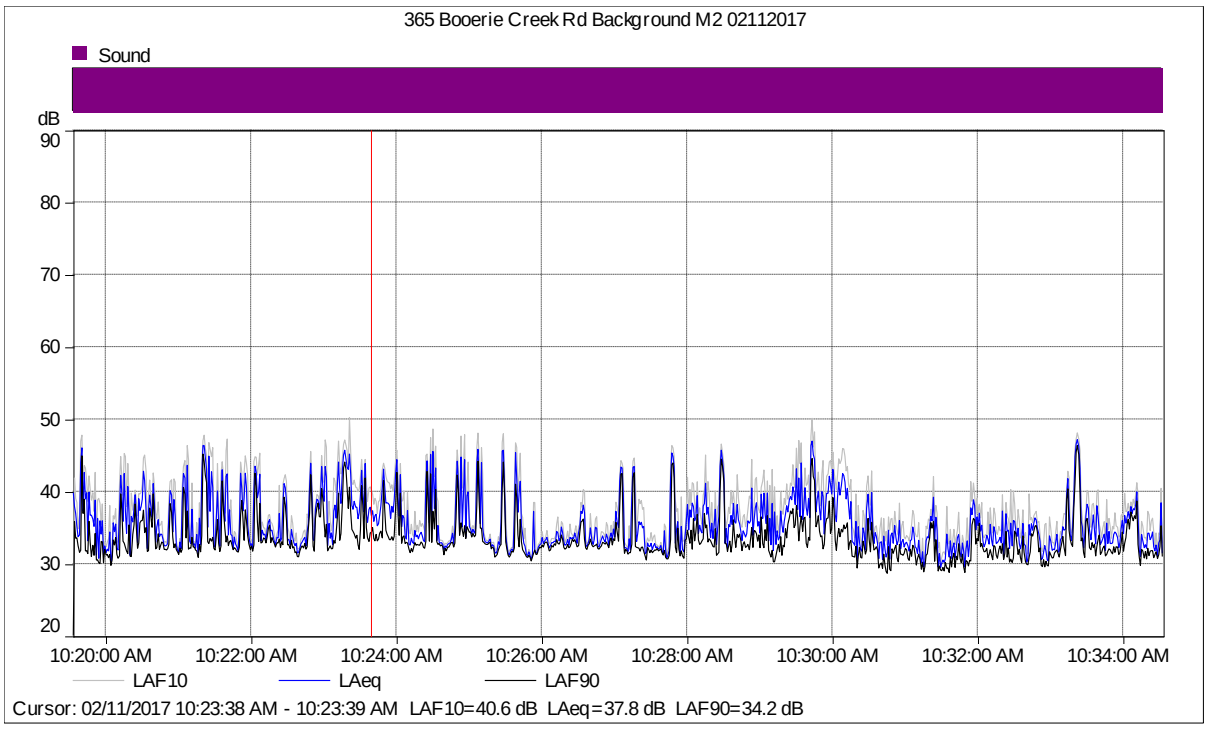
Graph C.4 Receiver 3 09/11/2017



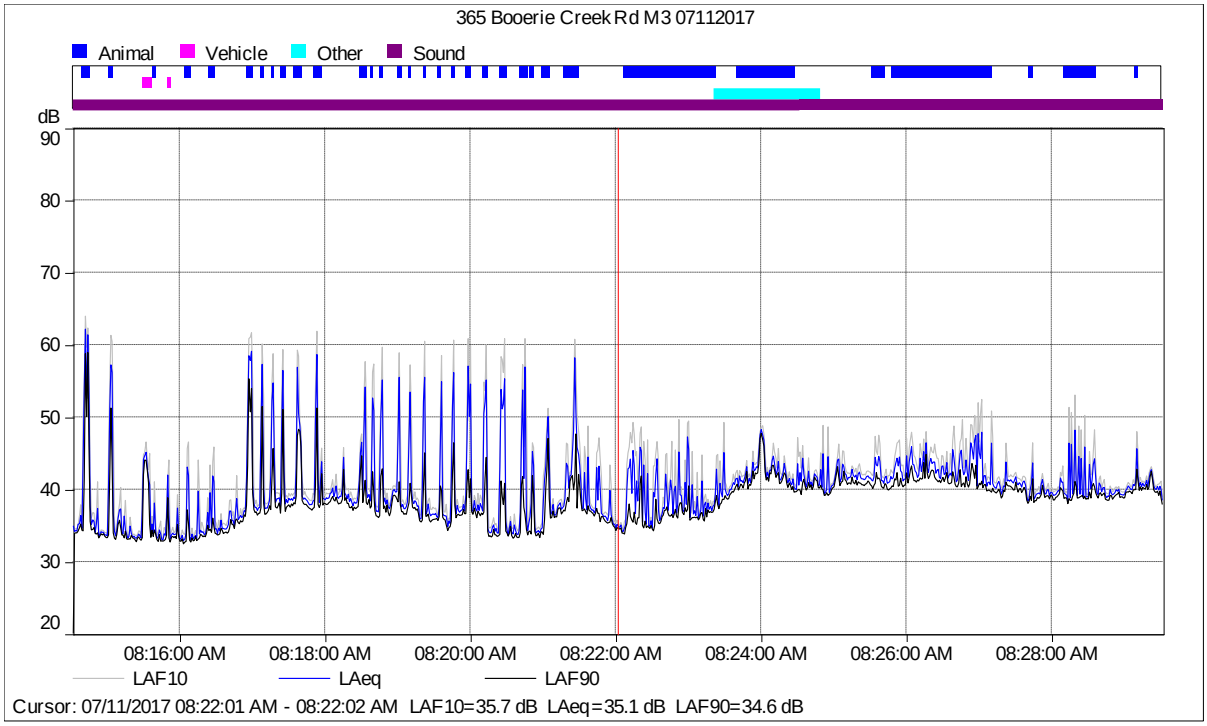
Graph C.5 Receiver 4 02/11/2017 Background – Quarry Not Operating M1



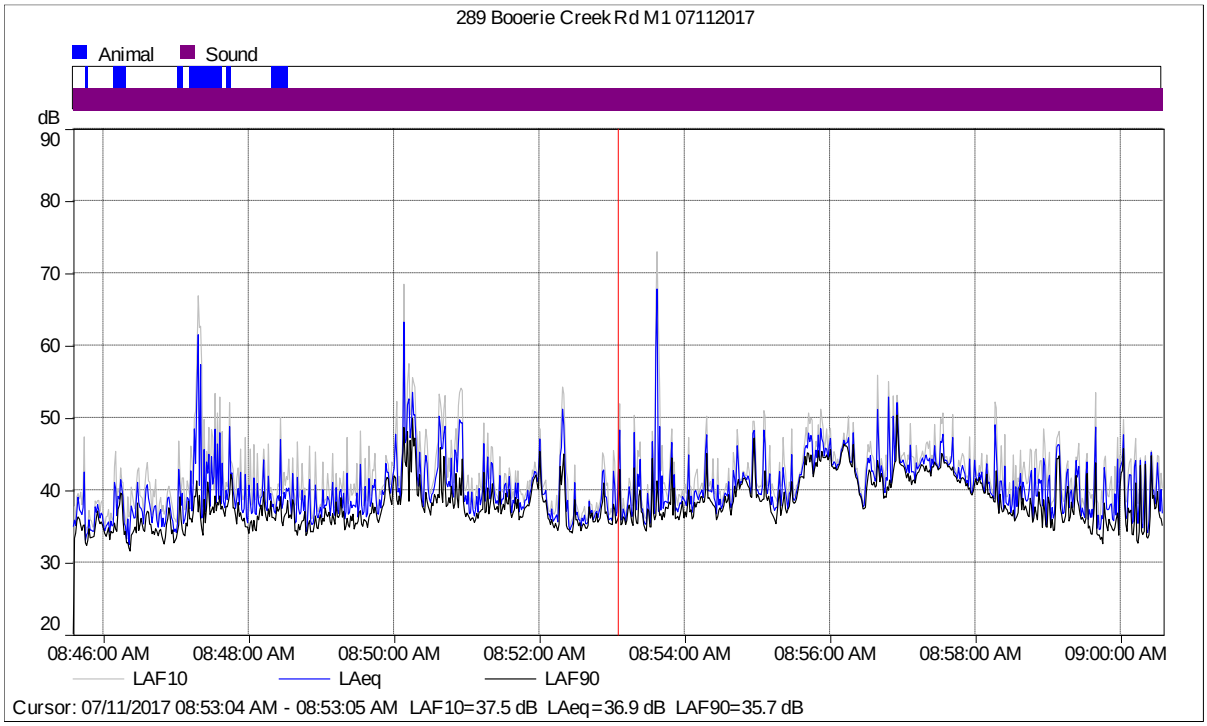
Graph C.6 Receiver 4 02/11/2017 Background – Quarry Not Operating M2



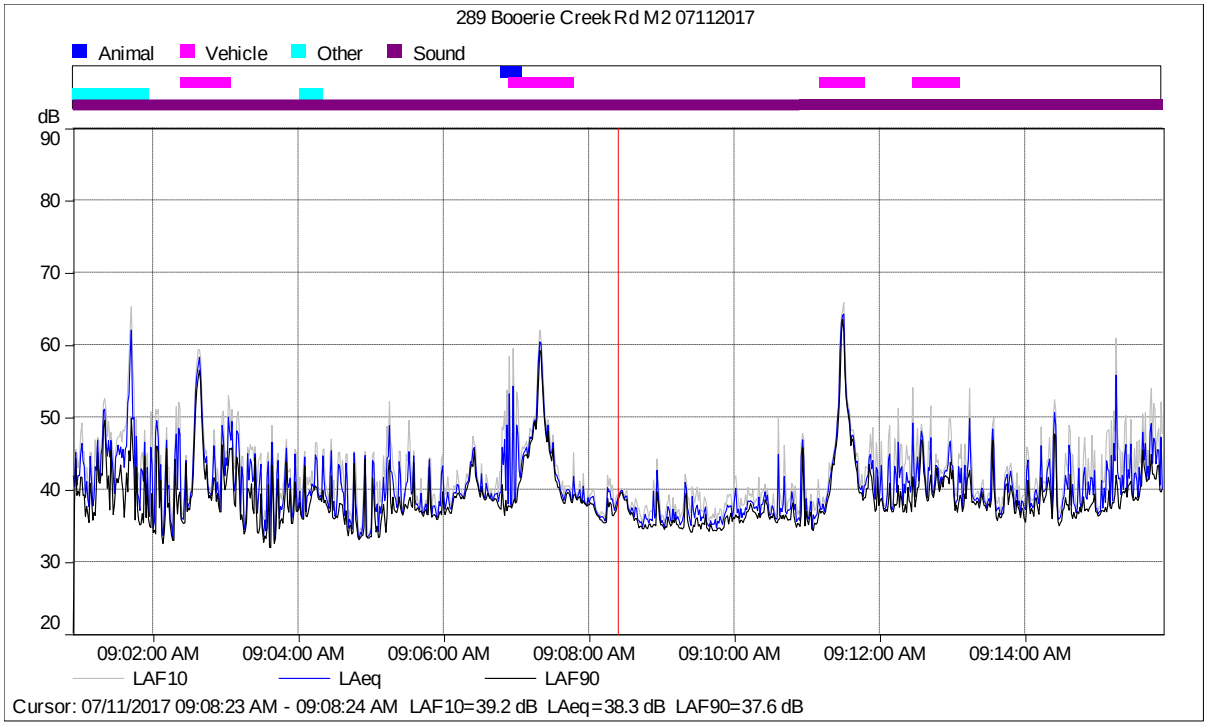
Graph C.7 Receiver 4 07/11/2017



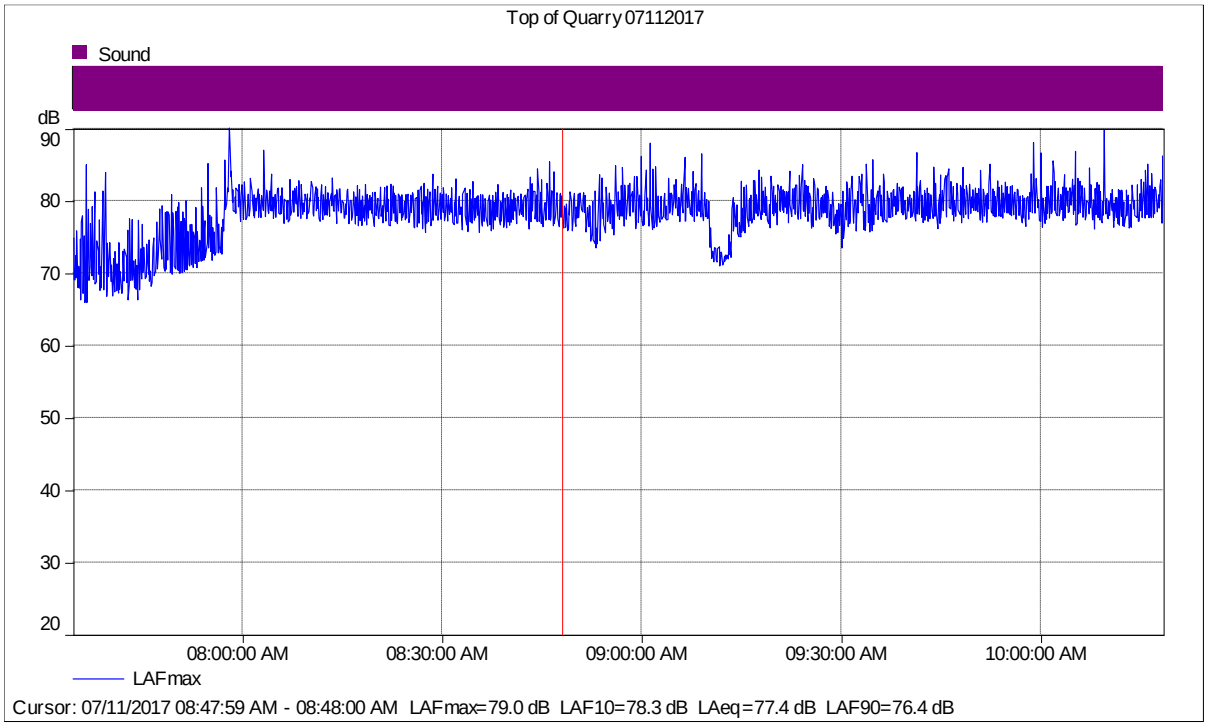
Graph C.8 Receiver 6 07/11/2017 M1



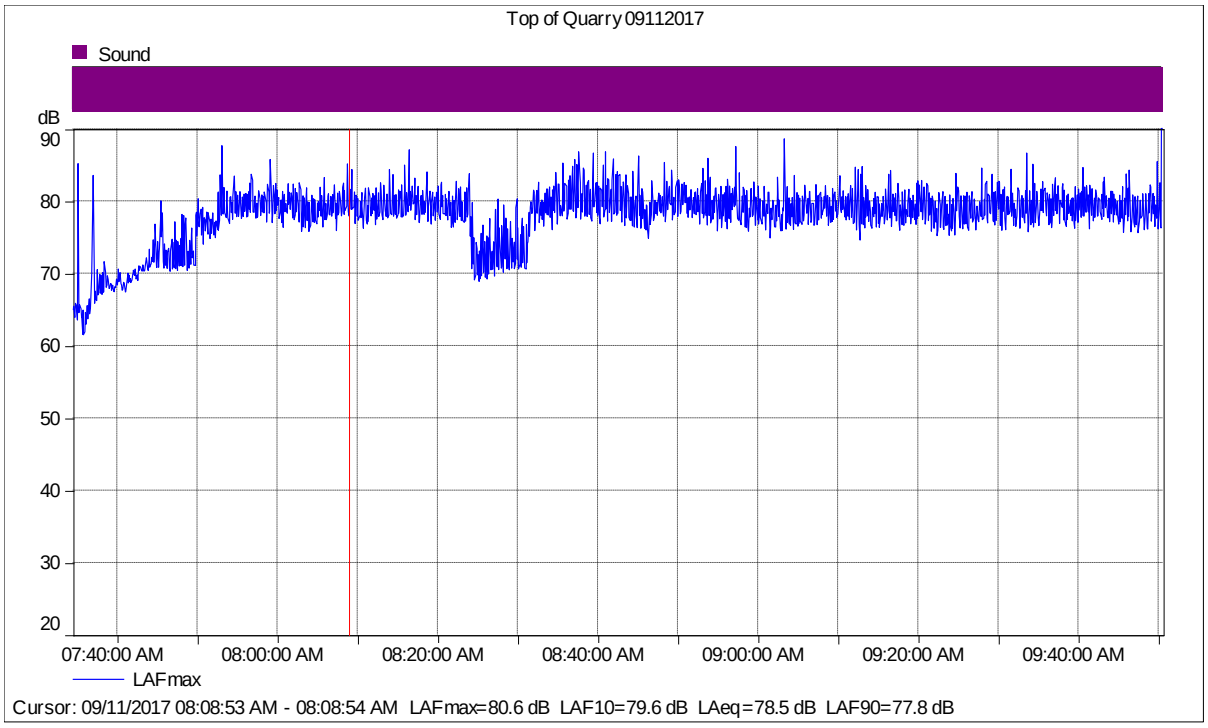
Graph C.9 Receiver 6 07/11/2017 M2



Graph C.10 Measured Noise Levels at Top of Quarry Above Crushing 07/11/2017



Graph C.11 Measured Noise Levels at Top of Quarry Above Crushing 09/11/2017



Appendix D
Quarry Operations 7th and 9th November 2017

Source – Google Earth – Image Date 17/02/2017

Note : Aerial photo not of operations on 7th and 9th of November 2017

Crushing Operations 07, 09 November 2017

2 jaw crushers

4 screen decks

1 cone crusher

1 VSI crusher

4 excavators

2 dump trucks

2 front end loaders

various haul trucks

Mobile Asphalt Plant November 2017

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 9

Blast Monitoring

Event Report

Date/Time	Long at 13:04:53 February 1, 2017
Trigger Source	Geo: 0.810 mm/s
Range	Geo: 254 mm/s
Record Time	6.0 sec at 1024 sps
Notes	

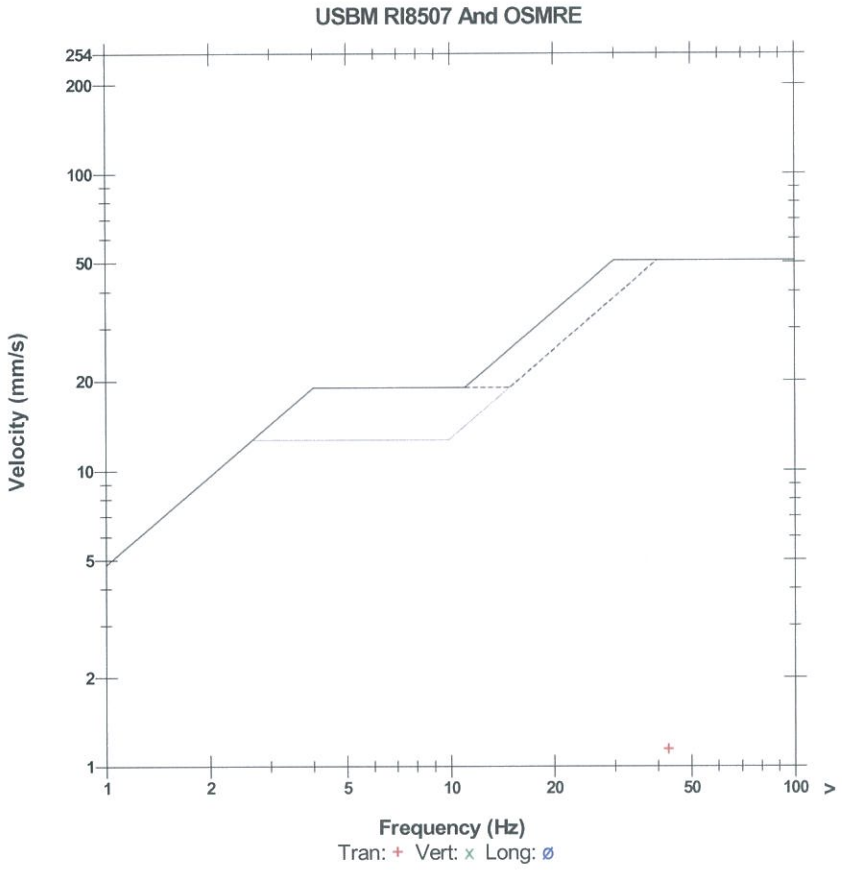
Serial Number	BE13456 V 10.72-1.1 Minimate Blaster
Battery Level	6.0 Volts
Unit Calibration	May 6, 2015 by Saros (Int)
File Name	O456GQUV.050
Post Event Notes	
Customer Site	BlakeBrook
Blast ID	BLA 17
Monitor Location	MP#1 (484 nimbin RD)
Monitored BY	Lucas Flanagan

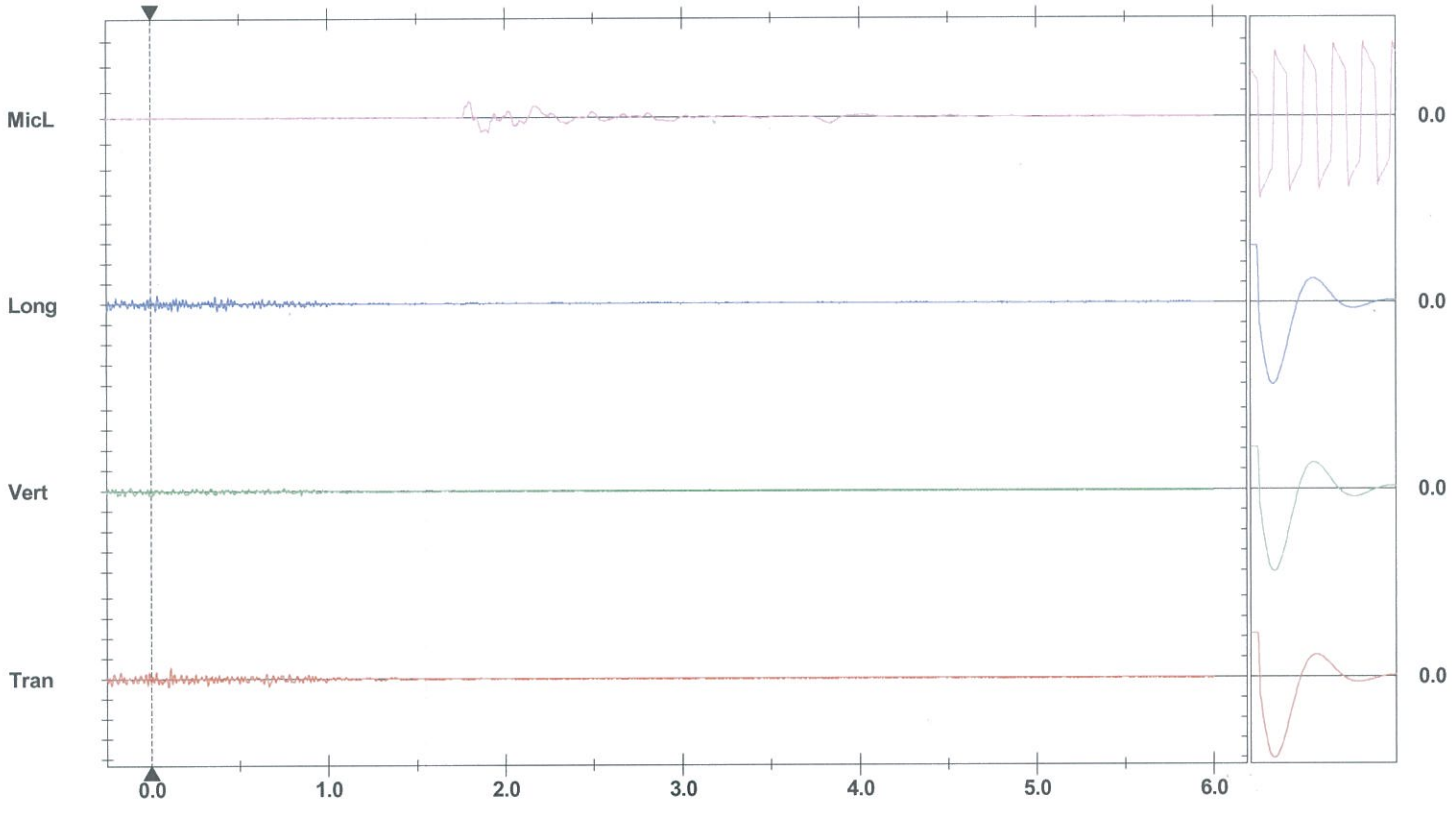
Extended Notes

Microphone	Linear Weighting
PSPL	109.9 dB(L) 6.25 pa.(L) at 1.797 sec
ZC Freq	8.8 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 454 mv)

	Tran	Vert	Long	
PPV	1.14	0.508	0.889	mm/s
ZC Freq	43	21	47	Hz
Time (Rel. to Trig)	0.110	-0.189	0.038	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00484	0.00415	0.00310	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.4	7.6	Hz
Overswing Ratio	3.8	3.2	3.6	

Peak Vector Sum 1.18 mm/s at 0.110 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.(L)/div

Sensor Check

Trigger = ▶----------◀

Instantel Event Report

Date/Time	Tran at 13:04:53 February 1, 2017
Trigger Source	Geo: 0.810 mm/s
Range	Geo: 254 mm/s
Record Time	6.0 sec at 1024 sps
Notes	

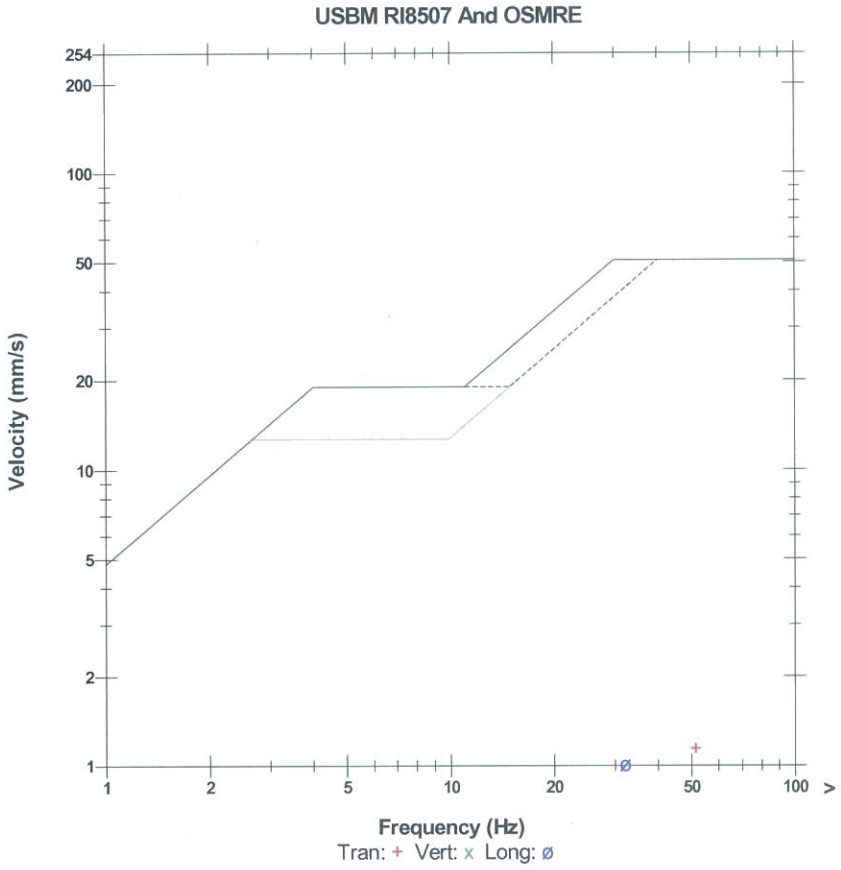
Serial Number	BE13371 V 10.72-1.1 Minimate Blaster
Battery Level	6.2 Volts
Unit Calibration	May 20, 2016 by Saros (Int)
File Name	__TEMP.EVT
Post Event Notes	
Customer Site	BlakeBrook
Blast ID	BLA 17
Monitor Location	MP#2 (356-387 Boorie Creek RD)
Monitored BY	Lucas Flanagan

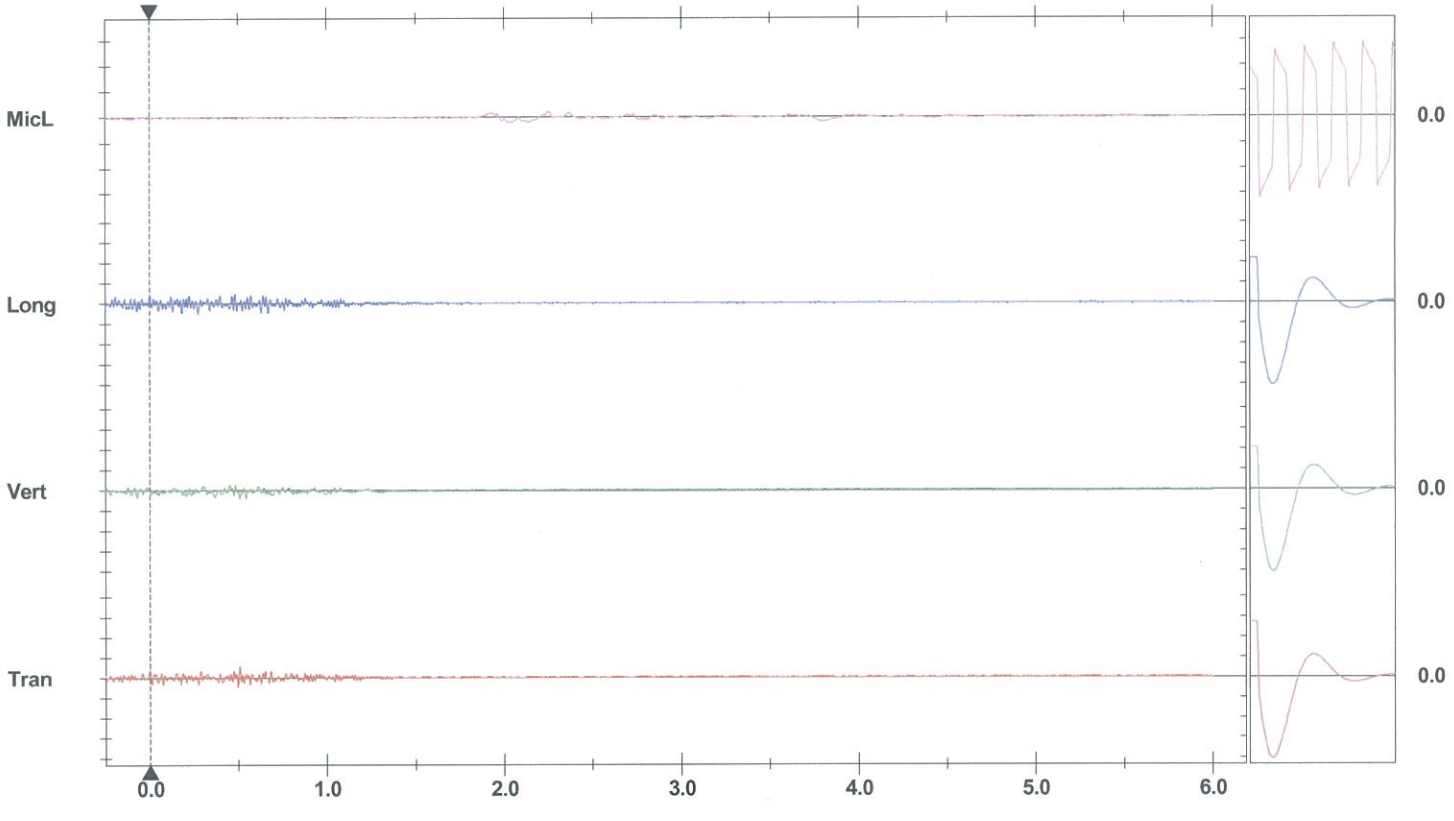
Extended Notes

Microphone	Linear Weighting
PSPL	101.9 dB(L) 2.50 pa.(L) at 2.022 sec
ZC Freq	4.9 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 475 mv)

	Tran	Vert	Long	
PPV	1.14	0.762	1.02	mm/s
ZC Freq	51	30	32	Hz
Time (Rel. to Trig)	0.509	0.506	0.273	sec
Peak Acceleration	0.0398	0.0265	0.0265	g
Peak Displacement	0.00347	0.00502	0.00477	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.4	7.4	7.5	Hz
Overswing Ratio	3.8	3.5	3.5	

Peak Vector Sum 1.38 mm/s at 0.509 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.(L)/div

Sensor Check

Trigger = ▶----------◀

BlakeBrook

Blast Number:	BLA 18
Location:	Main pit
Time:	13:11
Date:	23/03/2017
Monitor Location:	356-387 Boorie Creek Rd
Weather:	Fine

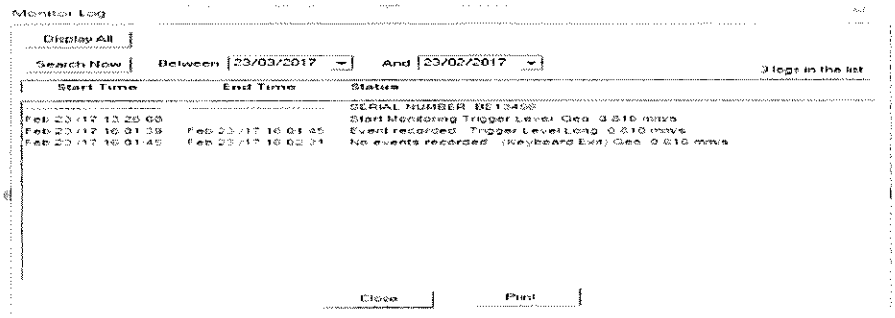
NO TRIGGER REPORT

monitoring conducted by: Brenton Oppermann

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from

from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number BE13456
next Calibration due 20-May-17

* Monitor log Shows No Event trigger at time of blast

BlakeBrook

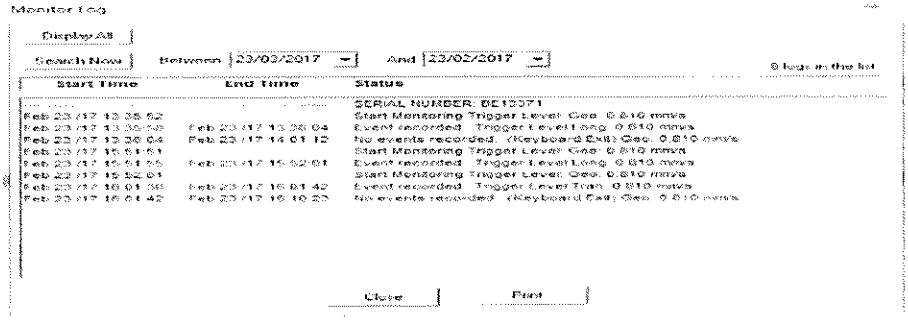
Blast Number:	BLA 18
Location:	Main Pit
Time:	13:11
Date:	23/03/2017
Monitor Location:	484 Nimbin Rd
Weather:	Fine

NO TRIGGER REPORT

monitoring conducted by: Brenton Oppermann

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 500m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number	BE13371
next Calibration due	20-May-17

* Monitor log Shows No Event trigger at time of blast

Instantel Event Report

A

Date/Time	Long at 13:11:00 ~~February~~ MARCH 23, 2017
Trigger Source	Geo: 0.810 mm/s
Range	Geo: 254 mm/s
Record Time	6.0 sec at 1024 sps
Notes	

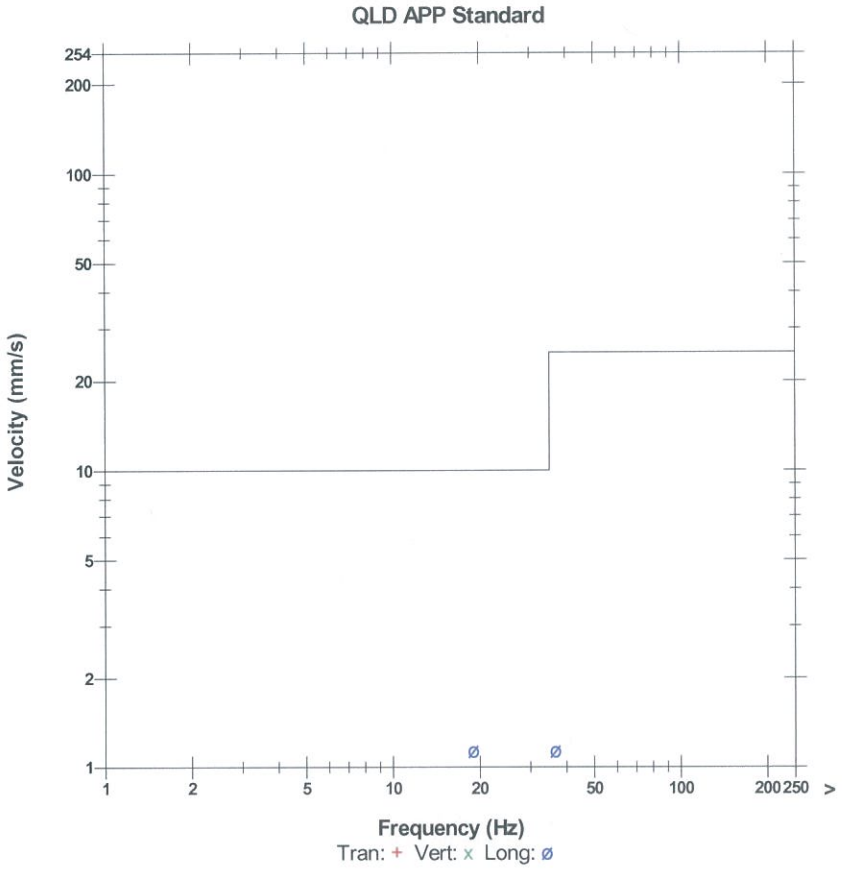
Serial Number	BE12705 V 10.72-1.1 Minimate Blaster
Battery Level	6.2 Volts
Unit Calibration	March 4, 2016 by Saros (Int)
File Name	N705GRZT.UR0
Post Event Notes	
Customer Site	Blake Brook
Blast ID	BLA 18
Monitor Location	MP#3 464-528 Nimbin Rd
Monitored by	Brenton Oppermann

Extended Notes

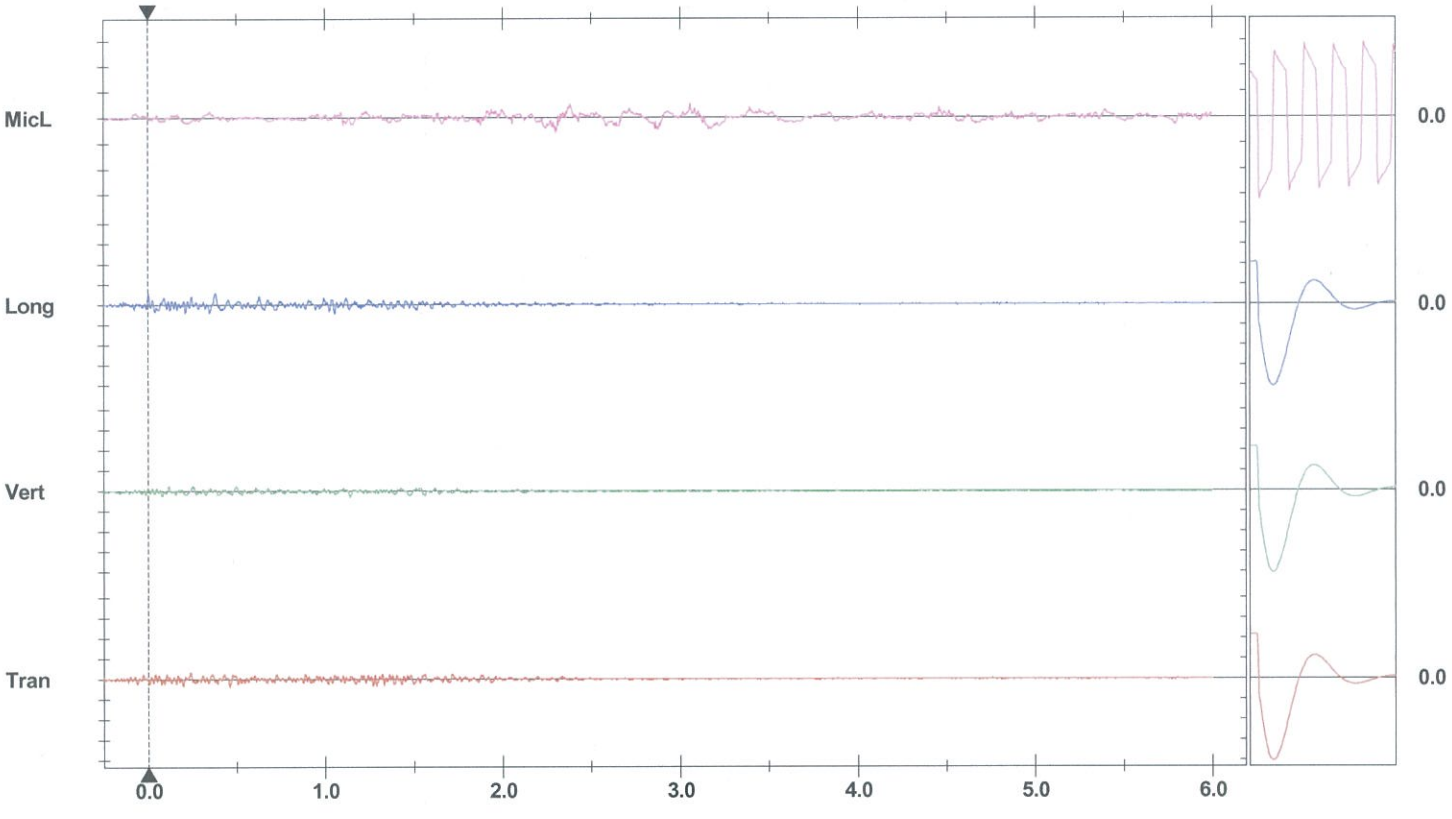
Microphone	Linear Weighting
PSPL	109.5 dB(L) at 2.299 sec
ZC Freq	3.8 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 519 mv)

	Tran	Vert	Long	
PPV	0.762	0.635	1.14	mm/s
ZC Freq	32	26	37	Hz
Time (Rel. to Trig)	0.461	1.139	0.004	sec
Peak Acceleration	0.0398	0.0133	0.0265	g
Peak Displacement	0.00453	0.00527	0.00943	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.4	7.3	Hz
Overswing Ratio	3.7	3.4	3.7	

Peak Vector Sum 1.23 mm/s at 0.004 sec



whole i



Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.(L)/div

Sensor Check

Trigger = ▶----------◀

BlakeBrook

Blast Number: BLA21 BLA22
Location: Main pit
Time: 11.45
Date: 24/04/2017
Monitor Location: 484 Nimbin Road
Weather: O/cast

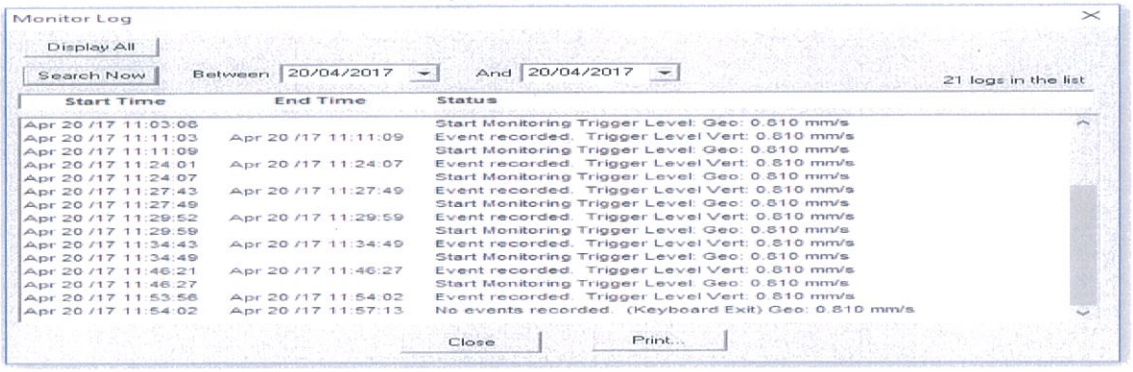
NO TRIGGER REPORT

monitoring conducted by: Brenton Oppermann

Geophone Trigger Level: **0.81 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from

from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.81mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number BE13456
next Calibration due 20-May-17

* Monitor log Shows No Event trigger at time of blast

BlakeBrook

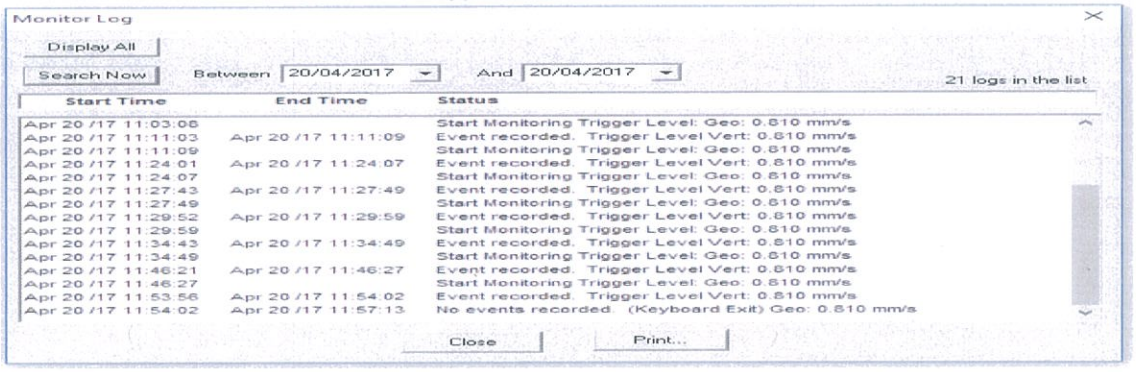
Blast Number: BLA 21 / BLA22
Location: Main Pit
Time: 11.45
Date: 24/04/2017
Monitor Location: 533 Nimbin Rd
Weather: o/cast

NO TRIGGER REPORT

monitoring conducted by: Brenton Oppermann

Geophone Trigger Level: **0.81 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 500m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.81mm/s and that the blast over pressure was less less than the trigger level of 110 dBL


Monitor Log

Display All

Search Now | Between 20/04/2017 | And 20/04/2017 | 21 logs in the list

Start Time	End Time	Status
Apr 20 /17 11:03:08		Start Monitoring Trigger Level: Geo: 0.810 mm/s
Apr 20 /17 11:11:03	Apr 20 /17 11:11:09	Event recorded. Trigger Level Vert: 0.810 mm/s
Apr 20 /17 11:11:09		Start Monitoring Trigger Level: Geo: 0.810 mm/s
Apr 20 /17 11:24:01	Apr 20 /17 11:24:07	Event recorded. Trigger Level Vert: 0.810 mm/s
Apr 20 /17 11:24:07		Start Monitoring Trigger Level: Geo: 0.810 mm/s
Apr 20 /17 11:27:43	Apr 20 /17 11:27:49	Event recorded. Trigger Level Vert: 0.810 mm/s
Apr 20 /17 11:27:49		Start Monitoring Trigger Level: Geo: 0.810 mm/s
Apr 20 /17 11:29:52	Apr 20 /17 11:29:59	Event recorded. Trigger Level Vert: 0.810 mm/s
Apr 20 /17 11:29:59		Start Monitoring Trigger Level: Geo: 0.810 mm/s
Apr 20 /17 11:34:43	Apr 20 /17 11:34:49	Event recorded. Trigger Level Vert: 0.810 mm/s
Apr 20 /17 11:34:49		Start Monitoring Trigger Level: Geo: 0.810 mm/s
Apr 20 /17 11:46:21	Apr 20 /17 11:46:27	Event recorded. Trigger Level Vert: 0.810 mm/s
Apr 20 /17 11:46:27		Start Monitoring Trigger Level: Geo: 0.810 mm/s
Apr 20 /17 11:53:56	Apr 20 /17 11:54:02	Event recorded. Trigger Level Vert: 0.810 mm/s
Apr 20 /17 11:54:02	Apr 20 /17 11:57:13	No events recorded. (Keyboard Exit) Geo: 0.810 mm/s

Close | Print...

Instantel Minimate Blaster Serial Number BE13371
next Calibration due 20-May-17

* Monitor log Shows No Event trigger at time of blast

Event Report

Date/Time	Vert at 12:32:08 May 25, 2017
Trigger Source	Geo: 0.810 mm/s
Range	Geo: 254 mm/s
Record Time	6.0 sec at 1024 sps
Notes	

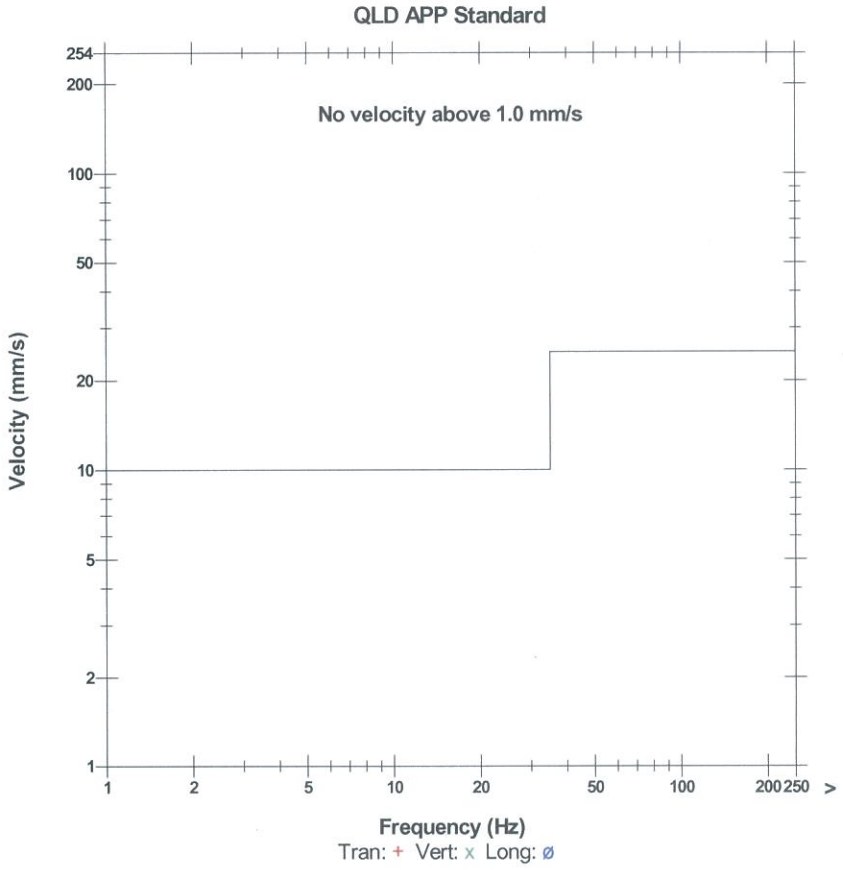
Serial Number	BE13456 V 10.72-1.1 Minimate Blaster
Battery Level	6.1 Volts
Unit Calibration	May 6, 2015 by Saros (Int)
File Name	O456GWO2.TK0
Post Event Notes	
Customer Site	BlakeBrook
Blast ID	BLA 23
Monitor Location	#3(464-528 Nimbin RD)
Monitored By	Peter Bradford

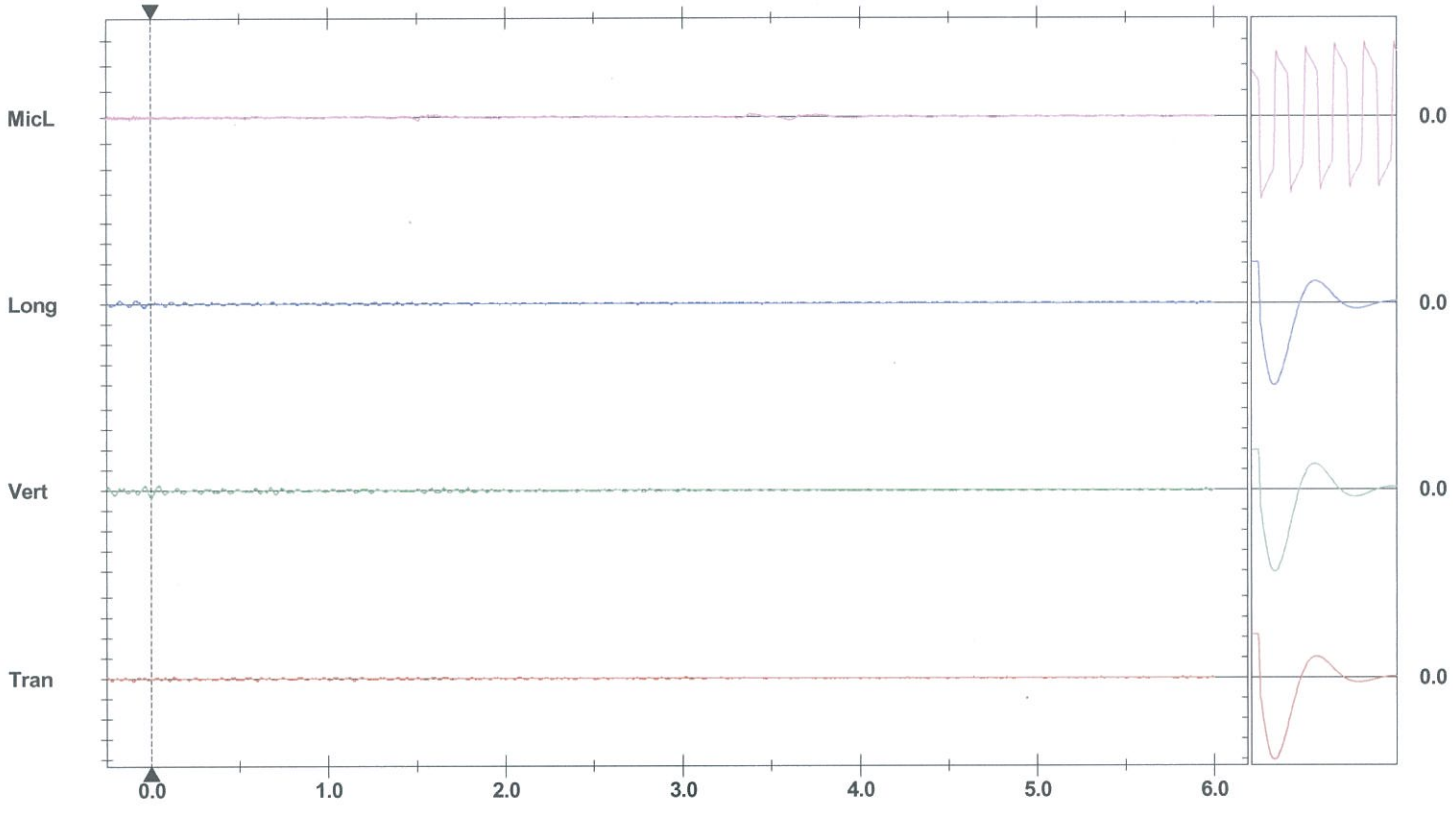
Extended Notes

Microphone	Linear Weighting
PSPL	98.8 dB(L) at 1.510 sec
ZC Freq	21 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 620 mv)

	Tran	Vert	Long	
PPV	0.254	0.762	0.381	mm/s
ZC Freq	>100	16	24	Hz
Time (Rel. to Trig)	-0.226	0.000	-0.180	sec
Peak Acceleration	0.0133	0.0265	0.0133	g
Peak Displacement	0.00112	0.00819	0.00490	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.1	7.5	7.3	Hz
Overswing Ratio	4.0	3.3	3.8	

Peak Vector Sum 0.773 mm/s at 0.000 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.(L)/div

Sensor Check

Trigger = ▶----------◀

Blake Brook

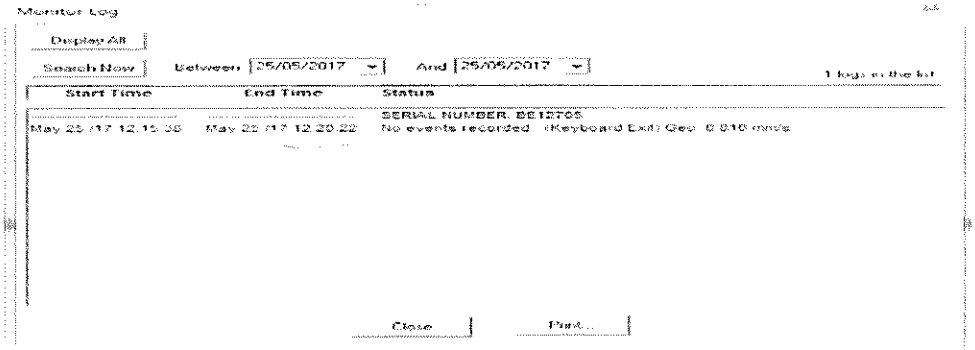
Blast Number: BLA 23
Location: Main Pit
Time: 13:32 08
Date: 25/05/2017
Monitor Location: 356-387 Boorie Creek Rd
Weather: Fine

NO TRIGGER REPORT

monitoring conducted by: Peter Bradford

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 1200m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number BE12705
next Calibration due 4-Mar-17

* Monitor log Shows No Event trigger at time of blast

BlakeBrook

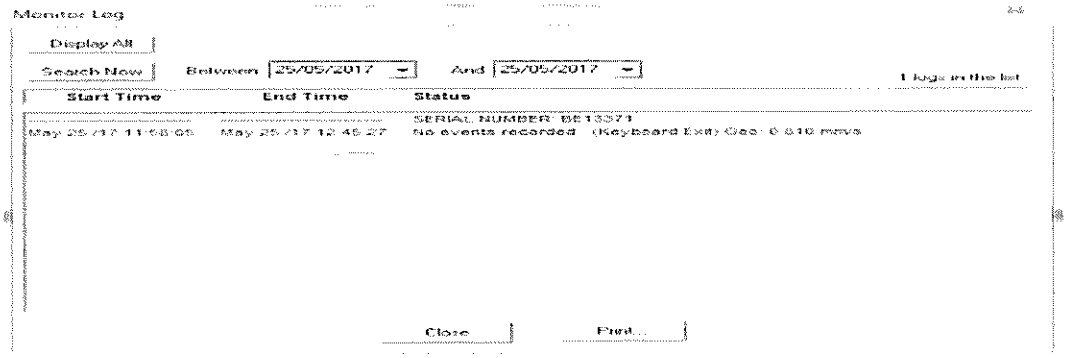
Blast Number: BLA 23
Location: Main Pit
Time: 13:02 08
Date: 25/05/2017
Monitor Location: 484 Nimbin RD
Weather: Fine

NO TRIGGER REPORT

monitoring conducted by: Peter Bradford

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 680m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level 110 dBL



Instantel Minimate Blaster Serial Number BE13371
next Calibration due 20-May-17

* Monitor log Shows No Event trigger at time of blast

Instantel

Event Report

Date/Time	Tran at 13:32:55 July 13, 2017
Trigger Source	Geo: 0.810 mm/s, Mic: 110 dB(L)
Range	Geo: 254 mm/s
Record Time	6.0 sec at 1024 sps
Notes	

Serial Number	BE13371 V 10.72-1.1 Minimate Blaster
Battery Level	6.3 Volts
Unit Calibration	June 1, 2017 by Saros Int.
File Name	__TEMP EVT
Post Event Notes	
Customer Site	BlakeBrook
Blast ID	BLA 25
Monitor Location	464-528 Nimbin Rd
Monitored By	Brad Markwell

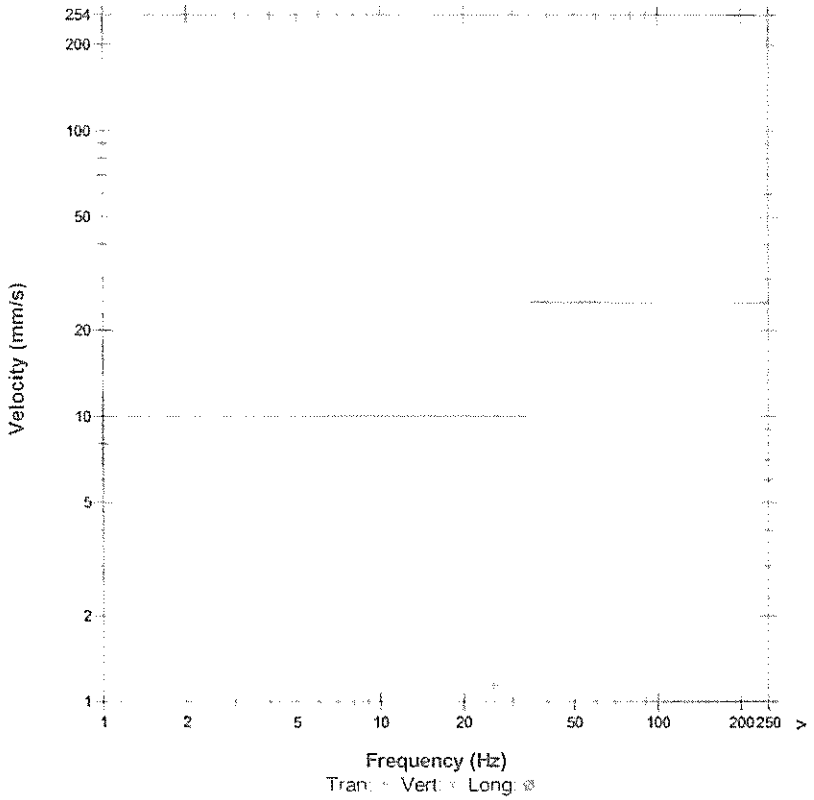
Extended Notes

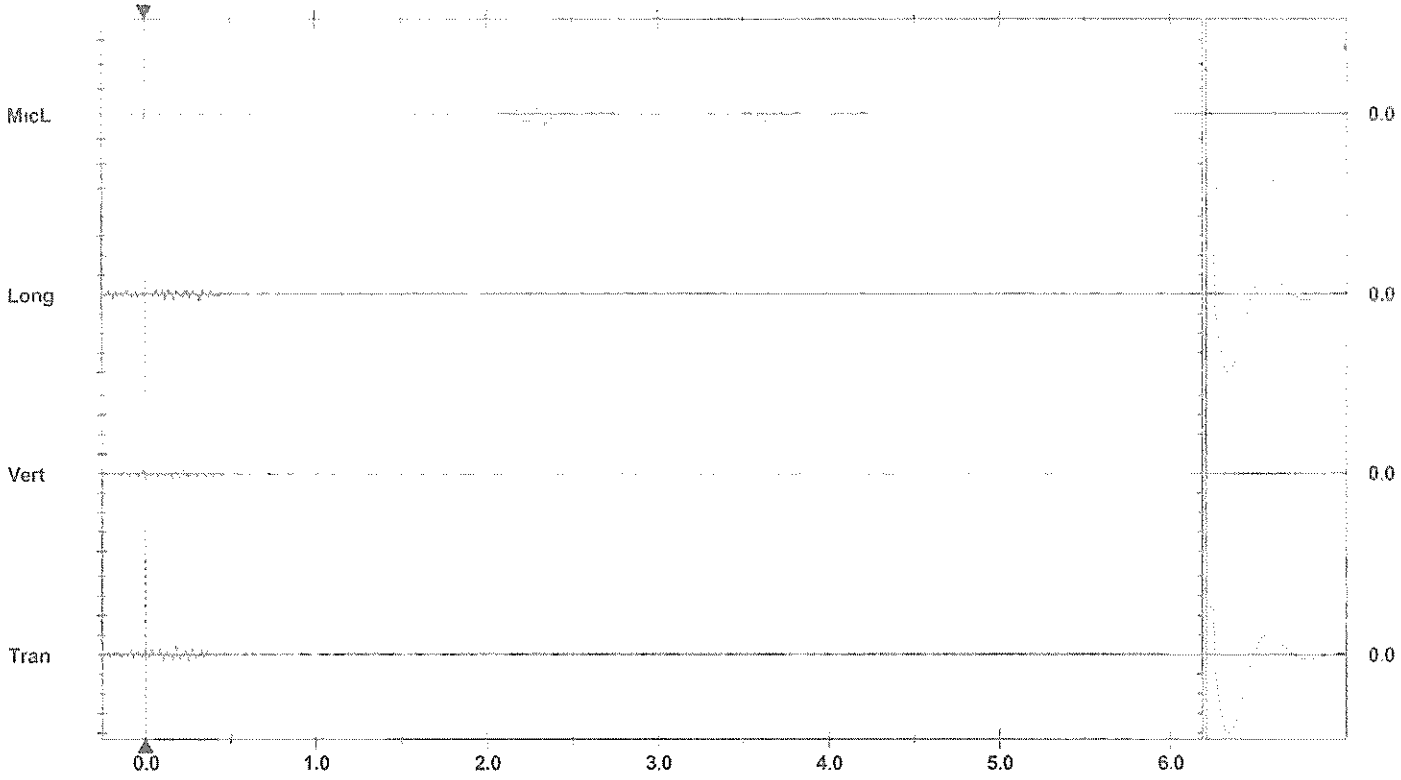
Microphone	Linear Weighting
PSPL	107.5 dB(L) at 2.337 sec
ZC Freq	3.5 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 578 mv)

	Tran	Vert	Long	
PPV	1.14	0.635	0.889	mm/s
ZC Freq	26	30	30	Hz
Time (Rel. to Trig)	0.182	0.201	0.319	sec
Peak Acceleration	0.0265	0.0265	0.0265	g
Peak Displacement	0.00657	0.00415	0.00428	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.5	Hz
Overswing Ratio	4.0	3.6	3.6	

Peak Vector Sum 1.20 mm/s at 0.182 sec

QLD APP Standard





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.(L)/div Sensor Check

Trigger =

Event Report

Date/Time	Tran at 13:32:25 July 13, 2017
Trigger Source	Geo: 0.810 mm/s, Mic: 110 dB(L)
Range	Geo: 254 mm/s
Record Time	6.0 sec at 1024 sps
Notes	

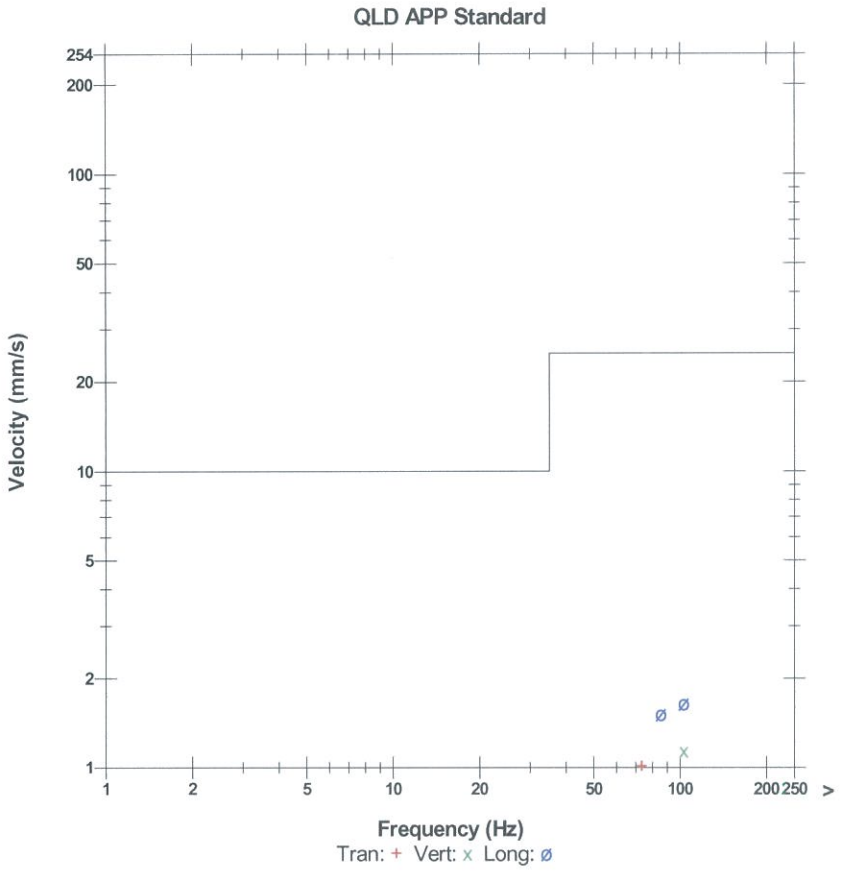
Serial Number	BE12705 V 10.72-1.1 Minimate Blaster
Battery Level	6.1 Volts
Unit Calibration	April 10, 2017 by Saros (Int)
File Name	__TEMP.EVT
Post Event Notes	
Customer Site	BlakeBrook
Blast ID	BLA 25
Monitor Location	356-387 Boorie Creek RD
Monitored By	Brad Markwell

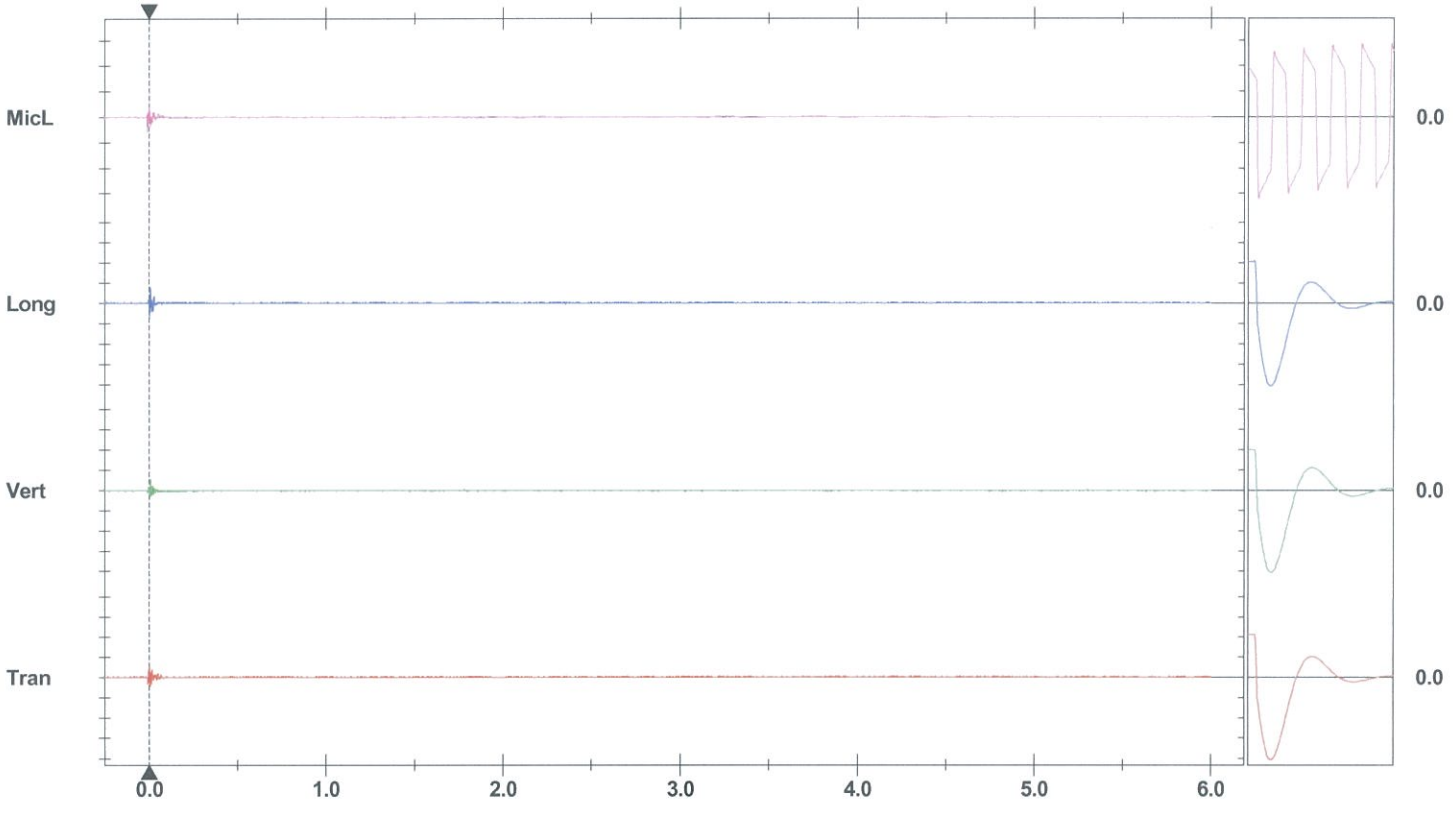
Extended Notes

Microphone	Linear Weighting
PSPL	109.5 dB(L) at -0.005 sec
ZC Freq	>100 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 596 mv)

	Tran	Vert	Long	
PPV	1.02	1.14	1.65	mm/s
ZC Freq	73	>100	>100	Hz
Time (Rel. to Trig)	0.001	0.010	0.010	sec
Peak Acceleration	0.0663	0.0795	0.106	g
Peak Displacement	0.00229	0.00167	0.00248	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.4	7.5	Hz
Overswing Ratio	4.0	3.7	3.9	

Peak Vector Sum 2.04 mm/s at 0.010 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.(L)/div Sensor Check

Trigger = ▶----------◀

Instantel

Event Report

Date/Time	Long at 13:32:57 July 13, 2017
Trigger Source	Geo: 0.810 mm/s, Mic: 110 dB(L)
Range	Geo: 254 mm/s
Record Time	6.0 sec at 1024 sps
Notes	

Serial Number	BE13456 V 10.72-1.1 Minimate Blaster
Battery Level	6.2 Volts
Unit Calibration	June 1, 2017 by Saros Int
File Name	__TEMP.EVT
Post Event Notes	
Customer Site	BlakeBrook
Blast ID	BLA 25
Monitor Location	484 Nimbin Rd
Monitored By	Brad Markwell

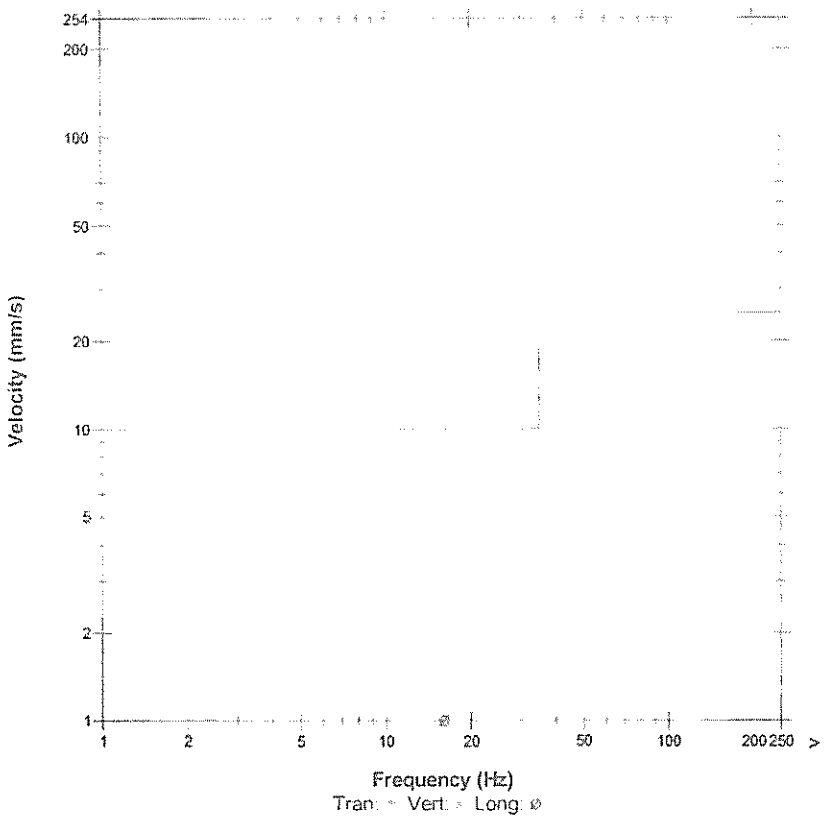
Extended Notes

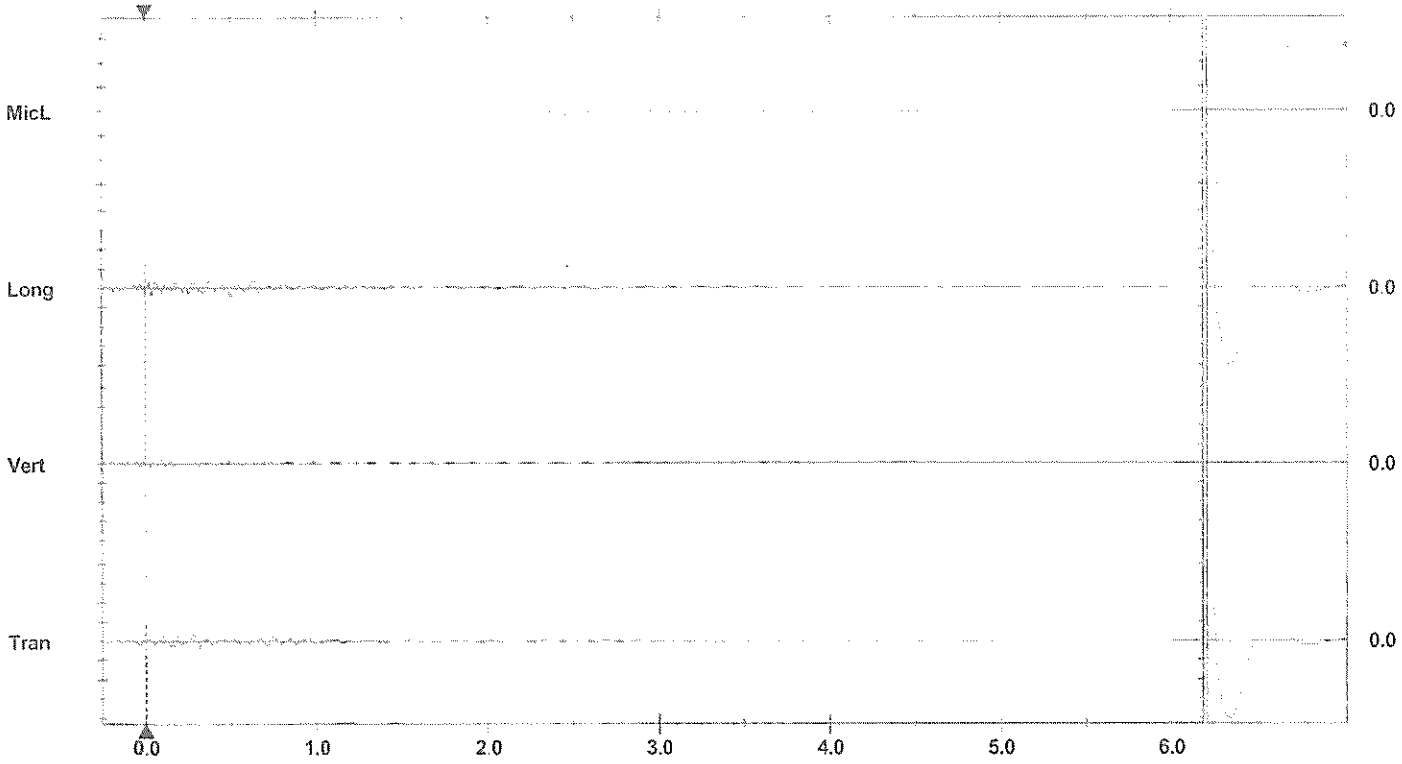
Microphone	Linear Weighting
PSPL	106.5 dB(L) at 2.641 sec
ZC Freq	6.5 Hz
Channel Test	Passed (Freq = 20.5 Hz Amp = 579 mv)

	Tran	Vert	Long	
PPV	0.889	0.635	1.02	mm/s
ZC Freq	27	26	16	Hz
Time (Rel. to Trig)	0.185	0.097	0.497	sec
Peak Acceleration	0.0133	0.0133	0.0265	g
Peak Displacement	0.0115	0.00490	0.0117	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.2	7.5	7.3	Hz
Overswing Ratio	3.9	3.3	3.8	

Peak Vector Sum - 1.10 mm/s at 0.274 sec

QLD APP Standard





Time Scale: 0.50 sec/div Amplitude Scale: Geo: 2.00 mm/s/div Mic: 10.00 pa (L)/div

Trigger =

Sensor Check

Blakebrook

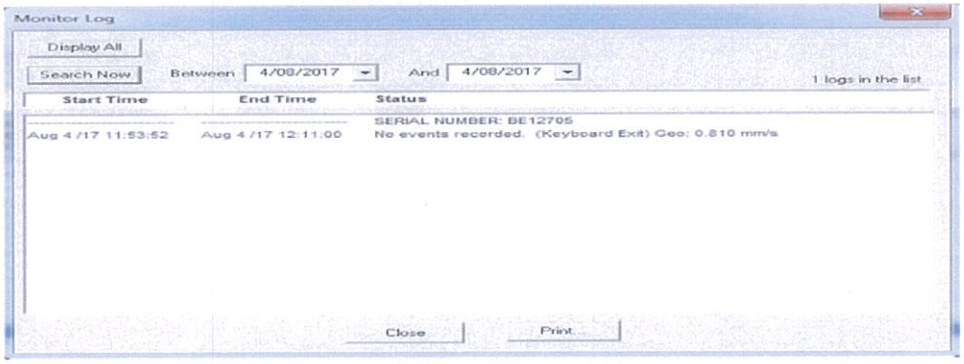
Blast Number: BLA 26
Location: Main Pit
Time: 12:06 49
Date: 4/08/2017
Monitor Location: 484 Nimbin Rd
Weather: Fine

NO TRIGGER REPORT

monitoring conducted by: Brad Markwell

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 1100m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number BE12705
next Calibration due 10-Apr-18

* Monitor log Shows No Event trigger at time of blast

BlakeBrook

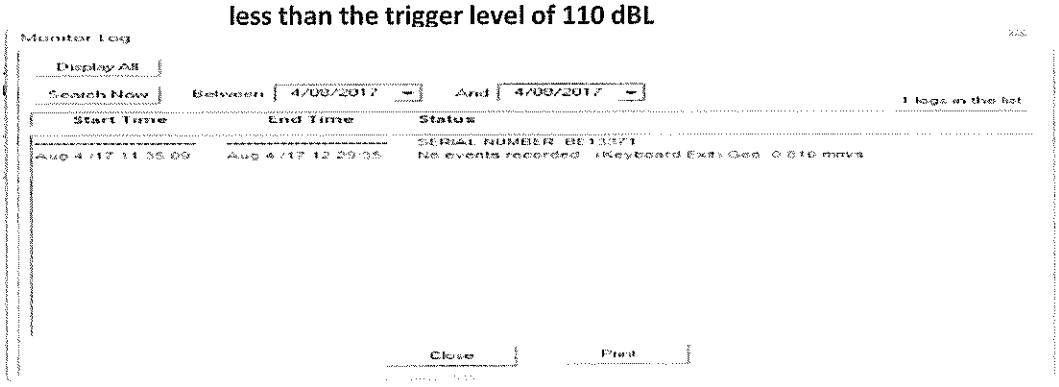
Blast Number: BLA 26
Location: Main Pit
Time: 12:06
Date: 4/08/2017
Monitor Location: 464-528 Nimbin RD
Weather: Fine

NO TRIGGER REPORT

monitoring conducted by: Brad Markwell

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 800m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number BE13371
next Calibration due 10-Apr-18

* Monitor log Shows No Event trigger at time of blast

BlakeBrook

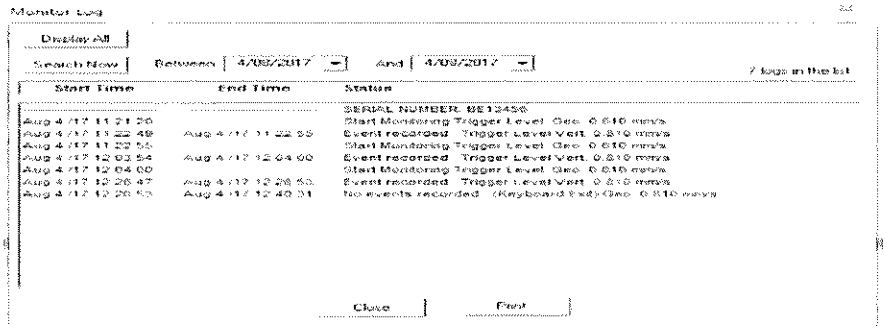
Blast Number: BLA 26
Location: Main pit
Time: 12:06
Date: 4/08/2017
Monitor Location: 356-387 Boorie Creek Rd
Weather: Fine

NO TRIGGER REPORT

monitoring conducted by: Brad Markwell

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 850m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number BE13456
next Calibration due 1-Jun-18

* Monitor log Shows No Event trigger at time of blast

BlakeBrook

Blast Number:	BLA 27
Location:	Main pit
Time:	13:57:49 PM
Date:	9/10/2017
Monitor Location:	356-387 Boorie Creek Rd
Weather:	Fine

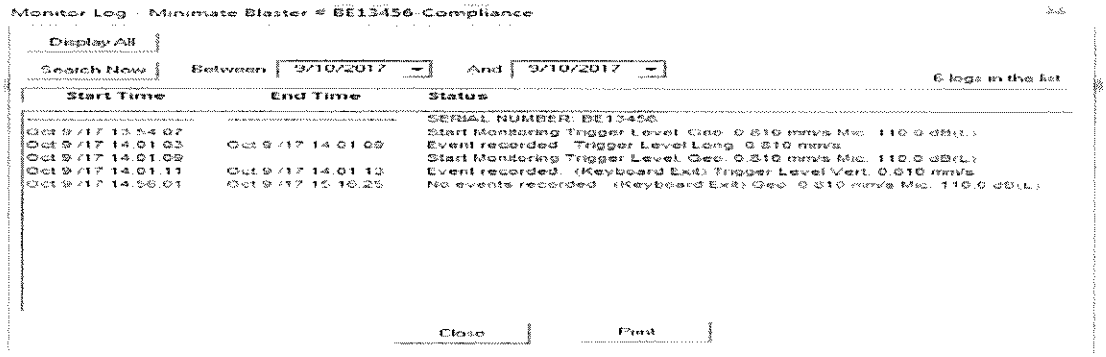
NO TRIGGER REPORT

monitoring conducted by: Brad Markwell

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 840m

from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number	BE13456
next Calibration due	1-Jun-18

* Monitor log Shows No Event trigger at time of blast

Event Report

Date/Time	Long at 13:57:46 October 9, 2017
Trigger Source	Geo: 0.810 mm/s
Range	Geo: 254 mm/s
Record Time	6.0 sec at 1024 sps
Notes	

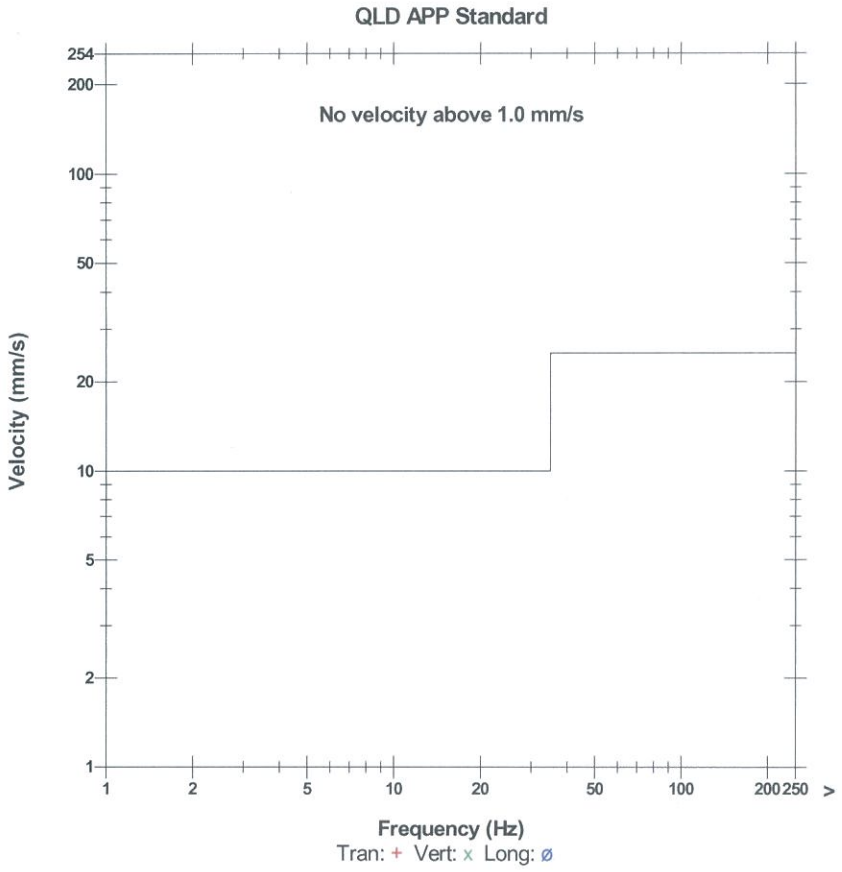
Serial Number	BE13371 V 10.72-1.1 Minimate Blaster
Battery Level	6.3 Volts
Unit Calibration	June 1, 2017 by Saros Int.
File Name	__TEMP.EVT
Post Event Notes	
Customer Site	Blakebrook
Blast ID	BLA 27
Monitor Location	484 Nimbin RD
Monitored By	Brad Markwell

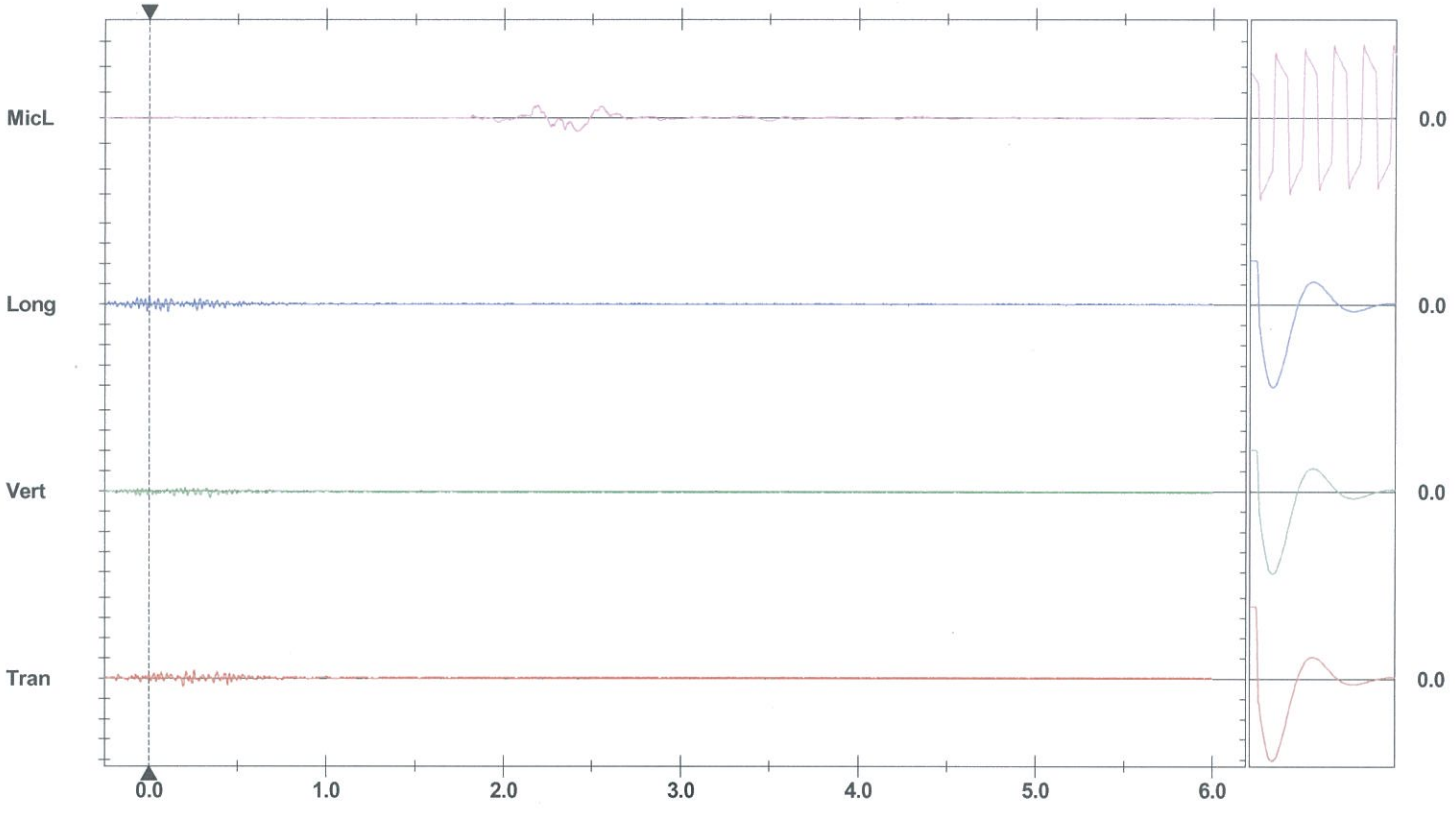
Extended Notes

Microphone	Linear Weighting
PSPL	108.8 dB(L) at 2.411 sec
ZC Freq	2.8 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 498 mv)

	Tran	Vert	Long	
PPV	0.762	0.635	0.762	mm/s
ZC Freq	32	27	47	Hz
Time (Rel. to Trig)	0.193	0.343	0.000	sec
Peak Acceleration	0.0265	0.0133	0.0265	g
Peak Displacement	0.00391	0.00397	0.00341	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.4	7.5	7.5	Hz
Overswing Ratio	3.8	3.5	3.6	

Peak Vector Sum 0.916 mm/s at 0.256 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.(L)/div Sensor Check

Trigger = ▶----------◀

Event Report

Date/Time	Long at 13:57:48 October 9, 2017
Trigger Source	Geo: 0.810 mm/s
Range	Geo: 254 mm/s
Record Time	6.0 sec at 1024 sps
Notes	

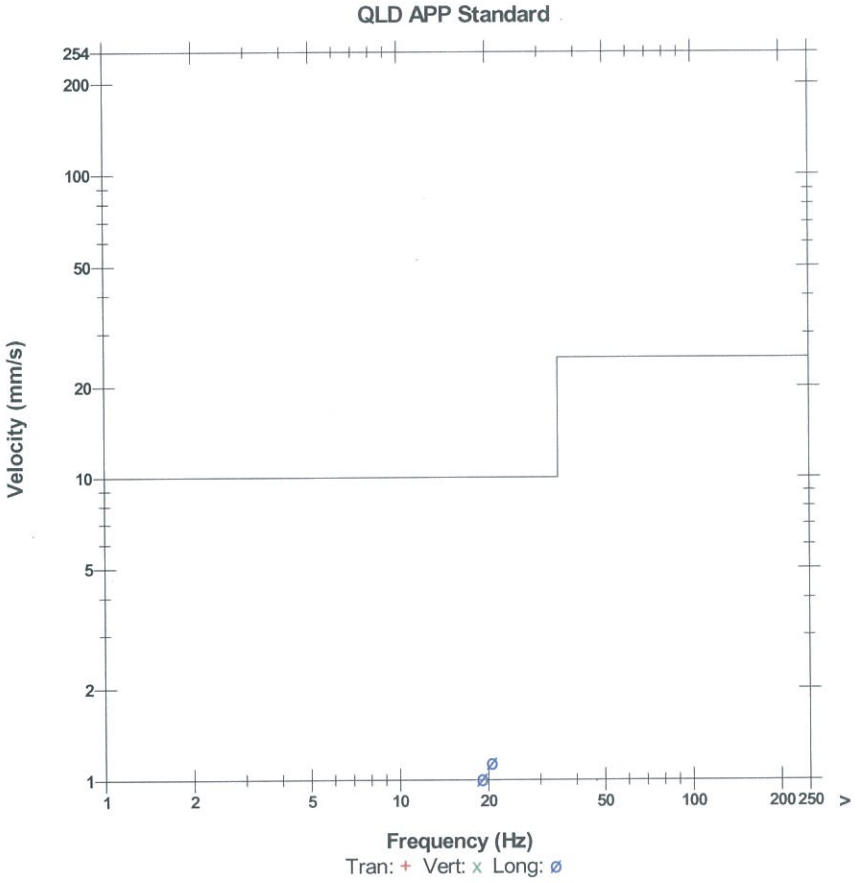
Serial Number	BE12705 V 10.72-1.1 Minimate Blaster
Battery Level	5.9 Volts (Battery Low)
Unit Calibration	April 10, 2017 by Saros (Int)
File Name	__TEMP.EVT
Post Event Notes	
Customer Site	Blakebrook
Blast ID	BLA 27
Monitor Location	464-528 Nimbin Rd
Monitored By	Brad Markwell

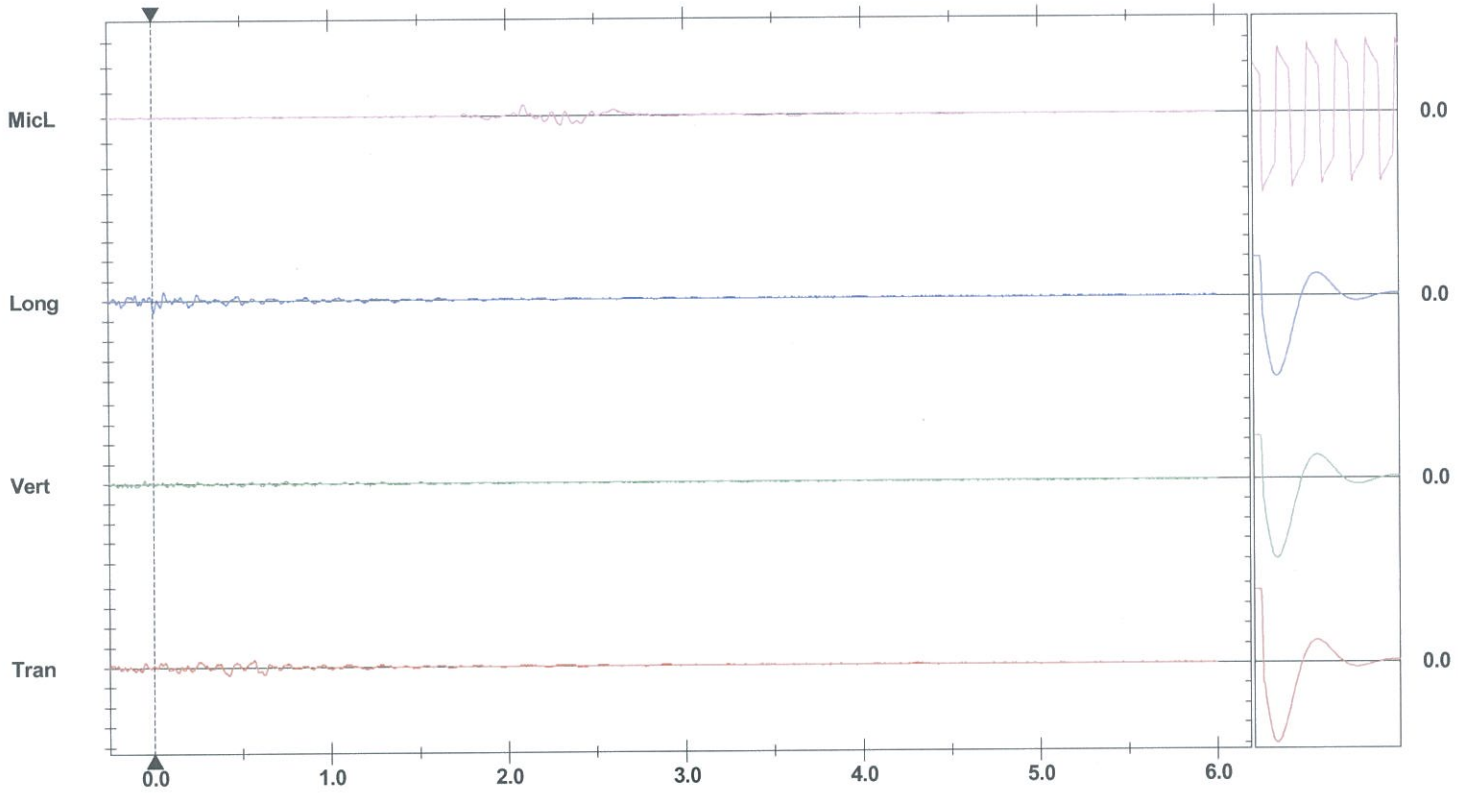
Extended Notes

Microphone	Linear Weighting
PSPL	107.0 dB(L) at 2.094 sec
ZC Freq	9.8 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 467 mv)

	Tran	Vert	Long	
PPV	0.889	0.381	1.14	mm/s
ZC Freq	10	34	20	Hz
Time (Rel. to Trig)	0.422	-0.051	0.004	sec
Peak Acceleration	0.0133	0.0133	0.0133	g
Peak Displacement	0.0138	0.00260	0.0122	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.5	7.5	7.4	Hz
Overswing Ratio	3.8	3.5	3.8	

Peak Vector Sum 1.16 mm/s at 0.005 sec





Time Scale: 0.50 sec/div **Amplitude Scale:** Geo: 2.00 mm/s/div Mic: 10.00 pa.(L)/div

Sensor Check

Trigger = ▶----------◀

BlakeBrook

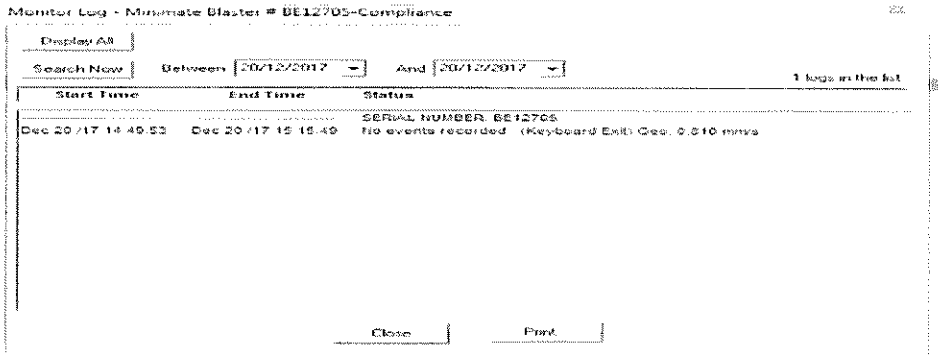
Blast Number:	BLA 31
Location:	Mainpit
Time:	14:49.0
Date:	020/12/2017
Monitor Location:	484 Nimbin Rd
Weather:	Fine

NO TRIGGER REPORT

monitoring conducted by: Brad Markwell

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 1100m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number BE12705
next Calibration due 10-Apr-18

* Monitor log Shows No Event trigger at time of blast

BlakeBrook

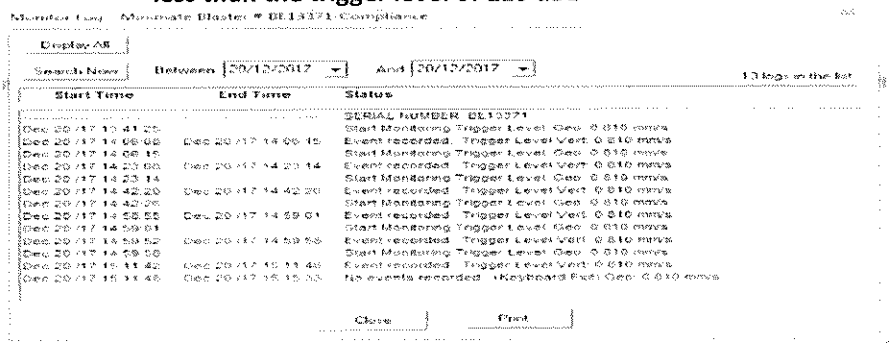
Blast Number:	BLA 31
Location:	Main Pit
Time:	14:49:00 PM
Date:	20/12/2017
Monitor Location:	464-528 Nimbin RD
Weather:	Fine

NO TRIGGER REPORT

monitoring conducted by: Brad Markwell

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 870m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number BE13371
next Calibration due 10-Apr-18

* Monitor log Shows No Event trigger at time of blast

BlakeBrook

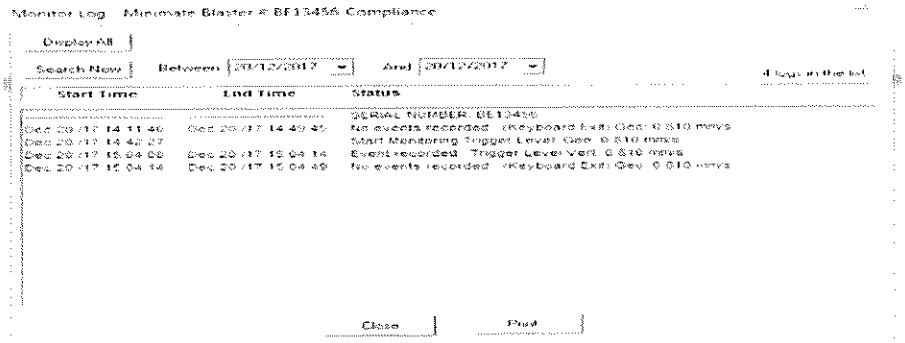
Blast Number:	BLA 31
Location:	Main pit
Time:	14:49
Date:	20/12/2017
Monitor Location:	356-387 Boorie Creek Rd
Weather:	Fine

NO TRIGGER REPORT

monitoring conducted by: Brad Markwell

Geophone Trigger Level: **0.51 mm/s**
Microphone Trigger level: **110 DBL**

NOTES:.... This monitor was approximately from 850m from the Blast. Donnelly blasting services advises that the Blast Viration Was lower than the trigger level of 0.51mm/s and that the blast over pressure was less less than the trigger level of 110 dBL



Instantel Minimate Blaster Serial Number	BE13456
next Calibration due	1-Jun-18

* Monitor log Shows No Event trigger at time of blast

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 10

Dust Monitoring

Blakebrook Quarry Dust Monitoring Summary 2017

Sample Point	Exposure period	Sample comments	Sampling Days (30 days +/- 2)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of:			
					($g/m^2/mth$)	($mg/m^2/day$)	Ash ($g/m^2/mth$) **Limit – 4g/m^2/mth**	Combustible Matter ($g/m^2/mth$)	Soluble Matter ($g/m^2/mth$)	Total Solids ($g/m^2/mth$)
1	19/12/16 – 16/1/17	Organic matter present	28	3.350	1.8	64	0.5	1.3	2.9	4.7
	16/1/17 – 13/2/17	Few bits of dirt	28	0.580	0.9	33	0.2	0.7	1.3	2.2
	13/2/17 – 13/3/17	-	28	1.400	0.7	25	0.8	0.0	1.4	2.2
	13/3/17 – 10/4/17	Clean	28	5.270	0.1	5	0.0	0.1	1.9	2.1
	10/4/17 – 8/5/17	Clean, minimal dirt	28	0.650	0.6	21	0.5	0.1	1.3	1.9
	8/5/17 – 5/6/17	-	28	0.600	0.3	9	0.2	0.1	0.5	0.8
	5/6/17 – 3/7/17	-	28	5.300	3.1	102	2.2	0.9	3.7	6.7
	3/7/17 – 31/7/17	Dry / 0.5L mill Q added	28	0.500	0.5	15	0.3	0.2	0.0	0.5
	31/7/17 – 28/8/17	Dry / pine needles / 0.5L milli Q added	28	0.500	1.3	42	0.7	0.5	0.1	1.4
	28/8/17-25/9/17	Dry / 0.5L milli Q added	28	0.500	0.7	24	0.5	0.2	0.1	0.9
	25/9/17-24/10/17	Clear/org.matter	29	3.500	0.2	8	0.2	0.0	3.1	3.3
	23/10/17-20/11/17	Greenish/leaves	28	1.550	0.5	17	0.3	0.2	2.1	2.7
2	19/12/16 – 16/1/17	Yellow colour, organic matter present	28	3.150	1.9	68	1.0	0.9	4.3	6.1
	16/1/17 – 13/2/17	Greenish colour	28	0.390	1.8	64	0.9	0.9	2.2	4.0
	13/2/17 – 13/3/17	-	28	1.550	0.4	14	0.4	0.1	1.6	2.0
	13/3/17 – 10/4/17	Clean	28	5.250	3.8	128	2.1	1.8	6.4	10.2
	10/4/17 – 8/5/17	Cloudy, brown, green	28	0.570	2.0	66	1.2	0.8	4.4	6.3
	8/5/17 – 5/6/17	Yellow	28	0.680	0.8	27	0.4	0.5	2.0	2.9
	5/6/17 – 3/7/17	Yellow/organic matter present	28	4.700	6.9	231	2.6	4.4	12.2	19.2
	3/7/17 – 31/7/17	Dry / yellow 0.5L mill Q added	28	0.500	1.6	53	0.7	0.9	2.3	3.8
	31/7/17 – 28/8/17	Dry / 0.5L mill Q added	28	0.500	0.7	24	0.3	0.4	0.3	1.0
	28/7/17-25/9/17	Dry / 0.5L milli Q added	28	0.500	0.4	12	0.3	0.1	0.0	0.4
	25/9/17-24/10/17	Clear/org.matter	29	3.200	3.0	99	1.5	1.4	4.8	7.8
	23/10/27-20/11/17	Clean/org.matter	28	1.450	1.1	36	0.6	0.5	1.2	2.3
3	19/12/16 – 16/1/17	Yellow colour, organic matter present	28	3.150	5.4	194	2.0	3.4	8.9	14.4
	16/1/17 – 13/2/17	Dry 0.2L milli-Q added	28	0.200	0.2	7	0.1	0.1	1.9	2.1
	13/2/17 – 13/3/17	Brown/yellow cloudy	28	1.240	2.8	94	1.5	1.3	9.8	12.6
	13/3/17 – 10/4/17	Little bit of dirt	28	5.300	0.9	29	0.2	0.7	2.6	3.5
	10/4/17 – 8/5/17	Clean, some dirt	28	0.380	0.5	17	0.4	0.1	1.5	2.0
	8/5/17 – 5/6/17	-	28	0.550	0.1	2	0.1	0.0	0.6	0.7
	5/6/17 – 3/7/17	Yellow/organic matter present	28	4.470	8.7	289	3.0	5.7	12.4	21.1
	3/7/17 – 31/7/17	Dry / 0.5L mill Q added	28	0.500	0.3	9	0.1	0.1	0.3	0.6
	31/7/17 – 28/8/17	Dry / 0.5L mill Q added	28	0.500	1.3	42	0.7	0.5	1.3	2.6
	28/8/17-25/9/17	Dry / 0.5L milli Q added	28	0.500	0.8	28	0.4	0.4	1.6	2.4
	25/9/17-24/10/17	Greenish/org matter	29	3.100	4.2	141	0.9	3.3	16.9	21.1
	23/10/17-20/11/17	High in colour/org.matter	28	1.100	9.7	322	2.7	7.0	12.8	22.4

Blakebrook Quarry Dust Monitoring Summary 2017

Sample Point	Exposure period	Sample comments	Sampling Days (30 days +/- 2)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of:			
					($g/m^2/mth$)	($mg/m^2/day$)	Ash ($g/m^2/mth$) **Limit – 4g/m^2/mth**	Combustible Matter ($g/m^2/mth$)	Soluble Matter ($g/m^2/mth$)	Total Solids ($g/m^2/mth$)

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 11

Ground Water Monitoring

Blakebrook Quarry Ground Water Analysis results 2017

Sample Point	Date	pH	Total Suspended Solids (mg/L)	Total Oils & Grease (mg/L)	Nitrate (mg/L N)	Silver (mg/L)	Aluminium (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Iron (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Lead (mg/L)	Selenium (mg/L)	Zinc (mg/L)	Mercury (mg/L)
ANZECC Trigger Values for Freshwater					0.7		0.055	0.024	0.0002		0.0014			0.011	0.0034		0.008	0.0006
NHMRC Trigger Values for Drinking Water					50		0.2	0.007	0.002		2			0.02	0.01		3	0.001
GW1 BQS1-S	9/3/17 7/6/17	7.13 6.88	153 175	3 4	0.020 0.016	<0.001 <0.001	0.182 0.620	<0.001 <0.001	<0.001 <0.001	<0.001 0.001	0.001 0.003	0.542 2.634	0.109 0.129	0.006 0.009	<0.001 0.001	<0.002 <0.005	0.022 0.035	<0.0005 0.001
GW2 BQS1-I	9/3/17 7/6/17	8.09 8.07	741 643	2 4	0.030 0.079	<0.001 <0.001	0.231 1.026	0.001 0.001	<0.001 <0.001	<0.001 0.006	0.001 0.005	0.364 4.769	0.067 0.157	0.003 0.017	0.001 0.007	<0.002 <0.005	0.023 0.139	<0.0005 <0.0005
GW3 BQS1-D	9/3/17 7/6/17	8.16 8.14	93 688	7 11	0.042 0.011	<0.001 <0.001	0.142 1.210	0.001 0.002	<0.001 <0.001	<0.001 0.002	<0.001 0.002	0.251 6.512	0.027 0.117	0.002 0.011	0.001 0.010	<0.002 <0.005	0.017 0.163	<0.0005 <0.0005
GW4 BQN1-B	9/3/17 7/6/17	7.01 6.77	6 3	2 4	0.003 0.010	<0.001 <0.001	0.001 0.004	0.002 0.003	<0.001 <0.001	<0.001 0.000	0.001 0.002	1.635 2.496	0.143 0.158	<0.001 <0.001	<0.001 <0.001	<0.002 <0.005	0.001 0.018	<0.0005 <0.0005
GW5 BQN1-A	9/3/17 7/6/17	10.29 10.09	88 174	2 <2	0.132 0.192	<0.001 <0.001	0.072 1.711	0.001 0.001	<0.001 <0.001	<0.001 0.004	<0.001 0.010	0.048 1.836	0.005 0.111	0.001 0.009	<0.001 0.002	<0.002 <0.005	0.002 0.025	<0.0005 <0.0005
GW6 BQN1-D	9/3/17 7/6/17	9.01 8.72	133 22	4 5	0.006 0.021	<0.001 <0.001	0.692 0.376	0.003 0.003	<0.001 <0.001	0.003 0.003	0.008 0.097	2.405 1.478	0.038 0.028	0.009 0.005	<0.001 <0.001	<0.002 <0.005	0.045 0.032	<0.0005 <0.0005
GW7 BQN2-B	9/3/17 7/6/17	9.94 10.36	124 86	5 2	0.015 0.148	<0.001 <0.001	0.081 0.392	0.003 0.004	<0.001 <0.001	0.001 0.001	0.002 0.009	0.081 0.503	0.006 0.026	0.002 0.005	<0.001 0.001	<0.002 <0.005	0.003 0.015	<0.0005 <0.0005
GW8 BQN2-A	9/3/17 7/6/17	8.17 8.33	315 20	4 <2	0.019 0.020	<0.001 <0.001	0.327 0.121	0.003 0.003	<0.001 <0.001	<0.001 0.003	0.030 0.018	0.588 0.239	0.070 0.041	0.011 0.014	0.001 0.001	<0.002 <0.005	0.010 0.033	<0.0005 <0.0005
GW9 BQN2-D	9/3/17 7/6/17	8.26 8.37	878 533	4 4	0.099 0.070	<0.001 <0.001	0.450 0.399	0.003 0.003	<0.001 <0.001	<0.001 0.001	0.008 0.011	2.034 3.488	0.039 0.050	0.011 0.010	0.004 0.004	<0.002 <0.005	0.124 0.129	<0.0005 <0.0005

RESULTS OF WATER ANALYSIS

6 samples supplied by Ground Water Data Collection Services on the 12th September, 2017 - Lab. Job No. G3101
Analysis requested by Mathew Baker. **Your Project: Blakebrook Quarry**
2 Tildon Drive CLUNES NSW 2480

Parameter	Methods reference	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
		LFPB1	LFPB2	LFPB3	LFPB4	LFPB5	LFPSW1
	Job No.	*G3101/1*	*G3101/2*	*G3101/3*	*G3101/4*	*G3101/5*	*G3101/6*
pH	APHA 4500-H$^+$-B	7.59	7.12	7.02	7.03	6.94	8.87
Conductivity (EC) (dS/m)	APHA 2510-B	1.444	1.624	1.978	3.638	2.302	1.238
Total Dissolved Salts (mg/L)	** Calculation using EC x 680	982	1,104	1,345	2,474	1,565	842
Total Suspended Solids (mg/L)	GFC equiv. filter - APHA 2540-D	2,630	2,550	365	1,150	578	42
Biochemical Oxygen Demand$_5$ (mg/L O_2)	APHA 5210-B	3.9	1.4	0.5	0.5	<0.5	4.6
Total Oils and Grease (mg/L)	APHA 5520-D (hexane extractable)	17	12	6	5	9	3
Total Phosphorous (mg/L P)	In house method W4	1.38	1.77	0.93	1.57	1.13	0.52
Phosphate (mg/L P)	APHA 4500 P-G	0.317	0.216	0.757	0.408	0.097	0.254
Total Nitrogen (mg/L N)	In house method W4	0.72	0.18	0.40	0.32	0.04	1.77
Total Kjeldahl Nitrogen (mg/L N)	** Calculation: TN – NOx	0.69	0.16	0.39	0.30	0.04	1.76
Nitrate (mg/L N)	APHA 4500 NO_3^--F	<0.005	0.009	0.016	0.006	0.007	0.005
Nitrite (mg/L N)	APHA 4500 NO_2^--I	0.026	0.013	<0.005	0.006	<0.005	<0.005
Ammonia (mg/L N)	APHA 4500 NH_3-H	0.098	0.110	0.355	0.131	0.094	<0.005
Faecal Coliforms (cfu/100 ml)	** APHA 9222-D	10	<10	<10	<10	<10	65
Silver (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Aluminium (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.020	0.003	<0.005	0.002	<0.005	0.016
Arsenic (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.002	<0.001	<0.001	0.002	<0.001	<0.001
Cadmium (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001	0.001	<0.001	0.003
Iron (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.036	0.012	0.006	0.008	0.008	0.026
Manganese (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.051	0.671	0.184	0.355	2.030	0.002
Nickel (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	0.001	0.002	0.002	0.004
Lead (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.001	0.003	0.005	0.008	0.007	0.002
Mercury (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Notes:

1. Total metals - samples digested with nitric acid; Total available (acid soluble/ extractable) metals - samples acidified with nitric acid to <2pH;
   Dissolved metals - samples filtered through 0.45μm cellulose acetate and then acidified with nitric acid prior to analysis
2. Metals and salts analysed by Inductively Coupled Plasma - Mass Spectrometry (ICP-MS).
3. 1 mg/L (milligram per litre) = 1 ppm (part per million) = 1000 μg/L (micrograms per litre) = 1000 ppb (part per billion).
4. For conductivity 1 dS/m = 1 mS/cm = 1000 μS/cm.
5. Analysis performed according to APHA (2012) 'Standard Methods for the Examination of Water & Wastewater', 22nd Edition, except where stated otherwise.
6. Analysis conducted between sample arrival date and reporting date.
7. ** NATA accreditation does not cover the performance of this service.
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Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster
Laboratory Manager

RESULTS OF WATER ANALYSIS

9 samples supplied by Ground Water Data Collection Service on 12/12/17. Lab Job No.G5843
Samples submitted by Mathew Baker. Your Job: Blakebrook Quarry
2 Tildon Drive CLUNES NSW 2480

Parameter	Methods reference	Sample 1 BQS1-S	Sample 2 BQS1-I	Sample 3 BQS1-D	Sample 4 BQN1-B	Sample 5 BQN1-A	Sample 6 BQN1-D	Sample 7 BQN2-B	Sample 8 BQN2-A	Sample 9 BQN2-D
	Job No.	*G5843/1*	*G5843/2*	*G5843/3*	*G5843/4*	*G5843/5*	*G5843/6*	*G5843/7*	*G5843/8*	*G5843/9*
pH	APHA 4500-H$^+$-B	7.07	8.09	8.28	7.22	11.53	9.17	11.05	8.30	8.85
Conductivity (EC) (dS/m)	APHA 2510-B	0.487	1.522	1.829	1.171	2.082	1.440	1.150	0.892	1.030
Total Dissolved Salts (mg/L)	** Calculation using EC x 680	331	1,035	1,244	796	1,416	979	782	607	700
Total Suspended Solids (mg/L)	GFC equiv. filter - APHA 2540-D	455	442	975	5	71	3,410	87	13	21
Total Oils and Grease (mg/L)	APHA 5520-D (hexane extractable)	15	21	30	<2	22	2	3	<2	4
Nitrate (mg/L N)	APHA 4500 NO_3^--F	0.028	0.018	0.048	<0.005	0.242	0.054	0.257	0.077	0.075
Silver (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Aluminium (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.954	1.021	1.064	0.001	0.102	11.623	0.377	0.090	0.205
Arsenic (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	<0.001	0.001	0.002	0.003	<0.001	0.009	0.003	0.002	0.002
Cadmium (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.001	0.001	0.003	<0.001	0.003	0.031	0.002	0.003	0.004
Copper (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.003	0.006	0.003	0.001	0.002	0.259	0.003	0.008	0.003
Iron (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	3.132	3.138	8.861	1.822	0.104	57.409	0.184	0.165	0.150
Manganese (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.145	0.161	0.147	0.155	0.016	1.267	0.010	0.037	0.009
Nickel (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.014	0.006	0.021	<0.001	0.003	0.147	0.002	0.012	0.002
Lead (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.002	0.003	0.008	<0.001	<0.001	0.005	<0.001	0.001	<0.001
Selenium (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.045	0.103	0.205	0.008	0.007	1.074	0.010	0.027	0.024
Mercury (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
BTEX										
Benzene (µg/L or ppb)	Subcontracted: Envirolab report 182080	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene (µg/L or ppb)	Subcontracted: Envirolab report 182080	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene (µg/L or ppb)	Subcontracted: Envirolab report 182080	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (µg/L or ppb)	Subcontracted: Envirolab report 182080	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (µg/L or ppb)	Subcontracted: Envirolab report 182080	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (µg/L or ppb)	Subcontracted: Envirolab report 182080	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons (TRH)										
C10-C14 Fraction (µg/L or ppb)	Subcontracted: Envirolab report 182080	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (µg/L or ppb)	Subcontracted: Envirolab report 182080	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (µg/L or ppb)	Subcontracted: Envirolab report 182080	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (µg/L or ppb)	Subcontracted: Envirolab report 182080	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (µg/L or ppb)	Subcontracted: Envirolab report 182080	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (µg/L or ppb)	Subcontracted: Envirolab report 182080	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (µg/L or ppb)	Subcontracted: Envirolab report 182080	<100	<100	<100	<100	<100	<100	<100	<100	<100

Notes:

1. Total metals - samples digested with nitric acid; Total available (acid soluble/ extractable) metals - samples acidified with nitric acid to pH <2
   Dissolved metals - samples filtered through 0.45µm cellulose acetate and then acidified with nitric acid prior to analysis
2. Metals and salts analysed by Inductively Coupled Plasma - Mass Spectrometry (ICP-MS).
3. 1 mg/L (milligram per litre) = 1 ppm (part per million) = 1000 µg/L (micrograms per litre) = 1000 ppb (part per billion).
4. For conductivity 1 dS/m = 1 mS/cm = 1000 µS/cm.
5. Analysis performed according to APHA (2017) 'Standard Methods for the Examination of Water & Wastewater', 23rd Edition, except where stated otherwise.
6. Analysis conducted between sample arrival date and reporting date.
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checked: .....
Graham Lancaster
Laboratory Manager

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 12

Site Water Balance

PROJECT

ANNUAL SURFACE WATER BALANCE - 2017 BLAKEBROOK QUARRY BLAKEBROOK NEW SOUTH WALES

PREPARED FOR

LISMORE CITY COUNCIL

DATE

FEBRUARY 2018

GILBERT SUTHERLAND

DOCUMENT CONTROL

DOCUMENT 11737_WB2017_RAF1F.docx
TITLE Annual Surface Water Balance 2017, Blakebrook Quarry, Blakebrook, New South Wales
PROJECT MANAGER C. Anderson
AUTHOR(S) A. Fullagar
CLIENT Lismore City Council
CLIENT CONTACT Kevin Trustum
CLIENT REFERENCE –

SYNOPSIS This report details water balance modelling for the 2017 annual return period for Blakebrook Quarry, Blakebrook, New South Wales.

REVISION HISTORY

REVISION #	DATE	EDITION BY	APPROVED BY
1	02/18	A. Fullagar	C. Anderson / L. Varcoe

DISTRIBUTION

	REVISION NUMBER									
Distribution	1	2	3	4	5	6	7	8	9	10
Lismore City Council	1									
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SUMMARY

Lismore City Council commissioned Gilbert & Sutherland to prepare a water balance report for Blakebrook Quarry for the annual reporting period comprising the 2017 calendar year.

This water balance report uses estimates of quarry pit areas, catchment areas, water storage volumes and water usage that were in place during the reporting period. The model was developed to represent operational procedures at the site during 2017 (to the degree that these practices could be quantified).

CONTENTS

1 Introduction

This annual water balance report has been prepared to represent operational procedures in place during the annual reporting period for the 2017 calendar year. It precedes the recommendations contained within Gilbert & Sutherland's (G&S) draft '*Soil and Water Management Plan, Blakebrook Quarry, Blakebrook, New South Wales'* prepared for Lismore City Council (LCC) in December 2017, and the corresponding draft *'Site Surface Water Balance, Blakebrook Quarry, Blakebrook, New South Wales'*, prepared by G&S in January 2018. Those reports included a number of recommendations to improve operational and recording procedures on site with respect to water management that were to be implemented for the following return period (2018).

This water balance report uses estimates of quarry pit areas, catchment areas, water storage volumes and water usage that were in place during the reporting period. The model was developed to represent operational procedures at the site during 2017 (to the degree that these practices could be quantified).

2 Model description and structure

A spreadsheet-based water balance model was developed to examine the water flows in, within and out of the quarry development. The model defines the day-to-day site runoff, water storage volumes, water uses and stormwater discharges from the site. This day-to-day evaluation was then used to assess water supply and estimate annual discharges from the site.

The water balance model addresses discharge across three (3) identified site discharge points, as shown on Drawing No. 11737-007 (in Attachment 1). LPD1 is currently the only licensed discharge point from the quarry. LPD2 and LPD3 are existing natural discharge points which G&S' draft *'Soil and Water management plan, Blakebrook Quarry, Blakebrook, New South Wales'* prepared for LCC and dated December 2017 (the SWMP) proposed to also be included as licensed discharge points for current and future quarry operations.

2.1 Model structure

The water balance was developed using a spreadsheet model, adopting a daily time-step for estimation of rainfall, runoff, collection, reuse and discharge of water from the site. The model specifically and solely addresses surface water flows within the site and excludes any consideration of groundwater interaction (with the exception of an allowance for seepage out of water storages on the site). The model also excludes all potable water usage and wastewater discharge from the site.

The model is comprised of three (3) separate 'modules' which, in general, operate independently with respect to water management within the site. These three modules are based on the three defined catchment areas and corresponding sedimentation basins shown on Drawings No. 11737-007 (in Attachment 1). These catchment areas are:

- North Pit
- South Pit
- South-western catchment

A summary of the management of surface water within each of the modelled modules is described herein.

2.1.1 North Pit

The North Pit has the largest catchment area, occupying the majority of the site. Surface water collected within the North Pit is relied upon for the majority of uses within the site. The North Pit contains a sedimentation basin (for treatment of runoff) and the main water storage dam. The main dam provides the primary water storage on the site and is used for filling of a water cart for dust-suppression within the site and also for topping up the water storage tank. The tank is a secondary water storage and is used to supply all other (non-potable) site uses.

Runoff from the undisturbed upslope areas within this catchment is intercepted by a clean water diversion drain and conveyed around the northern end of the pit to LPD2. This diverted clean water has been excluded from the water balance model.

Runoff from the pit and all remaining upslope areas draining into the pit is collected in a single sedimentation basin, currently located in the north-west of the pit. This sediment basin only has sufficient capacity internally to cater for nuisance events. In all larger events, it is intended that runoff that exceeds the basin capacity will temporarily pond over the floor of the pit until it is treated and discharged. The sediment basin operates as a wet basin due to seepage into the basin from the surrounding rock.

Following rainfall, water collected in the sediment basin is tested and treated (to meet the required water quality targets) before being discharged. Discharge from the basin is pumped to the main dam for reuse within the site. When the dam reaches capacity, excess treated water is to be pumped out of the sediment basin directly to LPD2.

The main dam is isolated from directly receiving site runoff to ensure that a clean water supply is maintained on site whenever possible. The dam is topped up by treated water from the sediment basin. The water is used directly for filling of a water cart for dust suppression, and indirectly for all other non-potable site uses by topping up the water storage tank.

The water storage tank is used to supply the asphalt plant, sprinklers (for dust suppression on the haul road) and for maintaining product moisture during processing.

2.1.2 South Pit

The South Pit has a significantly smaller catchment area and, at present, runoff from this catchment is not required for water supply purposes. Accordingly, the management of surface water runoff in this catchment is focused on treatment and discharge to meet the site's water quality targets.

Runoff from a small undisturbed upslope area within this catchment is intercepted by a clean water diversion drain and conveyed around the north-western side of the pit to an adjacent ephemeral gully. This diverted clean water has been excluded from the water balance model.

Initial excavation works for the South Pit commenced in late 2014 under a temporary approval to service a specific state government project. These initial works have been completed and further excavation works for the South Pit are currently on hold.

Throughout the reporting period (the 2017 calendar year), a small sedimentation basin was located on the eastern side of the southern catchment. Runoff (for all rainfall events) from the disturbed catchment area upslope of the basin was collected in the basin for treatment prior to discharge. Runoff from the remainder of the catchment (downslope of the basin) drained into the South Pit. Water collected in the South Pit during rainfall events up to the design event (60.2 mm in five days) was pumped to the sediment basin for treatment prior to discharge. For events exceeding the design rainfall depth, treatment is not required and water collected in the South Pit during these large rainfall events was pumped directly to the receiving environment, exiting the site at proposed discharge point, LPD3. This arrangement is shown on Drawing No. 11737-007.

The sedimentation basin was operated as a dry basin. As its capacity is only sufficient to collect and treat runoff during nuisance events, water collected in the South Pit (for all events up to the design event) was temporarily held in the pit and pumped to the sediment basin at a rate at which it could be treated (i.e. assuming the full sediment basin capacity would be discharged evenly across a 5-day period following rain and water from the pit could only enter the sediment basin when capacity was available).

The South Pit was also operated as a dry system. Following rainfall events up to the design event, there was continuous discharge to the sediment basin (whenever capacity was available) until all collected water was removed from the pit. During large events (exceeding the design event), runoff collected in the pit was discharged directly to the receiving environment until the pit was empty.

2.1.3 South-western catchment

The south-western catchment is outside of the quarry pit catchment areas and does not contribute to the site's water supply requirements. The catchment discharges to LPD1. The management of surface water runoff in this catchment is focused on treatment and discharge to meet the site's water quality targets.

Throughout the reporting period, all catchment runoff was directed as surface flow to the south-western sediment basin. Runoff entering the basin was temporarily stored to allow entrained sediment to settle. Catchment runoff during rainfall exceeding the design event was allowed to overflow from the basin and discharge directly to the receiving environment, exiting the site at LPD1.

3 Model inputs and assumptions

3.1 Model inputs

The water balance model was run for the Annual Return period covering the 2017 calendar year. Operational procedures relating to water management during this period are depicted on Drawing No. 11737-007 in Attachment 1. The adopted assumptions for the modelling are described herein.

3.1.1 Climate data

Daily time-step SILO Data Drill for the quarry site for the period from 1 January 1889 to 4 February 2018 was obtained from the Queensland Government Department of Science, Information Technology and Innovation (DSITI). From this we extracted the daily data for the 2017 calendar year for use in the model. The total annual rainfall depth for 2017 was 2,015 mm.

An analysis of the annual rainfall totals for 1889 to 2017 provided the statistics in Table 3.1.1.1 below for comparison to rainfall during the return period. Thus Table 3.1.1.1 provides a comparison of the annual rainfall statistics for the entire dataset and the adopted modelling period.

Table 3.1.1.1 Annual rainfall statistics

Statistic	Annual rainfall (mm) - 1889 to 2017
Mean	1,491
Minimum	585
Maximum	2,478
Percentile bands	
5th percentile	913
10th percentile	1,051
20th percentile	1,141
Median (50th percentile)	1,426
80th percentile	1,845
90th percentile	2,119
95th percentile	2,226

Based on the above analysis, 2017 can be described as a moderately wet year, with a rainfall depth between the 80th and 90th percentiles of the long-term dataset.

Daily rainfall data was collected and recorded using a manual rain gauge located at the site throughout 2017. Based on the data provided by LCC, the total rainfall depth recorded at the site in 2017 was 2,119.5 mm. Although site-specific data should provide a more representative input to the model, the following factors contributed to a decision to obtain and use SILO Drill Data instead:

- Onsite recordings excluded holiday periods at the start and end of the year. Based on the SILO data, there was appreciable rainfall during both those periods. (Note: rainfall in the holiday period at the start of the year appears to be included in the first reading when the quarry re-opened, however there is no distribution pattern of this rainfall to apply to the model.)

- Onsite rainfall appears to have generally only been recorded on weekdays/operational days and depths recorded at the start of the week may be inclusive of weekend rainfall.
- The on-site rain-gauge overflowed on at least one occasion, when daily rainfall exceeded its 254 mm capacity and as such the actual rainfall depth could not be recorded.
- Rainfall data for the most-significant event during the reporting period is specifically noted to have been collected and recorded by different personnel. This data included rainfall in excess of 50 mm on four consecutive days, including recordings of the gauge being overflowing on two separate days. Comparatively, the SILO data for the area had significant rainfall totals for only two consecutive days, with two dry days on either side of the event. Whilst recognition is given to the spatial and temporal variability of rainfall, it is unlikely that the differences at the locale would be this substantial. In our opinion, it is possible that the site data may have included a duplicate reading.

Daily rainfall and pan evaporation SILO drill data were adopted as inputs for the model. The average monthly rainfall and pan evaporation totals for the reporting period 2017 are compared to long term monthly averages in Table 3.1.1.2.

Table 3.1.1.2 Comparison of 2017 reporting period monthly rainfall and pan evaporation to long term averages

	Rainfall (mm)		Pan evaporation (mm)	
Month	Long -term average (1889-2017)	Reporting period (2017)	Long -term average (1889-2017)	Reporting period (2017)
January	182.8	268.6	168.6	191.2
February	208.7	68.6	132.7	195.6
March	213.1	719.3	125.9	129.0
April	140.6	24.8	97.4	105.6
May	119.3	48.8	74.5	81.2
June	111.4	305.3	66.0	62.8
July	78.0	4.0	75.2	78.8
August	59.7	0.2	98.8	121.8
September	48.8	0.0	127.0	168.4
October	81.9	259.0	150.3	138.8
November	104.7	120.1	159.0	141.8
December	142.5	195.9	177.4	196.4
Annual total	**1491.5**	**2014.6**	**1453.2**	**1,611.4**

Although 2017 can be described as a moderately wet year, the 2017 reporting period was characterised by significant variation in monthly rainfall depths when compared to the long-term data. Rainfall depths were significantly higher than long term averages (exceeding the 90th percentile depth) in March (98th percentile), June (94th percentile) and October (99th percentile) and the daily rainfall total of 283.2 mm recorded on 31 March 2017 was the fourth highest daily rainfall total in the 128-year data period.

Additionally, rainfall depths were significantly lower than long-term averages (less than the 10th percentile depth) in April (5th percentile), July (9th percentile), August (1st percentile) and September (equal lowest on record). Rainfall of less than 0.5 mm in a calendar month has only occurred six times on record and 2017 is

the only year to contain two such months. Furthermore, the three-month period from July to August returned the lowest three-month rainfall total on record (4.2 mm) and the only three-month period with less than 10 mm rainfall.

3.1.2 Catchment areas

Catchment areas included in the modelling for each of the three modules are described in Table 3.1.2.1.

Table 3.1.2.1 Contributing catchment areas

Description	North Pit (ha)	Southern catchment (ha)	SW catchment
Areas included in model			
Sub-catchment 1	37.107[a]	1.928[b]	2.61[a]
Sub-catchment 2	-	1.817[a]	-
Dam	0.292	-	-
Total	**37.399**	**3.746**	**2.61**
External catchment area (excluded from model)			
Undisturbed catchment	11.309	1.102	-

3.1.3 Storage volumes

The capacity of the main dam and storage tank were provided by quarry management and are shown in Table 3.1.3.1.

Table 3.1.3.1 Storage volumes

Water storage	Volume (ML)
Main Dam	30
Tank	1.0

The sedimentation basins were modelled using a stage-area-storage relationship to represent the settling zone capacity within each basin. For the sediment basins in the North Pit and the south-western catchment, these relationships were derived from ground survey data supplied by Newton Denny Chapmen (NDC).

The following assumptions were made for modelling purposes:

- The North Pit sedimentation basin is permanently wet due to seepage into the basin from the surrounding rock.
- Based on a review available satellite imagery, it is estimated that, between rainfall events, the wet area of the basin is approximately 0.2 ha.
- A review of the basin survey returned a footprint of 0.202 ha at RL101.9 metres Australian Height Datum (mAHD) and this was adopted as the 'bottom' of the settling zone within the basin. The surveyed storage below this level is considered as sediment storage capacity and has been excluded from the model.
- As the basin is only sized to cater for nuisance events, the modelled stage-storage relationship was extended above the top of the surveyed basin area (0.4 ha at RL102.8 mAHD) to represent temporary ponding over the quarry floor.

The modelled storage characteristics for the north pit sedimentation basin are given in Table 3.1.3.2 (on the following page).

Table 3.1.3.2 North Pit sedimentation basin – modelled storage details

Elevation (mAHD)	Area (ha)	Volume (ML)
101.9	0.202	0.000
102.0	0.248	0.225
102.1	0.279	0.350
102.2	0.303	0.490
102.3	0.335	0.646
102.4	0.359	0.986
102.5	0.374	1.353
102.6	0.384	1.732
102.7	0.392	2.121
102.8	0.401	2.517
102.9	0.601	3.018
103.0	0.902	3.770
103.1	1.353	4.897
103.2	2.029	6.588
103.3	3.044	9.124
103.4	4.566	12.929
103.5	6.848	18.636
103.6	10.273	27.197
103.7	15.409	40.037
103.8	21.600	58.542
103.9	21.600	80.142

The southwestern sediment basin is a dry basin. Based on the sedimentation basin design principles, where half of the of the settling zone capacity is included as additional sediment storage capacity, it was assumed that one third of the surveyed capacity was set aside as the sediment storage zone and the upper two-thirds of the surveyed capacity was the available settling zone for inclusion in the model.

The modelled storage characteristics for the south-western sedimentation basin are given in Table 3.1.3.3 (on the following page).

Table 3.1.3.3 South-western sedimentation basin – modelled storage details

Elevation (mAHD)	Area (ha)	Volume (ML)
115.4	0.0000	0.000
115.5	0.0158	0.015
115.6	0.0166	0.032
115.7	0.0174	0.049
115.8	0.0182	0.066
115.9	0.0189	0.085
116.0	0.0196	0.104
116.1	0.0203	0.124
116.2	0.0210	0.145
116.3	0.0217	0.166
116.4	0.0225	0.188
116.5	0.0232	0.211

Recent improvements to the water management strategy for the southern catchment have included filling in the sedimentation basin (that was in place during the reporting period) and re-directing all runoff to the pit. An estimate of the basin's storage capacity was based on review of satellite imagery in combination with visual observations of the basin prior to filling. Table 3.1.3.4 shows the modelled stage-area-storage relationship for the settling zone component of the basin storage.

Table 3.1.3.4 Southern catchment sedimentation basin – modelled storage details

Stage (m)	Area (ha)	Volume (ML)
1.3	0.0000	0.000
1.4	0.0145	0.014
1.5	0.0154	0.029
1.6	0.0163	0.045
1.7	0.0172	0.062
1.8	0.0181	0.079
1.9	0.0191	0.098
2.0	0.0201	0.118

3.1.4 Water usage – main dam

Water truck

A water truck is used for dust suppression throughout the site. Water for the cart is sourced directly from the Main Dam. We have been advised by quarry management that:

- The water truck has as capacity of 17.5 kL.
- In warmer months, approximately 6-8 truck loads are currently used on site each day.
- In cooler months, approximately 2-4 truck loads are currently used on site each day.

- Following very light rainfall, a water truck use decision is made by visual observation of site conditions.
- During wet weather, the water truck is not used.

We anticipate that water usage for dust suppression will increase as the quarry footprint increases in the future (approximately doubling the current footprint). Based on the above estimates, the usage in Table 3.1.4.1 was adopted in the model. The highest water usage (in the warmer months) has been correlated with average monthly pan evaporation values.

Table 3.1.4.1 Water truck usage adopted in the model

Month	Number of loads per day
January	8
February	6
March	6
April	4
May	3
June	2
July	3
August	4
September	6
October	7
November	7
December	8

For modelling purposes, it has been assumed that:

- the water truck will not operate on days where the rainfall exceeds pan evaporation; and
- the water truck will not operate on Sundays when the quarry is closed.

Quarry management recently introduced a daily log of water truck usage to better quantify actual site water usage. Those records will be reviewed periodically to inform updates to the water balance model estimates.

3.1.5 Water usage – storage tank

Quarry management has advised that the 1 ML storage tank is topped up from the dam once per week. On average, we have been advised that the tank empties to approximately 50 percent capacity within this time frame, however no measurements of water usage and top-up volumes have been undertaken to date to confirm this. Modelled water usage from the tank is described below.

It is noted that G&S' December 2017 draft *'Soil and Water management plan, Blakebrook Quarry, Blakebrook, New South Wales'* provided recommendations regarding recording water usage data on site, so the following estimates can be improved for future reporting purposes.

Haul road sprinklers

Sprinklers are located along the haul road for dust suppression during truck movements. Water for the sprinklers is sourced from the storage tank. Based on the assumptions listed in ERM's April 2011 Soil and Water Management Sub-Plan, whilst operating, the sprinklers use approximately 20 kL per day. This daily demand has been applied to the model for 6 days per week, excluding Sundays when the quarry is closed.

Asphalt plant
An on-site asphalt plant is located in the south-western catchment and sources its water from the storage tank. Estimated water usage for the plant was adopted from ERM's April 2011 Soil and Water Management Sub-Plan. When operating, the asphalt plant uses 0.2 kL/day. This demand is considered to be independent of climatic variables and has been applied to the model as a constant for the six days per week (excluding Sundays) when the plant is operating. The estimated annual plant water usage is 0.0616 ML.

Process/product water
Water is used to maintain moisture in the product during processing, at an average rate of four percent moisture (by weight) for all product exported from the site. This water is sourced from the storage tank.

Daily product export data for 2017 was supplied and summed to return a total production for the year of 147,327.37 tonnes. To represent periodic changes in production rates (ore product export rates), whilst recognising that the process/product water would not only be applied on the specific day that product is exported from the site, the product exported was totalled for each calendar month and then averaged across six-days per week (i.e. excluding Sundays) for that month (noting that no further adjustment was made for Public Holidays or holiday periods).

The total monthly product export and assumed daily product water demand is given in Table 3.1.5.1. This demand has been applied to the model, six days per week (excluding Sundays) except where the rainfall exceeds pan evaporation, in which case no product moisture has been added in the model.

Table 3.1.5.1 Product water demand adopted in the model

Month	Monthly production (tonnes)	No. of days (excl. Sundays)	Average daily product (tonnes)	Daily water demand (kL)
January	13,499.8	26	519.2	20.8
February	8,799.2	24	366.6	14.7
March	5,528.6	27	204.8	8.2
April	1,939.25	25	77.6	3.1
May	9,345.35	27	346.1	13.8
June	11,432.35	26	439.7	17.6
July	12,757.7	26	490.7	19.6
August	20,679.55	27	765.9	30.6
September	26,844.87	26	1,032.5	41.3
October	15,464.95	26	594.8	23.8
November	20,524.35	26	789.4	31.6
December	511.4	26	19.7	0.8

3.1.6 Controlled discharge from sedimentation basins

As noted above, it is a requirement of the license that rainfall runoff collected in the sedimentation basins (in the North Pit, South Pit and south-western catchment) be tested and treated (to meet the required water quality targets) before being discharged within five days. For modelling purposes, the water balance assumes that satisfactory water quality can be achieved to commence discharge from the basins on the same day that any runoff is collected.

North Pit

For the North Pit, discharge from the basin will be primarily directed to the main dam. When the dam reaches capacity, excess treated water is to be pumped out of the sediment basin directly to LPD2.

For rainfall up to the design event, a base discharge rate has been applied to the model, based on emptying the required sedimentation basin capacity (including overflow to the pit floor) evenly across five days. For large rainfall events (exceeding the 60.2 mm design event) discharge is not required to meet the water quality targets and the basins should be emptied as soon as practicable.

For rainfall exceeding the design event, the maximum daily discharge from the North Pit sediment basin rate has been calculated based on pumping at a rate of 200L/s for 12 hours per day.

South pit

All runoff from southern sub-catchment 1 was collected within the South Pit, whilst runoff from sub-catchment 2 drained directly to the sedimentation basin.

The modelled rate of controlled discharge from the sediment basin has been based on emptying the full sediment basin capacity evenly across five days following a rainfall event. Runoff entering the basin during large events, in excess of the basin capacity, has been assumed to overflow to the receiving environment, subsequently discharging at (proposed) LPD3.

Runoff collected win the pit during rainfall up to the design event, was subsequently pumped to the sedimentation basin for treatment prior to discharge. When the sediment basin was full (from direct runoff entering the basin), water collected in the pit was temporarily stored within the pit until sufficient capacity was available in the basin for treatment. The base discharge rate (for pumping from the pit to the sediment basin) was limited by the basin capacity and corresponding discharge rate.

Discharge following large rainfall events (exceeding 60.2 mm across five days) is not required to meet the water quality targets and water storages should be emptied as soon as practicable. During these events, runoff collected within the south pit was pumped directly to the receiving environment, with a maximum daily discharge rate calculated based on pumping at a rate of 50L/s for 12 hours per day.

Southwestern catchments

For the south-western catchment, all surface runoff is collected within the sedimentation basin located at the catchment outlet.

It is a licence requirement that water collected during rainfall events (up to the five-day rainfall design event of 60.2 mm) be treated and discharged within five days of the event. Accordingly, for rainfall up to this design event, a base discharge rate, equivalent to emptying the sedimentation basin capacity evenly across five days, was modelled.

In rainfall events exceeding the design event, it is anticipated that catchment runoff (in excess of the basin capacity) would enter the basins and subsequently overflow to the receiving environment, leaving the site at LPD 1. The base pumping rate would still apply during these periods to empty the sedimentation basin capacity below the overflow level.

Summary of discharge rates

A summary of the modelled pumping rates for emptying the sedimentation basins is provided in Table 3.1.6.1 on the following page.

Table 3.1.6.1 Modelled sedimentation basin discharge pumping rates

Water storage	Value
North Pit sedimentation basin	
Settling zone volume (ML)	17.79
Base discharge rate (ML/day)	3.558
Maximum discharge rate (ML/day)	8.64
Southern catchment - sedimentation basin	
Settling zone volume (ML)	0.118
Base discharge rate (ML/day)	0.0236
Maximum discharge rate (ML/day)	2.16
Southern catchment – south pit	
Base discharge rate (ML/day) – to sedimentation basin	0.0236
Maximum discharge rate (ML/day) – to discharge point	2.16
South-western catchment 1 sedimentation basin	
Settling zone volume (ML)	0.211
Discharge rate (ML/day)	0.0422

3.2 Water balance calculations

3.2.1 Runoff

The volumetric runoff coefficient is defined as the proportion of rainfall that runs off as stormwater. Catchment runoff was calculated adopting the volumetric runoff coefficients from Table F2 of Appendix F of the *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th edition, March 2004*, Landcom (the Blue Book). Based on the soil type the applicable values for the runoff coefficient are shown in Table 3.2.1.1.

Table 3.2.1.1 Volumetric runoff coefficients (Soil Hydrologic Group D)

Rainfall depth (mm)	Runoff coefficient (C_v)
< 20	0.39
20 – 25	0.50
25 – 30	0.56
30 – 40	0.64
40 – 50	0.69
50 – 60	0.74
60 – 80	0.79
> 80	0.84

Rainfall runoff calculations were undertaken for all dry catchment areas contributing to the sedimentation basins. For wet catchment areas (i.e. the main storage dam and the calculated daily wet area for each sedimentation basin), rainfall was applied directly to the water body in the model with no volumetric reduction for conversion to runoff.

3.2.2 Evaporation

Losses due to evaporation were applied to all openwater storages on a daily basis, based on the estimated wet area. The main dam area was assumed as a constant, adopting the area in Table 3.1.2.1. Wet areas for each of the sedimentation basins were based on the stage-storage relationships described in Section 3.1.3. Evaporative losses from water bodies were calculated using a conversion factor of 0.7, applied to the pan evaporation data.

3.2.3 Seepage

Losses due to seepage were applied all open water storages on a daily basis, based on the estimated wet area. The main dam area was assumed as a constant, adopting the area in Table 3.1.2.1. Wet areas for each of the sedimentation basins were based on the stage-storage relationships described in Section 3.1.3. Seepage losses from water bodies have been calculated using a constant seepage rate of 10 mm/day.

3.2.4 Initial conditions

For modelling purposes, the following assumptions have been made in respect of water storage volumes at the commencement of the 2017 annual return period:

- Main water storage dam – initial volume = 28.7 ML (average modelled long-term storage volume)
- Water storage tank – full (initial volume = 1 ML)
- North Pit sedimentation basin – empty
- Southern catchment sedimentation basin – empty
- South Pit – empty
- South-western catchments sedimentation basin – empty

4 Results

4.1 Climate data summary

A summary of relevant climate data is provided in Table 4.1.1.1.

Table 4.1.1.1 Climate data analysis – 2017 return period

Parameter	Value
Total number of rainfall days	170
Total number of days exceeding 5-day design rainfall (60.2 mm) for previous 5 days	51
Number of events exceeding 5-day design rainfall (60.2 mm)	10
Duration of longest exceedance event [a] (days)	10
Total depth of largest event (mm in 5 days)	376.6

[a] Duration of exceedance event is defined by number consecutive days that 5-day rainfall total exceeds 5-day design rainfall. Duration of exceedance may exclude (up to) the first to 4 days of rainfall event if 5-day design rainfall is not exceeded during those days.

4.2 Northern catchment

Based on the inputs and assumptions described above, the modelling results show that rainfall and runoff captured from the northern catchment alone provides sufficient inflow to the main dam to service all water demands within the quarry throughout the full range of modelled climatic conditions.

4.2.1 Northern catchment sedimentation basin

A summary of the annual water balance results for the Northern catchment sedimentation basin is presented in Table 4.2.1.1.

Table 4.2.1.1 Northern catchment sedimentation basin – 2017 return period

Parameter	Volume (ML)
Rainfall volume – total North Pit catchment area	753.4
Runoff volume – total North Pit catchment area [a]	488.5
Total basin inflow	501.8
Evaporative losses	9.2
Seepage losses	40.1
Discharge – pumped to main dam	42.8
Discharge – pumped out to LPD2	409.7

[a] Total runoff that would have been generated and discharged from equivalent catchment area if no obstructions (sediment basin, dam, quarry pit) were present. Estimate provided for comparison to estimated discharge pumped to LPD2.

For the 2017 reporting period, it is estimated that total catchment discharge from the North Pit area to LPD 2 was reduced by approximately 16 percent as a result of the quarry operations (compared to an undeveloped catchment). No flow measurements were made on site for comparison to the modelled estimates.

A summary of the estimated sedimentation basin performance is provided in Table 4.2.1.2 (on the following page).

Table 4.2.1.2 Northern catchment sedimentation basin performance – 2017 return period

Parameter	Value
Total number of discharge days (to Main Dam and/or LPD)	161
Total number of days discharging to Main Dam	108
Total number of days discharging to LPD	113
Total number of days per year when basin contains water [a]	53
Maximum number of consecutive days where basin contains water	18
Average number of days to empty basin	4.1

[a] Total number of days containing water has been calculated based on end-of-day volumes after all losses and discharges have been accounted for. The basin may be subject to wetting and drying more frequently during small events which are accounted for by losses and/or can be discharged immediately.

The model inputs (basin volumes and pumping rates) dictate that the basin will be emptied (to the standing water level) within five days of the cessation of all rainfall events up to and including the five-day design rainfall event of 60.2 mm. However, where rainfall exceeds the design capacity of the system or a rainfall event continues for more than the five-day design event duration, the basin may contain water for a longer period whilst active discharge is taking place. The modelling indicates that the longest continuous period the basin contained water (above the standing water level) during the return period was 18 days.

4.2.2 Main Dam water balance

A summary of the water balance model results for the Main Dam is presented in Table 4.2.2.1.

Table 4.2.2.1 Northern catchment Main Dam – volume estimates for 2017 return period

Parameter	Volume (ML)
Dam inflow from direct rainfall	5.9
Dam inflow pumped from sediment basin	42.8
Total dam inflow	**48.7**
Evaporative losses	3.3
Seepage losses	10.6
Total losses	**13.9**
Usage – water truck for dust suppression	22.4
Usage – main tank top-up for other site usage	11.1
Total usage	**33.6**
Minimum daily stored volume	16.7
Maximum daily stored volume	31.0
Average daily stored volume	**27.8**

Figure 1 (attached) shows the estimated daily dam storage volumes for the entire model period.

Although controlled dam inflows (i.e. pumped discharge from the sediment basin) are restricted to occur only when the dam is below full storage level, direct rainfall onto the dam during large rainfall events results in the full-storage capacity being exceeded for a short time after such events. For the 2017 annual return period, it is estimated the maximum volume stored in the dam exceeded its capacity by 1 ML. This additional volume is accommodated within a bunded dam area around the dam to prevent mixing with 'dirty' quarry pit runoff.

Water truck

No records of water truck usage were kept on site during the 2017 return period. However, based on the inputs described in Section 2.1.4, the modelling estimates that 22.4 ML (or 1,280 truck loads) of water was used for dust suppression. Quarry management's recent introduction of a daily log of water truck movements will help to confirm and improve the accuracy of the water usage estimates in future years.

4.2.3 Main Tank water balance

A summary of the water balance results for the Main Tank is presented in Table 4.2.3.1.

Table 4.2.3.1 Northern catchment Main Tank – 2017 return period

Parameter	Volume (ML)
Tank inflow pumped from main dam (ML)	11.15
Usage – haul road sprinklers (ML)	6.24
Usage – asphalt plant (ML)	0.06
Usage – process/product water (ML)	4.84
Average daily stored volume (ML)	**0.89**

The attached Figure 2 shows the estimated daily storage volumes in the tank for the 2017 return period. Based on the stated water usage assumptions, the modelling suggests that throughout the modelling period the minimum water level in the rain tank prior to weekly top-up was 0.63 ML.

4.3 Southern catchment

The southern catchment water balance was undertaken to estimate catchment discharge volumes at LPD3. Collection and storage of water within the catchment is intended to be temporary only to satisfy water quality treatment requirements.

4.3.1 Southern catchment – quarry pit

During the 2017 return period, the south pit provided temporary storage for runoff entering the pit, prior to treatment in the sedimentation basin and subsequent discharge, or direct discharge during large events. A summary of the annual water balance results for the South Pit is presented in Table 4.3.1.1.

Table 4.3.1.1 South Pit – 2017 return period

Parameter	Value
Total pit inflow (ML)	28.7
Evaporative losses (ML)	2.1
Seepage losses (ML)	5.2
Discharge – pumped to sediment basin for treatment (ML)	0.3
Discharge – pumped directly out to LPD3 (ML)	21.1
Total number of days discharging to sediment basin	16
Total number of days discharging to LPD3	32
Total number of days per year when pit contains water [a]	49
Maximum number of consecutive days where pit contains water	8
Average number of days to empty pit	2.3

[a] Total number of days containing water has been calculated based on end-of-day volumes after all losses and discharges have been accounted for. The basin may be subject to wetting and drying more frequently during small events which are accounted for by losses and/or can be discharged immediately.

4.3.2 Southern catchment – sedimentation basin

During the 2017 return period the southern catchment sedimentation basin provided treatment for runoff directly entering the basin from the upper portion of the catchment as well runoff collected in the pit and pumped to the basin for treatment. A summary of the annual water balance model results for the southern catchment sedimentation basin is presented in Table 4.3.2.1.

Table 4.3.2.1 Southern catchment sedimentation basin volumes – 2017 return period

Parameter	Volume (ML)
Inflow from rainfall & runoff (ML)	23.8
Inflow pumped from South Pit (ML)	0.3
Total basin inflow (ML)	**24.1**
Evaporative losses (ML)	0.1
Seepage losses (ML)	0.3
Discharge – treated and pumped to LPD3 (ML)	4.5
Discharge – overflow to LPD3 (ML)	19.1

A summary of the estimated sedimentation basin performance is provided in Table 4.3.2.2.

Table 4.3.2.1 Southern catchment sedimentation basin performance – 2017 return period

Parameter	Value
Total number of days controlled discharge to LPD3	232
Total number of days discharging to LPD3	54
Total number of days per year when pit contains water [a]	170
Maximum number of consecutive days where pit contains water	30
Average number of days to empty pit	9.4

[a] Total number of days containing water has been calculated based on end-of-day volumes after all losses and discharges have been accounted for. The basin may be subject to wetting and drying more frequently during small events which are accounted for by losses and/or can be discharged immediately.

4.3.3 Southern catchment discharge

A summary of the modelled annual water balance results for the total southern catchment discharge is presented in Table 4.3.3.1.

Table 4.3.3.1 Southern catchment – annual volumes

Parameter	Value
Rainfall volume – total South Pit catchment area (ML)	75.5
Runoff volume – total South Pit catchment area (ML) [a]	48.9
Total discharge to LPD3 – pit and basin (ML)	44.7

[a] Total runoff that would have been generated and discharged from equivalent catchment area if no obstructions (i.e. quarry pit & sedimentation basin) were present. Estimate provided for comparison to estimated discharge pumped to LPD3.

Based on the available information and assumptions described above, it is estimated that total discharge from the southern catchment area to LPD 3 during the return period reduced by approximately 9 percent as a result of the quarry operations. This reduction is the result of evaporative and seepage losses during the temporary storage and controlled discharge of water for treatment in the sedimentation basin and South Pit.

4.4 South-western catchment

The south-western catchment water balance has been undertaken to estimate catchment discharge volumes at LPD1. Collection and storage of water within this catchment is intended to be temporary only to satisfy water quality treatment requirements.

4.4.1 South-western catchment – sedimentation basin SW1

A summary of the annual water balance model results for the catchment SW1 sedimentation basin is presented in Table 4.4.1.1.

Table 4.4.1.1 Sedimentation basin SW1 – annual volumes

Parameter	Volume (ML)
Rainfall volume – total SW1 catchment area (ML)	52.6
Runoff volume – total SW1 catchment area (ML) [a]	34.1
Total basin inflow (ML)	34.2
Evaporative losses (ML)	0.1
Seepage losses (ML)	0.3
Discharge to LPD1 (pumped and overflow)	33.6

[a] Total runoff that would have been generated and discharged from equivalent catchment area if no obstructions (i.e. sedimentation basin) were present. Estimate provided for comparison to estimated catchment discharge pumped to LPD1.

On average, it is estimated that, for the 2017 return period, total discharge from the southwestern catchment area to LPD 1 was reduced by approximately 1.5 percent as a result of the quarry operations. This reduction is the result of evaporative and seepage losses during the temporary storage and controlled discharge of water for treatment in the sedimentation basin.

A summary of the estimated sedimentation basin performance is provided in Table 4.4.1.2.

Table 4.4.1.2 Sedimentation basin SW1 performance

Parameter	Value
Total number of days discharging to LPD	222
Total number of days of overflow	49
Total number of days per year when pit contains water [a]	155
Maximum number of consecutive days where pit contains water	29
Average number of days to empty pit	8.6

[a] Total number of days containing water has been calculated based on end-of-day volumes after all losses and discharges have been accounted for. The basin may be subject to wetting and drying more frequently during small events which are accounted for by losses and/or can be discharged immediately.

5 Conclusion

This report presents details of water balance modelling undertaken for the 2017 annual return period. It demonstrates that during this period, rainfall captured and stored within the quarry catchment provided sufficient supply for all on-site (non-potable) water usage.

6 Attachment 1 – Drawings

NORTHERN PIT
- Area = 21.6 ha
Notes:
1. All pit runoff directed to sediment basin.

NORTHERN SEDIMENT BASIN
- Basin area = 0.401 ha
- Storage volume in basin = 2.517 ML
- Total required storage volume = 26.7 ML (incl. ponding across pit floor)
Notes:
1. Following rainfall event, basin is tested & treated (if necessary) to meet discharge requirements.
2. Treated water is pumped from basin to dam (until dam fills).
3. Excess discharge is pumped to LPD 2.
4. Basin is treatedand pumped out to permanent storage level within 5-days of design rainfall event and to remain at (or below) permanent storage level at all other times.

MAIN WATER STORAGE DAM
- Area = 0.292ha (approx.)
- Estimated volume = 30 ML
- Usage:
  - Water tank top-up
  - Water cart for dust supression

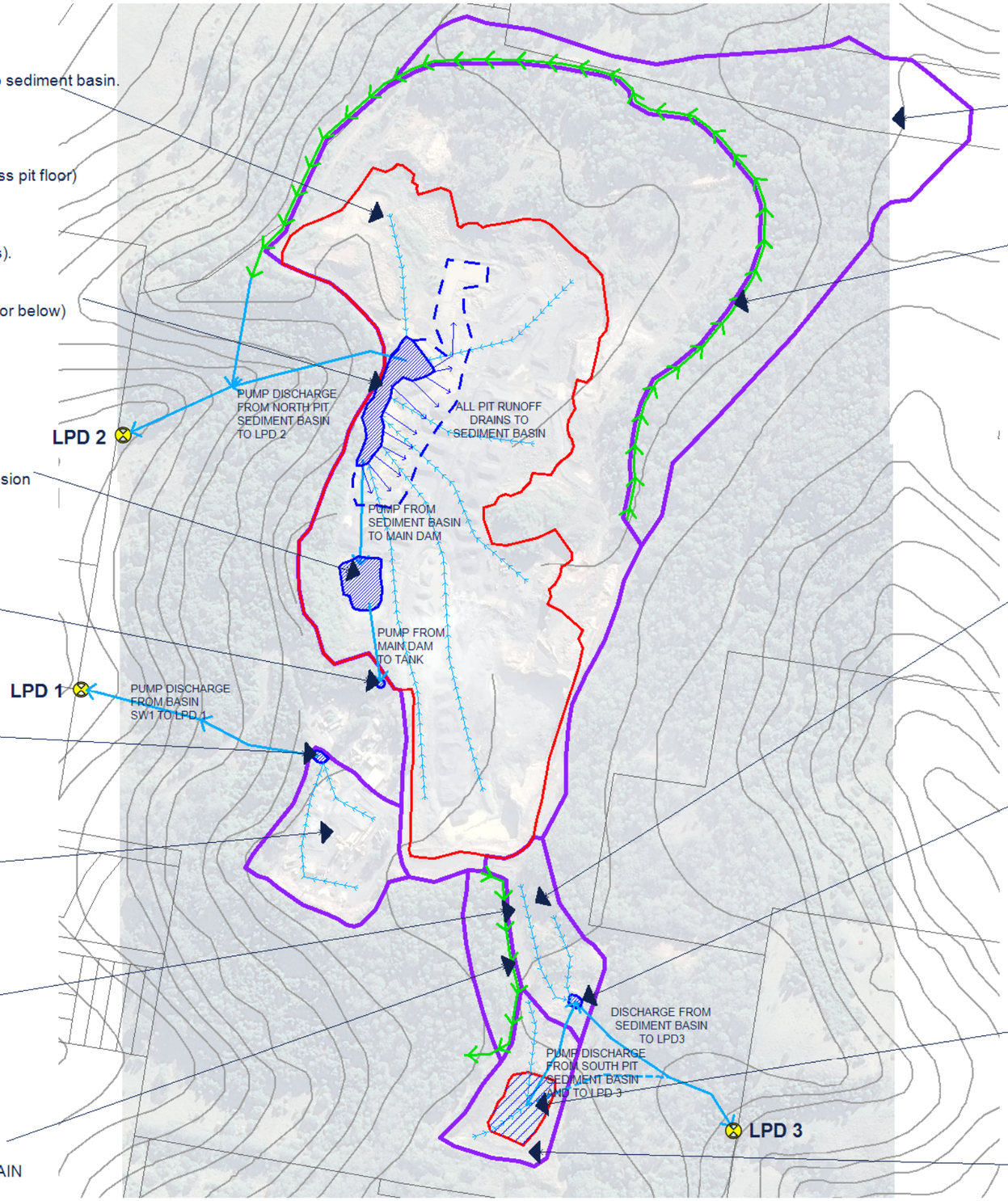
WATER TANK
- Volume = 1 ML
- Usage:
  - Asphalt plant
  - Haul road sprinklers (dust supression)
  - Product water (4% by weight)

SEDIMENT BASIN SW1
- Area = 232 m²
- Settling zone volume = 0.211ML
Notes:
1. Basin discharge pumped to LPD 1.
2. Collected water is tested, treated and released within 5-days of rainfall event.

SOUTH WESTERN CATCHMENT
- Area = 2.61 ha
- Catchment runoff drains to sediment basin SW1

SOUTHERN CATCHMENT
- Total area = 4.8ha
- Area draining to pit or sediment basin = 3.7 ha
- Undisturbed area diverted around pit = 1.1 ha
Note:
1. All runoff from undisturbed area to be collected in clean water diversion drain and diverted west to existing ephemeral gully.
2. Temporary ponding my occur behind diversion drain.

CLEAN WATER DIVERSION DRAIN



NORTHERN CATCHMENT
- Total area = 48.7 ha
- Area draining to pit = 37.4 ha
- Undisturbed area diverted around pit = 11.3 ha
Note:
1. All runoff from undisturbed area to be collected in clean water diversion drain and diverted around pit to LPD2.

CLEAN WATER DIVERSION DRAIN

SOUTHERN SUB-CATCHMENT 2
- Total area = 1.8ha
- Drains to sediment basin

SOUTHERN SEDIMENT BASIN
- Area: 201m²
- Settling zone volume = 0.118ML
Notes:
1. Following rainfall event, basin is tested & treated (if necessary) to meet discharge requirements.
2. Treated water is pumped from pit to LPD3.
3. Overflow (runoff exceeding basin capacity) discharges to LPD3.

SOUTH PIT
- Area = 0.49ha
Notes:
1. Collects all runoff from sub-catchment 2.
2. Discharge pumped to sediment basin for treatment when rainfall is less than design rainfall and capacity is available. Runoff may be temporarily stord in pit until sediment basin has capacity.
3. When rainfall exceeds design event (i.e. > 60.2mm in 5 days), discharge is pumped directly from pit to receiving environment (treatment not required).

SOUTHERN SUB-CATCHMENT 2
- Total area = 1.9ha
- Drains to pit

ORIENTATION

SCALE
50 100 150 200 250
metres

ROBINA
PO Box 4115 Robina QLD4230 07 5578 9944
Email robina@access.gs www.access.gs

LEGEND
- Catchment boundary
- Quarry pit (existing)
- Discharge point
- Sediment basins / water storage
- Clean water diversion drain

SOURCES
Image source: Google Earth Pro
Image dates: 6 June 2016

PROJECT: BLAKEBROOK QUARRY SOIL AND WATER MANAGEMENT PLAN
CLIENT: LISMORE CITY COUNCIL
DRAWING: BLAKEBROOK QUARRY WATER MANAGEMENT 2017 RETURN PERIOD

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:6,250@A3	22/02/2018	AJF	CMA	11737	007	-

GILBERT SUTHERLAND

7 Attachment 2 – Figures

Figure 1 - Main Dam water balance for 2017 annual return period

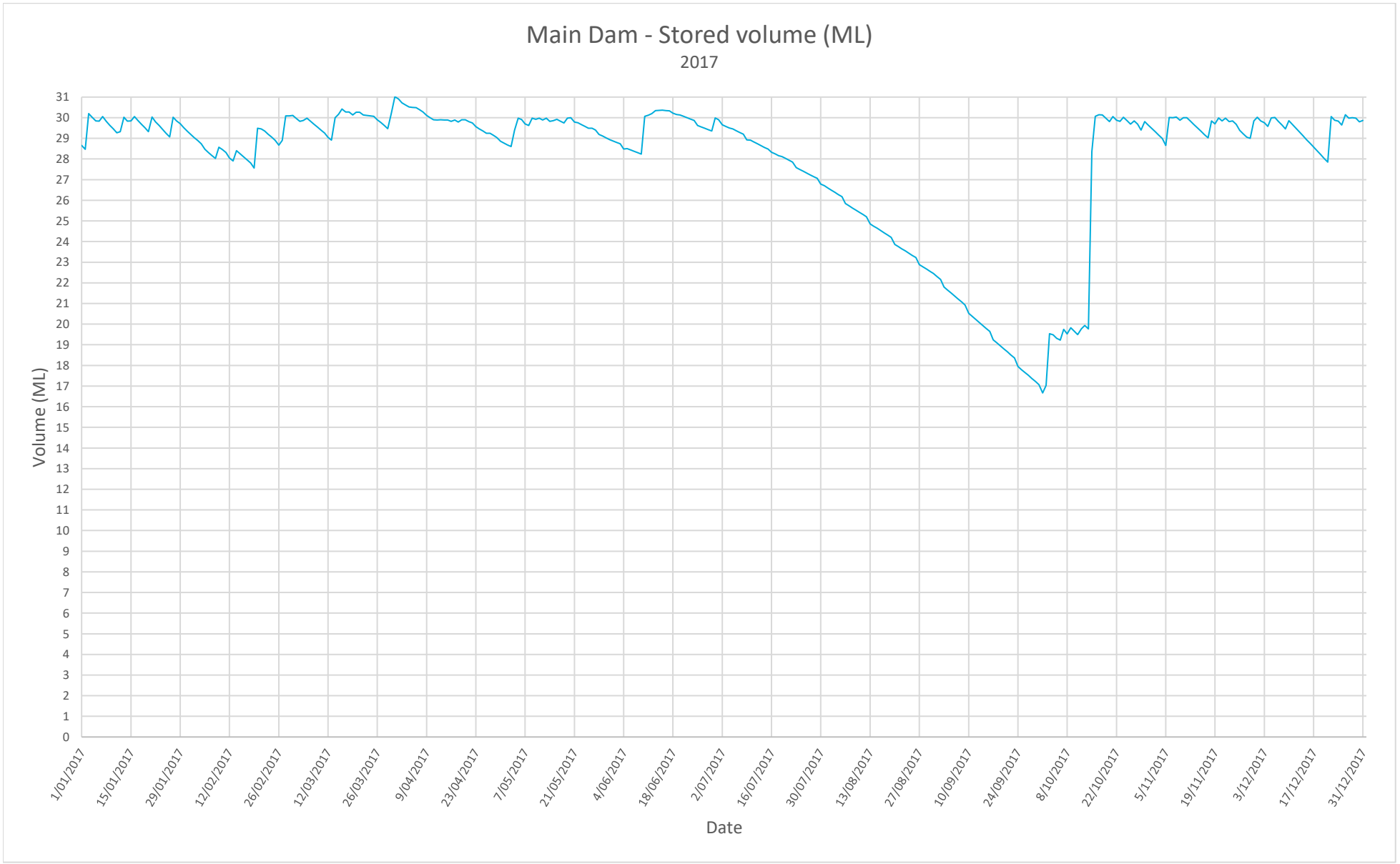
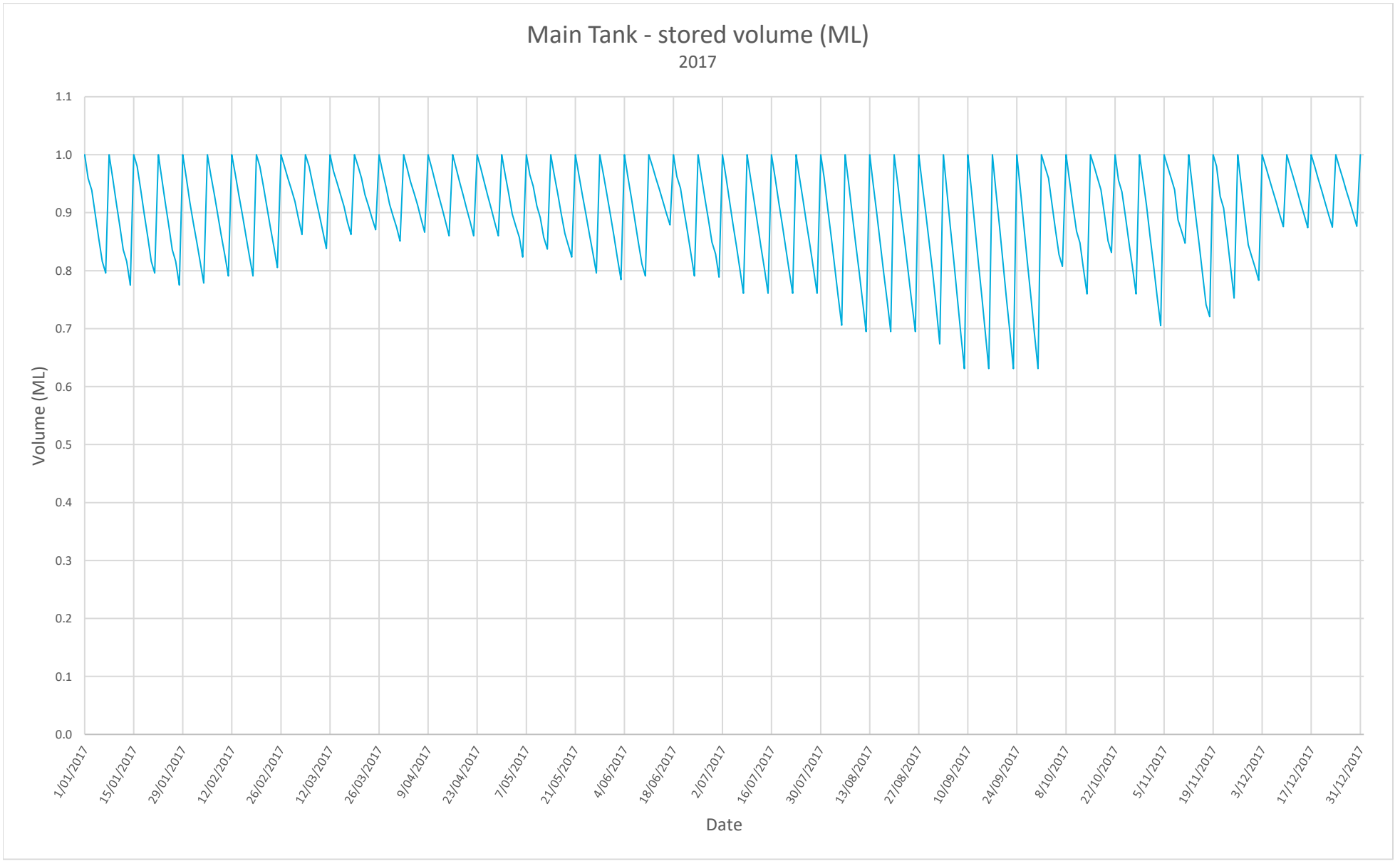


Figure 2 - Main Tank water balance for 2017 annual return period



Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 13

Surface Water Monitoring

Blakebrook Quarry Surface Water Analysis results 2017

Sample Point	Date	pH	Conductivity (EC) (dS/m)	Total Suspended Solids (mg/L)	Dissolved Oxygen (mg/L O_2)	Total Oils and Grease (mg/L)	Nitrate (mg/L N)	Aluminium (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Nickel (mg/L)	Lead (mg/L)	Zinc (mg/L)	Mercury (mg/L)	Redox Potential (mV)	Temperature (c)
ANZECC 200 Trigger Values		6.5-9.0	1500	50*		No visible sheen or detectable odour	0.7	0.055	0.024	0.0002	n/s	0.0014	0.011	0.0034	0.008	0.0006		
SW1	9/2/17 29/5/17 1/9/17	7.33 7.37 7.51	0.524 0.860 1.100	11 9 9	7.0 7.3 4.3	2.2 <2.0 <2.0	0.015 0.035 0.010	0.110 0.446 0.087	0.002 0.001 <0.001	<0.001 <0.001 <0.001	<0.001 <0.001 <0.001	0.001 0.003 0.001	0.004 0.002 0.002	<0.001 <0.001 <0.001	0.002 0.003 0.004	<0.0005 <0.001 <0.0005	189 175 116	27 15 17
SW2	9/2/17 29/5/17 1/9/17	8.12 7.46 7.74	0.194 0.327 0.228	14 12 6	5.0 8.4 5.6	4.2 <2.0 <2.0	0.032 0.133 0.010	0.099 0.490 0.230	0.001 <0.001 <0.001	<0.001 <0.001 <0.001	<0.001 <0.001 <0.001	0.001 0.001 0.001	0.001 0.001 0.001	<0.001 <0.001 <0.001	0.002 0.004 0.004	<0.0005 <0.001 <0.0005	172 172 95	30 15 16
SW3	9/2/17 29/5/17 1/9/17	7.81 7.41 7.71	0.180 0.328 0.229	7 14 10	5.1 7.4 4.9	7.0 <2.0 <2.0	0.036 0.132 0.009	0.107 0.473 0.221	0.001 <0.001 <0.001	<0.001 <0.001 <0.001	<0.001 <0.001 <0.001	0.001 0.001 0.001	0.001 0.001 0.001	<0.001 <0.001 <0.001	0.001 0.002 0.002	<0.0005 <0.001 <0.0005	167 173 96	30 15 17
SW4	16/1/17 16/3/17 21/3/17 4/4/17 14/6/17	8.74 7.67 7.11 7.47 7.88		20 60 60 38 34		<2.0 4 6 2 5												

RESULTS OF WATER ANALYSIS

3 samples collected by EAL for Lismore City Council on 21/11/2017. Lab Job No.G5182
Samples submitted by Greg Buckler. Your Job: Blakebrook Quarry
PO Box 23a LISMORE NSW 2480

Parameter	Methods reference	Sample 1 SW1	Sample 2 SW2	Sample 3 SW3
	Job No.	*G5182/1*	*G5182/2*	*G5182/3*
pH	APHA 4500-H+-B	7.40	6.84	7.70
Conductivity (EC) (dS/m)	APHA 2510-B	0.411	0.176	0.179
Total Dissolved Salts (mg/L)	** Calculation using EC x 680	279	120	122
Temperature (° C)	Onsite	19	20	20
Total Suspended Solids (mg/L)	GFC equiv. filter - APHA 2540-D	8	32	22
Turbidity (NTU)	APHA 2130	24	41	36
Dissolved Oxygen (mg/L O_2)	** APHA 4500-O-G (Onsite method preferable)	8.1	9.2	9.4
Total Oils and Grease (mg/L)	APHA 5520-D (hexane extractable)	3	2	2
Nitrate (mg/L N)	APHA 4500 NO_3^--F	<0.005	<0.005	<0.005
Aluminium (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	2.604	2.319	2.054
Arsenic (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.001	<0.001	<0.001
Cadmium (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001
Chromium (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.002	0.001	0.001
Copper (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.002	0.002	0.001
Iron (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	2.348	2.114	1.790
Manganese (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.122	0.049	0.045
Nickel (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.003	0.002	0.002
Lead (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001
Selenium (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001
Zinc (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	0.009	0.006	0.004
Mercury (mg/L)	Total Available - APHA 3125 ICPMS*note 1&2	<0.0005	<0.0005	<0.0005
Silver (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001
Aluminium (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.145	0.531	0.466
Arsenic (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.001	<0.001	<0.001
Cadmium (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001
Chromium (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001
Copper (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.001	0.001	0.001
Iron (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.205	0.621	0.593
Manganese (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.103	0.017	0.019
Nickel (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.001	0.001	0.001
Lead (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001
Selenium (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.001	<0.001	<0.001
Zinc (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.002	0.007	0.003
Mercury (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	<0.0005	<0.0005	<0.0005

Notes:

1. Total metals - samples digested with nitric acid; Total available (acid soluble/ extractable) metals - samples acidified with nitric acid to pH <2
   Dissolved metals - samples filtered through 0.45μm cellulose acetate and then acidified with nitric acid prior to analysis
2. Metals and salts analysed by Inductively Coupled Plasma - Mass Spectrometry (ICP-MS).
3. 1 mg/L (milligram per litre) = 1 ppm (part per million) = 1000 μg/L (micrograms per litre) = 1000 ppb (part per billion).
4. For conductivity 1 dS/m = 1 mS/cm = 1000 μS/cm.
5. Analysis performed according to APHA (2017) 'Standard Methods for the Examination of Water & Wastewater', 23rd Edition, except where stated otherwise.
6. Analysis conducted between sample arrival date and reporting date.
7. ** NATA accreditation does not cover the performance of this service.
8. .. Denotes not requested.
9. This report is not to be reproduced except in full.

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

checked: .....
Graham Lancaster
Laboratory Manager

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 14

Water Quality Investigation

BLAKEBROOK QUARRY

PRELIMINARY WATER QUALITY INVESTIGATION

540 NIMBIN ROAD, BLAKEBROOK NSW 2480

June 2017

Document control

Project Title:	**Blakebrook Quarry** **Preliminary Water Quality Investigation**
Job Number	17041
Document Title	Preliminary Water Quality Investigation
Document number	17041 - Blakebrook Quarry - FINAL
Prepared for	Greg Buckler, Lismore City Council
Prepared by	Ecoteam
Site Assessor and Report Authors	Stefanie Stanley BAppSci. Lise Bolton BAppSci ,MEng.

Revision	Date	Description	Report Author/s	Internal Review	Approved for Issue
01	07/06/2017	Issued for Review	Stefanie Stanley	Lise Bolton	Lise Bolton

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EXECUTIVE SUMMARY

Ecoteam has been requested by Greg Buckler, on behalf of Lismore City Council, to undertake a Preliminary Water Quality Investigation on the Blakebrook Quarry. The Quarry is located at 540 Nimbin Road, Blakebrook, approximately 6km North West of Lismore. The property is owned by Lismore City Council and covers approximately 1.267km^2. Lismore City Council undertakes quarterly monitoring of surface water and groundwater as part of NSW EPA licencing requirements. Historical surface water and groundwater monitoring results have identified elevated concentrations of aluminium and other metals in the samples, above Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC Guidelines) and Australian Drinking Water Guidelines.

This report provides information on the rationale for the site investigation, site condition and characteristics and interpretation of previous surface water and groundwater monitoring results. This report also contains recommendations for further investigations as a proactive approach to ongoing management of the Blakebrook Quarry site.

Scope of works – The scope of the Preliminary Water Quality Investigation is to identify possible sources of contamination and any sensitive environmental receptors. Discrete surface water sampling was conducted at four sites in wet weather conditions, and analysed for TSS, total and dissolved aluminium and copper. One discrete groundwater sample was collected from the deep monitoring well at location BQN1 following the major flood event in March and analysed for total and dissolved metals and TSS. Two soil samples were collected based on judgemental sampling and analysed for metals to determine the contribution of geology on local water quality. Results from the discrete sampling of surface water, groundwater and soils were then compared to historical monitoring results and landholder data.

Summary of Sampling Results – Concentrations of both total and dissolved copper were above ANZECC Guidelines in surface water samples. Concentrations of total aluminium, chromium, copper and zinc results were above ANZECC Guidelines in groundwater samples, however, dissolved concentrations of these metals were all below ANZECC Guideline limits. Soil results were all within NEPM Guideline limits.

Conclusions – Elevated concentrations of aluminium and copper in surface water samples is attributed to the local in-situ soils of the Wollongbar landscape which are highly erodible, have high acidity and high aluminium toxicity potential. Elevated concentrations of total metals and suspended solids in groundwater may be attributed to surface water percolating through the surface soils and exposed basalt within the Quarry as well as from naturally occurring soft, muddy soil layers located at various depths. While total metals concentrations are above ANZECC Guideline limits, the discrete sample collected at BQN1-D returned dissolved metal concentrations below the ANZECC Guidelines for Freshwater Aquatic Ecosystems.

Recommendations – We recommend ongoing analysis of total and dissolved metals in groundwater in future monitoring rounds. We also recommend compiling the driller's logs for the five new monitoring wells (installed in 2016) to inform future data analysis and interpretation.

The current site characteristics do not pose a risk to human or environmental health, however, ongoing monitoring and regular interpretation of groundwater results is recommended.

Contents

1. Introduction

1.1. Project Outline

Ecoteam has been requested by Greg Buckler, on behalf of Lismore City Council, to undertake a Preliminary Water Quality Investigation on the Blakebrook Quarry. The scope of the Investigation is to identify any potential contaminants of concern and the any sensitive environmental receptors (NEPC, 2013b). Further, to interpret historical surface water and groundwater monitoring results in relation to local conditions and quarry activities.

This report provides information on the rationale for the site investigation, site condition and characteristics and interpretation of previous surface water and groundwater monitoring results. This report also contains recommendations for further investigations as a proactive approach to ongoing management of the Blakebrook Quarry site.

1.2. Site Identification

Blakebrook Quarry is located on Nimbin Road, 6km from Lismore. **Table 1** contains site details. Refer to **Appendix A** for a detailed site plan of the Investigation Area.

Table 1. **Site details of Blakebrook Quarry.**

Feature	Description
Address	540 Nimbin Road, Blakebrook, NSW 2480
Plan Number	Lot 201 DP 1227138
Local Government Area	Lismore City Council
Geographic Coordinates	153°15'7.53" E, 28° 45'43.74" S
Property Area	Approx. 1.267 km2

1.3. Objectives

The objectives of this assessment are to:

a) Determine the fraction of colloidal versus dissolved (inorganic) metals in surface water and groundwater samples.

b) Identify potential sources of elevated TSS, aluminium and other metals in surface water and groundwater based on soil and water sample results, data from adjacent landowners and background research.

c) Identify potential risks (if any) of the surface water and groundwater quality to human health and the receiving environment.

d) Recommend management strategies (if required) to reduce risk to human health and the environment.

e) Recommend further investigations (if required) to comply with EPA requirements.

f) Document the methodology, results, interpretation and recommendations in a report to be sent to the NSW EPA as a proactive approach to management of the Quarry by LCC.

1.4. Guidelines

The scope of works for this assessment was guided by the following documents.

Reporting requirements:

- Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (NSW OEH, 2011).
- Guidelines for the Assessment and Management of Groundwater Contamination (NSW EPA, 2007).
- Guidelines for Protection of Groundwater in Australia (AGMCA/ANZECC, 1995).

Sampling design, methods and quality assurance:

- Sampling Design Guidelines (NSW EPA, 1995).
- Schedule B(2) of NEPM – Guidelines on Site Characterisation (NEPC, 2013b).
- Australian Standard AS5667.11:1998. Water quality—sampling. Part 11: Guidance on sampling of groundwater's.
- Australian Standard AS5667.6:1998. Water quality—sampling. Part 6: Guidance on sampling of rivers and streams.

Guideline reference values:

- Schedule B(1) of NEPM – Guideline on the Investigation Levels for Soil and Groundwater (Deriving HILs) (NEPC, 2013a).
- Australian and New Zealand Guidelines for Fresh Water and Marine Quality Volume 1 (ANZECC/ARMCANZ, 2000).
- Australian Drinking Water Guidelines (ADWG) 6, Version 3.3 (NHMRC, 2011).

1.5. Detailed Scope of Works

Desktop Assessment & Project Management

1. Undertake a literature and desktop assessment of soil types and soil landscapes, including sources of Aluminium in local soils.
2. WHS, Quality Assurance and Project Management throughout.

Surface Water Monitoring

1. Collect filtered and non-filtered water samples from all four surface water sampling sites and test for aluminium, copper and TSS.
2. Analyse pH, dissolved oxygen (DO), Conductivity (EC), redox potential (ORP) and temperature in situ.
3. Prepare Chain of Custody paperwork and transport samples to NATA laboratory.
4. Compare results with historical data and the ANZECC Guidelines for freshwater ecosystems (ANZECC/ARMCANZ, 2000).
5. Interpret all water quality results in relation to site characteristics and provide recommendations for future management of the site.

Groundwater Monitoring

Data Collection from adjacent landholders

1. Identify groundwater bores in Blakebrook Quarry area and download all reports from the NSW Office of Water website.
2. Contact landholders to obtain groundwater quality data.
3. Compare results with historical data, the ANZECC Guidelines for freshwater ecosystems (ANZECC/ARMCANZ, 2000) and the Australian Drinking Water Guidelines (ADWG) (NHMRC, 2011).

Groundwater monitoring

1. Measure standing water level at deep well BQN1-D.
2. Collect a groundwater sample using the HydraSleeve method.
3. Collect filtered and non-filtered water samples and test for a suite of metals (as required by EPA) and TSS.
4. Analyse pH, dissolved oxygen (DO), Conductivity (EC), redox potential (ORP) and temperature in situ.
5. Prepare Chain of Custody paperwork and transport samples to NATA laboratory.
4. Compare results with historical data, the ANZECC Guidelines for freshwater ecosystems (ANZECC/ARMCANZ, 2000) and the Australian Drinking Water Guidelines (ADWG) (NHMRC, 2011).
6. Interpret all water quality results in relation to site characteristics and provide recommendations for future management of the site.

Soil Testing

1. Collect two soil samples from within the Quarry area and analyse for a suite of metals including aluminium, copper, nickel, lead and zinc.
2. Compare and interpret results according to Schedule B1 of NEPC – Commercial Health Investigation Levels (HILs) (NEPC, 2013a).

2. Site Conditions

2.1. Topography, geology and hydrology

Table 2 contains a description of the regional topography, geology and hydrogeology.

Table 2. **Topography, geology, soil landscape and hydrogeology**

Feature	Description
Topography	Extremely low to very low undulating rises on plateau surfaces on basalt plateau surfaces.
Geology (NSW Geo Survey, 1969)	Lamington Volcanics: Lismore Basalts – Tertiary basalts, with bole and minor agglomerate.
Soil Landscape (Morand, 1994 & NSW OEH, 2017)	Mapped as Frederick (fr) soil landscape. Contains pockets of associated Krasnozems of the Wollongbar (wo) soil type overlying mottled yellow-brown medium clay C horizon. Wollongbar soil landscape is very strongly acid with high aluminium toxicity potential and moderate (wo1) to high (wo2) erodibility.
Surface water	Several drainage lines flow from the property. Two drainage lines flow west from the property into Terania Creek, approximately 1 km away at the closest point. Another drainage line originates on the property and flows west to Blakebrook Creek to the East, approximately 500m from the closest point.
Groundwater	The subject property forms part of the Richmond River Basin in the *Clarence-Moreton Bay GWMA.*

2.2. Surrounding Land Use

The property is surrounded by farmland on four sides (**Table 3**).

Table 3. **Surrounding Land Use**

Orientation	Land Use
North	RU1 Primary Production
South	RU1 Primary Production
East	RU1 Primary Production / Heavy natural vegetation
West	RU1 Primary Production

2.3. Current Site Conditions

Blakebrook Quarry supplies aggregates, drainage rock, road base, metal dust, basalt and argillite products and fill material for Council operations and local businesses.

A weighbridge is located at the front entrance. Grading, storage and loading facilities are located near the weighbridge. The asphalt plant is located in the south west corner of the property. The main quarry operations occur in the southern and northern areas of the quarry pit. Machinery used for crushing and processing is located on the quarry floor. Unwanted soil material is stockpiled in large bunds on the north eastern corner of the property near groundwater monitoring site BQN1 and also stockpiled near groundwater monitoring site BQN2.

All road surfaces are gravel or dirt. A one way ring road circles the top of the Quarry and two haul roads are used to access the Quarry floor. Unformed stormwater drains are located across the site. Drainage from the materials storage area is directed into a stormwater retention pond near the weighbridge. Surface water collects on the Quarry floor following heavy rain events and discharges via a cut channel near surface water sampling site SW4. There are two stormwater retention ponds also located on the western side of the quarry floor.

Overland flow from the forested area on the north east corner of the property collects in a natural channel near groundwater site BQN1.

Three distinct soil and geological layers are visible on the quarry face – a red-brown topsoil layer, a lighter yellow secondary layer and a fractured basalt rock layer.

2.4. NSW Groundwater Bore Search and Monitoring Well Information

A groundwater bore search was conducted (within the Blakebrook Quarry and also the surrounding area) using the NSW Office of Water groundwater map data system (NSW Office of Water, 2017) (**Appendix A**).

Blakebrook Quarry Site

The locations and characteristics of monitoring wells within the Blakebrook Quarry were determined using the NSW Office of Water Website and also via discussions with Greg Buckler from Lismore City Council. There are nine (9) groundwater bores within the Blakebrook Quarry property boundary (**Table 4**). The groundwater monitoring wells are in three locations with a nest of three wells at each location. The depth of the screen intervals on the groundwater wells ranges from 12 m to 121 m below surface level.

Four groundwater monitoring wells are registered with NSW Office of Water. Five groundwater monitoring wells are not registered with NSW Office of Water and were installed in 2016. (N.B. As of 2016, monitoring bores no longer need to be registered).

Table 4. **Groundwater Monitoring Wells within Blakebrook Quarry property boundary.**

Site Name	Site Code	Well Number	Depth (m)	Screen Interval (m)	NSW Office of Water Reference
BQS1	BQS1 - S	GW1	55	40 - 52	NA
	BQS1 - I	GW2	73	58 - 70	NA
	BQS1 - D	GW3	103	88 - 100	NA
BQN1	BQN1 - B	GW4	42	30 - 42	GW30225
	BQN1 - A	GW5	60	51 - 60	GW30724
	BQN1 - D	GW6	115	100 - 112	NA
BQN2	BQN2 - B	GW7	21	12 - 21	GW307323
	BQN2 - A	GW8	60	48 - 60	GW307322
	BQN2 - D	GW9	133	109 - 121	NA

Adjacent to Blakebrook Quarry

Two landholders were contacted to obtain anecdotal information and to request any available groundwater data. This was undertaken to determine if there are similar water quality results from wells located in Frederick soil landscape. One well was chosen in the Georgica landscape as control point.

- GW300669 – an active irrigation licence (30BL177205) located within the Frederick soil landscape on Mcleay Road, North Lismore. Owners were contacted three times between 2 May and 6 June 2017. Messages were left on two occasions with no reply. On the third occasion, the phone had been disconnected.
- GW305019 – a cancelled stock and domestic licence (30BL183282) located at Keerrong Road, Keerrong on the Georgica soil landscape. The owner returned our call (6 June 2017) and the status of the groundwater well was discussed. The groundwater well was established in 2004 but had to be filled in as the groundwater was too salty for it be used for irrigation, stock watering or domestic use. The owner mentioned that there was significant volume of water in the aquifer. The owner also suggested contacting the Community Consultative Committee for the Quarry and asking them for assistance in regard to groundwater data. It may be useful to approach local landholders on the Frederick and Wollongbar soil landscapes to request access to existing data or potentially collect discrete samples from their existing wells.

2.5. Site Contamination History

Surface water and groundwater monitoring has been undertaken at Blakebrook Quarry since 2012 as part of NSW EPA annual reporting requirements. Some water quality results (e.g. metals, particularly aluminium) have exceeded ANZECC Guidelines and the Australian Drinking Water Guidelines on a number of occasions, particularly in groundwater samples, hence this investigation.

The site is not considered contaminated and is not included on the 'List of NSW contaminated sites notified to the EPA' (NSW EPA, 2017).

2.6. Sensitive receptors

A number of sensitive receptors have been identified within the vicinity of the Quarry.

- People and workers visiting the site.
- Local landholders and cattle using the groundwater for drinking water and stock watering.
- Ecological receptors in the groundwater aquifers.
- Ecological receptors within surface water tributary and Terania Creek to the West of the Quarry.
- Ecological receptors within surface water tributary and Booerie Creek to the East of the Quarry.

3. Contaminants of Potential Concern (CoPC)

3.1. Surface Water

Surface water analysis results for three analytes were above ANZECC Guidelines on at least one occasion during 2016 quarterly monitoring rounds (ANZECC/ARMCANZ, 2000). Based on this previous surface water sampling (2016), the following are identified as potential contaminants of concern:

- Aluminium
- Copper
- Nitrate

3.2. Groundwater

Aluminium, arsenic, nickel, lead and zinc groundwater analysis results were above Australian Drinking Water Guidelines on at last one occasion during 2016 monitoring rounds (NHMRC, 2011). Groundwater analysis results for seven metals (listed below) were also above ANZECC Guidelines for freshwater ecosystems on at least one occasion during 2016 monitoring rounds (ANZECC/ARMCANZ, 2000). Groundwater analysis results for TSS were above ANZECC Guidelines for aquaculture on at least one occasion during 2016 monitoring rounds. Based on previous groundwater sampling the following is a complete list of potential groundwater contaminants of concern:

- Aluminium
- Arsenic
- Cadmium
- Copper
- Nickel
- Lead, and
- Zinc.

3.3. Soil

With reference to the surface water and groundwater contaminants of potential concern, and with reference to the Frederick soil landscape the following are contaminants of potential concern for the Blakebrook Quarry:

- Aluminium
- Arsenic

- Cadmium
- Copper
- Nickel
- Lead, and
- Zinc.

3.4. Summary of Contaminants of Potential Concern

Based on land use, historical reports and previous monitoring results, and the scope of works for this investigation the Contaminants of Potential Concern (CoPCs) are:

- Metals and nitrate in surface water.
- Metals and TSS in groundwater.
- Metals in soil.

4. Assessment Criteria

4.1. Surface Water Quality Assessment Criteria

Section 3 of the ANZECC Guidelines details the trigger values for slightly disturbed Freshwater Aquatic Ecosystems (**Table 5**). The ANZECC Guidelines are trigger values, below which, there should be minimal risk of adverse effects. Further investigation is recommended to determine the level of risk to sensitive receptors (e.g. humans and the environment) if a trigger value is exceeded (ANZECC/ARCAMNZ, 2000).

Surface water quality assessment criteria including physical parameters, nutrients, metals and pesticides.

PARAMETER	ANZECC 2000 Guidelines Trigger values for Freshwater Environments
pH	6.5 - 8.0
CONDUCTIVITY (EC) (dS/m)	0.200
TOTAL DISSOLVED SALTS (mg/L)	-
DISSOLVED OXYGEN (RDO) Sat %	85-110
REDOX POTENTIAL (ORP) (mV)	-
TOTAL SUSPENDED SOLIDS (mg/L)	-
BIOCHEMICAL OXYGEN DEMAND$_5$	-
SILVER (mg/L)	0.00005
ALUMINIUM (mg/L)	0.055
ARSENIC (mg/L)	0.024
CADMIUM (mg/L)	0.0002
CHROMIUM (mg/L)	0.001
COPPER (mg/L)	0.0014
IRON (mg/L)	ID
MANGANESE (mg/L)	1.9
NICKEL (mg/L)	0.011
LEAD (mg/L)	0.0034
SELENIUM (mg/L)	0.011
ZINC (mg/L)	0.008
MERCURY (mg/L)	0.0006

4.2. Groundwater Quality Assessment Criteria

Groundwater Investigation Levels (GILs) are derived from Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater (NEPC, 2013a). The document references the ANZECC Guidelines for Freshwater Aquatic Ecosystems (ANZECC/ARMCANZ, 2000) and the Australian Drinking Water Guidelines (NHMRC, 2011).

These Guidelines are trigger values, below which, there should be minimal risk of adverse effects. Further investigation is recommended to determine the level of risk to sensitive receptors (e.g. humans and the environment) if a trigger value is exceeded.

While there are no ANZECC Guidelines (for freshwater aquatic ecosystems) or Australian Drinking Water Guidelines for Total Suspended Solids (TSS), comparison could be made to the ANZECC Aquaculture Trigger Value (freshwater) of 40 mg/L. Also, the ANZECC Aquaculture Guidelines of 300 mg/L for total oils and grease could be used to compare groundwater results in the absence of trigger values for Freshwater Ecosystems.

17 5 lists the relevant GILs for the Blakebrook Quarry.

Table 5. **Groundwater Investigation Levels (GILs) to be used as assessment criteria for Blakebrook Quarry, including physical parameters, nutrients, metals and pesticides (ANZECC/ARMCANZ, 2000; NEPC, 2013a and NHMRC, 2011).**

PARAMETER	ANZECC 2000 Guidelines Trigger values for Freshwater Environments	Australian Drinking Water Guidelines (ADWG)
pH	6.5 - 8.0	6.5 - 8.0
CONDUCTIVITY (EC) (dS/m)	0.200	-
TOTAL DISSOLVED SALTS (mg/L)	-	-
DISSOLVED OXYGEN (RDO) Sat %	85-110	-
REDOX POTENTIAL (ORP) (mV)	-	-
TOTAL SUSPENDED SOLIDS (mg/L)	-	-
BIOCHEMICAL OXYGEN DEMAND$_5$	-	-
SILVER (mg/L)	0.00005	-
ALUMINIUM (mg/L) (pH>6.5)	0.055	0.2
ARSENIC (mg/L)	0.024	0.01
CADMIUM (mg/L)	0.0002	0.002
CHROMIUM (mg/L)	0.001	0.05
COPPER (mg/L)	0.0014	2
IRON (mg/L)	ID	-
MANGANESE (mg/L)	1.9	0.5

PARAMETER	ANZECC 2000 Guidelines Trigger values for Freshwater Environments	Australian Drinking Water Guidelines (ADWG)
NICKEL (mg/L)	0.011	0.02
LEAD (mg/L)	0.0034	0.01
SELENIUM (mg/L)	0.011	0.01
ZINC (mg/L)	0.008	-
MERCURY (mg/L)	0.0006	0.001

4.3. Soil Assessment Criteria

Soil assessment criteria are derived from Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater (NEPC, 2013a) (**Table 6**). Schedule B1 provides levels which can be used to assess risk of contamination to human and ecological receptors. Health Investigation Levels (HILs) have been adopted from the measure in order to determine the likely human health impacts of contamination and any further investigation required.

HILs provide assessment criteria for indicators of risk for direct contact and therefore are an important in determining risk. HILs are general assessment criteria used when conducting an initial screening of potential risk to human health. The HILs for Commercial & Industrial premises will be used (referred to as HIL-D) (NEPC, 2013a).

Table 6. **Assessment Criteria for Metals in Soil**

Substances	Health Investigation Level (HIL) Column D (mg/kg)
Metals/Metalloids	
Aluminium (%)	-
Arsenic	3,000
Cadmium	900
Chromium (VI)	<3,600
Copper	240,000
Iron (%)	-
Lead	1,500
Manganese	60,000
Mercury (inorganic)	730
Nickel	6,000
Silver	-
Selenium	2,500
Zinc	100,000

5. Sampling Methodology

5.1. Surface Water Quality Sampling Design & Rationale

Surface water sampling undertaken by Ecoteam was based on the location of four pre-existing water monitoring sites identified as part of the Soil and Water Management Sub-plan developed as part of the Blakebrook Quarry Expansion (ERM, 2011b). Surface water sampling locations are included as **Appendix A**.

The sampling round conducted in early February 2017 occurred prior to significant rainfall, whereas the sampling conducted by Ecoteam in mid-March 2017 followed significant rainfall. It is the intention of this investigation to compare 'dry weather' (i.e. early February) and 'wet weather' samples (i.e. mid-March).

Surface water quality sampling was undertaken by Stefanie Stanley and Lise Bolton on Thursday March 16, 2017. Discrete surface water samples were collected from all four surface water sampling sites.

Notes were collected on site conditions at the time of sampling using a template extracted from AS/NZS 5667.6:1998. Weather conditions at the time were overcast, with a light breeze. Sampling was undertaken from 11:30am – 2:30pm. There was over 167 mm of rainfall in the Wilsons River catchment in the week preceding surface water sampling.

The grab sampling method was used to collect surface water samples. A long sampling pole was used to collect water from approximately 300mm below the surface. Samples were collected in a clean plastic bottle and analysed for total and dissolved aluminium, copper and TSS. Historically, only total metals have been analysed in surface water samples in reports to the EPA. In situ water quality parameters were recorded using a SmartTROLL. **Appendix B** contains the water quality sampling methodology.

All surface water samples were stored on ice in an esky and submitted to the laboratory for analysis within 24 hours as per AS/NZS 5667.6:1998. **Appendix B** contains a signed chain-of-custody form acknowledging receipt date and time, and identity of surface water samples.

Refer to **Table 7** for sample details.

Table 7. **Details of Water Quality samples.**

Sampling Site	Sample description	No. of samples	Analysis
SW1	Grab	1	Aluminium, copper and TSS
SW2	Grab	1	Aluminium, copper and TSS
SW3	Grab	1	Aluminium, copper and TSS
SW4	Grab	1	Aluminium, copper and TSS

5.2. Groundwater Sampling Design & Rationale

The groundwater sampling rationale for discrete sampling undertaken by Ecoteam was determined based on historical groundwater analysis of pre-existing monitoring wells within Blakebrook Quarry.

The location and depth of three nests of monitoring wells were previously determined as part of the Groundwater Management Sub-plan developed as part of the Blakebrook Quarry Expansion (ERM, 2011a). At each groundwater monitoring location there are three wells at different depths up to 121m below surface level. The locations of groundwater monitoring wells are shown in **Appendix A**.

It is the intention of this investigation to compare results from 'dry weather' sampling to 'wet weather' sampling. The groundwater sampling round conducted in early March 2017 following a period of dry weather. The sampling conducted by Ecoteam in early April 2017 followed significant rainfall.

Detailed investigation was undertaken into the most appropriate method for groundwater sampling in deep wells prior to sampling. Three methods were considered:

1. Bailing,
2. Low flow pumping, and
3. HydraSleeve in-situ sampling.

According to AS/NZ 5667.11:1998, bailing is a relatively crude method of collecting water quality samples and is recommended for use during the establishment of wells and for sampling the surface layer of water in an aquifer. Low flow pumping is another option, however can be very time consuming and expensive, and can affect water quality results, particularly in deep wells >100m below surface level, like BQN1-D. Depth sampling using in-situ equipment is recommended for wells >100m as other equipment may be impractical.

The HydraSleeve (which is comparative low flow sampling) was used for this project based on AS/NZS 5667.11:1998 and the relatively inexpensive and reliable results that can be obtained from this approach. The HydraSleeve is an insitu grab sampling method where a sealed soft plastic tube is lowered into the well (Plate 1, **Appendix E**). The sampling depth is measured carefully to ensure the HydraSleeve is placed in the middle of the well screen. The HydraSleeve is left in place for 2-4 days to allow the groundwater in the well to settle. The HydraSleeve is then pulled up 1-2m in one quick motion, the top of the HydraSleeve opens and the grab sample is collected in the HydraSleeve tube. The HydraSleeve is pulled up gently out of the well and then in-situ measurements can be taken and laboratory samples collected for analysis.

BQN1-D is a relatively new groundwater monitoring well, installed in 2016 at a depth of 112 m below surface level. A concentration of 97.4 mg/L of aluminium was detected in BQN1-D in the monitoring round conducted on 13 September 2016 and was the first sample to be extracted from the well following installation. This result was the highest overall aluminium concentration in all groundwater samples across all sites collected from 2013-2017. Aluminium is soluble above pH 8.5. Aluminium in groundwater will be in particulate form at

pH 5 – 8.5. Therefore, pH of groundwater will also be correlated with TSS, rainfall, and concentrations of total and dissolved metals.

It is unclear if the groundwater well was established after installation. If the well was not properly established and a bailer used to collect the initial well sample, than higher concentrations of TSS and metals could be expected in the water column. Elevated TSS in the water column is due to the disturbance of soil as the well is drilled into the groundwater table. BQN1-D was chosen for discrete sampling to determine if water quality had changed at depth since the well installation.

Groundwater sampling was undertaken by Stefanie Stanley and Lise Bolton on Tuesday 28 March 2017 and Wednesday April 5 2017. The HydraSleeve was deployed on Tuesday 28 March and the sample collected for analysis on Tuesday 5 April. Notes were collected on site conditions at the time of sampling using a template extracted from AS/NZS 5667.11:1998. Weather conditions at the time the sample was collected were light rain with a light breeze. Sampling was undertaken from 10:00am to 10:45am.

Samples were collected in a plastic bottle and analysed for pH, TSS and a suite of total and dissolved metals as defined by EPA licencing requirements. Historically, only total metals have been analysed in groundwater samples as part of EPA reporting. The groundwater sample was stored on ice in an esky and submitted to the laboratory for analysis within 24 hours as per AS/NZS 5667.11:1998. **Appendix C** contains a signed chain-of-custody form acknowledging receipt date and time, and identity of groundwater samples.

In situ water quality parameters were recorded using a SmartTROLL. **Appendix B** contains the groundwater quality sampling methodology.

5.3. Soil Sampling Design & Rationale

Judgemental soil sampling was selected as the preferred methodology for this Preliminary Water Quality Investigation for several reasons. According to Schedule B2 of NEPM (NEPC, 2013b), judgemental sampling is the preferred methodology when performing a relatively small scale screening assessment, as is the case for this report. Judgemental sampling results can then be used to determine if more detailed site assessment is required. Given the size and extent of the Blakebrook Quarry site, targeted sampling based on professional judgement was the preferred approach.

Soil sample locations were selected based on desktop assessment and site investigation. Desktop assessment identified the soil landscape as Frederick. Frederick soils are very strongly acid, have moderate erodibility and aluminium toxicity potential (Morand, 1994). The initial proposal was to collect a soil sample from the A and B Horizons of the Frederick soil landscape to determine the presence of metals in the soil that may be contributing to metals in the groundwater.

Soil sampling was undertaken by Stefanie Stanley and Lise Bolton on 28th March 2017. Weather conditions were cloudy with rainfall occurring prior to sampling. Two soil samples were collected and analysed for a suite of metals. The soil sampling design was amended following assessment of site characteristics. Light yellow - brown turbid water was noticed ponding within the bunded wall in the north-east corner of the site near groundwater wells at location of groundwater wells, BQN1. The turbid water was of similar colour to the soil used to build the bund and therefore one soil sample was collected from the top of the bund wall.

The second soil sample was collected in-situ soil from the cutting adjacent to the road leading down into the quarry floor. The soil at the second location was from the lower soil horizons and was of similar colour and characteristics to that used to build the bund wall. If there is any direct penetration of surface water into the groundwater, it would be from the overlying soil (either disturbed or in-situ) and hence these layers were collected and analysed. Refer to Error! Reference source not found. for details on the sampling regime for the Investigation Area.

Table 8. **Soil Sampling Design and Locations**

Sample zone	Sample description	No. of samples	Analysis	Sample ID
Near BQN1	Judgmental (Top of Bund Wall)	1	Metals	S02
Road Cutting	Judgmental (In-situ Soil Horizon)	1	Metals	S03

Appendix B contains the detailed soil sampling methodology. **Appendix C** contains a signed chain-of-custody form acknowledging receipt date and time, and identity of soil samples. Refer to **Appendix A** for a map of soil sampling locations.

6. Investigation Quality Assurance/ Quality Control Evaluation

Table 10 contains the summary of the field and laboratory investigation QA/QC evaluation.

Table 9. **Investigation Field QA/ QC program.**

Criteria	Objective/DQO	References	Evaluation/ comments
Historical evaluation/ desktop study	Determine contaminates that present contamination risk. Review historical aerial photograph & reports.	NSW OEH, 2011 NSW EPA, 2007 AGMCA/ANZECC, 1995	Objective achieved – limited to preliminary investigation requirements.
Water Sampling Design	Sample surface and groundwater at pre-existing locations as per EPA reporting requirements. Target contaminants are metals, nitrate, TSS, BTEX and TRH.	NEPC, 2013b. AS/NZS 5667.6:1998 AS/NZS 5667.11:1998	Objectives achieved - limited to preliminary investigation requirements.
Soil Sampling Design	Judgemental sampling methodology. Target contaminants are metals. Sample stockpile and in-situ soil to detect CoPCs.	NSW EPA, 1995. NEPC, 2013b.	Objective achieved - limited to preliminary investigation requirements.
Site Assessment	Investigate soil type. Assess potential contaminant pathways. Use qualified and experienced staff. Ensure all field equipment has been calibrated.	NSW EPA, 1995. NEPC, 2013b.	No visible contamination indicators. Turbid water observed ponding on the surface following rainfall. Objectives achieved.
QA/QC Water Sampling Procedure	Surface water sampled at four pre-existing locations as per EPA licencing requirements. Groundwater was sampled at one location where highest concentrations of aluminium detected (BQN1-D). No cross contamination between samples. In situ samples recorded and laboratory sample collected from each location. Surface water samples collected following rainfall using long pole to capture in stream flow and collected from 30cm below the surface. Groundwater sample collected using in-situ HydraSleeve method due to depth of well (>100m), diameter of well and time and budget constraints.	AS/NZS 5667.6:1998 AS/NZS 5667.11:1998	Sample plan and procedures followed. Correct non-contamination procedures used. All surface sampling executed on the same day/weather by the same personnel. Samples were stored correctly. Objectives achieved.

Criteria	Objective/DQO	References	Evaluation/ comments
	Samples individually stored in clean sampling containers provided by EAL. Proper recording of sample locations, time and sampler. Holding times, temporal and operator influences minimised. Samples stored on ice on the day, and sent to the laboratory on the same day. Chain-of-custody paperwork completed.		
QA/QC Soil Sampling Procedure	No cross contamination between samples Decontamination procedure – New disposable gloves used to collect samples, shovels decontaminated between each sampling location. Sampling equipment washed with phosphate free detergent and rinsed with distilled water for each sampling location. Samples individually stored in clean sampling containers provided by the EAL. Proper recording of sample locations, time and sampler. Holding times, temporal and operator influences minimised. Samples stored on ice on the day sent to the laboratory on the same day. Chain-of-custody procedure followed.	NEPC, 2013b. AS/NZS 4482.1:2005	Sample plan and procedures followed. Correct decontamination procedures used. All sampling executed on the same day/weather by the same personnel. Samples were stored correctly. Objective achieved
Testing Accreditation	Maximise data quality by using NATA accredited laboratories.	EAL (NATA accreditation No. 14960).	Laboratory employs full QA procedures. Objective achieved.

7. Results & Interpretation

The scope of works for this report was to collect discrete surface water, groundwater and soil samples from the Blakebrook Quarry area and analyse the samples for a range of CoPCs to identify if the concentrations found were above guideline limits.

Surface water and groundwater samples collected in early February and early March occurred prior to significant rainfall and can be considered 'dry weather' samples. Surface water and groundwater samples analysed by Ecoteam were collected following significant rainfall (mid to late March and early April 2017) and could be considered 'wet weather' samples.

Soil samples were collected and analysed for a suite of metals to determine aluminium concentrations in particular. If there are elevated aluminium concentrations in the local soils than aluminium levels may be naturally occurring and not a result of site specific contamination. High aluminium levels in the groundwater may be as a result of surface water percolating through acidic soils and dissolving the naturally occurring aluminium of the Frederick / Wollongbar soil landscapes.

7.1. Surface Water Results

Discrete Surface Water Sampling Results

Surface water quality measurements (RDO, ORP and Conductivity) were taken in-situ using a handheld SmarTROLL. pH and temperature were measured in-situ using a handheld probe at SW1 and SW4 and the SmarTROLL at SW2 and SW3. In-situ measurements for surface water sites SW1- SW4 are shown in **Table 10**.

Table 10. **In situ surface water quality measurements for SW1 – SW4. Results above guideline limits are shaded in light blue.**

PARAMETER	ANZECC 2000 Guidelines Trigger values for Freshwater Environments	Results			
		SW1	SW2	SW3	SW4
pH	6.5 - 8.0	7.6	9.25	8.70	7.4
Temp °C	-	23.3	23.62	23.88	24.8
RDO (mg/L)	-	7.16	6.09	6.08	7.23
RDO Sat %	85-110	85.76	72.47	72.89	91.05
ORP (mV)	-	59.42	84.27	101.24	119.65
CONDUCTIVITY (EC) (dS/m)	0.200	0.18	0.06	0.08	0.14
Depth (mm)	-	298	673	425	243

Surface water samples were from collected from SW1 - SW4 and analysed in the laboratory for TSS, and total and dissolved aluminium and copper. Results are shown in **Table 11** and laboratory report is included as **Appendix D.** Nitrate was not analysed in this investigation

as only two samples have returned results above guideline limits in the previous 5 years of sampling.

Total and dissolved aluminium results were above guideline levels in all samples, however, dissolved aluminium was lower in concentration by a factor of 4 at each sampling location. Sites SW2 and SW3 had the highest total aluminium concentrations, at 3.469 mg/L and 4.275 mg/L, respectively. SW2 and SW3 are located upstream and downstream of the Quarry tributary, respectively.

Total and dissolved copper results were above guideline levels in all samples. Site SW4 had had the highest total copper concentration at 0.005 mg/L. Dissolved copper concentrations were consistently recorded as 0.002 mg/L at all four sampling sites.

Table 11. **Surface water quality results from laboratory analysis of samples collected from sites SW1 – SW4.**

PARAMETER	ANZECC 2000 Guidelines Trigger values for Freshwater Environments	Results			
		SW1	SW2	SW3	SW4
TOTAL SUSPENDED SOLIDS (mg/L)	-	35	29	69	69
NITRATE (mg/L N)	0.04	-	-	-	-
ALUMINIUM (mg/L) TOTAL	0.055	0.819	3.469	4.275	0.957
ALUMINIUM (mg/L) DISSOLVED	0.055	0.172	1.117	0.883	0.256
COPPER (mg/L) TOTAL	0.0014	0.003	0.002	0.002	0.005
COPPER (mg/L) DISSOLVED	0.0014	0.002	0.002	0.002	0.002

Historical Surface Water Sampling Results

At least 17 historical surface water monitoring rounds have been undertaken since 2012. Aluminium concentrations were above ANZECC Guidelines in all surface water samples and at all locations from 2012 - 2017. There was only one occasion (24 October 2012) when sample results for aluminium were within ANZECC Guideline of 0.055 mg/L. This occurred at one site only, namely SW1 with concentrations of aluminium at 0.013 mg/L (located in the tributary downstream of the Quarry discharge point).

Water quality results from 2012 – 2017 range from 0.013 mg/L – 3.374 mg/L. The three highest aluminium concentrations occurred on the 1 July 2013, ranging from 2.773 mg/L – 3.374 mg/L. The two highest results were recorded within Terania Creek, upstream (site SW2 at 3.181 mg/L) and downstream (site SW3 at 3.374 mg/L) of the Quarry tributary. Total Suspended Solids (TSS) concentrations were above the ANZECC Guideline of 50 mg/L at all three sites SW1 – SW3, ranging from 107 mg/L at SW1 to 280 mg/L at Site SW3. Copper concentrations were also recorded above the ANZECC Guideline of 0.0014 mg/L with 0.002 mg/L recorded at sites SW1 – SW3. Up to 39 mm of rainfall had occurred during the preceding two days of the monitoring round (BOM, 2017).

The next three highest aluminium concentrations occurred on the 25 August 2015, ranging from 1.392 mg/L – 1.938 mg/L (sites SW1-SW3). The highest concentration of aluminium was recorded upstream of the Quarry tributary (1.938 mg/L at site SW2). Total Suspended Solids (TSS) were also elevated though not above ANZECC Guidelines. Up to 26.8 mm of rainfall had occurred during the preceding two days of the monitoring round (BOM, 2017). Monitoring results for all three sampling rounds in 2015 recorded elevated levels of copper above the ANZECC Guideline of 0.0014 mg/L.

No discharge was recorded from the Quarry (site SW4) during 2015 or 1 July 2013 monitoring rounds.

Interpretation of Surface Water Results

Soils in the far north coast of NSW are generally acidic and of basaltic origin. These soils are acidic with high exchangeable aluminium in the subsoils. The topsoil and subsoils can be mobilised by erosion during rainfall events particularly if riparian vegetation is lacking (Jenkins & Morand, 2002). Aerial photography shows an absence of a dense riparian zone along Terania Creek.

Historical aluminium concentrations are consistently above ANZECC Guidelines, in both dry and wet weather. This, in conjunction with soil type and the absence of a dense riparian zone along Terania Creek indicates that the source of aluminium and copper is likely to be from eroded soil that has been mobilised during rainfall events. Surface water was highly turbid within Terania Creek due to significant rain in the days prior to collecting water quality samples (Plate 2, **Appendix E**).

In summary, elevated concentrations of aluminium and copper in surface waters correlate with rainfall events occurring immediately preceding monitoring rounds (i.e. 2-7 days). TSS concentrations were also elevated immediately following rain events. Discrete surface water sampling undertaken by Ecoteam at all four sites SW1- SW4 indicates that the majority of aluminium present in the surface water is of colloidal (particulate) form which is not readily available to aquatic organisms. Aluminium is only considered toxic to aquatic organisms in dissolved form. Although concentrations of dissolved aluminium are above ANZECC Guidelines, this is most likely naturally occurring and attributed to the local soil type.

Groundwater also interfaces with Terania Creek, and, if aluminium is present in local soils, would also be attributing to elevated aluminium concentrations.

7.2. Groundwater Results

Discrete Groundwater Sampling

The groundwater sample was collected from BQN1-D and analysed in the laboratory for TSS, pH and a suite of total and dissolved metals. In-situ measurements were also taken using the SmarTROLL. Results are shown in **Table 12** and the laboratory report is included as **Appendix D**. Results above guideline limits highlighted in light blue.

Table 12. **In situ groundwater quality measurements for BQN1-D. Results above guideline limits are shaded in light blue.**

PARAMETER	ANZECC 2000 Guidelines Trigger values for Freshwater Environments	Australian Drinking Water Guidelines (ADWG)	BQN1-D Groundwater Results (5 April 2017)
pH (Lab)	6.5 - 8.0	6.5 – 8.5	8.97
pH (Field – SmarTROLL)	6.5 - 8.0	6.5 - 8.0	8.51
TEMPERATURE (°C)	-	-	20.66
CONDUCTIVITY (EC) (dS/m)	0.200	-	1.66
TOTAL DISSOLVED SALTS (mg/L)	-	0-600	1178.2
DISSOLVED OXYGEN (RDO) (%Sat)	85-110	>85%	45.63
REDOX POTENTIAL (ORP) (mV)	-	-	-19.90
TOTAL SUSPENDED SOLIDS (mg/L)	-	-	74
BIOCHEMICAL OXYGEN DEMAND$_5$	-	-	NA
SILVER Total (mg/L)	0.00005	-	<0.001
SILVER Dissolved (mg/L)	0.00005	-	<0.001
ALUMINIUM Total (mg/L) (pH>6.5)	0.055	0.2	0.707
ALUMINIUM Dissolved (mg/L) (pH>6.5)	0.055	0.2	0.037
ARSENIC Total (mg/L)	0.024	0.01	0.003
ARSENIC Dissolved (mg/L)	0.024	0.01	0.004
CADMIUM Total (mg/L)	0.0002	0.002	<0.001
CADMIUM Dissolved (mg/L)	0.0002	0.002	<0.001
CHROMIUM Total (mg/L)	0.001	0.05	0.005
CHROMIUM Dissolved (mg/L	0.001	0.05	0.001
COPPER Total (mg/L)	0.0014	2	0.009
COPPER Dissolved (mg/L	0.0014	2	0.001
IRON Total (mg/L)	ID	-	2.372
IRON Dissolved (mg/L)	ID	-	0.010
MANGANESE Total (mg/L)	1.9	0.5	0.035
MANGANESE Dissolved (mg/L)	1.9	0.5	0.008
NICKEL Total (mg/L)	0.011	0.02	0.010
NICKEL Dissolved (mg/L)	0.011	0.02	0.002
LEAD Total (mg/L)	0.0034	0.01	0.001
LEAD Dissolved (mg/L)	0.0034	0.01	<0.001
SELENIUM Total (mg/L)	0.011	0.01	0.001

PARAMETER	ANZECC 2000 Guidelines Trigger values for Freshwater Environments	Australian Drinking Water Guidelines (ADWG)	BQN1-D Groundwater Results (5 April 2017)
SELENIUM Dissolved (mg/L)	0.011	0.01	<0.002
ZINC Total (mg/L)	0.008	-	0.047
ZINC Dissolved (mg/L)	0.008	-	0.003
MERCURY Total (mg/L)	0.0006	0.001	<.00005
MERCURY Dissolved (mg/L)	0.0006	0.001	<0.0005

Conductivity and Total Dissolved Salts (TDS) were recorded at 1.66 mg/L and 1176.2 mg/L, respectively, which is noted as poor condition in the Australian Drinking Water Guidelines (NHMRC, 2011). TDS comprise sodium, potassium, calcium, manganese, chloride, sulfate, bicarbonate, carbonate, silica, organic matter, fluoride, iron, manganese, nitrate, nitrite and phosphorus (NHMRC, 2011). pH 8.51 was measured in the field, and pH 8.97 was measured in laboratory samples. Dissolved oxygen was below 50% and ORP (redox potential) was recorded at -19.90 mV.

Total aluminium, chromium, copper and zinc results were above ANZECC Guidelines, however, dissolved concentrations of these metals were all below ANZECC Guideline limits. Total suspended solids (TSS) were also elevated at 74 mg/L on the day of sampling.

It is worth noting that the HydraSleeve method returned similar results to bailing at BQN1-D for monitoring conducted 9 March 2017 and discrete sampling undertaken by Ecoteam on 5 April 2017. Results may be similar because the groundwater had not had time to percolate through the soil following the significant rain event.

If bailing of three well volumes was not conducted prior to collecting the groundwater sampling in deep wells, than using the bailer to collect an in-situ sample may be satisfactory. It is important to record the method used for collecting groundwater samples in future monitoring rounds to enable accurate and meaningful interpretation of laboratory results.

Historical Groundwater Sampling Results

At least 15 historical groundwater monitoring rounds have been undertaken since 2013. Twelve (12) monitoring rounds have occurred at locations BQN1 and BQN2 in both the shallow and intermediate wells. Three sampling rounds (during 2016/17) have occurred at the three new monitoring wells at BQS1 including the new deep monitoring wells at existing sites BQN1 and BQN2. All recorded results are for concentrations of total metals.

In groundwater, total aluminium concentrations were above ANZECC Guidelines and Australian Drinking Water Guidelines at all sampling locations on at least one occasion during 2016. Total arsenic, cadmium, copper, nickel, lead and zinc concentrations were also above ANZECC Guidelines on at least one occasion in 2016. At some groundwater

monitoring locations, total copper and zinc were above ANZECC Guidelines in every sample collected in 2016.

Groundwater quality results for total aluminium range from 0.001 mg/L – 97.4 mg/L over the monitoring period, in some instances well above the ANZECC Guideline of 0.055 mg/L. Aluminium concentrations were significantly elevated on 13 September 2016, including the two of the three highest results between 2013 – 2017, at 11.4 mg/L and (BQN1-A) and 97.4 mg/L (BQN1-D). The second highest total aluminium concentration was recorded at BQN1-A at 22.7 mg/L on 5 February 2015.

At BQN1-A, the well at intermediate depth in the north east corner of the Quarry, high total aluminium concentrations correlate with high TSS and rainfall, except on one occasion on 27 October 2014. Rainfall in the five weeks preceding was 16.8 mm, however TSS was recorded at 309 mg/L and aluminium concentrations at 3.328 mg/L (BOM, 2017). This may be due to the slow drawdown of the aquifer. Elevated aluminium concentrations at BQN1-A correlate with rainfall events in the month preceding monitoring rounds. In the fortnight preceding 5 February 2015, up to 102.2 mm of rain fell in the catchment. In the 5 weeks preceding the 13 September 2016, up to 115.2 mm of rain fell in the catchment (BOM, 2017). At BQN1-A, the water bearing zone (WBZ) is 52 – 60m below surface level and the screen interval is 51-60m below surface level. Soft basalt and soft muddy basalt noted as strata overlying water bearing zone at 15-48 m and 12-15m below surface level, respectively (NSW Office of Water, 2017).

At site BQN1-B, the shallow monitoring well in the north east of the Quarry, aluminium concentrations have exceeded ANZECC Guidelines on only one occasion, being 0.293 mg/L in the sampling round conducted on 22 April 2016. At BQN1- B, the WBZ is noted as 28-38m below surface level with the screen interval at 30-42m below surface level. The driller's log notes soft, muddy basalt at 23-30m below surface level as the strata overlying the water bearing zone (NSW Office of Water, 2017). There are two hard basalt layers from 2-7m and 13-23m which are likely to be preventing surface water percolating through the soft, muddy layer to the WBZ.

In contrast, at BQN2-A (the intermediate depth monitoring well on the western side of the Quarry) aluminium concentrations have met or exceeded ANZECC Guidelines for aluminium on every occasion (ranging from 0.055 mg/L on 8 December 2016 to 1.134 mg/L on 22 July 2014). At BQN2-A, the WBZ is 52-60m below surface level with the screen interval at 48-60m below surface level. Soft, muddy basalt is noted as the overlying strata in the driller's log at both 20-24 and 45-52m, below surface level (NSW Office of Water, 2017).

At BQN2-B (the shallow monitoring well on the western side of the Quarry) aluminium concentrations have exceeded ANZECC Guidelines on every occasion except one (ranging from 0.019 mg/L on 28 October 2013 to 2.308 mg/L on 23 April 2014). At BQN2-B, the WBZ is 15-19m below surface level and the screen interval is 12 to 21 m below surface level. Soft muddy basalt noted in driller's log from 19-24m below surface level (NSW Office of Water 2017).

All wells at site BQS1 recorded aluminium concentrations above ANZECC Guidelines. These wells have only been established for three monitoring rounds. The driller's logs for these wells were not available on the NSW Office of Water website and as such we are unable to comment on the geology or water bearing zones. However, given the geology and driller's logs of BQN1 and BQN2, it is likely that they have similar surface geology including a combination of basalts, and soft, muddy or clay layers to 60m.

Deep groundwater monitoring wells were installed at three locations in 2016. There have been three monitoring rounds of the deep wells to date. The first monitoring round on 13 September 2016 recorded the highest aluminium concentration of any sample (at BQN1-D) since the commencement of the groundwater monitoring program. This may be attributed to the relatively recent installation of the well, and given the depth, the well may not have had been adequately purged of the well water disturbed during drilling. A subsequent monitoring round has recorded much lower total aluminium concentrations at 0.692 mg/L.

The Blakebrook Quarry site has also returned consistently high levels of TSS, up to 1,340 mg/L at BQN2-B on 2 November 2015. Up to 76.8 mm of rainfall occurred in the catchment in the 5 weeks preceding the monitoring round, however, these results are exceptionally high for groundwater (BOM, 2017).

Summary

The Groundwater Monitoring and Management Sub-plan, completed for the Blakebrook Quarry expansion notes the complex geology of Lismore Basalts, including the highly complex interaction of surface water with groundwater (ERM, 2011a). In particular, the report notes that the surface and intermediate geological layers will be most responsive to significant rainfall events with deeper, underlying aquifers much slower to respond due to the overlying hard basalt layers at depth.

Observations from site assessments noted that there was significant ponding of surface water on the Quarry floor near surface water monitoring location SW4, the discharge point from the Quarry (Plate 3, **Appendix E**). Fractured basalt was observed on the Quarry floor near SW4 monitoring site (Plate 4, **Appendix E**).

The investigation indicates that aluminium may be naturally occurring in the soils and subsoils within the Quarry. A discrete sample of groundwater from BQN1-D identified that the majority of aluminium is in particulate form. Metals in colloidal or particulate form are not considered harmful to aquatic organisms (Upjohn, Fenton and Conyers, 2005). Dissolved concentrations of metals in the discrete groundwater sample at BQN1-D were within ANZECC Guidelines and Australian Drinking Water Guidelines.

7.3. Soil Testing Results

Soil assessment criteria were derived from Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater (NEPC, 2013a). Results from two soil samples collected by Ecoteam are shown in **Table 14** and laboratory report is included as **Appendix D**.

Table 13. **Assessment Criteria for Metals in Soil**

Substances	Health Investigation Level (HIL) Column D (mg/kg)	Site S02 (top of bunded wall near BQN1)	Site S03 (from cutting on eastern haul road)
Metals/Metalloids (mg/kg)			
Aluminium (%)	NA	3.6	2.6
Arsenic	3,000	1.8	3.5
Cadmium	900	0.1	0.1
Chromium (VI)	<3,600	43	48
Copper	240,000	18	9
Iron (%)	NA	5.7	10.2
Lead	1,500	7.4	9.6
Manganese	60,000	100	270
Mercury (inorganic)	730	<0.1	<0.1
Nickel	6,000	7.3	8.0
Silver	NA	<0.1	<0.1
Selenium	2,500	1.4	1.6
Zinc	100,000	81	65

There have been no previous investigations into the potential contamination of soils in the Blakebrook Quarry. It is noted that the top soil and subsoils are removed and stockpiled as part of quarry operations in order to access, crush and process the basalt rock layer.

All soil sampling results are within HIL-D guideline values for Commercial & Industrial sites. There are no HIL-D Guideline values for aluminium, silver and iron. Both iron and aluminium were detected in the soil samples, indicating a potential source of aluminium in groundwater.

While the soil landscape is mapped as Frederick, observations on site revealed the soil has pockets of the Wollongbar (wo) soil type. Wollongbar soils are more acidic than the Frederick landscape and have a higher aluminium toxicity potential and a higher erodibility. Further, site observations identified associated soil material as 'mottled medium clay with weathered basalt' being the C horizon (Morand, 1994). The C horizon is clearly evident in photographs of the Quarry face and from soil samples collected on site (Plate 5, **Appendix E**). The mottled clay has colours ranging from yellowish brown, purple, grey brown and white.

7.4. Summary

Soil testing results and site observations identified that the Blakebrook Quarry is mapped as Frederick soil landscape, however contains pockets of Wollongbar krasnozems with high aluminium toxicity potential and high erodibility and mottled medium clays in the C horizon. Soils of the Wollongbar soil type are also highly acidic, with pH 4.5 – 5.0 (Morand, 1994).

Krasnozem subsoils are particularly acidic and consist of kaolinite clays and gibbsite in various concentrations (Jenkins & Morand, 2002). As water seeps through the subsoils, it

becomes acidic and aluminium is dissolved from the kaolin clays and gibbsite and becomes soluble (UNESCO, 2011-12). It is likely that as surface water and groundwater becomes highly acidic as it percolates through the soil layers, dissolving aluminium and other metals.

8. Conclusion & Recommendations

8.1. Conclusions

The Blakebrook Quarry is a complex formation of Lismore Basalt. The soil landscape is mapped as Frederick with overlying soils of the Wollongbar landscape. Wollongbar soils are characterised by high aluminium toxicity potential, high erodibility and ph 4.5 – 5.0, meaning they are highly acidic.

Surface water sampling results and interpretation indicate that the lack of riparian vegetation and subsequent bank erosion are the most likely contributor to TSS and elevated total and dissolved metals in Terania Creek. Concentrations of aluminium and copper are higher within the main channel of Terania Creek (at sites SW2 and SW3) than within the Quarry. Concentrations of aluminium and copper are higher both upstream and downstream of the confluence of the Quarry tributary with Terania Creek, indicating that the Quarry is not a point source of aluminium and copper contamination.

Groundwater results show that there is a complex geology and interaction between surface water, soil layers, rock strata and underlying aquifers in the Blakebrook Quarry investigation area. Surface water may be percolating through the fractured basalt layers, however this was not observed on site.

It is unlikely that the groundwater interfacing with Terania Creek contains aluminium and other metals from the Blakebrook Quarry as the basalt rock layers at shallow and intermediate depth would interface with the ground surface forming springs from the Blakebrook Hill. Because water quality results for aluminium and copper at SW1 (the Blakebrook tributary), are lower than the main channel, the most likely source of aluminium and other metals in the surface water and groundwater are from local, in-situ soils being eroded either from the land surface or from other geological layers at much lower depths. Investigating the driller's logs from the deep monitoring wells would provide more information.

8.2. Recommendations

- Analyse surface water and groundwater samples for total and dissolved metals as part of regular monitoring rounds.
- Write up and map the driller's logs for the five new groundwater wells to correlate rock strata and aquifers with existing information. Investigate if the mottled medium clay layer overlies BQS1 and BQN2. This data would assist future analysis and interpretation.
- Consider collecting surface water quality samples near fractured basalt during a rain event.
- Ensure three well volumes are purged prior to sampling by bailer as per Groundwater Monitoring and Management Plan.

- Consider requesting groundwater data or access to landholder's monitoring wells as part of quarterly Community Consultative Committee meetings.

8.3. Summary

Our Preliminary Water Quality Investigation has revealed that the most likely source of aluminium and other metals in surface water and groundwater is from local, in-situ soil of the Wollongbar landscape. (Although mapped as Frederick soil landscape, site assessments revealed that Wollongbar landscape is more accurate). Wollongbar soils are highly acidic, extremely erodible and have high aluminium toxicity potential. Surface water and groundwater results show that aluminium concentrations increase following rainfall events.

Historical surface water and groundwater monitoring rounds only analyse samples for total metals. While total metals are above ANZECC Guidelines (for aluminium in groundwater in particular), discrete sampling results of dissolved metals in groundwater are well within ANZECC Guidelines. To compile a more complete groundwater data set, ongoing monitoring of dissolved metals (particularly aluminium) is recommended.

Where dissolved metals are above ANZECC Guidelines in surface water, this can be attributed to soil erosion from in-situ local soils within the main channel and catchment of Terania Creek.

Surface water was observed percolating directly through fractured basalt rock on the Quarry floor, however, analysis of dissolved metals in groundwater samples are well within ANZECC Guidelines and Australian Drinking Water Guidelines. We recommend continued monitoring of total and dissolved metals, specifically in groundwater, as part of future management of the Quarry.

We also recommend compiling the driller's logs for the five new groundwater monitoring wells to enable more detailed interpretation of geology and surface water and groundwater interactions in future investigations.

Finally, to enable accurate interpretation of future groundwater monitoring results, we recommend recording the sampling methodology for each groundwater well.

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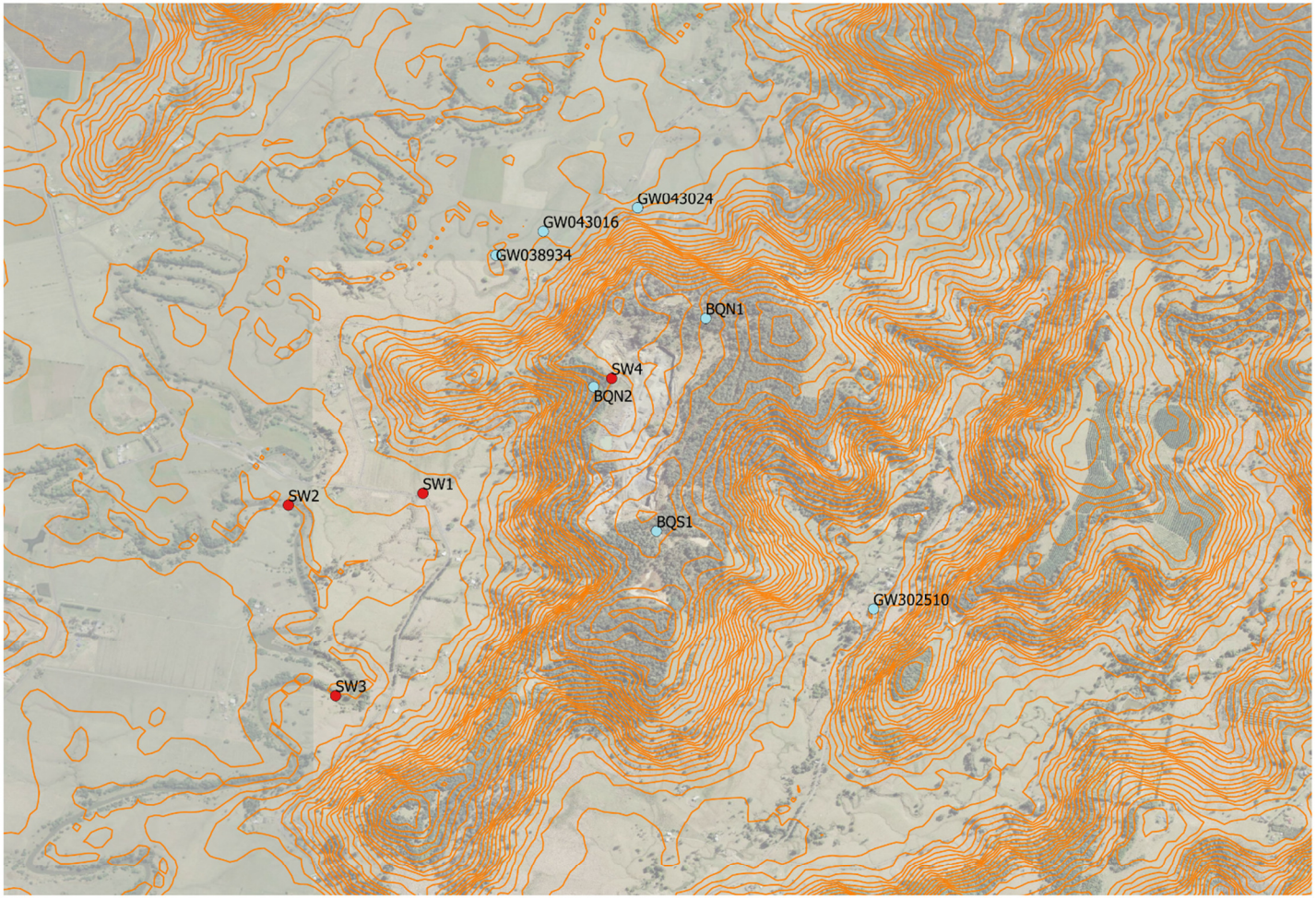
Appendix A. **Detailed Site Sampling Plan**



ecoteam natural solutions for environmental challenges **Project No: 17041** **Project Title: Blakebrook Quarry Preliminary Site Investigation** **Drawing Title: Site Overview**	Dated: Rev: Drawn: Review: SCALE:	07/06/2017 1 LB SS 1 : 17000	**SCALE:** 500 0 500 1000 m

Appendix B. Sampling Methodology – Surface Water, Groundwater and Soil

Surface Water Sampling methodology & procedures were as follows:

- New sample bottles were collected from EAL prior to the site assessment.
- Water sampling locations were chosen based on the pre-existing monitoring points.
- An extendable pole was used to collect the water sample. A clean plastic bottle was secured to the pole and lowered 30cm below the water surface.
- Samples were stored in an esky and submitted for analysis the same day as collection.
- In-situ measurements were collected by attaching the SmarTROLL to the extendable pole and lowering it 30cm below the water surface. Measurements were recorded on the InSitu iPhone app.

Analysis for all metals and TSS was conducted by the NATA accredited Southern Cross University Environmental Analysis Laboratory, Military Road, Lismore (SCU EAL).

Groundwater Sampling methodology & procedures were as follows:

- A new sample bottle was collected from EAL prior to the site assessment.
- The groundwater sampling location was chosen based on a pre-existing monitoring point.
- A 1L volume HydraSleeve was lowered into the well to 105m and secured to the top of the well using rope.
- The HydraSleeve was left in the well for at least four days to allow the water column to settle prior to sample collection.
- To collect the water sample, the HydraSleeve was pulled up 3 – feet very rapidly through the screen interval.
- In-situ measurements were collected by analysing a small volume of groundwater from the HydraSleeve. Measurements were recorded on the InSitu iPhone app.
- The remaining groundwater was transferred to a clean plastic bottle
- Samples were stored in an esky on ice until submitted for analysis on the same day.

Analysis for all metals and TSS was conducted by the NATA accredited Southern Cross University Environmental Analysis Laboratory, Military Road, Lismore (SCU EAL).

Soil sampling methodology & procedures were as follows:

- Glovers were used to collect surface soil samples.
- Samples were immediately placed in glass jars.
- Samples were stored in an esky with ice and transported to the laboratory on the same day.
- Sampling equipment was decontaminated using industry-standard detergent (DECON90 or similar) prior to sampling.

Analysis for all metals was conducted by the NATA accredited Southern Cross University Environmental Analysis Laboratory, Military Road, Lismore (SCU EAL).

Appendix C. **Completed Chain of Custody Forms**

F7848 x 4 water

CHAIN OF CUSTODY

eal Environmental Analysis Laboratory, Southern Cross University

PO Box 157 (Military Road)
LISMORE NSW 2480
P| 02 6620 3678 F| 02 6620 3957
eal@scu.edu.au, www.scu.edu.au/eal

Submitting Client Details

Quote Id:
Job Ref: 17041
Company Name: Ecoteam
Contact Person: Stef Stanley
Phone: 66215123
Mobile:
Fax:
Email: stefanie@ecoteam.com.au
Postal Address:

Billing Client Details

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Preservation: None / Ice / Ice bricks / Acidified / Filtered / Other:		
Received By: KC	16/3/17	
Condition on receipt: Ambient / Cool / Frozen / Other:		

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Price List Code (e.g. SW-PACK-06)

Lab Sample No.	Sample ID	Sample Depth	Sampling Date	Your Client	Crop ID	Sample Type (e.g. water, leaf, soil)	TSS SW-SING-003	SW-Prep-002	SW-Prep-003	SW-Sing-102	SW-Sing-103	SW-Sing-104				
1	SW1		16-3-17	17041		W	x	x	x		x	x				
2	SW2		16-3-17	"		W	x	x	x		x	x				
3	SW3		16-3-17	"		W	x	x	x		x	x				
4	SW4		"	"		W	x	x	x		x	x				

EAL Chain of Custody
Issue: V1.1 27/09/2016

EAL Project Reference:

QFORM 4.2
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Al+Cu
Al+Cu

F8366

CHAIN OF CUSTODY

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Postal Address:

Billing Client Details

ABN: x1 water
Company Name:
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Phone: Robyn.
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☐ Purchase Order
☐ Cheque
☐ Invoice (prior approval required)
☐ Credit Card Mastercard / Visa No:_____/_____/_____/_____

Exp. Date: Name on Card: CVV:_____

		Date	Signed
Relinquished By:	Lise Bolton	5/4/17	
Preservation: None / Ice / Ice bricks / Acidified / Filtered / Other:			
Received By:		5.4.17	
Condition on receipt: Ambient / Cool / Frozen / Other:			

Comments:

Marketing Survey – where did you find us?
☐ Word of mouth ☐ Magazine ☐ Google search ☐ Other

Sample Analysis Request

Price List Code (e.g. SW-PACK-06)

Lab Sample No.	Sample ID	Sample Depth	Sampling Date	Your Client	Crop ID	Sample Type (e.g. water, leaf, soil)	SW-PACK-029 Total Metals	SW-PACK-040 Diss Metals	SW-SING-033 TSS	SW-SING-055 pH					
1.	GW001		5/4/17			Water	✓	✓	✓	✓					

F8143 X 2 Soil

CHAIN OF CUSTODY

eal Environmental Analysis Laboratory
Southern Cross University

PO Box 157 (Military Road)
LISMORE NSW 2480
P| 02 6620 3678 F| 02 6620 3957
eal@scu.edu.au, www.scu.edu.au/eal

Submitting Client Details

Quote Id:
Job Ref: 17041
Company Name: Ecoteam
Contact Person: Stefanie Stanley
Phone: 0428346622
Mobile:
Fax:
Email: stefanie@ecoteam.com.au
Postal Address:

Billing Client Details

ABN:
Company Name:
Contact Person:
Phone:
Mobile:
Fax:
Email:
Postal Address:

This section will be destroyed after being processed. Only Complete CVV number if you are supplying the original hardcopy to EAL.

Payment Method:
☐ Purchase Order
☐ Cheque
☐ Invoice (prior approval required)
☐ Credit Card Mastercard / Visa No:_____/_____/_____/_____
Exp. Date: Name on Card: CVV:_____

	Date	Signed
Relinquished By: Stef Stanley		
Preservation: None / Ice / Ice bricks / Acidified / Filtered / Other:		
Received By: KC	28/3/17	
Condition on receipt: Ambient / Cool / Frozen / Other:		

Comments:

Marketing Survey – where did you find us?
☐ Word of mouth ☐ Magazine ☐ Google search ☐ Other

Sample Analysis Request

Price List Code (e.g. SW-PACK-06)

Lab Sample No.	Sample ID	Sample Depth	Sampling Date	Your Client	Crop ID	Sample Type (e.g. water, leaf, soil)	SS-PACK-004									
1	S02	150 mm	28/3			Soil	X									
2	S03	150mm	28/3			Soil	X									

EAL Chain of Custody
Issue: V1.1 27/09/2016

EAL Project Reference:

QFORM 4.2
Page 1 of 2

Appendix D. **Laboratory Reports**

RESULTS OF WATER ANALYSIS

4 samples supplied by Ecoteam on the 16th March, 2017 - Lab. Job No. F7848
Analysis requested by Stefanie Stanley. **Your Project:** 17041
(43 Ewing Street LISMORE NSW 2480).

PARAMETER	METHODS REFERENCE	Sample 1 SW1	Sample 2 SW2	Sample 3 SW3	Sample 4 SW4
	Job No.	*F7848/1*	*F7848/2*	*F7848/3*	*F7848/4*
TOTAL SUSPENDED SOLIDS (mg/L)	GFC equiv. filter - APHA 2540-D	35	29	69	69
ALUMINIUM (mg/L)	Total - APHA 3125 ICPMS*note 1&2	0.819	3.469	4.275	0.957
COPPER (mg/L)	Total - APHA 3125 ICPMS*note 1&2	0.003	0.002	0.002	0.005
ALUMINIUM (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.172	1.117	0.883	0.256
COPPER (mg/L)	Dissolved - APHA 3125 ICPMS*note 1&2	0.002	0.002	0.002	0.002

Notes:
1. Total metals - samples digested with nitric acid
1. Dissolved metals - samples filtered through 0.45μm cellulose acetate and then acidified with nitric acid prior to analysis
2. Metals/ salts analysed by ICP-MS (Inductively Coupled Plasma - Mass Spectrometry) or ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry)
3. 1 mg/L (milligram per litre) = 1 ppm (part per million) = 1000 μg/L (micrograms per litre)= 1000 ppb (part per billion)
4. For conductivity - 1 dS/m = 1 mS/cm = 1000 μS/cm
5. Analysis performed according to APHA, 2012, "Standard Methods for the Examination of Water & Wastewater", 22nd Edition, except where stated otherwise.
6. Analysis conducted between sample arrival date and Report provision date
7. ** denotes these test procedure or calculation are as yet not NATA accredited but quality control data is available
8. .. Denotes not requested

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster
Laboratory Manager

RESULTS OF WATER ANALYSIS

1 sample supplied by Ecoteam on the 5th April, 2017 - Lab. Job No. F8366
Analysis requested by Stefanie Stanley. Your Project: 17041
(43 Ewing Street LISMORE NSW 2480).

PARAMETER	METHODS REFERENCE	Sample 1 GW001 5/04/17
	Job No.	F8366/1
pH	APHA 4500-H+-B	8.97
TOTAL SUSPENDED SOLIDS (mg/L)	GFC equiv. filter - APHA 2540-D	74
SILVER (mg/L)	Total - APHA 3125 ICPMS *note 1&2	<0.001
ALUMINIUM (mg/L)	Total - APHA 3125 ICPMS *note 1&2	0.707
ARSENIC (mg/L)	Total - APHA 3125 ICPMS *note 1&2	0.003
CADMIUM (mg/L)	Total - APHA 3125 ICPMS *note 1&2	<0.001
CHROMIUM (mg/L)	Total - APHA 3125 ICPMS *note 1&2	0.005
COPPER (mg/L)	Total - APHA 3125 ICPMS *note 1&2	0.009
IRON (mg/L)	Total - APHA 3125 ICPMS *note 1&2	2.372
MANGANESE (mg/L)	Total - APHA 3125 ICPMS *note 1&2	0.035
NICKEL (mg/L)	Total - APHA 3125 ICPMS *note 1&2	0.010
LEAD (mg/L)	Total - APHA 3125 ICPMS *note 1&2	0.001
SELENIUM (mg/L)	Total - APHA 3125 ICPMS *note 1&2	0.001
ZINC (mg/L)	Total - APHA 3125 ICPMS *note 1&2	0.047
MERCURY (mg/L)	Total - APHA 3125 ICPMS *note 1&2	<0.0005
SILVER (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	<0.001
ALUMINIUM (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	0.037
ARSENIC (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	0.004
CADMIUM (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	<0.001
CHROMIUM (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	0.001
COPPER (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	0.001
IRON (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	0.010
MANGANESE (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	0.008
NICKEL (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	0.002
LEAD (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	<0.001
SELENIUM (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	<0.002
ZINC (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	0.003
MERCURY (mg/L)	Dissolved - APHA 3125 ICPMS *note 1&2	<0.0005

Notes:

1. Total available (acid soluble/ extractable) metals - samples acidified with nitric acid to <2pH.
1. Dissolved metals - samples filtered through 0.45µm cellulose acetate and then acidified with nitric acid prior to analysis
2. Metals/ salts analysed by ICP-MS (Inductively Coupled Plasma - Mass Spectrometry) or ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry)
3. 1 mg/L (milligram per litre) = 1 ppm (part per million) = 1000 µg/L (micrograms per litre)= 1000 ppb (part per billion)
4. For conductivity - 1 dS/m = 1 mS/cm = 1000 µS/cm
5. Analysis performed according to APHA, 2012, "Standard Methods for the Examination of Water & Wastewater", 22nd Edition, except where stated otherwise.
6. Analysis conducted between sample arrival date and Report provision date
7. ** denotes these test procedure or calculation are as yet not NATA accredited but quality control data is available
8. .. Denotes not requested

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster
Laboratory Manager

RESULTS OF SOIL ANALYSIS

2 samples supplied by Ecoteam on 28th March, 2017 - Lab Job No. F8143
Analysis requested by Stefanie Stanley. **Your Project: 17041**
(43 Ewing Street LISMORE NSW 2480).

	Method	Sample 1 S02	Sample 2 S03
	Job No.	*F8143/1*	*F8143/2*
METALS			
Silver (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	<0.1	<0.1
Arsenic (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1.8	3.5
Lead (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	7.4	9.6
Cadmium (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	0.1	0.1
Chromium (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	43	48
Copper (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	18	9
Manganese (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	100	270
Nickel (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	7.3	8.0
Selenium (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	1.4	1.6
Zinc (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	81	65
Mercury (mg/Kg)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	<0.1	<0.1
Iron (%)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	5.7	10.2
Aluminium (%)	1:3 Nitric/HCl digest - APHA 3125 ICPMS	3.6	2.6

Notes:
1: ECEC = Effective Cation Exchange Capacity = sum of the exchangeable Mg, Ca, Na, K, H and Al
2: Exchangeable bases determined using standard Ammonium Acetate extract (Method 15D3) with no pretreatment for soluble salts. When Conductivity ≥0.25 dS/m soluble salts are removed (Method 15E2).
3. ppm = mg/Kg dried sample
4. Exchangeable sodium percentage (ESP) is calculated as sodium ($cmol^+/Kg$) divided by ECEC
5. All results as dry weight DW - samples were dried at 40°C for 24-48hrs prior to crushing and analysis.
6. Aluminium detection limit is 0.05 $cmol^+/Kg$; Hydrogen detection limit is 0.1 $cmol^+/Kg$. However for calculation purposes a value of 0 is used.
7. For conductivity 1 dS/m = 1 mS/cm = 1000 µS/cm
8. 1 $cmol^+/Kg$ = 1 meq/100g
9. Methods from Rayment and Lyons, Soil Chemical Methods - Australasia
10. Conversion of cmol+/Kg to mg/Kg multiply cmol+/Kg by:
230 for Sodium; 391 for Potassium; 200 for Calcium; 122 for Magnesium; 90 for Aluminium
11. Metals analysed by ICP-MS (Inductively Coupled Plasma - Mass Spectrometry) or ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry)

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster
Laboratory Manager

Appendix E. **Site Photographs**

Plate 1
28/3/2017
Hydra Sleeve being lowered into BQN1-D groundwater well.

Plate 2
16/3/2017
Highly turbid streamflow in Terania Creek at SW3, following significant rain. Noting bank erosion.

Plate 3
16/03/2017
Ponding of surface water near surface water discharge point SW4.

Plate 4
16/03/2017
Fractured basalt on Quarry floor near SW4.

Plate 5
28/03/2017
Distinct soil layers of Wollongbar landscape. Exposed and fractured basalt also evident on Quarry face.

Appendix F. **Insurances**

Insurance Class	Policy No.	Insurer	Period of Insurance	Limit of Liability
Worker's Compensation	WC438588157	QBE Workers Compensation	31 October 2016 - 31 October 2017	$2,000,000
Professional Indemnity	P-PI/0/58221/14/F-6	DUAL Australia Pty Ltd On behalf of certain underwriters at Lloyd's	30 January 2017 - 30 January 2018	$5,000,000
Public/Products Liability	12120041	Sterling Insurance Pty Ltd 100% underwritten by certain underwriters at Lloyd's	10 December 2016 - 10 December 2017	$10,000,000

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 15

Bush Regeneration Reports

Bush Regenaration Report Blakebrook Quarry

10/01/2017 to 10/05/2017

Roots Down Conservation Contractors

Site Assesment

In this period we have extended the area worked in zone 7 and continued to follow-up weeds in zones 6,7 and 19. .

In zone 7 the Eucalypt canopy became denser. More dry rainforest species occurred in the midstorey and the understorey more ferns and orchids grow in the denser canopied areas. As we approach zone 8 woody weeds such as large leaf privet and camphor laurel have increased in numbers but reduced in stem diameter, the lantana is climbing more and mostly on the edge of the area.

With the follow-up treatment in zone 6 we have observed an increase in eucalypt seedlings in the southern grassy area.

It is expected given the hot dry summer and the extensive April rains we will see a increase in weed germination May/June

Treatment

A spray follow-up program was commenced in zone 6 using a broadleaf selective (metsulfurin methyl) to maintain the grass cover, small amounts of glyphosate was used to control weedy grasses and camphor laurel seedlings present. In zone 7 a program of cut and paint and stem injection using glyphosate to control the large woody weeds, the lantana is mostly physically removed from the soil as is passionfruit vine as this has proven to be resilient in zone 6 . A follow-up in zone 7 and 19 of spot spraying with glyphosate to control seedlings and grass weeds has been comenced.

Results

So far zone 6 has shown a reduction of numbers and health of weed present, reproduction very unlikely. The ongoing spray program will control any weeds reshooting or germinating from the seed bank or invading from outside the site will consolidate these gains. We have found species of passionfruit more persistent in this area than other weeds because of this we have increased emphisis on hand removal of passionfruit during the primary weed control stage. There has also been germination of eucalypts in the southern area through the blady/kangaroo grass area.

Due to the control of the Privet and Camphor Laurel in zone 19 and 7 reducing the density of the canopy significant extra light is reaching the understorey plants and should allow the increase in native grasses and groundcovers it will also allow the regenerating eucalypts to establish but may encourage the growth of annual weeds and it is expected germination of woody weed seedlings from the seed bank.

Noxious Weeds

Noxious weeds controlled during Bush Regeneration activites

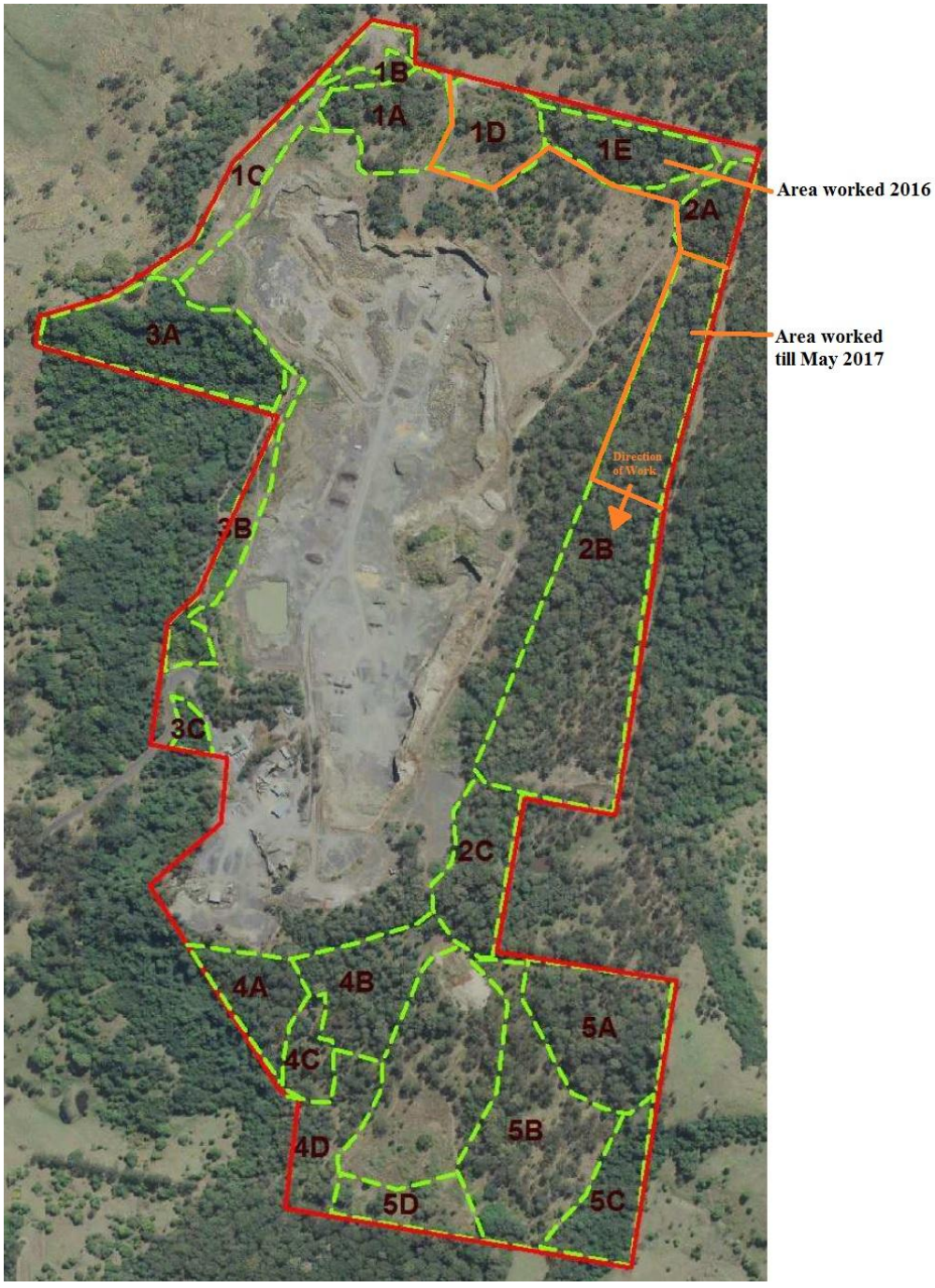
Category 3

Giant devils fig	*Solanum chrysotrichum*
Groundsel bush	*Baccharis halimifolia*

Category 4

Camphor laurel	*Cinnamomum camphora*
Lantana	*Lantana species*
Privet (broad-leaf)	*Ligustrum ludicum*
Privet (narrow-leaf)	*Ligustrum sinense*

Map of Works


1B
1A
1D
1E
1C
2A
Area worked 2016
Area worked
till May 2017
3A
Direction
of Work
3B
2B
3C
2C
4A
4B
5A
4C
5B
4D
5D
5C

Additional Information

Blakebrook Quarry Photo Monitoring 11/2017

Roots Down Conservation Contractors

Photopoint 1 Zone 19 looking West

Figure 1 25/02/2016

Figure 2 20/04/2016

Figure 3 07/02/2017

Figure 4 27/11/2017

Photopoint 1 Zone 19 looking East

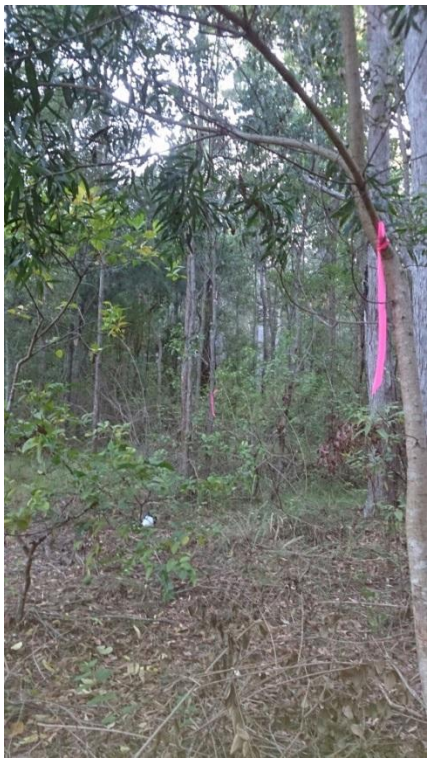


Figure 5 25/02/2016

Figure 6 20/04/2016

Figure 7 07/02/2017

Figure 8 27/11/2017

Photopoint 2 Zone 19 looking North

Figure 9 20/04/2016 8am

Figure 10 20/04/2016 3pm

Figure 11 07/02/2017

Figure 12 27/11/2017

Photopoint 2 Zone 19 looking South

Figure 13 20/04/2016 8am

Figure 14 20/04/2016 3pm

Figure 15 07/02/2017

Figure 16 27/11/2017

Photopoint 3 Zone 7 looking South

Figure 17 07/02/2017

Figure 18 27/11/2017

Photopoint 3 Zone 7 looking North

Figure 19 07/02/2017

Figure 20 27/11/2017

Photopoint 4 Zone 8 looking South

Figure 21 27/11/2017

Photopoint 4 Zone 8 looking North

Figure 22 27/11/2017

Daily Work Sheet

Site: Blakebrook Quarry **Date:** 07/02/17 **Hour:** 8 (5 David)
Personnel: David De Nardi, Steve Wood, Fiona Dawson
Weather conditions (temperature, wind speed & direction, cloud cover, rain):

Growing Conditions	Temperature	Weather Conditions	Wind	Direction
Very Good	Cool <20º	Showers	Strong	North
Good	Warm 21º-25º	Overcast	Gusty	East
Poor	V/Warm 26º-30º	Clear Sky	Light	South
Very Poor	Hot >30º	Variable	Calm	West

Herbicide	Trade Name	Batch No.	Dilution Rate	Total	Equipment
Mix 1	9.30am-2pm			60L	Knapsack
Glyphosate 360 g/L:	*Weedmaster duo*®	96881-0533	1to75	ml	
Metsulfuron Methyl:	*Associate*®		1.5g-10L	9g	
Additive:	[ ] Protec Plus®		1-500	ml	
	[ ] Pulse®	11233	1-500	60ml	
	[ ] Herbidye®	11317	1 to 250	240ml	
Mix 2	7am-1pm			6L	Knapsack
Glyphosate 360 g/L:	Weedmaster duo®	96881-0533	1to75	70ml	
Metsulfuron Methyl:	Associate®		1.5g-10L	g	
Additive:	[ ] Protec Plus®		1-500	12ml	
	[ ] Pulse®	11233	1-500	0ml	
	[ ] Herbidye®	11317	1 to 250	24ml	
Mix 3				2L	Hand Sprayer
Glyphosate 450 g/L:	*Glyphosate 450*®	MAA12295	1-3	600L	
Metsulfuron Methyl:	*Associate*®		1g-1L	2g	

Zone	**Activity & methods:** hp: hand pull, co: crown out, c+p: cut and paint, sp: scrape and paint, ss: spot spray, si: stem inject	**Area (m^2)**	**Comments**
Zone 7 south	C&p, Si, Hp; camphor, privet, Devil's fig, lantana, corky passionfruit	700	
Zone 19	Ss; camphor, paspalum, privet, Devil's fig, lantana, corky passionfruit, crofton weed ,silver desmodium	10000	

Additional observations: Flowering/fruiting/recruitment/germination/flora & fauna sightings:
Comments: Effectiveness of previous works/Follow up needs/Reminders:
OHS:

Source: Modified from Environmental Training and Employment (Envite) Inc. NSW 2004.

Daily Work Sheet

Site: Blakebrook Quarry **Date:** 21/02/17 **Hour:** 8
Personnel: David De Nardi, Steve Wood, David Dreher
Weather conditions (temperature, wind speed & direction, cloud cover, rain):

Growing Conditions	Temperature	Weather Conditions	Wind	Direction
Very Good	Cool <20º	Showers	Strong	North
Good	Warm 21º-25º	Overcast	Gusty	East
Poor	V/Warm 26º-30º	Clear Sky	Light	South
Very Poor	Hot >30º	Variable	Calm	West

Herbicide	Trade Name	Batch No.	Dilution Rate	Total	Equipment
Mix 1	7am-9.30am			20L	Knapsack
Glyphosate 360 g/L:	*Weedmaster duo*®	96881-0533	1to75	ml	
Metsulfuron Methyl:	*Associate*®		1.5g-10L	3g	
Additive:	[ ] Protec Plus®		1-500	ml	
	[ ] Pulse®	11233	1-500	40ml	
	[ ] Herbidye®	11317	1 to 250	800ml	
Mix 2	7am-9.30am			3L	Knapsack
Glyphosate 360 g/L:	Weedmaster duo®	96881-0533	1to75	60ml	
Metsulfuron Methyl:	Associate®		1.5g-10L	g	
Additive:	[ ] Protec Plus®		1-500	6ml	
	[ ] Pulse®	11233	1-500	0ml	
	[ ] Herbidye®	11317	1 to 250	12ml	
Mix 3				4L	Hand Sprayer
Glyphosate 450 g/L:	*Glyphosate 450*®	MAA12295	1-3	1200L	
Metsulfuron Methyl:	*Associate*®		1g-1L	4g	

Zone	**Activity & methods:** hp: hand pull, co: crown out, c+p: cut and paint, sp: scrape and paint, ss: spot spray, si: stem inject	**Area (m^2)**	**Comments**
Zone 7 south	C&p, Si, Hp; camphor, privet, Devil's fig, lantana, corky passionfruit	2000	
Zone 19	Ss; camphor, paspalum, privet, Devil's fig, lantana, corky passionfruit, crofton weed ,silver desmodium	5000	

Additional observations: Flowering/fruiting/recruitment/germination/flora & fauna sightings:
Comments: Effectiveness of previous works/Follow up needs/Reminders:
OHS:

Source: Modified from Environmental Training and Employment (Envite) Inc. NSW 2004.

Daily Work Sheet

Site: Blakebrook Quarry **Date:** 07/03/17 **Hour:** 8
Personnel: David De Nardi, Steve Wood, Fiona Dawson, David Dreher
Weather conditions (temperature, wind speed & direction, cloud cover, rain):

Growing Conditions	Temperature	Weather Conditions	Wind	Direction
Very Good	Cool <20º	Showers	Strong	North
Good	Warm 21º-25º	Overcast	Gusty	East
Poor	V/Warm 26º-30º	Clear Sky	Light	South
Very Poor	Hot >30º	Variable	Calm	West

Herbicide	Trade Name	Batch No.	Dilution Rate	Total	Equipment
Mix 1	7-8.30am			30L	Knapsack
Glyphosate 360 g/L:	*Weedmaster duo*®	96881-0533	1to75	450ml	
Metsulfuron Methyl:	*Associate*®		1.5g-10L	4.5g	
Additive:	[ ] Protec Plus®		1-500	ml	
	[ ] Pulse®	11233	1-500	30ml	
	[ ] Herbidye®	11317	1 to 250	120ml	
Mix 2				L	Knapsack
Glyphosate 360 g/L:	Weedmaster duo®	96881-0533	1to75	70ml	
Metsulfuron Methyl:	Associate®		1.5g-10L	g	
Additive:	[ ] Protec Plus®		1-500	ml	
	[ ] Pulse®	11233	1-500	0ml	
	[ ] Herbidye®	11317	1 to 250	ml	
Mix 3				6L	Hand Sprayer
Glyphosate 450 g/L:	*Glyphosate 450*®	MAA12295	1-3	1800L	
Metsulfuron Methyl:	*Associate*®		1g-1L	6g	

Zone	**Activity & methods:** hp: hand pull, co: crown out, c+p: cut and paint, sp: scrape and paint, ss: spot spray, si: stem inject	**Area (m^2)**	**Comments**
Zone 7 south	C&p, Si, Hp; camphor, privet, Devil's fig, lantana, corky passionfruit	2000	
Driveway bund	Ss; camphor, paspalum, privet, Devil's fig, lantana, corky passionfruit, crofton weed ,silver desmodium	10000	250 trees to fig 100 to camphor (cattle grid)

Additional observations: Flowering/fruiting/recruitment/germination/flora & fauna sightings:
Comments: Effectiveness of previous works/Follow up needs/Reminders:
OHS:

Source: Modified from Environmental Training and Employment (Envite) Inc. NSW 2004.

Daily Work Sheet

Site: Blakebrook Quarry **Date:** 13/03/17 **Hour:** 8
Personnel: David De Nardi, Steve Wood, Fiona Dawson, Trudi Yates
Weather conditions (temperature, wind speed & direction, cloud cover, rain):

Growing Conditions	Temperature	Weather Conditions	Wind	Direction
Very Good	Cool <20º	Showers	Strong	North
Good	Warm 21º-25º	Overcast	Gusty	East
Poor	V/Warm 26º-30º	Clear Sky	Light	South
Very Poor	Hot >30º	Variable	Calm	West

Herbicide	Trade Name	Batch No.	Dilution Rate	Total	Equipment
Mix 1				L	Knapsack
Glyphosate 360 g/L:	*Weedmaster duo*®	96881-0533	1to75	0ml	
Metsulfuron Methyl:	*Associate*®		1.5g-10L	g	
Additive:	[ ] Protec Plus®		1-500	ml	
	[ ] Pulse®	11233	1-500	ml	
	[ ] Herbidye®	11317	1 to 250	0ml	
Mix 2				L	Knapsack
Glyphosate 360 g/L:	Weedmaster duo®	96881-0533	1to75	0ml	
Metsulfuron Methyl:	Associate®		1.5g-10L	g	
Additive:	[ ] Protec Plus®		1-500	ml	
	[ ] Pulse®	11233	1-500	0ml	
	[ ] Herbidye®	11317	1 to 250	ml	
Mix 3				8L	Hand Sprayer
Glyphosate 450 g/L:	*Glyphosate 450*®	MAA12295	1-3	2400L	
Metsulfuron Methyl:	*Associate*®		1g-1L	8g	

Zone	**Activity & methods:** hp: hand pull, co: crown out, c+p: cut and paint, sp: scrape and paint, ss: spot spray, si: stem inject	**Area (m^2)**	**Comments**
Zone 7 south	C&p, Si, Hp; camphor, privet, Devil's fig, lantana, corky passionfruit	4000	

Additional observations: Flowering/fruiting/recruitment/germination/flora & fauna sightings:
Comments: Effectiveness of previous works/Follow up needs/Reminders:
OHS:

Source: Modified from Environmental Training and Employment (Envite) Inc. NSW 2004.

Daily Work Sheet

Site: Blakebrook Quarry **Date:** 04/10/17 **Hour:** 8
Personnel: David De Nardi, Steve Wood, Fiona Dawson, Brett Weissel
Weather conditions (temperature, wind speed & direction, cloud cover, rain):

Growing Conditions	Temperature	Weather Conditions	Wind	Direction
Very Good	Cool <20º	Showers	Strong	North
Good	Warm 21º-25º	Overcast	Gusty	East
Poor	V/Warm 26º-30º	Clear Sky	Light	South
Very Poor	Hot >30º	Variable	Calm	West

Herbicide	Trade Name	Batch No.	Dilution Rate	Total	Equipment
Mix 1 8-10				40L	Knapsack
Glyphosate 360 g/L:	*Weedmaster duo®*	96881-0533	1to75	600ml	
Metsulfuron Methyl:	*Associate®*		1.5g-10L	g	
Additive:	[ ] Protec Plus®		1-500	80ml	
	[ ] Pulse®	11233	1-500	0ml	
	[ ] Herbidye®	11317	1 to 250	160ml	
Mix 2:				L	
Glyphosate 360 g/L:	*Weedmaster Duo®*		1-50	0ml	Knapsack
Metsulfuron Methyl:	*Associate®*		1.5g-10L	G	
Additive:	[ ] Protec Plus®		1-500	ml	
	[ ] Pulse®		1-500	ml	
	[ ] Herbidye®		1-500	ml	
Mix 3				5L	Hand Sprayer
Glyphosate 450 g/L:	*Glyphosate 450®*	MAA12295	1-3	1500mL	
Metsulfuron Methyl:	*Associate®*		1g-1L	5g	

Zone	**Activity & methods:** hp: hand pull, co: crown out, c+p: cut and paint, sp: scrape and paint, ss: spot spray, si: stem inject	**Area (m^2)**	**Comments**
Entrance Bund	Ss; lantana, camphor, billygoat, bidens, thistle, privet	4000	
Cattle grid north boundry and power lines	Si, c&p; Devils Fig, Privet, lantana	2000	

Additional observations: Flowering/fruiting/recruitment/germination/flora & fauna sightings:

Comments: Effectiveness of previous works/Follow up needs/Reminders:
OHS:

Source: Modified from Environmental Training and Employment (Envite) Inc. NSW 2004.

Daily Work Sheet

Site: Blakebrook Quarry **Date:** 23/10/17 **Hour:** 6
Personnel: David De Nardi, Steve Wood, Fiona Dawson, Trudi Yates
Weather conditions (temperature, wind speed & direction, cloud cover, rain):

Growing Conditions	Temperature	Weather Conditions	Wind	Direction
Very Good	Cool <20º	Showers	Strong	North
Good	Warm 21º-25º	Overcast	Gusty	East
Poor	V/Warm 26º-30º	Clear Sky	Light	South
Very Poor	Hot >30º	Variable	Calm	West

Herbicide	Trade Name	Batch No.	Dilution Rate	Total	Equipment
Mix 1				0L	Knapsack
Glyphosate 360 g/L:	*Weedmaster duo®*	96881-0533	1to75	00ml	
Metsulfuron Methyl:	*Associate®*		1.5g-10L	g	
Additive:	[ ] Protec Plus®		1-500	80ml	
	[ ] Pulse®	11233	1-500	0ml	
	[ ] Herbidye®	11317	1 to 250	160ml	
Mix 2:				L	
Glyphosate 360 g/L:	*Weedmaster Duo®*		1-50	0ml	Knapsack
Metsulfuron Methyl:	*Associate®*		1.5g-10L	G	
Additive:	[ ] Protec Plus®		1-500	ml	
	[ ] Pulse®		1-500	ml	
	[ ] Herbidye®		1-500	ml	
Mix 3				3L	Hand Sprayer
Glyphosate 450 g/L:	*Glyphosate 450®*	MAA12295	1-3	900mL	
Metsulfuron Methyl:	*Associate®*		1g-1L	3g	

Zone	**Activity & methods:** hp: hand pull, co: crown out, c+p: cut and paint, sp: scrape and paint, ss: spot spray, si: stem inject	**Area (m^2)**	**Comments**
Zone 8	Si,C&p, Hp; privet Camphor, lantana	2500	

Additional observations: Flowering/fruiting/recruitment/germination/flora & fauna sightings:

Comments: Effectiveness of previous works/Follow up needs/Reminders:
Rained out at Lunchtime
OHS:

Source: Modified from Environmental Training and Employment (Envite) Inc. NSW 2004.

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 16

Koala Monitoring Program

Northern Rivers Quarry & Asphalt

KOALA MONITORING PROGRAM

DATE	Time	Your Name	No. sighted	Where (identify as per map)	Observed Koala Activity
2/03/2012	11.00 am	James Livingstone	1	Sth end	resting
14/03/2012	2.00 pm	Murray Punshon	1	Asphalt plant trees	feeding in tree
16/05/2012	10:00 AM	Leonie Sky	1	Asphalt plant trees	crossing road & climbing tree
13/06/2012	2:00 PM	Leonie Sky	1	Asphalt plant trees	crossing road & climbing tree
20/07/2012	6.50AM	Lucia Zorzi	1	Asphalt plant trees	Climbing down tree, lost sight
26/07/2012	9.22AM	Lucia Zorzi	1	Asphalt plant trees	crossing road & climbing tree
15/08/2012	5.27am	Andrew Smith	1	Asphalt plant trees	on ground travelling towards lab
4/09/2012	2.55pm	Graham Bryant	2	Asphalt plant trees	Mother and joey resting in tree
9/10/2012	11.00am	Murray Punshon	1	Asphalt plant trees	Resting in tree
5/11/2012	8.30am	Leonie Lockhart	2	Asphalt plant trees	Mother and joey resting in tree
12/11/2012	7am	Andrew Smith	1	Asphalt plant trees	Resting in tree
30/11/2012	7am	Leonie Lockhart	1	entrance road, near 2nd grid	about to climb tree
27/02/2013	10.30am	Murray Punshon	1	Asphalt plant trees	resting in tree
15/05/2013	8.25am	Graham Bryant	1	Asphalt plant trees	Resting in tree
16/05/2013	06.45am	Lucia Zorzi	1	Road near asphalt plant	Crossing road
1/07/2013	7.00am	Andrew Smith	1	Asphalt plant trees	walking near noise wall
25/07/2013	03.40pm	Lucia Zorzi	1	Asphlat plant exit road	Heading toward asphalt trees
22/10/2013	11.08am	Andrew Smith	2	Near Asphalt agg bins	Resting in tree
9/11/2013	5.35pm	Andrew Smith	2	Asphalt plant trees	Resting in tree
11/11/2013	3.23pm	Andrew Smith	1	Asphalt plant trees	moving from tree to tree
14/11/2013	2.20pm	Andrew Smith	1	Asphalt plant trees	crossing road to asphalt trees
18/11/2013	12.30pm	Chris Clapham	2	Asphalt plant trees	climbing up trees at Asphalt plant
21/11/2013	1.55pm	Murray Punshon	1	Asphalt plant trees	Resting in tree
23/11/2013	10.45am	Murray Punshon	1	Asphalt plant trees	Resting in tree
17/07/2014	07.27am	Lucia Zorzi	1	Asphalt plant trees	Crossing road toward dam
10/10/2014	07.15an	Lucia Zorzi	1	Asphalt plant trees	Crossing road toward Dam
30/10/2014	07.30am	Tom Hazell	1	Asphalt plant trees	Walking near sound wall
17/11/2014	10.55am	Dakota Christian	1	Asphalt plant trees	Resting in tree
10/12/2014	07.45am	Kurt Bezjak	1	Asphalt plant trees	Resting in tree
12/03/2015	11.30am	Kurt Bezjak	1	road near asphalt plant	Crossing road
16/03/2015	7.50am	Lucia Zorzi	1	Road near asphalt plant	Crossing road
25/03/2015	10.30am	Andrew Smith	1	Asphalt plant trees	Resting in tree
29/04/2015	09.00am	Mathew Baker	1	Near northern monitoring bore	resting in tree
3/08/2015	2.54pm	Leonie Lockhart	1	Asphalt plant trees	Resting in tree
10/08/2015	11.00am	Andrew Smith	1	Asphalt plant trees	Resting in tree
6/10/2015	07.00am	Andrew Smith	1	Asphalt plant trees	Resting in tree
12/10/2015	11.50am	Andrew Smith	1	Asphalt plant trees	Resting in tree
2/11/2015	07.35am	Lucia Zorzi	1	Road near asphalt plant	Crossing road
2/11/2015	01.30pm	Kurt Bezjak	1	Asphalt plant trees	Resting in tree
10/11/2015	06.00am	Steve Williamson (ASTEC)	1	Road near asphalt plant	Crossing Road
10/11/2015	0345pm	Riccardo Martinez	1	Asphalt plant trees	Resting in tree
11/11/2015	08.00am	Luke Arnold	2	Asphalt plant trees	Resting in tree
13/11/2015	12.25pm	Luke Arnold	1	Asphalt plant trees	Resting in tree
19/11/2015	11.02am	Kurt Bezjak	1	Asphalt plant trees	Resting in tree
27/11/2015	8.30am	Luke Arnold	1	Asphalt plant trees	crossing road & climbing tree
4/12/2015	02.40pm	Luke Arnold	1	Asphalt plant trees	Resting in tree
7/12/2015	09.55am	Andrew Smith	1	Asphalt plant trees	Resting in tree
9/12/2015	11.40am	Steve Reece (driver)	1	Trees at top of haul road	Resting in tree
9/12/2015	1.25pm	Steve Reece (driver)	2	Trees near PC bins	Resting in tree
11/12/2015	06.30am	Andrew Smith	1	Trees near PC bins	Resting in tree
27/01/2016	11.00am	Dave Edwards	1	Northern Boundary trail	Resting in tree
1/02/2016	7am	James Livingstone	1	Northern side of weighbridge	crossing road & climbing tree
19/02/2016	8.15am	Andrew Smith	1	Asphalt plant trees	Resting in tree
2/03/2016	9.40am	Luke Arnold	1	Asphalt plant trees	Resting in tree
3/03/2016	7.30am	James Livingstone	1	Asphalt plant trees	Resting in tree
3/03/2016	10.45am	Kurt Bezjak	1	Asphalt plant trees	Resting in tree
4/03/2016	9.00am	Phil Klepzig	1	Asphalt plant trees	Resting in tree
9/03/2016	03.00am	Andrew Smith	1	asphalt plant trees	Climbing down to ground
6/04/2016	02.00am	Graham Bryant	1	Asphalt plant trees	Climbing tree behind new AC plant
15/04/2016	7.20am	Leonie Lockhart	1	garden outside weighbridge	running through garden
8/06/2016	2.15pm	Kurt Bezjak	1	Asphalt plant trees	Resting in tree
15/06/2016	9am	Kurt Bezjak	1	Asphalt plant trees	Resting in tree
17/06/2016	9.30am	Kurt Bezjak	1	Asphalt plant trees	Resting in tree
8/07/2016	7.45am	Kurt Bezjak	1	old asphalt plant near top dam	walking across road
11/08/2016	07.30am	Kurt Bezjak	2	Asphalt plant trees	Resting in tree
8/11/2016	10.45am	Leonie Lockhart	1	crossing road near old asphalt plant	crossing road & climbing tree
11/01/2017	12.00pm	Andrew Smith	1	Asphalt plant trees	Resting in tree
13/02/2017	1.00pm	Luke Arnold	1	Asphalt plant trees	Resting in tree
26/09/2017	3.50pm	Graham Bryant	1	Entrance Rd	walking on road below second grid
5/12/2017	11.30am	Warren Scott	1	Entrance Rd	Crossing Rd near hairpin.

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 17

Community Consultative Committee Minutes

MINUTES OF **NRQA COMMUNITY CONSULTATIVE COMMITTEE MEETING – THURSDAY, 11 May 2017** GOOLMANGAR HALL, GOOLMANGAR 4.30 PM (EF11/13)

Present: Tim Heldt (Chairperson), Kurt Bezjak (Operations Manager Commercial Services), Leonie Lockhart (Administration), Kath Parry (LCC Representative), Tony Heffernan (LLS)
Community members: Bill Wallace, Jeff Greber, John & Sue Wraights, Sam Clayton, John McIntyre, Josh Wellman (LLS & resident)

Apologies: Lisa Wellman

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1. Welcome

Kurt introduced Tim as the new chairperson, who gave a brief account of his background. The meeting was opened and welcomed all members.

2. Previous Minutes

overview of previous meeting & Minutes, were accepted as being true & correct.

3. Business arising from minutes of previous meeting

Weed Control:
Roots Down Conservation are working around each of the weed zones strategically. An extra person will be employed within the group from FY 2017/2018 to expedite the process and contain noxious weed species.

Environmental Offset Strategy:
The offset purchasing of 45 ha is now finalised.

There is one section of fencing that needs to be realigned. Kurt will meet with John Wraights (McNamara property) to discuss and organise works.

Bushland Regeneration:
Quarry staff maintain visual inspections of boundary fencing, which is scheduled for slashing every 6 months to keep control of maintenance. Roots Down Conservation monitor weed control and growth of trees planted on site, more trees are scheduled for planting in Spring.

Groundwater monitoring:
Being tested quarterly results on LCC website (www.lismore.nsw.gov.au / Business & Industry / Northern Rivers Quarry & Asphalt / Environmental Reporting)

Monitoring is conducted every 3 months from 3 nest sites containing 3 bores in each.

NRQA is currently working with Gilbert & Sutherland (consultants) to satisfy all of the Conditions from Dept of Planning, in order to gain approval for vertical mining, currently at RL 104 and can extract down to RL 50 after approval.

Wild Dog baiting program:
Tony Heffernan spoke in detail about the group co-ordinating a baiting program. LLS run free workshops mostly each fortnight for certification for dog baiting and mentioned having a few people in the group certified makes the program efficient and not a burden on anyone person. Sam Clayton is happy to attend the workshop to help co-ordinate the first group bait with NRQA.

Noise Monitoring:
Latest annual report was conducted in November 2016, which was complying with Dept of Planning conditions.

General business:
Kurt gave a brief update on the asphalt tender being processed through LCC currently. Two companies have submitted tenders for assessment.

The flood last month has had an impact on normal operations, however the work is starting to pick up especially in regards to material for road repairs, some of this is dependent on Government funding.

Bill mentioned part of Jeff's road was washed out from the flood. Kurt will meet with them both to inspect and discuss.

NEXT MEETING set for November 2017 at Goolmangar Hall. Leonie will confirm closer to the date.

The meeting commenced at 4.45pm and concluded at 5.45 pm.

Item	Action Outcome	By whom & when
Plant feeder trees	On site & berm wall	Kurt – Oct
Wild dog baiting	Group to co-ordinate	Leonie – Oct
Road wash outs	Kurt to meet with Bill & Jeff	Kurt – end of June
New fencing requirements	Kurt to meet with John Wraights	Kurt – end of June

Newton Denny Chapelle
SURVEYORS PLANNERS ENGINEERS

ATTACHMENT 18

Complaints Register

Environmental Complaints Register

Information received about an Environmental Complaint shall be added to the register. These details shall then be added to a Non Conformance Report Form and actioned via the Non Conformance Procedure.

To be kept for at least 7 yrs Date & Time	Method of Complaint (phone, Face to face)	Details of Complainant	Nature of Complaint	Action taken	Reason for no action (if applicable)	NCAR Report No
16/02/09 7:20am	**Phone**	**Adam Wijeyekoon** **Phone: 0414 329 027** 387 Boorerie Creek Road, Lismore	**Upset about the noise of rock breaker**	Rock breaking activities between 9am – 3pm Mon-Fri only. Rock breaking cannot occur if wind direction is NE.		
17/02/09 7:10am	**Phone**	**Adam Wijeyekoon** **Phone: 0414 329 027**	**Noise from rock breaker**	Rock breaking activities between 9am – 3pm Mon-Fri only. Rock breaking cannot occur if wind direction is NE.		
5/03/09 7:05am	**Phone**	**Adam Wijeyekoon** **Phone: 0414 329 027** 387 Boorerie Creek Road, Lismore	**Reverse buzzer on machine used between 6am & 7am**	Reverse buzzer to be disconnected prior to 7am and flashing will be installed		
1/05/09 7:45am	**Phone**	**Adam Wijeyekoon** **Phone: 0414 329 027** 387 Boorerie Creek Road, Lismore	**Smell of diesel fumes is causing headaches**	Production Supervisor checked diesel tanks for any leaks – Nothing detected		

Environmental Complaints Register

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To be kept for at least 7 yrs Date & Time	Method of Complaint (phone, Face to face)	Details of Complainant	Nature of Complaint	Action taken	Reason for no action (if applicable)	NCAR Report No
16/03/10 7:05am	**Phone**	**Adam Wijeyekoon** **Phone: 0414 329 027** 387 Boorerie Creek Road, Lismore	**Banging noise with hammer?**	Asphalt Plant Manager reminded staff no noise before 7am Adam was contacted via mobile informing him of the action taken		
3/05/10 6:20am	**Phone**	**Adam Wijeyekoon** **Phone: 0414 329 027** 387 Boorerie Creek Road, Lismore	**Humming noise coming form the quarry – Lime tanker was unloading at the time at the Asphalt Plant**	Lime tankers will not be unloading before 7:00am Murray & Graham~~e~~ will be having a meeting with Adam concerning the asphalt plant operations before 7:00 am		
20/07/10	**Phone**	**Margie 6689 1331**	**Waste Asphalt leaching oil (Diesel) near creek**	Metal dust sent to location to contain the leeching. Suspect areas to be removed & replaced with asphalt. Site visit by Manager to assess. LCC environmental Informed.		
23/9/11	**Phone (via EPA)**	**Peter Lynch – EPA** Peter.lynch@environment.nsw.gov.au	**Machinery noise 5.55am**	All staff and contractors to be reminded of DA hours of operation. After investigation, no source of noise was able to be identified.		

Environmental Complaints Register

Information received about an Environmental Complaint shall be added to the register. These details shall then be added to a Non Conformance Report Form and actioned via the Non Conformance Procedure.

To be kept for at least 7 yrs Date & Time	Method of Complaint (phone, Face to face)	Details of Complainant	Nature of Complaint	Action taken	Reason for no action (if applicable)	NCAR Report No
28/11/11	**Phone (via EPA)**	**Peter Lynch – EPA** Peter.lynch@environment.nsw.gov.au	**Machinery noise 5.50am**	Investigate source of noise and remind all staff & contractors of DA hours of operation. After investigation, no source of noise was able to be identified		
2/7/12 overnight	**Phone**	**William Wallace** Nimbin Rd, Blakebrook **6629 3289**	**Bitumen tanker delivering for SAS parked at NRQA gate over night leaving his burners on, creating noise**	Asphalt plant manager visited Mr Wallace to apologise for the disturbance and assure him that it wouldn't happen again, as SAS will no longer be located at NRQA site.		
31/08/12	**Phone**	**Roz Diskin** 0421 321 700 via Council call centre	**Called to notify us that the blast taken at approx 10.00am caused a tremor felt in the house similar to that experienced when lightning strikes in close proximity. Caused windows to rattle.**	Explained that the cause may have been due to cloud cover not allowing pressure wave to dissipate vertically as the weather was overcast forcing the concussion to dissipate laterally. She and her husband would like to have a look around the quarry at some stage if possible; discussed with Murray and will try to arrange. LZ	**Over pressure sensor readings returned all within parameter.**	

Environmental Complaints Register

Information received about an Environmental Complaint shall be added to the register. These details shall then be added to a Non Conformance Report Form and actioned via the Non Conformance Procedure.

To be kept for at least 7 yrs Date & Time	Method of Complaint (phone, Face to face)	Details of Complainant	Nature of Complaint	Action taken	Reason for no action (if applicable)	NCAR Report No
19/6/15	**Phone**	**Phone call received from Peter Lynch - EPA saying there was a noise complaint from an anonymous neighbour**	**Night work being conducted for RMS road works (Clunes). Anonymous neighbor phoned EPA reporting noise after hours.**	Copy of LCC DA sent to EPA noting Point 8, identifying our right to work during this time		
15/4/16	**Phone**	**Anonymous neighbor**	**Asphalt night works disturbing them (noise)**	Caller did not wish to identify themselves or lodge a formal complaint.		
18/4/16	**Phone**	**Anonymous neighbor**	**Asphalt night works disturbing them (noise)**	Caller did not wish to identify themselves or lodge a formal complaint.		
19/4/2016 - 19/7/2016				Nil - No complaints received		
19/7/2016 - 19/10/2016				Nil- No Complaints received		
19/10/2016 -19/1/2017				Nil- No Complaints received		
19/1/2017 - 19/4/2017				Nil- No Complaints received		
190/4/2017 19/07/2017				Nil - No complaints received		
19/7/2017 - 19/10/2017				Nil- No complaints received		
19/10/2017 19/1/2018				Nil- No Complaints received		