LISMORE CITY COUNCIL

STATEMENT OF ENVIRONMENTAL EFFECTS

For a Modification to the Conditions of Consent for Blakebrook Quarry (MP 07_0020 SSD)

For the Proposed

INCLUSION OF AN ANCILLARY ASPHALT PLANT AND OTHER MINOR AMENDMENTS

Prepared for: Lismore City Council
PO Box 23A
Lismore NSW 2480

Our reference: 18037

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TO WHOM IT MAY CONCERN

I/We, the undersigned, hereby certify that I/we have read this Statement of Environmental Effects prepared on behalf of Lismore City Council by Mitchel Hanlon Consulting Pty Ltd and I/we believe the information contained in this document in relation to:-

1. The proposed use of the land is correct;
2. The information supplied by Lismore City Council in regard to the present use of the site is true and correct; and
3. This document represents an accurate statement of the proposed development, environmental impacts and the methodology for environmental protection of the site.

Eleisha Went

Commercial Services Compliance Coordinator, Lismore City Council

Signature

Date

Shelley Oldham

General Manager, Lismore City Council

Signature

Date

Submission of Statement of Environmental Effects (SEE)

Prepared under the Environmental Planning and Assessment Act 1979.

SEE Prepared by	
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In respect of	
Proponents Name	Lismore City Council
Proponent Address	43 Oliver Avenue, Goonellabah NSW 2480
Land on which activity to be carried out:	Lot 201 in DP 1227138 540 Nimbin Road, Blakebrook
Proposed development / modification	Inclusion of an Ancillary Asphalt Plant and other Minor Amendments to MP 07_0020
Statement of Environmental Effects	
Certificate	I / We certify that I have prepared the contents of this Report to the best of my knowledge: It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.
Signature	
Name	Tim McLean Mitchel Hanlon Consulting
Release Date	24th July 2019

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1.0 Introduction

1.1 Background

Lismore City Council (LCC) is the owner and operator of Blakebrook Quarry, a State Significant Development (SSD). Blakebrook Quarry currently operates pursuant to the Minister's Conditions of Approval MP07-0020, dated 18 September 2017, otherwise known as the development approval. As part of the original approval process, an Environmental Impact Statement (EIS) was prepared and submitted to the NSW Department of Planning (now known as the NSW Department of Planning and Environment (DPE)).

The Blakebrook Quarry presently holds an environmental protection licence (EPL) issued by the NSW Environmental Protection Authority (EPA), authorising extractive activities of up to 500,000 tonnes per annum, including asphalt production as an ancillary activity. Blakebrook Quarry excavates aggregate material for use on infrastructure development and maintenance with its primary product being basalt. This basalt is primarily utilised as a road base and aggregate. An asphalt plant currently resides within the Blakebrook Quarry footprint area and operates pursuant to a standard Council development approval (DA) DA90/341. As part of this development approval process an EIS was prepared and submitted to Lismore City Council, Planning Unit. The existing DA permits an average production of 15,000 tonnes of asphalt per annum.

LCC is currently responsible for the periodic environmental management and compliance associated with the licencing of both the quarry and the asphalt plant. In an attempt to streamline management and reduce excessive expenditure on environmental compliance and monitoring, LCC is proposing to modify the quarry's development consent to include the asphalt plant as an ancillary activity to the quarry operations. LCC is also seeking to amend the current approval to allow a number of other minor changes to be made to the consent and associated environmental compliance requirements.

As part of this process LCC is also requesting that a number of development approval conditions be amended to adequately reflect operations and LCC's request to increase asphalt production to 50,000 tonnes per annum.

Part 5 of the *Environmental Planning & Assessment Act 1979* requires a Statement of Environmental Effects (SEE) to identify potential environmental issues. This SEE has been prepared in conjunction with LCC's application to modify the existing Blakebrook Quarry's development consent MP07-0020.

This SEE has been commissioned by LCC and describes the existing land and the characteristics of the proposed development and identifies the potential impacts the development will have on the immediate environment. Where deleterious impacts are identified, measures which can mitigate their impact have been presented.

Figure 1 shows the site's location in relation to the Lismore Locality.

1.2 Location

Blakebrook Quarry is located at 540 Nimbin Road. Blakebrook (Lot 201 in DP 1227138), approximately seven (7) kilometres north west of Lismore. The asphalt plant is within the quarry boundaries. The regional and local locations are shown in Figure 1.

As a requirement of the recent lease of the asphalt plant to the RPQ Group (RPQ), the plant site is to be excised from Lot 201 in DP 1227138 and be contained within its own Lot.

The subdivision and registration process associated with this requirement has not yet occurred but is being undertaken by LCC concurrently to this modification. The asphalt plant and quarry will subsequently be situated on separated lots within the same deposited plan (DP), however it is deemed that they will still operate within the same site footprint identified as the Blakebrook Quarry.

1.3 The Proponent

The proponent for the development is Lismore City Council.

Council's contact details are:

Lismore City Council
43 Oliver Avenue,
GOONELLABAH NSW 2480
ABN: 60 080 932 837

Phone: 1300 87 83 87
Email: council@lismore.nsw.gov.au
Website: www.lismore.nsw.gov.au

2.0 The Proposal

2.1 Introduction

Blakebrook Quarry is currently owned and operated by LCC. The Asphalt plant is owned and historically operated by LCC. Asphalt operations have recently been taken over by RPQ Asphalt Pty Ltd (part of the RPQ Group).

2.2 Site Description

Table 1: Site Identification – Blakebrook Quarry

ASPECT	DESCRIPTION
Site Address	540 Nimbin Road, Blakebrook NSW, 2480
Lot / DP	201/1227138 (current)
LGA	Lismore City
Co-ordinates: (GD94 – MGA56)	E: 524400.462, N: 6817895.412 Zone: 56
Site Owner/s	Lismore City Council
Applicant / Proponent	Lismore City Council
Quarry Operator	Lismore City Council
Asphalt Plant Operator	RPQ Asphalt Pty Ltd (part of the RPQ Group)
Total Quarry Site Area (Approximate)	126 ha
Asphalt Plant Area (Approximate)	3.4 ha
Current Use	Extractive Industry (Quarry/Asphalt Plant)
Local Planning Instrument	Lismore Environmental Plan 2012
Current Zoning [#]	*RU1*
Development Type	State Significant (MP 07_0020)
Consent Authority	NSW Department of Planning

[#] Zoning under Lismore LEP 2012

2.3 Proposal Overview

LCC wishes to amalgamate the existing asphalt plant into the Blakebrook Quarry development consent. The asphalt plant is already operative within the quarry site under its own separate development consent.

LCC is making an application to modify the quarry's development consent (MP07_0020) to include the asphalt plant as an ancillary activity to the quarry operations.

LCC is also seeking to amend the current approval to allow a number of other minor changes to be made to the consent and associated environmental compliance requirements.

2.3.1 Proposed Modifications

As part of this application LCC is requesting a variation to a number of development approval conditions including:

- Consolidate quarry and asphalt plant consents;
- An asphalt production limit increase to 50,000 tonnes per annum;
- An increase to daily truck count from 100 trucks per day to 150 trucks per day and
- The amendment of the consent description to refer to an extractive industry and ancillary mobile asphalt plant.

LCC are also seeking various amendments to the current conditions of consent and associated compliance commitments. The proposed amendments are contained within Table 2.

Table 2: Proposed Amendments to Conditions of Consent

CONDITION / ITEM	PROPOSED AMENDMENT / JUSTIFICATION
SCHEDULE 1	
• NIL	
SCHEDULE 2 – ADMINISTRATIVE CONDITIONS	
• Current definition of laden truck	Change definition to 'vehicles carrying more than 5 tonne'. This was removed/replaced from the previous consent and given the quarry at various time may have small public pickups of gravel material etc a definition based upon a weight/volume criteria is deemed to be more suitable.
• Condition 8b:	Increase number of allowable trucks movements from 100 trucks per day to 150 trucks per day.
SCHEDULE 3 – SPECIFIC ENVIRONMENTAL CONDITIONS	
• Condition 3:	Change the noise criteria at 'Location 2' ($L_{Aeq\ (15min)}$ 36dB) to that of the criteria used in original noise assessment (38dB) as current criteria is below existing 'background' levels. Also see Appendix 2, Commitment 5.8 of issued approval.
• Condition 5a:	Amend timeframe to complete any management plan updates be extended to 6 months. Budget restraints means this is extremely difficult to complete within 3 months.
• Condition 7:	Change to include 'any maintenance and safety work to roads and quarry' as haul road widening is required by the resource regulator.
• Condition 20:	Change the stated six (6) month period to annually (12 months) to coincide with the Annual Environmental Monitoring Report (AEMR) review and data collation.
• Condition 23b:	Request a timeframe extension requested to coincide with collection of data as part of AEMR review.
• Condition 28:	Request a timeframe extension requested to coincide with collection of data as part of AEMR review.

SCHEDULE 4 – ADDITIONAL PROCEDURES	
• NIL	
SCHEDULE 5 – ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING	
• Condition 4:	Request an extension of this timeframe to six (6) months due to budget restraints.
• Condition 9:	Change condition to state within 'seven (7) days of 'confirmation' of the incident'. This is to allow for laboratory analysis timeframes.
• Condition 14:	Change reporting timeframe from monthly to annually and/or on request. At present all complaints are received and managed through Council's complaint management system. As such an annual report can be extracted and listed on the website. Maintaining a separate register is not operationally viable and due to budgetary constraints Council no longer have an administrative resource at the quarry.
APPENDIX 1 – PROJECT LAYOUT PLAN	
• NIL	
APPENDIX 2 – STATEMENT OF COMMITMENTS	
• Commitment 1.1	Amend to allow for inclusion of the various approved managements plans (as amended) required by the conditions of consent.
• Commitment 2.12	Change 'Council' to 'relevant authority' as Council is the proponent
• Commitment 3.1	Change 'Vegetation and Habitat Management Plan' to 'Approved Management Plans eg. bush regeneration, BOS, BRMP etc'
• Commitment 3.2	As above
• Commitment 5.1	Change stated to hours to 'in accordance with conditions of approval (Schedule 3 (1)).
• Commitment 5.2	Change 'prohibit' compressions breaking to 'limit' due to safety concerns
• Commitment 5.8	Noise requirements for 'Location 2' (122 Keerrong Road) are different to those prescribed in Schedule 3 (3). Please update Schedule 3 (3) to match.

• Commitment 6	Remove requirements from commitments as these are prescribed in conditions of consent and the various approved management plan.
• Commitment 7	Remove requirements from commitments as these are prescribed in conditions of consent and the various approved management plan.
• Commitment 8	Remove requirements from commitments as these are prescribed in conditions of consent and the various approved management plan.
• Commitment 10	Remove requirements from commitments as these are prescribed in conditions of consent and the various approved management plan. The expenditure modelling provided in management plans was submitted to department for approval.
APPENDIX 3 – RECEIVER LOCATION PLAN	
• Receiver Plan	Update to reflect plan within approved management plan/s
APPENDIX 4 – BIODIVERSITY OFFSET STRATEGY	
• NIL	
APPENDIX 5 – NOISE COMPLIANCE ASSESSMENT	
• NIL	

NOTE: ALL LOCATIONS, AREAS & DIMENSIONS SHOWN ON THIS PLAN ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY

INFORMATION SHOWN RELATING TO CADASTRAL, TOPOGRAPHICAL FEATURES AND RECEPTOR LOCATIONS HAVE BEEN INTERPOLATED FROM NSW LAND AND PROPERTY INFORMATION SIX MAPS AND SUB-CONSULTANT REPORTS. THEREFORE ALL INFORMATION SHOWN IS APPROXIMATE ONLY AND SHOULD NOT BE SCALED AND SHOULD ONLY BE RELIED UPON FOR PLANNING PURPOSES.

INFORMATION SOURCES / IMAGERY USED:

- GOOGLE EARTH;
- NSW SIX MAPS;
- LISMORE CITY COUNCIL: AND
- ASSURED ENVIRONMENTAL PTY LTD

Locality Plan - Ancillary Asphalt Plant

Blakebrook Quarry, 540 Nimbin Road, BLAKEBRROK

FIGURE 1

Mitchel Hanlon Consulting Pty Ltd

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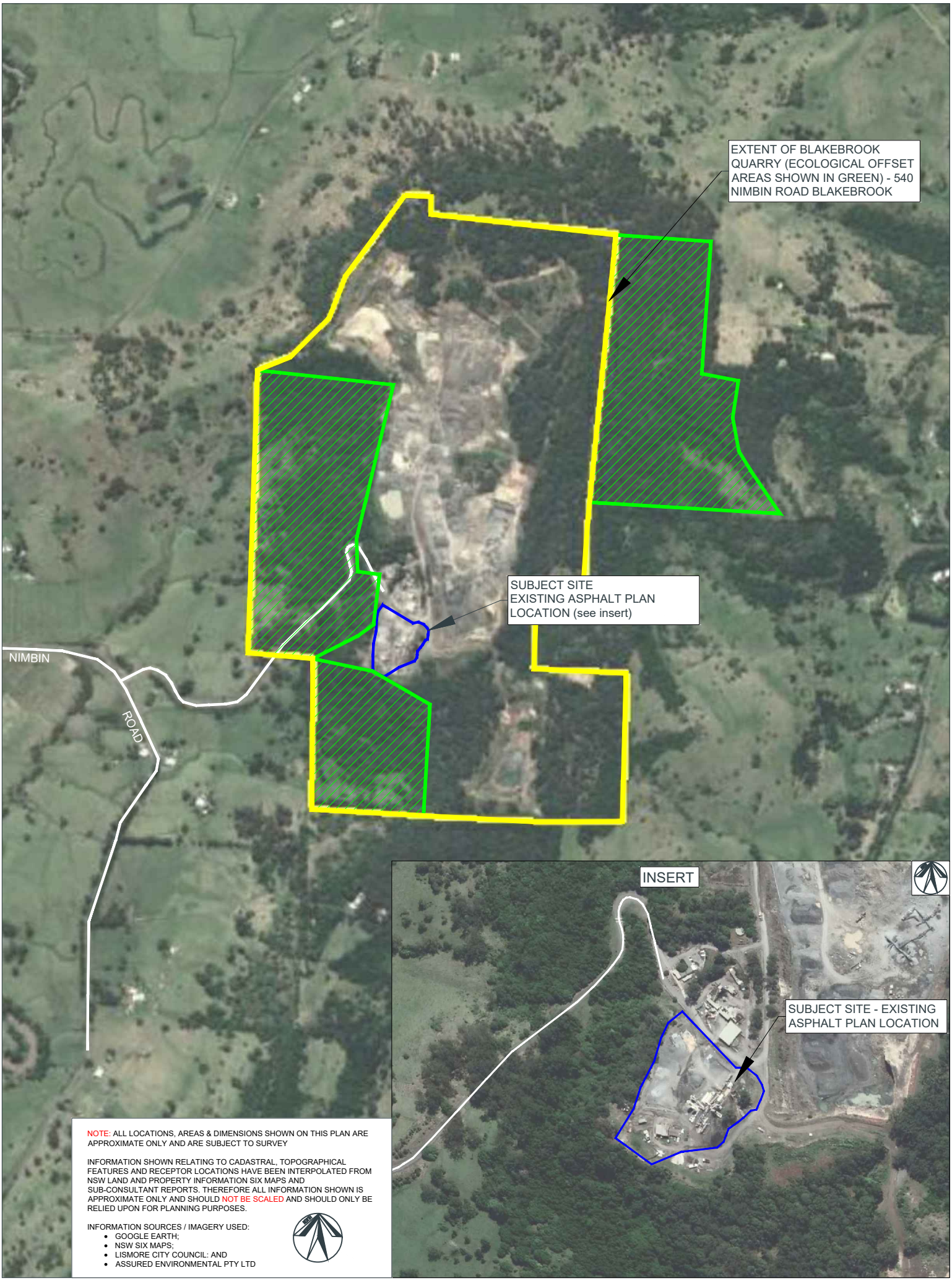

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INFORMATION SOURCES / IMAGERY USED:

- GOOGLE EARTH;
- NSW SIX MAPS;
- LISMORE CITY COUNCIL: AND
- ASSURED ENVIRONMENTAL PTY LTD

Site Plan - Ancillary Asphalt Plant

Blakebrook Quarry, 540 Nimbin Road, BLAKEBRROK

FIGURE 2

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3.0 Development Characteristics

3.1 Current Development Descriptions

3.1.1 Quarry Operation

The Blakebrook Quarry facility provides a key resource for hard rock and infrastructure construction materials to the Lismore region. The facility, which includes both quarrying and asphalt production operations, has operated at the site for a considerable period of time.

The quarry is licenced for the extraction, processing and storage of 600,000 tonnes per annum, with a maximum of 100 laden trucks per day permitted under the existing development consent (MP 07-0020).

Quarrying at the facility is undertaken using a drill and blast technique with the operating plant and equipment on site including:

- Jaw Crusher (330hp);
- Scalper/reclaimer (140hp);
- Cone Crusher (540hp);
- VSI Crusher (540hp);
- 2 x Screendecks (100hp);
- 2 x Powered Stockpilers (75hp);
- Cat 336EH Excavator;
- Volvo 380 Excavator;
- Pugmill;
- Komatsu WA480 FEL;
- Komatsu WA500 FEL;
- Service Truck;

- Fuel Truck;
- Water Truck;
- Drill Rig; and
- Trucks (on-site and off-site transportation).

3.1.2 Asphalt Plant

In addition to the quarrying operation, asphalt is produced on-site through a permanent (and more recently a mobile) asphalt plant operated by LCC. Recently, asphalt operations have been taken over by an external contractor (RPQ). The asphalt plant is currently approved under DA90/341 and authorised to produce an average of 15,000 tonnes of product per annum.

Asphalt production at the site is undertaken using a recently installed Benninghoven portable asphalt plant (Plate 1to Plate 6 illustrates the typical arrangement of the plant) the with a production capacity of 80 tonnes per hour.

It is noted that asphalt is produced in a process that heats, dries and mixes aggregate, bitumen and sand into a composite. Bitumen is the liquid binder that holds asphalt together.

The current (and proposed) arrangement for the asphalt plant at Blakebrook Quarry means that bitumen is imported to the site in suitable bitumen transport tankers and is stored onsite appropriately in accordance with the relevant Australian Standards, dangerous goods code and industry best practice.

Key components of the mobile asphalt plant include:

- Bag House;
- Bag House Fan;
- Burner/Blower;
- Conveyor Motor;
- Drum and Drum Drive;
- Truck Loading;
- Front End Loader; and
- Truck movements (including for deliveries of asphalt product, binder, fines and aggregate).

Table 3 provides and overview of the asphalt plant associated with this proposal.

As a double drum plant, aggregate material is added to the drum via hoppers and conveyor with mix proportions as required by the end user. Once dried and heated in the drum, binder material (in the form of bitumen and other modified binders) is added to produce the desired asphalt mix.

3.2 Proposed Development Descriptions

To provide for the ongoing operation of the facility and efficient environmental management, Council is seeking to amalgamate the Asphalt plant and Blakebrook Quarry SSD approval. It is noted that production capacities for the quarry are not proposed to change beyond those permitted under the existing development approval as a result of this amendment. Rather, the increase in permitted truck movements is to capture asphalt movements and the potential to provide greater capacity to deal with peak supply requirements for both the quarry and asphalt plant (noting that laden trucks would be limited to 150 movements on any given day).

The recent replacement of the outdated asphalt plant with a new machine has minimised noise and significantly improved efficiency. Therefore there are no predicted negative environmental impacts as a result of the development.

As a requirement of the recent lease of the asphalt plant to the RPQ Group the plant site is to be excised from Lot 201 in DP 1227138 and be contained within its own Lot.

The subdivision and registration process associated with this requirement has not yet occurred but is being undertaken by LCC concurrently to this modification. The asphalt plant and quarry will subsequently be situated on separated lots within the same deposited plan (DP), however it is deemed that they will still operate within the same site footprint identified as the Blakebrook Quarry.

Table 3: Asphalt Plant Overview (RPQ Group, 2018)

ASPECT	DETAILS
Type of asphalt mix process	• Batch mix; • Parallel flow drum mixing process; • Counter flow drum mixing process; and • Other as applicable.
Process inputs	• Bhmmx80 counter flow drum with external pugmill mixer • Benninghoven controls system , variable speed volumetric feeder • Calibrated weigh belt loads cells, calibrated volumetric bitumen / flux pump
Storages (material and quantity stored onsite at any one time)	• Site stockpiles (approx capacity): o Medium sand (200t); o Crusher dust (200t); o 7mm (300t); o 10mm (300t); o 14mm (300t); o 20mm (300t); o Rap (300t); o Glass (50t); o Coldmix product (50t); o Diesel tanks; o Bitumen 1 x (36t) – control transfer o Bitumen 1 x (36t) – PMB agitator • Hot bin storage: o 1 x (40t); and o 1 x (90t).
Unit operations e.g. • Generator and type; • Dryer and type (oil/ gas fuelled); • Heater and type; and • Operating hours for each type over the year.	• Mains power operation • Diesel fired burner • Burner 625hrs per year • Dryer 700hrs per year

ASPECT	DETAILS
Emission point(s) as applicable e.g. • Stacks; and • Vents.	• Stack from baghouse outlet
Emission control technologies in use (e.g. for dust), as applicable, such as: • Cyclones; • Settling chambers; • Baghouses; • Venturi scrubbers; and • VOC controls.	• Baghouse
Emission control practices, such as: • Wetting/crusting agents for stockpiles	• Stockpiles – sand / crusher dust tarp covered • Stockpile sprinkler / hose / water
Production rate	• 80t/hr

3.3 Existing Environment Protection Licence

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes the environmental licensing framework for pollution and waste management control. An EPL is required for all scheduled activities under Section 48 of the Act.

Blakebrook Quarry currently holds EPL 3384 with the asphalt plant as an ancillary activity.

Plate 1: Typical Arrangement of Mobile Asphalt Plant (RPQ Group)
Note: this image is obtained from another site

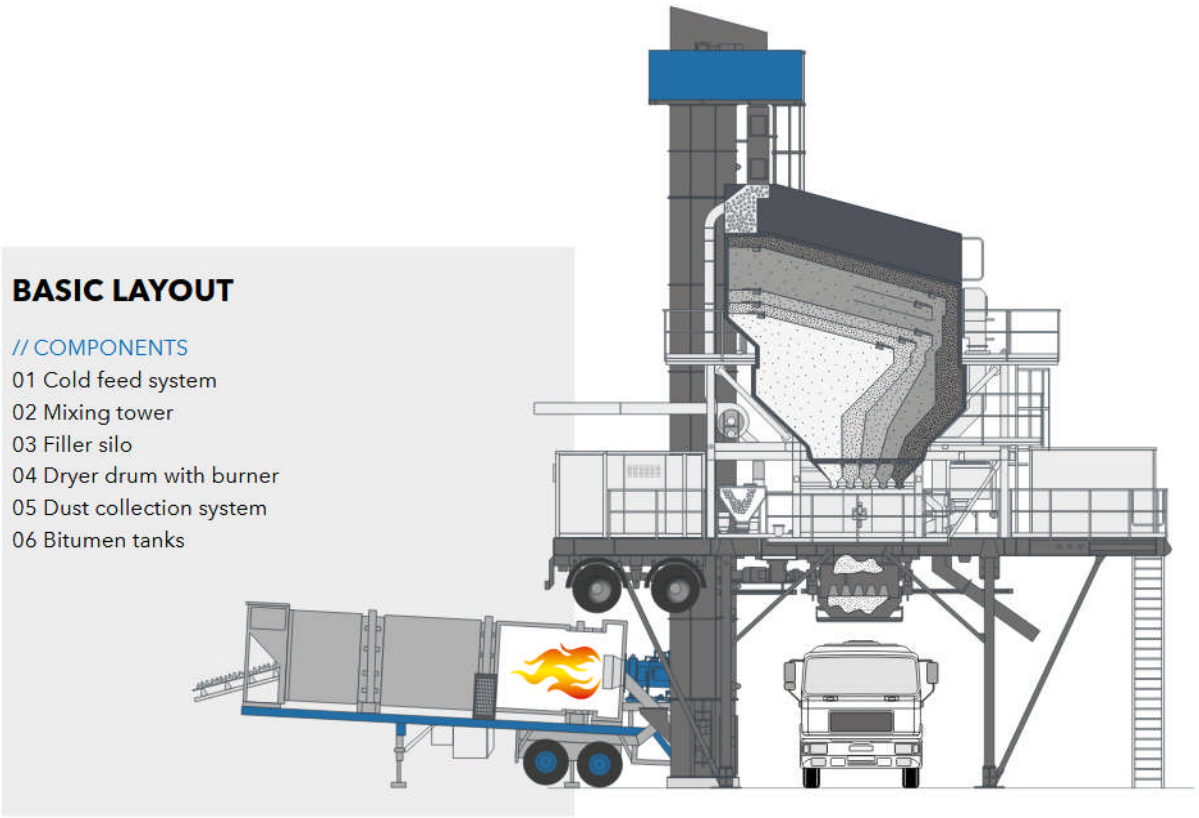
Plate 2: Typical Arrangement of Mobile Asphalt Plant – Reverse Aspect of Above (RPQ Group)
Note: this image is obtained from another site

Plate 3: Typical Arrangement of Feed Hoppers (RPQ Group)
Note: this image is obtained from another site

Plate 4: Typical Arrangement of Continuous Mixing Unit (RPQ Group)
Note: this image is obtained from another site

Plate 5: Typical Arrangement of Bitumen Tank (RPQ Group)
Note: this image is obtained from another site

Plate 6: Typical Arrangement of Hot Asphalt Storage (RPQ Group)
Note: this image is obtained from another site



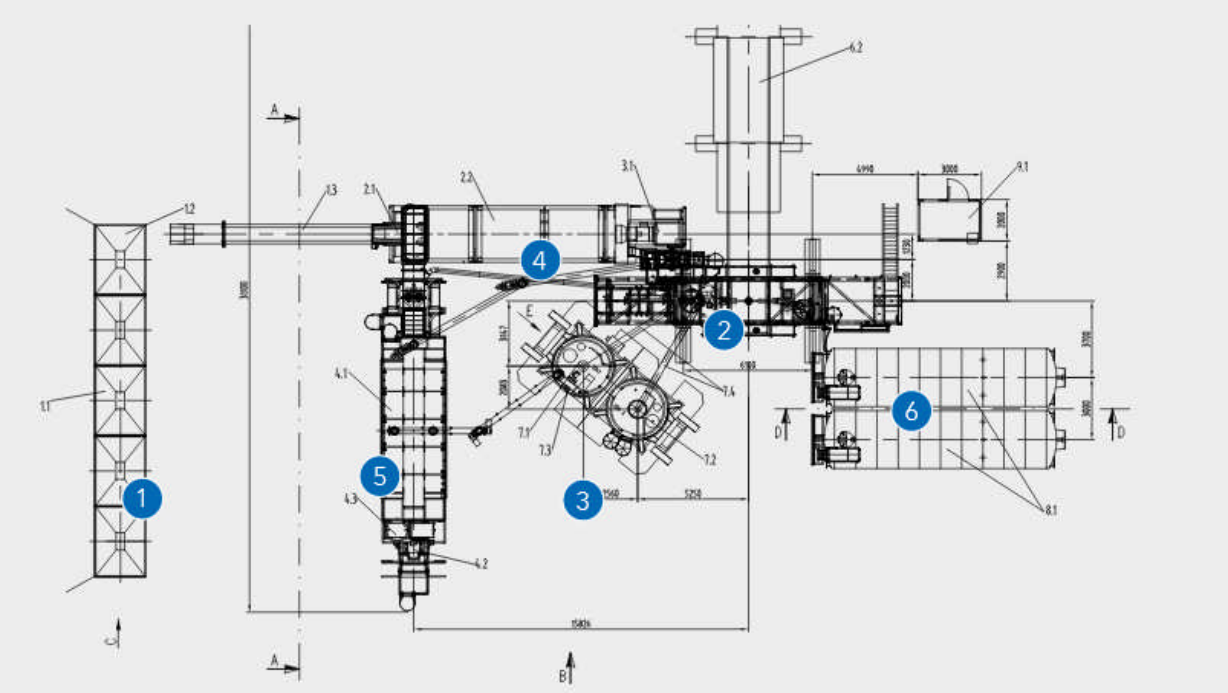


Figure 3: Typical Procedure

3.4 Existing Strategies, Management Plans and Programs

A condition of the NSW Department of Planning and Environment (DPE) approval to operate Blakebrook Quarry is to ensure that a copy of any approved strategies/plans/programs required under the approval are made publicly available via Council's website (https://www.lismore.nsw.gov.au).

The approved (by DP&E) strategies, management plans and programs relate to the operation of the quarry are detailed in Table 4 and are publicly available on Councils' website.

Table 4: Current Quarry Management Documents (LCC, 2018)

DOCUMENT NAME	PREPARED BY	DATE OF ISSUE
Mine Safety Management Plan 2017	Northern Rivers Quarry and Asphalt	July 2017
Blakebrook Quarry Pollution Incident Response Management Plan 2017	Northern Rivers Quarry and Asphalt	March 2017
Groundwater Monitoring and Management Sub Plan	Environmental Resource Management Australia (ERM)	April 2011
Air Quality Management Plan v3.1 – Blakebrook Quarry 2018	Environmental Resource Management Australia (ERM)	August 2018
Noise & Blast Management Plan v3.1 – Blakebrook Quarry 2018	Environmental Resource Management Australia (ERM)	August 2018
Aboriginal Heritage Management Plan v3.1 – Blakebrook Quarry 2018	Environmental Resource Management Australia (ERM)	August 2018
Operational Traffic Management Plan v3.1 – Blakebrook Quarry 2018	Environmental Resource Management Australia (ERM)	August 2018
Environmental Management Strategy v3.1 – Blakebrook Quarry 2018	Environmental Resource Management Australia (ERM)	August 2018
Biodiversity and Rehabilitation Management Plan v4.1 – Blakebrook Quarry 2019	Environmental Resource Management Australia (ERM)	March 2019
Soil and Water Management Plan – Blakebrook Quarry 2019	Gilbert & Sutherland	February 2019
Blakebrook Quarry Biodiversity Strategy 2019	Environmental Resource Management Australia (ERM)	February 2019

The following documents relate to the operation of the asphalt plant:

Table 5: Current Asphalt Management Documents (LCC, 2018)

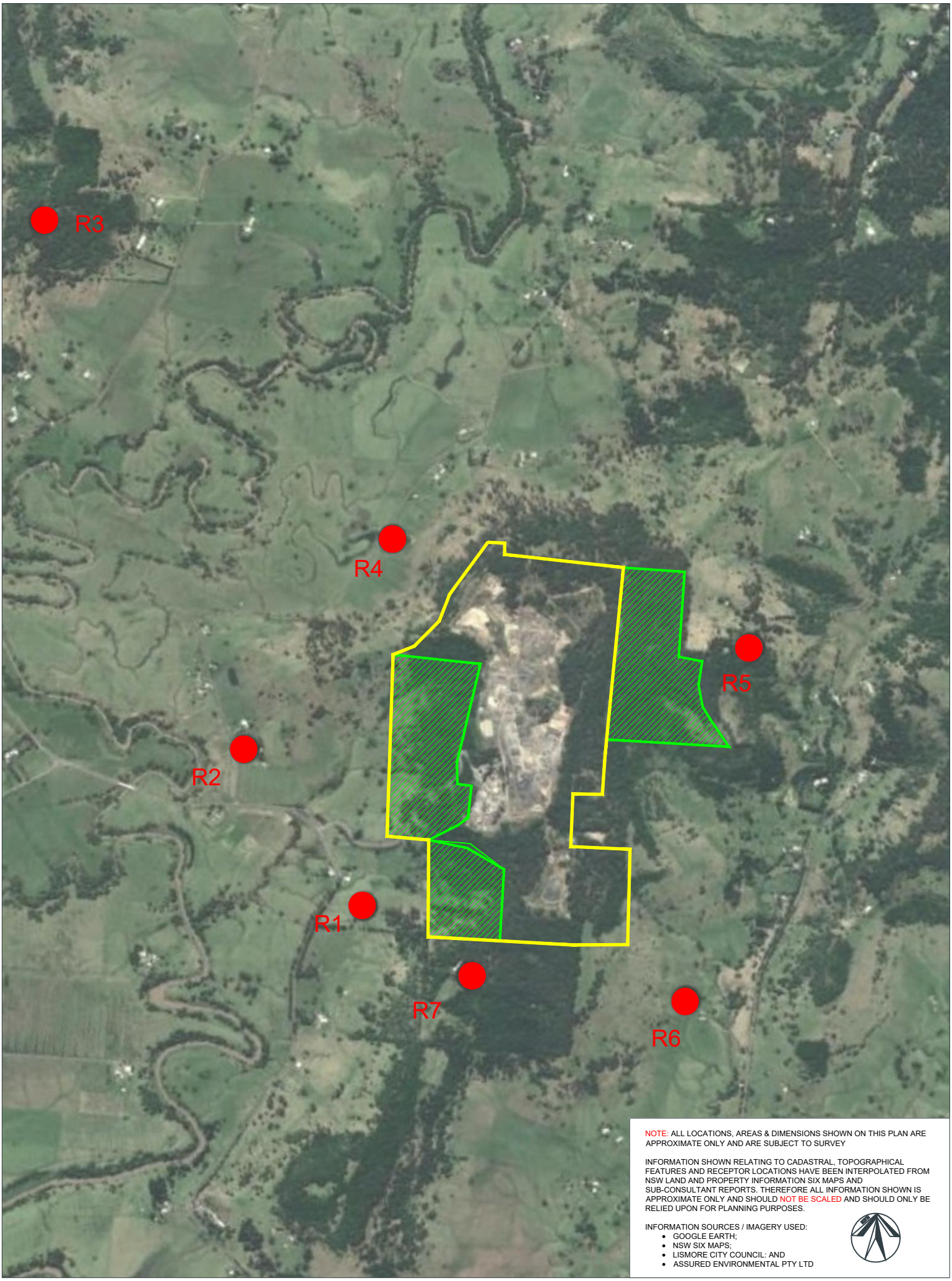
DOCUMENT NAME	PREPARED BY	DATE OF ISSUE
Environmental Aspects and Impacts Assessment	Northern Rivers Quarry and Asphalt	February 2018
Stormwater Management Plan	Northern Rivers Quarry and Asphalt	February 2018
Asphalt Manufacture Quality Plan & Procedure	Trico Asphalt Pty Ltd / RPQ Group	February 2018
Safe Work Method Statement	Trico Asphalt Pty Ltd / RPQ Group	February 2018
Emergency Response Plan, Asphalt Plant, Blakebrook Quarry, Nimbin Rd	Trico Asphalt Pty Ltd / RPQ Group	March 2018

3.5 Approvals Required

This SEE has been developed in response to the proposed modification of a consent issued for a NSW State Significant Development (SSD).

LCC is seeking to modify the State Significant Development Consent under Part 4, Division 4.9, Section 4.55 (cf previous s 96) of the Environmental Planning and Assessment Act 1979 (EP&A Act). The preparation of this SEE follows consultation with the DPE by LCC.

This SEE has been prepared by Mitchel Hanlon Consulting on behalf of LCC to support the application. It has been prepared in the form and content required under the EP&A Act and Regulation.



NOTE: ALL LOCATIONS, AREAS & DIMENSIONS SHOWN ON THIS PLAN ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY

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INFORMATION SOURCES / IMAGERY USED:

- GOOGLE EARTH;
- NSW SIX MAPS;
- LISMORE CITY COUNCIL: AND
- ASSURED ENVIRONMENTAL PTY LTD

Receptor Plan - Ancillary Asphalt Plant

Blakebrook Quarry, 540 Nimbin Road, BLAKEBRROK

FIGURE 3

Mitchel Hanlon Consulting Pty Ltd

Plot Date: 7 December 2018
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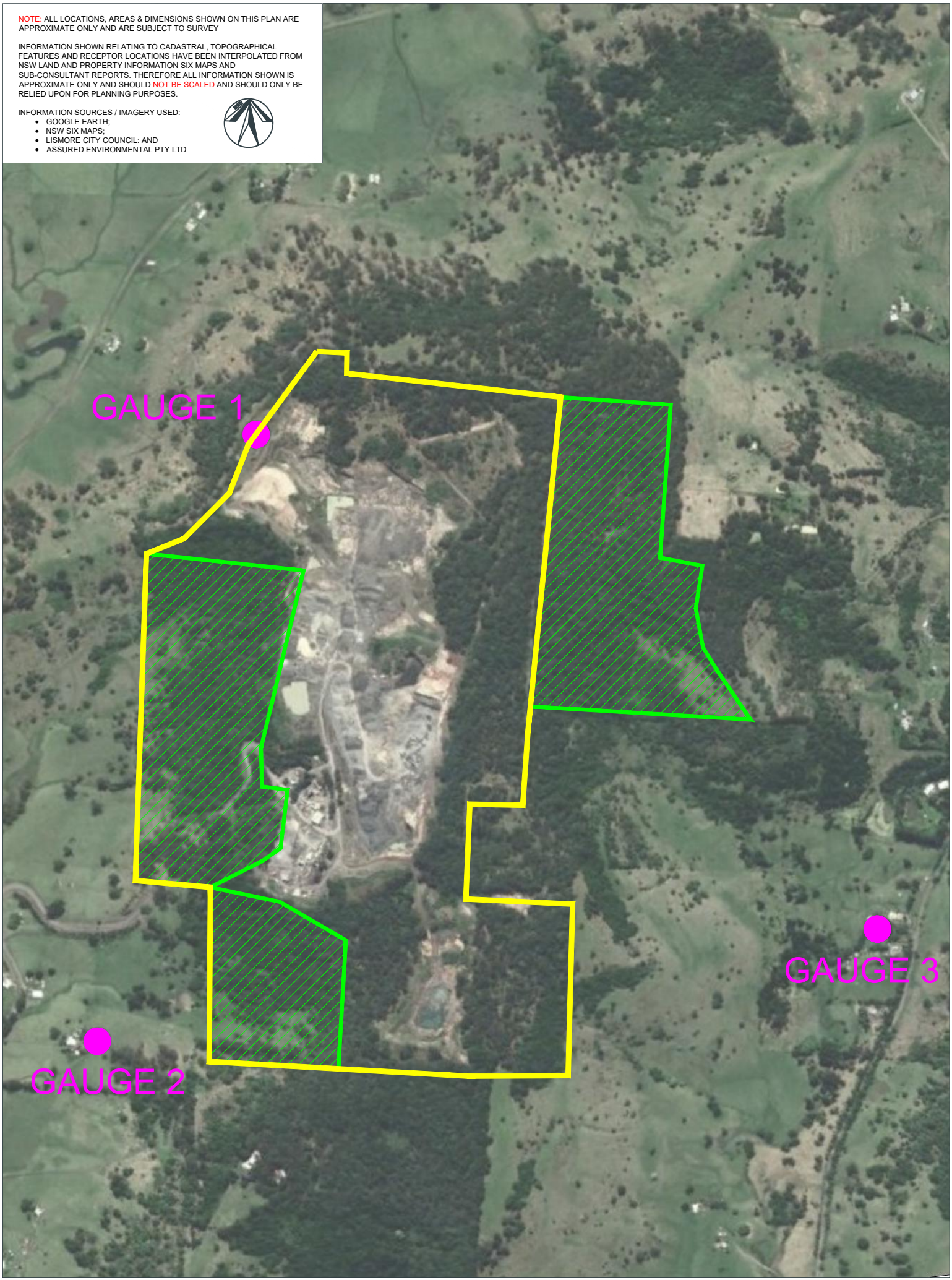

Dust Gauge Location Plan - Ancillary Asphalt Plant

Blakebrook Quarry, 540 Nimbin Road, BLAKEBRROK

FIGURE 4

Mitchel Hanlon Consulting Pty Ltd

Plot Date: 7 December 2018

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4.0 Existing Environment

4.1 Property Description

The subject site is currently identified as Lot 201 in DP 1227138 and has an approximate area of 126 hectares. The subject site is located approximately seven (7) kilometres north west of Lismore.

It is noted that as a requirement of the recent lease of the asphalt plant to the RPQ Group the plant site is to be excised from Lot 201 in DP 1227138 and be contained within its own Lot.

The subdivision and registration process associated with this requirement has not yet occurred but is being undertaken by LCC concurrently to this modification. The asphalt plant and quarry will subsequently be situated on separated lots within the same deposited plan (DP), however it is deemed that they will still operate within the same site footprint identified as the Blakebrook Quarry.

Primary access to the site is via Nimbin Road. The subject site currently forms part of an operative quarry (identified as a 'State Significant Development').

4.2 Land Use

The site is currently being utilised as a quarry and is identified as an extractive industry under the NSW EP&A Act 1979.

Surrounding land use is a mixture of agricultural and rural residential.

4.3 Geology and Soil

Previous site works have indicated the site is located on an igneous outcrop with laminar basalt flows. The soils are classified as red-brown krasnozem soils, which drain rapidly, allow infiltration and possess a low run-off co-efficient.

4.4 Groundwater

Previous site works onsite indicate there is a near surface local scale unconfined aquifer in the area of the quarry operations. Due to soils present, there is a high degree of connectivity between groundwater and surface waters.

4.5 Traffic and Access

Nimbin Road is the main road providing access for the quarry. It allows for a single lane of travel in each direction. Pavement width varies between 6 to 8 metres. Posted speed limits are 80km/hr with no kerb or guttering or street lighting. An auxiliary right turn is provided for northbound vehicles, to allow for through traffic to pass any vehicles turning into the quarry access road. It is noted that the access road is lit at the intersection.

The Quarry Access Road provides a sealed surface along its length until reaching the quarry operations. Where the movements are distributed across the unsealed internal haul roads, it operates under the posted speed limit of 40km/hr with no kerb and guttering or street lighting provided. It has a pavement width in the order of 8.5 metres along the majority of its length, with the road widened significantly at the intersection with Nimbin Road to allow for more efficient turning movements for heavy vehicles into and out of Nimbin Road.

The surrounding roads and intersections have been upgraded in recent years in order to ensure road safety can be managed. There are no changes proposed to the current transport routes. Given the minor increase in additional movements per hour, it is considered there are no further safety issues generated by the proposed modification to consent for the site operations.

Upgrades to portions of the road occurred as part of the original EIS approval and include:

- Upgrade the intersection of the Quarry Access and Nimbin Road, to a ‘Type AUR Intersection Treatment’;
- Upgrade the guard rails on the approaches to the Booerie Creek Bridge;
- Upgrade to the Booerie Creek Road and Nimbin Road Intersection to a ‘Type BAR Right Turn Treatment on the Through Road’;
- Upgrade to the Wilson Street and Nimbin Road intersection to a ‘Type CHR Right Turn Bay Treatment’; and

- Re-align Nimbin Road and the Quarry Access intersection to meet AUSTROADS sight distance requirements for vehicles travelling in both directions through the intersection.

Observations on site during the morning peak hour indicate that the intersection of Nimbin Road and the Quarry Access Road operates very well with relatively low traffic flows through the area.

Daily traffic flows through the area were quantified as part of the Operational Traffic Management Plan (OTMP) completed by ERM in 2018 for the quarry. These flows were taken from the previous Traffic Impact Report (Roadnet 2008) completed for the approved Quarry expansion. Traffic flows along Nimbin Road were as follows:

- Average weekday traffic volume of 2,700 vehicles north of the quarry access
- Average weekday traffic volume of 3,200 vehicles near Wilson Street.

These volumes were composed of Light Trucks (including single unit tippers) and buses accounting for 5.2% of the traffic stream and heavy trucks accounting for 2.2%.

It is predicted in the prior Traffic Impact Report (Roadnet 2008) that traffic growth along Nimbin Road is approximately 2.2% per annum, based on a comparison of count data between 1970 to 2007. As such, allowing for 10 years growth the current flows along Nimbin Road could be in the order of:

- Average weekday traffic volume of 3,300 vehicles north of the quarry access
- Average weekday traffic volume of 3,900 vehicles near Wilson Street.

The RMS Guide to Traffic Generating Developments provides advice on peak hour flows typically representing 8-12% (average 10%) of daily flows. As such, the current peak hour flows along Nimbin Road would be in the order of 330 vehicles per hour near the quarry access and 390 vehicles per hour near Wilson Street.

It is worth noting for the current arrangement that the absolute maximum number of outbound trucks per hour is 25, based upon the capacity of the weighbridge on site. The weighbridge will not be upgraded as part of this project and as such this upper limit on hourly flows will remain.

4.6 Air Quality

Assured Environmental (AE) were engaged to undertake an air quality assessment for the development. The full report is included in Appendix G. The following is an extract from the AE report detailing the existing conditions at the site.

4.6.1 Site Location and Topography

The topography the Subject Site is presented in Figure 2. Review of the topography confirms that the quarry is located on elevated terrain varying in height from approximately 120 m for the asphalt plant to 130 m at the edge of the quarry pit. Further afield, the terrain is noted to fall away with nearby receptors located at elevated ranging from approximately 20 m to 110 m.

The quarry site is also noted to be surrounded by a relatively densely vegetated area on all sides. This vegetative buffer is also expected to provide some minor additional reduction of particulate concentrations with the vegetation acting as a filtration media for dust emissions.

4.6.2 Nearby Sensitive Receptors

There is a number of existing sensitive receptors surrounding the quarry. Review of the '*Notice of Modification – Section 75W of the EP&A 1979'*, referred to in the EPA licence number 3384 dated 6 August 2018, identifies seven (7) sensitive receptors. For consistency these receptors will be assessed in relation to the site.

Figure 4 and Table 6 provide a summary of the nearest sensitive uses to the proposal.

Table 6: Sensitive Receptors (AE, 2018)

RECEPTOR	DESCRIPTION	ADDRESS	DISTANCE TO QUARRY
R1	Existing dwelling	1 Nimbin Road, Blakebrook	0.65km
R2	Existing dwelling	122 Keerrong Road, Blakebrook	1.0km
R3	Existing dwelling	145 Pinchin Road, Goolmangar	2.9km
R4	Existing dwelling	166 Keerrong Road, Blakebrook	1.12km
R5	Existing dwelling	365 Booerie Creek Road, Booerie Creek	1.19km
R6	Existing dwelling	210 Booerie Creek Road, Booerie Creek	1.08km
R7	Existing dwelling	484 Nimbin Road, Blakebrook	0.87km

4.6.3 Historical Monitoring

Since 2012, dust deposition monitoring has been undertaken at three (3) locations as presented in Figure 5.

Table 7 presents an annual summary of the dust deposition (total insoluble solids) results. For the purposes of this development application, a background dust deposition of 1.5 g/m^2/month has been adopted.

As stated in Section 8.8.1 of the approved Air Quality Management Plan 'due to the nature and composition of the hard rock resources, and the numerous pollutants that can make up '*insoluble solids'*, ash will be used as an indicator of the quarry dust contribution. This will ensure that organic pollutants such as bird droppings, pollen, wind-blown vegetation and the like will not be confused with the inorganic dust contribution, of which, a proportion would be from the quarry operations.'

The results outlined in Table 7 relate to insoluble solids and to assist in determining compliance with the impact assessment criteria (as detailed in Table 8.4 of the '*Blakebrook Quarry Air Quality Management Plan*' as approved by the NSW DPE) the ash component of the dust sample has also been included.

Given that the ash component is to be used as an indicator of quarry dust contribution, a review of the monitoring data indicates that the quarry complies with the with the Annual Average Dust criteria (4 g/m^2/month).

Table 7: Historic Annual Average Dust Deposition Results (AE, 2018)

YEAR#	DESCRIPTION	MONITORING LOCATION		
		1	2	3
2012	Annual Insoluble Component (g/m^2/month)	0.79	0.72	0.98
	Annual 'Ash' Component (g/m^2/month)	0.6	0.3	0.6
	Compliance with Criteria	Y	Y	Y
2013	Annual Insoluble Component (g/m^2/month)	1.25	1.13	1.05
	Annual 'Ash' Component (g/m^2/month)	0.9	0.4	0.6
	Compliance with Criteria	Y	Y	Y
2014	Annual Insoluble Component (g/m^2/month)	0.90	2.17	0.97
	Annual 'Ash' Component (g/m^2/month)	0.5	0.8	0.4
	Compliance with Criteria	Y	Y	Y
2015	Annual Insoluble Component (g/m^2/month)	0.76	2.53	1.35
	Annual 'Ash' Component (g/m^2/month)	0.5	1.1	0.5
	Compliance with Criteria	Y	Y	Y
2016	Annual Insoluble Component (g/m^2/month)	0.74	2.16	2.28
	Annual 'Ash' Component (g/m^2/month)	0.4	0.9	0.7
	Compliance with Criteria	Y	Y	Y
2017	Annual Insoluble Component (g/m^2/month)	0.89	2.03	2.91
	Annual 'Ash' Component (g/m^2/month)	0.5	1.0	1.1
	Compliance with Criteria	Y	Y	Y

YEAR#	DESCRIPTION	MONITORING LOCATION		
		1	2	3
2018*	Annual Insoluble Component (g/m^2/month)	1.51	1.70	3.19
	Annual 'Ash' Component (g/m^2/month)	0.7	0.6	0.9
	Compliance with Criteria	Y	Y	Y
Overall Average Total Insoluble *	g/m^2/month	0.53	1.50	1.44
Overall Average Ash Component*	g/m^2/month	0.6	0.7	0.7

 # Results obtained from Blakebrook Quarry Environmental Reporting website
*** Results accurate to date of document preparation only**

4.7 Noise

Assured Environmental (AE) were engaged to undertake a noise assessment for the development. The full report is included in Appendix F. The following is an extract from the AE report detailing the existing conditions at the site.

4.7.1 Nearby Sensitive Receptors

As previously stated, the current EPL for the quarry identifies seven (7) sensitive receptors. For consistency these receptors will be assessed in relation to the site.

Figure 4 and Table 6 provide a summary of the nearest sensitive uses to the proposal.

4.7.2 Historical Monitoring

Since 2012, attended noise monitoring has been undertaken at a number of sensitive receptors. Figure 4 and Table 6 detail the nearest sensitive receivers.

It is noted that the asphalt plant was upgraded following the November 2015 monitoring period and, as such results prior to November 2015 are not reflective of the current arrangement. Results prior to November 2015 have been included in an attempt to illustrate that the current arrangement has generally improved noise emissions from the site.

Despite the below, overall the results indicate that the quarry is expected to be inaudible at nearby receptors at most times. It is important to note that background noise is presently higher than the prescribed noise limits in the consent.

Excluding measurements when the quarry was not audible, the following can be determined:

- February 2012 – Only receptors 5 and 6 comply with the 36 dB(A) LAeq15 minute criteria;
- January 2013 – No receptors comply;
- August 2013 – Of the six (6) valid measurements at three (3) receptors, compliance is not achieved;
- February 2015 – Of the two (2) receptors where the quarry was audible, only receptor 4 complies;
- November 2015 – The quarry was only audible at receptor 6 which did not comply;
- November 2016 – The quarry was not audible at any receptors;
- November 2017 – Of the three (3) receptors that were valid, none comply. Exceedances were short in duration with the quarry being barely or not audible for the remainder of the monitoring period; and
- November 2018 – Of the five (5) locations where noise monitoring was undertaken, the quarry noise was not audible.

A full outline of historical monitoring results is included in the Noise Impact Assessment in Appendix A.

4.8 Soil and Water Management

Lismore City Council (LCC) commissioned Gilbert & Sutherland Pty Ltd (G&S) to prepare a Soil and Water Management Plan (SWMP) for Blakebrook Quarry to address the requirements of a Notice of Variation of Licence No. 3384

The SWMP was prepared to address the measures that will be employed to minimise soil erosion and the discharge of sediment and other pollutants from the current and future operations of the quarry (and associated asphalt plant).

The report details the physical characteristics of the site and the findings of various site assessments (including a water balance) undertaken by G&S. The SWMP proposes management measures to prevent and/or minimise potential impacts during the operational phase of the works.

The control measures stated in the SWMP are designed to minimise any potential environmental impacts associated with the hard rock quarry operations and asphalt and processing plant activities at Blakebrook Quarry.

As part of the SWMP G&S completed a water balance model to examine the current and future 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 model excludes all potable water usage and wastewater discharge from the site.

The following section provide an overview of the model prepared by G&S and details the results relevant to the site and the asphalt plant location. Unless explicitly stated all data and values have been reproduced straight from the G&S report found in Appendix I. Where data has been reproduced the relevant table or reference has also been provided.

4.8.1 Model Description and Overview

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 primarily addresses surface water flows within the site and has been updated to include consideration of surface water to groundwater interactions based on the outcomes of G&S's 'Hydrogeological Review: Groundwater Monitoring & Management Blakebrook Quarry Nimbin Road, Lismore, New South Wales' dated February 2019.

The model excludes all potable water usage and wastewater discharge from the site.

The model is comprised of four (4) separate 'modules' which, in general, operate independently with respect to water management within the site. However, at present, discharge out of each of the four site catchments is directed to a single licenced discharge point (LPD1). These four 'modules' are based on the four defined catchment areas and corresponding sedimentation basins shown on the drawings numbered 11737-004 and 11737-005 (in Attachment 1). These catchment areas are:

- North Pit;
- South Pit;
- South-western catchment 1 (SW1);
- South-western catchment 2 (SW2).

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.

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.

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.

South-western Catchments (SW1 and SW2)

The southwestern catchments (SW1 and SW2) are located outside of the quarry pit catchment areas and (similar to the South Pit) do not contribute to the site's water supply requirements. Both catchments discharge to LPD1. The management of surface water runoff in these catchments is focused on treatment and discharge to meet the site's water quality targets.

All catchment runoff is directed as surface flow to the respective basins. The sedimentation basins have been sized based on the design rainfall event for the site (60.2 mm in 5 days). Runoff up to the design event will be treated and pumped out of the basins within 5 days of a rainfall event. As these basins are not contained within the pits, catchment runoff during rainfall exceeding the design event will overflow from the basins and discharge directly to LPD1. Both sedimentation basins will remain dry at all other times.

It is noted that as the Southern Pit (and associated sedimentation basin) does not influence flows associated with the asphalt plant (nor does it accept flows from the asphalt plat area) the southern pit have been excluded from the following sections.

4.8.2 Model Inputs and Assumptions

The water balance model was run for the two scenarios – current and future quarry footprints – as depicted on the drawings numbered 11737-004 (Extract provided in Figure 6) and 11737-005 (Extract provided in Figure 8) in Appendix I. N.B. the 'quarry' footprint includes the current and proposed asphalt plant.

The model was constructed using various information sources in climate data, determination of catchment areas, calculated storage volumes, and approximate water usage across the site.

Catchment Areas

It is noted that the asphalt plant is located across catchments SW1 and SW2 (Refer to Figure 6, Figure 7 and Figure 8) and sources its water from the existing onsite storage tank (approx. volume of 1ML).

Based upon the inputs of the water balance, the relevant catchment areas associated with the both the current and future asphalt plant were determined to be unchanged as a result of the proposed plant upgrade i.e. the proposed asphalt plant upgrade does not result in an intensification of the land area, i.e. there is no increase in footprint, disturbed or hardstand areas (Refer to Table 8 below and Section 3.1.2 of the G&S Water Balance in Appendix I.

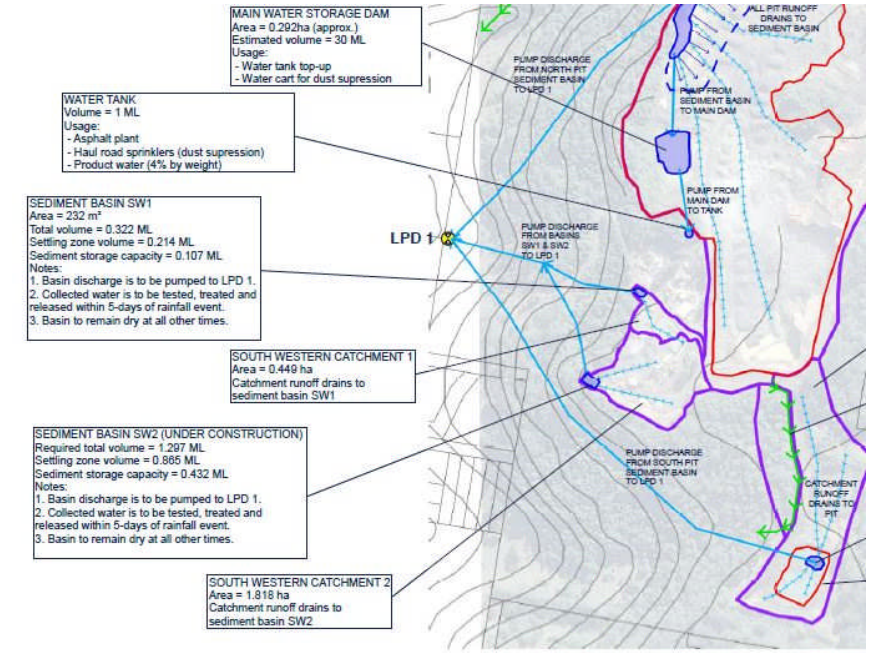

Figure 6: Extract from 11737-004 'Existing Quarry Footprint' (G&S, 2019) Showing SW1 & SW2 (Location of the Asphalt Plant)

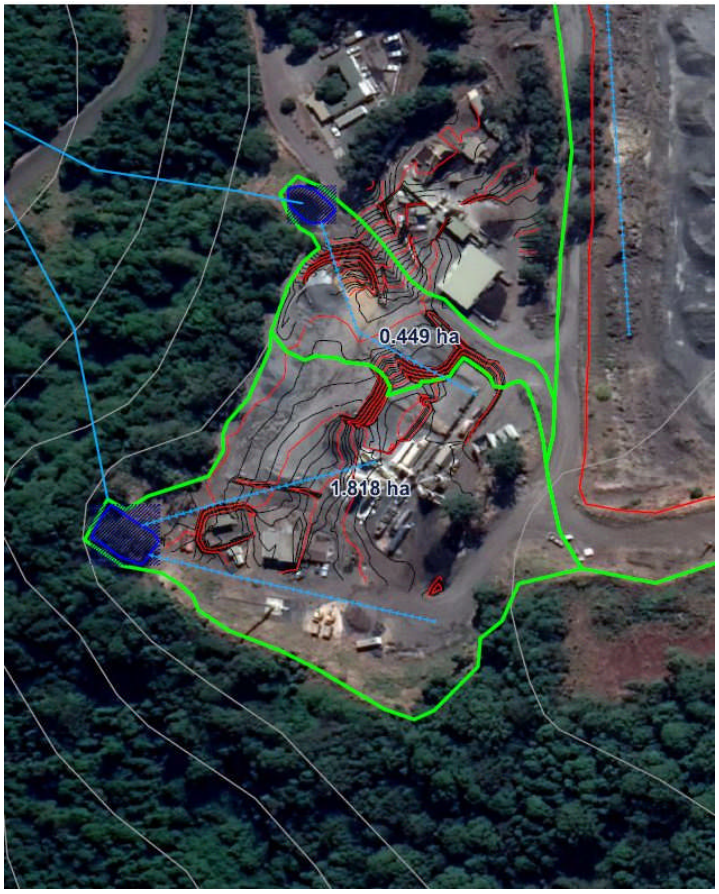

Figure 7: Location of the Asphalt Plant within SW1 and SW2 (G&S, 2019)

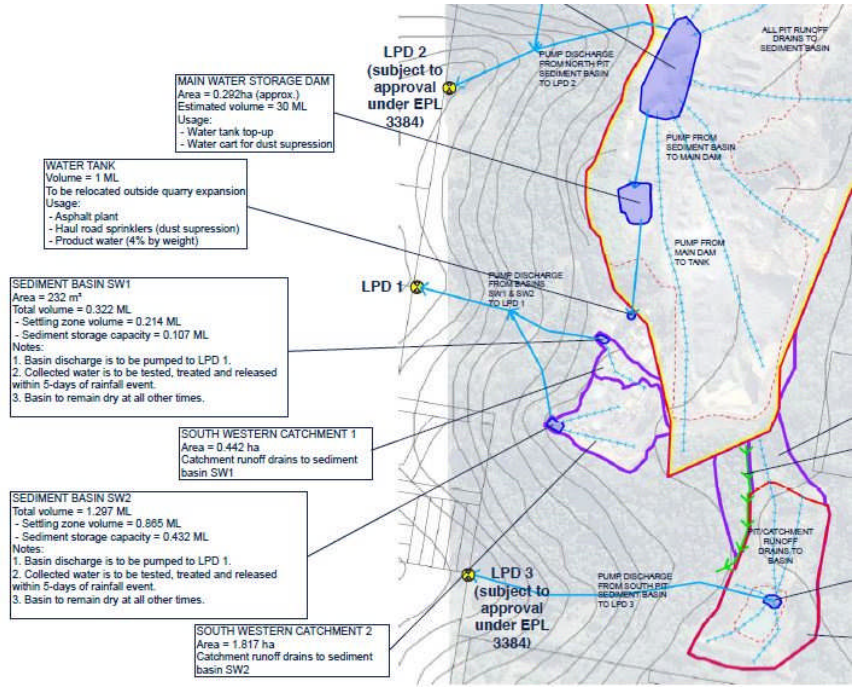

Figure 8: Extract from 11737-005 'Future Quarry Footprint' (G&S, 2019) Showing SW1 & SW2 (Location of the Asphalt Plant)

Table 8: Contributing Catchment Areas (Table 3.1.2.1 G&S, 2019)

DESCRIPTION	CURRENT FOOTPRINT (DECEMBER 2018)				FUTURE QUARRY FOOTPRINT			
	NORTH PIT (ha)	SOUTH PIT (ha)	SW1 (ha)	SW2 (ha)	NORTH PIT (ha)	SOUTH PIT (ha)	SW1 (ha)	SW2 (ha)
Areas included in model								
Catchment	37.107	3.746	0.449	1.818	40.924	4.893	0.442	1.817
Dam	0.292	–	–	–	0.292	–	–	–
Total	**37.399**	**3.746**	**0.449**	**1.818**	**41.216**	**4.893**	**0.442**	**1.817**
External catchment area (excluded from model)								
Undisturbed catchment	11.308	1.102	–	–	9,500	0.767	–	–

Storage Volumes – Existing Quarry Footprint

As detailed in the G&S report the following storage volumes were modelled:

Table 9: Existing Storage Volumes (Section 3.1.3.1 G&S, 2019)

WATER STORAGE	VOLUME (ML)
Main Dam	30
Tank	1.0
North sedimentation basin	2.517
Sedimentation basin SW1	0.322
Sedimentation basin SW2	1.297

Water Usage

With regard to existing water usage associated with the site, the following uses were included in the water balance as drawing water from the main 30 ML storage dam located onsite:

- Water Truck;
- Storage tank (1ML total storage volume);
  - Haul Road Sprinklers;
  - Asphalt Plant; and
  - Process/product water.

With regard to the asphalt plant, G&S estimated water usage for the plant 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 6 days per week (excluding Sundays) the plant is operating. The current estimated annual plant water usage is 0.0616 ML/year.

Controlled Discharge from Sedimentation Basins

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 LPD1. Subject to future approval of additional site discharge points, this will ultimately be pumped out to proposed LPD2.

Southwestern catchments

For the south-western catchments (SW1 and SW2) all surface runoff will be collected within the respective sedimentation basins located on the outlet of each catchment. These basins have been sized to capture and treat runoff during the five-day rainfall design event of 60.2 mm. 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 (i.e. emptying each of the sedimentation basins 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) will enter the basins and subsequently overflow to the receiving environment, leaving the site at LPD 1. The base pumping rate will still apply during these periods to empty the sedimentation basin capacity below the overflow level.

4.8.3 Results

The following sections provide a summary of the water balance results relating to the current and future quarry operating scenarios as modelled by G&S. Section 6.9 details any amendments to these results as a consequence of the proposal.

4.8.3.1 Existing Quarry Conditions

4.8.3.1.1 Sedimentation Basins

A summary of the current annual water balance results for the relevant sedimentation basins is presented in Table 10.

Table 10: Water Balance – 'Current' Sedimentation Basins – Annual Volumes (G&S, 2019)

PARAMETER	AVERAGE YEAR	MINIMUM	MAXIMUM
Northern Sedimentation Basin (Table 4.2.1.1 G&S, 2019)			
Rainfall volume – total North Pit catchment area (ML)	552.8	324.9	863.6
Runoff volume – total North Pit catchment area (ML) a	309.5	167.0	542.4
Total basin inflow (ML)	312.1	166.7	551.4
Evaporative losses (ML)	2.8	1.2	5.6
Seepage losses (ML)	10.9	4.6	23.4
Discharge – pumped to main dam	43.0	36.7	47.2
Sedimentation Basin SW1 (Table 4.4.1.1 G&S, 2019)			
Rainfall volume – total SW1 catchment area (ML)	6.6	3.9	10.4
Runoff volume – total SW1 catchment area (ML) a	3.7	2.0	6.5
Total basin inflow (ML)	3.7	2.0	6.6
Evaporative losses (ML)	0.02	0.01	0.04
Seepage losses (ML)	0.08	0.03	0.15
Pumped discharge to LPD1 (ML)	3.0	1.9	4.9
Overflow to LPD1 (ML)	6.0	0.0	2.0
Sedimentation Basin SW1 (Table 4.4.2.1 G&S, 2019)			
Rainfall volume – total SW1 catchment area (ML)	26.9	15.8	42.0
Runoff volume – total SW1 catchment area (ML) a	15.0	8.1	26.4
Total basin inflow (ML)	15.2	8.2	26.7
Evaporative losses (ML)	0.1	0.05	0.18
Seepage losses (ML)	0.37	0.16	0.69
Pumped discharge to LPD1 (ML)	12.2	7.5	19.6

[a] Total runoff expected to 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 diverted from this location to LPD1.

4.8.3.1.2 Water Supply and Usage

The Main Dam in the North Pit is used to provide all water supply requirements for the site and as such, no imported clean (mains) water is relied upon or needed for any operational uses on site. The Main Dam has a capacity of 30 ML.

With an average daily water usage across the site of 92.3 kL, this approximates to 181 days (or almost 6 months) of additional water supply available at all times throughout the modelling period.

A summary of the current water (supply and usage) balance results for the Main Dam and Main Tank is presented in Table 11.

Table 11: Water Supply and Usage Balance – Northern Catchment Main Dam & Main Tank – Annual Volumes (G&S, 2019)

PARAMETER	AVERAGE YEAR	MINIMUM	MAXIMUM
Northern Catchment Main Dam – Existing Annual Volumes (Table 4.2.2.1 G&S, 2019)			
Dam inflow from direct rainfall (ML)	4.3	2.5	6.7
Dam inflow pumped from sediment basin (ML)	43.0	36.7	47.2
Total dam inflow (ML)	**27.3**	**43.0**	**51.0**
Evaporative losses (ML)	2.9	2.6	3.3
Seepage losses (ML)	10.7	10.6	10.7
Total losses (ML)	**13.6**	**13.2**	**13.9**
Usage – water truck for dust suppression (ML)	22.7	19.6	24.6
Usage – main tank top-up for other site usage (ML)	11.0	10.5	11.4
Total usage (ML)	**33.7**	**30.3**	**35.9**
Daily stored volume (ML) [a]	**28.8**	**16.7**	**30.9**
Main Tank – Existing Annual Volumes (Table 4.2.3.1 G&S, 2019)			
Inflow from direct rainfall (ML)	11	10.5	11.4
Usage –haul road sprinklers (ML)	6.3	6.2	6.3
Usage – asphalt plant (ML)	0.1	0.1	0.1
Usage – process/product water (ML)	4.7	4.2	5.1
Average daily stored volume (ML) [a]	**0.89**	**0.62**	**1.00**

a) Stored volumes reported using average, minimum and maximum daily levels for entire modelling period (not based on annual averages).

Based on the inputs and assumptions described in the G&S water balance, the modelling results show that under all modelled climatic conditions, the main dam has sufficient water to meet all quarry (including the asphalt plant) water demands. The minimum estimated storage volume is 16.7 ML (or 13.3 ML below full capacity) throughout the model period.

The (usage) water balance for the main tank indicates that for the assumed asphalt plant usage of 0.0616ML/year (rounded to 0.1ML for use in the water balance) the modelling suggests that throughout the modelling period, the minimum water level in the rain tank prior to weekly top-up will be 0.62 ML.

4.8.3.2 Future Quarry Conditions

4.8.3.2.1 Sedimentation Basins

A summary of the future annual water balance results (as modelled by G&S) for the relevant sedimentation basins is presented in Table 12.

Table 12: Water Balance – 'Future' Sedimentation Basins – Annual Volumes (G&S, 2019)

PARAMETER	AVERAGE YEAR	MINIMUM	MAXIMUM
Northern Sedimentation Basin (Table 5.1.1.1 G&S, 2019)			
Rainfall volume – total North Pit catchment area (ML)	609.2	358.0	951.4
Runoff volume – total North Pit catchment area (ML) a	341.1	184.1	597.7
Total basin inflow (ML)	411.4	252.4	674.6
Evaporative losses (ML)	1.9	0.4	5.3
Seepage losses (ML)	0.7	0.1	2.5
Discharge – pumped to main dam	66.7	56.1	73.8
Sedimentation Basin SW1 (Table 5.3.1.1 G&S, 2019)			
Rainfall volume – total SW1 catchment area (ML)	6.6	3.9	10.4
Runoff volume – total SW1 catchment area (ML) b	3.7	2.0	6.5
Total basin inflow (ML)	3.7	2.0	6.6
Evaporative losses (ML)	0.02	0.01	0.04

Seepage losses (ML)	0.08	0.03	0.15
Pumped discharge to LPD1 (ML)	3.0	1.9	4.9
Overflow to LPD1 (ML)	6.0	0.0	2.0
Sedimentation Basin SW1 (Table 5.3.2.1 G&S, 2019)			
Rainfall volume – total SW1 catchment area (ML)	26.9	15.8	42.0
Runoff volume – total SW1 catchment area (ML) b	15.0	8.1	26.4
Total basin inflow (ML)	15.2	8.2	26.7
Evaporative losses (ML)	0.1	0.05	0.18
Seepage losses (ML)	0.37	0.16	0.69
Pumped discharge to LPD1 (ML)	12.2	7.5	19.6

[a] Total runoff that expected to 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 (proposed) LPD2.
[b] Total runoff that expected to 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.

4.8.3.2.2 Water Supply and Usage

A summary of the future annual water (supply and usage) balance results (as modelled by G&S) for the Main Dam and Main Tank is presented in Table 13.

Table 13: Water Supply and Usage Balance – Northern Catchment Main Dam & Main Tank – Annual Volumes (G&S, 2019)

PARAMETER	AVERAGE YEAR	MINIMUM	MAXIMUM
Northern Catchment Main Dam – Existing Annual Volumes (Table 5.1.2.1 G&S, 2019)			
Dam inflow from direct rainfall (ML)	4.3	2.5	6.7
Dam inflow pumped from sediment basin (ML)	66.7	56.1	73.8
Total dam inflow (ML)	**71.0**	**62.3**	**76.4**
Evaporative losses (ML)	2.9	2.6	3.3
Seepage losses (ML)	1.1	1.1	1.1
Total losses (ML)	**4.0**	**3.6**	**4.3**
Usage – water truck for dust suppression (ML)	45.3	39.2	49.2
Usage – main tank top-up for other site usage (ML)	21.7	20	23.1
Total usage (ML)	**67.0**	**59.2**	**72.3**
Daily stored volume (ML) [a]	**29.6**	**26.4**	**31.0**
Main Tank – Existing Annual Volumes (Table 5.1.3.1 G&S, 2019)			
Inflow from direct rainfall (ML)	21.7	20	23.1
Usage –haul road sprinklers (ML)	6.3	6.2	6.3
Usage – asphalt plant (ML)	0.1	0.1	0.1
Usage – process/product water (ML)	15.4	13.3	16.9
Average daily stored volume (ML)	**0.79**	**0.49**	**1.00**

a) Stored volumes reported using average, minimum and maximum daily levels for entire modelling period (not based on annual averages).

Under the modelled 'future quarry footprint' scenario, the Main Dam in the North Pit is used to provide all water supply requirements for the site and as such, no imported clean (mains) water will be relied upon or needed for any future operational uses on site. Though the form of the dam will likely change as excavation within the pit deepens, for modelling purposes, it has been assumed that the Main Dam will maintain capacity of 30 ML at full storage.

The modelling results show that for predicted future conditions, the main dam will provide sufficient supply to service all water demands within the quarry throughout the full range of modelled climatic conditions, with a minimum estimated storage volume of 26.4 ML (or 3.6 ML below full capacity) throughout the model period.

With an average daily water usage across the site of 183.6 kL, this approximates to 144 days (greater than 4 months) of additional water supply available at all times throughout the modelling period.

The (usage) water balance for the main tank indicates that (for the assumed asphalt plant usage of 0.0616ML/year) the modelling suggests that throughout the modelling period, the minimum water level in the rain tank prior to weekly top-up will be 0.49 ML.

4.9 Flora

The site contains a mixture of tall open forest, closed forest, disturbed grassland and re-growth scrub. As part of the original quarry EIS and approval, a biodiversity offset of 62.6 ha (6:1 offset ratio) was proposed.

Further, a *Landscape and Biodiversity Management Plan* was developed to re-vegetate degraded areas.

4.10 Fauna

Previous site works have identified 84 fauna species onsite. Of the identified species, five (5) are listed under the Biodiversity Conservation Act 2016.

As a result of this, a *Vegetation and Habitat Management Plan* as well as a *Koala Management Plan* were prepared for the quarry.

4.10.1 SEPP 44

SEPP 44 states that if vegetation constituting 'potential koala habitat' exhibits at least 15% cover of preferred feed tree species, the land is subject to a field survey to determine whether koalas are present.

The ecological assessment of the site for the EIS identified that the vegetation present was classified as core koala habitat. As a result, a *Koala Management Plan* for the site was developed.

4.11 Heritage

4.11.1 Indigenous Heritage

An *Indigenous Heritage Assessment* was undertaken for the site to prepare the EIS for the quarry. This included a review of databases, consultation with the *Ngulingah Local Aboriginal Land Council* and a site inspection.

It was determined that it is unlikely to contain items of Indigenous Heritage.

The quarry site also operates in accordance with an *Aboriginal Heritage Plan* (approved by the NSW DP&E). It is noted that, there has not been any identified items of aboriginal heritage during quarrying operations.

4.11.2 Non-Indigenous Heritage

A search was conducted on the NSW Planning Portal. No items of non-indigenous heritage are identified onsite.

5.0 Development Standards

The following legislation and policies were taken into consideration when developing this Statement of Environmental Effects (SEE).

5.1 Commonwealth Legislation

5.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected species, populations and communities and heritage items.

Under the EPBC Act 1999, activities that are likely to have a significant impact on matters of national environmental significance, actions undertaken on Commonwealth lands, or by the Commonwealth must be assessed and approved.

The EPBC Act identifies matters of national environmental significance such as:

- World heritage properties;
- National heritage properties;
- RAMSAR wetlands;
- Nationally threatened species and communities;
- Migratory species protected under international agreements;
- Commonwealth marine environment;
- Great Barrier Reef Marine Park;
- Nuclear actions; and
- Protection of water resources from coal seam gas development and large coal mining development.

Comment:

Sections 4.9 4.10, 4.11, 6.3 and 6.10 of this SEE discusses potential biodiversity and heritage impacts.

5.2 State Legislation

5.2.1 Environmental Planning and Assessment Act, 1979

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and its associated regulations provide the framework for assessing environmental impacts and determining planning approvals for developments and activities in NSW. The EP&A Act also establishes *State Environmental Planning Policies* (SEPPs) and *Local Environmental Plans* (LEPs) which have been considered as part of the proposal.

5.2.1.1 Objects of Act

The objects of this Act are as follows:

(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,

(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,

(c) to promote the orderly and economic use and development of land,

(d) to promote the delivery and maintenance of affordable housing,

(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,

(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),

(g) to promote good design and amenity of the built environment,

(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,

(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,

(j) to provide increased opportunity for community participation in environmental planning and assessment.

5.2.1.2 Approval Pathway

It is noted that the quarry development application was submitted under *Part 3A Major Infrastructure and Other Projects* of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *Environmental Planning and Assessment Regulations 2000* (EP&A Reg).

It is noted that Part 3A of the EP&A Act was repealed in 2011 and replaced with *Division 4.1 'State Significant Development'*.

As such, given the proposal seeks to modify a State Significant Development (SSD) consent, the proposal is deemed to require consideration of the matters listed under *Part 4, Division 4.9, Section 4.55 (cf previous s 96)* of the EP&A Act.

It is also noted that the proposal is considered to be an integrated development under Section 4.46 of the EP&A Act and its associated regulation.

The quarry and ancillary asphalt plant are also deemed to be designated development as listed in Schedule 3 of the EP&A Reg *2000*.

(2) Other Modifications

A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:

(a) It is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and;

(b) It has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and;

(c) It has notified the application in accordance with:

(i) the regulations, if the regulations so require, or

(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and

(iii) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.

Comment:

For the proposal to qualify as a 'modification' it must be proven that the proposal is 'substantially the same' as the originally approved activity / land use.

In determining whether a proposed modifications are 'substantially the same' the consent authority needs to have regard to both a 'quantitative' and 'qualitative' analysis of the proposed modification. This assessment needs to include consideration of the likely impacts arising from the proposed modifications and whether those impacts are 'additional' and/or 'adverse'.

The proposal is deemed to be substantially the same as the existing quarry consent based on the following qualitative and quantitative evaluation of the proposed modification:

Quantitative

- The asphalt plant use is considered to be 'ancillary' to the approved quarry use, particularly for the following reasons:
    - The quarry and the asphalt plant are located on the same site;
    - The asphalt plant sources aggregate from the approved quarry and therefore is be considered to serve the dominant quarry use;
    - The footprint of the asphalt plant is small when compared with the much larger approved footprint of the quarry. In this regard, it is considered that the asphalt plant is located generally within the operational quarry footprint;
    - The asphalt plant and quarry operate under the same EPL;
    - The proposed production quantity of the asphalt plant (50,000 tonnes per annum) is minor when considering the approved production quantity of the quarry (500,000m^3 per annum); and
    - The asphalt operation incorporates mobile and not permanent plant and equipment.

- As the asphalt plant is considered to be ancillary to the quarry use, the proposed modification does not change the dominant characterisation of the site, which is for an extractive industry (quarry). In this regard, the consent description would need to be amended to refer to an extractive industry and ancillary mobile asphalt plant.

- The proposed quantitative increase in asphalt production (15,000 to 50,000 tonnes) is understood to be considerably off-set by the fact that the quarry is providing the aggregate for the additional asphalt production and therefore that aggregate will not be going off site as it would have otherwise done.

Qualitative (likely impacts – and are they additional and adverse)

- The proposed modification does not require the change in the approved operational footprint of the site (quarry or the asphalt plant);

- The proposed modification does not require the removal of any additional vegetation from the site and therefore is not considered to have any additional ecological impacts;

- The proposed modification does not require any additional earthworks to be undertaken on the site;

- The proposed modification does not require any change the vehicular access to the site and does not require vehicular circulation within the site or loading and unloading that is not already approved to occur on the site;

- The proposed modification will increase traffic by 50 movements per day (or approximately per five (5) to six (6) movements per hour). Given the current road conditions (and traffic flows) within the vicinity of the site, this increase in traffic movements is deemed to be minimal and acceptable. Traffic impacts associated within the proposal are further detailed in Section 6.6;

- The proposed modification to increase the production of the asphalt plant is unlikely to result in an increased risk of additional or adverse noise impacts on existing residential uses in the area;

- The proposed modification to increase the production of the asphalt plant is unlikely to result in an increased risk of additional or adverse air quality (dust and odour) impacts on existing residential uses in the area;

- The proposed modification to increase the production of the asphalt plant will not result in the generation of significant volumes of additional waste from the site. Waste generation is currently considered to be controlled adequately. Additional measure as detailed in Section 0 will be implemented to ensure any increase resulting from the proposal will be adequately managed;
- The proposed modification does not result in any additional visual impacts; and
- The proposed modification is not expected to result in any additional stormwater impacts.

N.B. The current asphalt plant consent (DA1990/341) was recently amended to decommission the original asphalt plant (approved in 1990) and install alternate mobile asphalt plant. The new mobile asphalt plant results in significantly improved environmental performance when compared with the original Asphalt Plant approved in 1990. As such, there are no predicted negative environmental impacts as a result of the development as outlined in Section 0.

5.2.2 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) aims to protect vulnerable species, populations and communities listed under the Act. The BC Act requires consideration to be given to whether a development is likely to have impacts to these listed species, populations or communities. In accordance with Section 5A of the BC Act, impacts are identified through the application of an Assessment of Significance 5-part test. If the 5-part test indicates that the development will impart negative impacts to a listed threatened species, population and their habitat or on ecological communities, a Species Impact Statement or Biodiversity Development Assessment Report may be required.

Comment:

Sections 4.9, 4.10 and 6.3 of this SEE discusses the proposal in context of the BC Act and its impact on threatened species, populations, ecological communities or their habitats.

5.2.3 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act* 1997 (POEO Act) provides a framework for the licensing of certain activities. Schedule 1 of the POEA Act lists activities that require an Environment Protection License (EPL) to operate. The proposal is classified as '*crushing, grinding or separating*':

> (1) This clause applies to crushing, grinding or separating, meaning the processing of materials (including sand, gravel, rock or minerals, but not including waste of any description) by crushing, grinding or separating them into different sizes.
>
> (2) The activity to which this clause applies is declared to be a scheduled activity if it has a capacity to process more than 150 tonnes of materials per day or 30,000 tonnes of materials per year.

Comment:

The asphalt plant will continue to operate under the Blakebrook Quarry EPL (3384) per Section A3 Other activities. EPL 3384 is included in Appendix E.

5.2.4 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) aims to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. The NPW Act also aims to foster public appreciation, understanding and enjoyment of nature and cultural heritage, and provides for the preservation and management of national parks, historic sites and certain other areas identified under the Act. The NPW Act is administered by the NSW Office of Environment and Heritage (OEH).

Comment:

No known Aboriginal objects or places were identified within the study area. This is further discussed in Section 6.10.

5.2.5 Waste Avoidance and Resource Recovery Act 2001

The *NSW Waste Avoidance and Resource Recovery Act 2001* aims to encourage the most efficient use of resources and to reduce environmental harm. This includes the avoidance of waste generation and resource recovery and reuses where possible. Disposal is the least preferred option and should only be utilised where all other options are unfeasible.

Comment:

Proposed waste management practices are detailed in Section 6.11.

5.2.6 State Environmental Planning Policies (SEPPs)

5.2.6.1 SEPP No. 33 – Hazardous and Offensive Development

SEPP No 33 aims to ensure that the consent authority has sufficient information to assess whether a development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact.

Comment:

The development is deemed a 'potentially hazardous/offensive industry' under the *Hazardous and Offensive Development Application Guidelines – Applying SEPP 33* (2011), as such a Preliminary Hazard Analysis (PHA) is required. This is addressed further in Section 6.8.

5.2.6.2 SEPP No. 44 – Koala Habitat Protection

SEPP 44 aims at encouraging the:

> Proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.

This policy allows for the differentiation between potential and core koala habitat on the basis of preferred feed tree species and koala activity.

Comment:

SEPP 44 assessments initially involve a determination of habitat suitability (i.e. potential Koala habitat or not). Vegetation constituting 'potential Koala habitat' must exhibit at least 15% cover of preferred feed tree species, as listed in Schedule 1 of SEPP 44.

SEPP 44 is discussed further in Section 4.10.1 of this document.

5.2.6.3 SEPP (Mining, Petroleum Production and Extractive Industries) 2007

The aims of SEPP (Mining, Petroleum Production and Extractive Industries) 2007 are as follows:

> …in recognition of the importance to New South Wales of mining, petroleum production and extractive industries:
>
> (a) to provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State, and
>
> (b) to facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources, and
>
> (b1) to promote the development of significant mineral resources, and
>
> (c) to establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources, and
>
> (d) to establish a gateway assessment process for certain mining and petroleum (oil and gas) development:
>
> (i) to recognise the importance of agricultural resources, and
>
> (ii) to ensure protection of strategic agricultural land and water resources, and

(iii) to ensure a balanced use of land by potentially competing industries, and

(iv) to provide for the sustainable growth of mining, petroleum and agricultural industries.

Comment:

Given the nature of the existing activity and the intent to modify the consent associated with an extractive industry this policy is deemed to be applicable to the proposal.

It is noted that Part 2, Clause 7 '*Development permissible with consent*', in particular Clause 7 (4)(d) '*Co-location of industry*' is also applicable.

Clause 7 (4) states:

'If extractive industry is being carried out with development consent on any land, development for any of the following purposes may also be carried out with development consent on that land:

(a) the processing of extractive material,

(b) the processing of construction and demolition waste or of other material that is to be used as a substitute for extractive material,

(c) facilities for the processing or transport of extractive material,

(d) concrete works that produce only pre-mixed concrete or bitumen pre-mix or hot-mix.'

5.3 Local Environmental Plans

The proposed site is identified as falling under the *Lismore Local Environmental Plan 2012* (LLEP 2012).

5.3.1 Lismore LEP 2012

The site is identified as being located within the *RU1 'Primary Production'* Zone.

5.3.1.1 RU1 – Primary Production Zone Objectives

The general objectives and land use permissions that apply to the development are reproduced below from the LEP 2012.

Zone RU1 – Primary Production

(1) Objectives of zone

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To preserve rural resources by ensuring that the viability of rural land is not extinguished by inappropriate development or incompatible uses.*
- *To enable a range of other uses to occur on rural land providing such uses do not conflict with existing or potential agriculture and do not detract from the scenic amenity and character of the rural environment.*

(2) Permitted without consent

Environmental protection works; Extensive agriculture; Forestry; Home occupations; Home occupations (sex services); Intensive plant agriculture

(3) Permitted with consent

Airstrips; Animal boarding or training establishments; Aquaculture; Bed and breakfast accommodation; Boat launching ramps; Boat sheds; Building identification signs; Business identification signs; Camping grounds; Caravan parks; Cellar door premises; Cemeteries; Community facilities; Dual occupancies; Dwelling houses; Eco-tourist facilities; Environmental facilities; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Garden centres; Helipads; Home-based child care; Home businesses; Home industries; Information and education facilities; Intensive livestock agriculture; Jetties; Kiosks; Landscaping material supplies; Mooring pens; Open cut mining; Plant nurseries; Recreation areas; Recreation facilities (outdoor); Restaurants or cafes; Roads; Roadside stalls; Rural industries; Rural supplies; Turf farming; Water recreation structures

(4) Prohibited

Any development not specified in item 2 or 3

Comment:

The subject development (hot mix asphalt plant) is deemed to be a '*Heavy Industry*' and is not specified within Item 2 or 3 of the RU1 objectives. As such, the use is therefore to be deemed prohibited under the zone.

However, the heavy industry use is deemed to be 'ancillary' to the existing dominant / principal ('*Extractive Industry*') land use / activity also occurring on-site.

Given that the proposal is deemed to be ancillary to the current extractive industry occurring onsite the proposal is deemed to be permissible with consent.

5.3.1.2 Project Definition

The terms 'extractive industry' and 'heavy industry' are defined by the *LLEP 2012* as:

Extractive industry means the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunnelling or quarrying, including the storing, stockpiling or processing of extractive materials by methods such as recycling, washing, crushing, sawing or separating, but does not include turf

And

Heavy industry means a building or place used to carry out an industrial activity that requires separation from other development because of the nature of the processes involved, or the materials used, stored or produced, and includes:

(a) hazardous industry, or

(b) offensive industry.

> It may also involve the use of a hazardous storage establishment or offensive storage establishment.
>
> Note: Heavy industries are a type of industry

While the NSW Department of Planning and Infrastructure Planning Circular (PS 13-001) – *How to Characterise Development* defines ancillary as:

> 'An ancillary use is a use that is subordinate or subservient to the dominant purpose'

Given that the asphalt plant sources all aggregate materials used in production from the quarry, the plant is deemed to be subservient to the ongoing quarrying activity.

5.4 Justification of Permissibility

Given the provisions under Clause 7 (4)(d) of the SEPP *(Mining, Petroleum Production and Extractive Industries) 2007* and that the proposed asphalt plant is deemed to be ancillary to the dominant extractive industry land use, the asphalt plant is deemed to permissible.

It is noted that, from an Environmental Pollution License (EPL) viewpoint the asphalt plant is listed as ancillary use to the quarry and is licensed as such (Refer to Section A3 of EPL No. 3384).

It is considered that, having two (2) separate consents for related/ancillary activities (with similar impacts) on the same site is undesirable from an administrative and compliance management perspective.

Therefore, the amalgamation of the consents aims to streamline management and reduce excessive expenditure on environmental compliance and monitoring.

As such, in addition to improved management of various administrative and compliance issues associated with the consent, the amalgamation of the two (2) consents is also considered to satisfy 'object (c)' of the EP&A Act

6.0 Environmental Impacts and Mitigation

Hazards and risks associated with the proposal are expected to be minimal.

This is due to the quarry being operational with mitigation measures already in place.

A new asphalt plant (Benninghoven Portable Asphalt Plant) has recently been installed which results in quieter and more efficient operations. The mobile asphalt mixing plants are simply mounted on mobile steel foundations which only require a compacted gravel surface for the entire setup area. Figure 3 indicates the typical procedure of the mobile asphalt plant.

The following section outlines any environmental impacts that may occur as a result of the development. Where deemed to be required, measures have been detailed to mitigate the impact.

6.1 Visual Amenity

Due to the location of the asphalt plant, it is unlikely to cause objectionable views. This is a result of its removed locality and vegetation offering screening.

6.2 Groundwater

No negative impacts to groundwater have been identified. The asphalt plant will not contribute water to, or remove water from, the groundwater table.

6.3 Biodiversity

Previous site works have resulted in the development of several site specific environmental management plans.

As the development is occurring on a heavily modified and disturbed site, it is not expected that any species or communities will be put at risk by the development. There is no vegetation clearing activities proposed as part of the development.

Further, as the asphalt plant is already operative onsite, negative impacts to the area's biodiversity are extremely unlikely.

6.4 Noise

Assured Environmental (AE) were engaged to undertake a noise impact assessment for the development. The full report is included in Appendix A.

EPL 3384 outlines the noise limits applicable at the site:

L4 Noise Limits

L4.1 Noise from the licensed premise must not exceed an $L_{Aeq(15\ minute)}$ noise emission criterion of 36 dB(A) at Location 2 and 35 dB(A) at all other locations as stated in Section 4 of Schedule 3 within the Department of Planning – Section 75J of the Environmental Planning and Assessment Act 1979 – Blakebrook Quarry Project – Project No. 07_0020, except as expressly provided by this license.

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 metres/second at 10 metres above ground level; or
- Temperature inversion conditions greater than 3°C/100 metres.

There are seven (7) sensitive receptors identified near the site as shown in Figure 4.

Background noise monitoring was conducted from 18 September to 26 September 2018 at Receptor 7.

The results of the background noise monitoring are shown in Table 14.

Table 14: Baseline Noise Monitoring (dB(A)) (AE, 2018)

PERIOD	L_{max}	L_{eq}	ABL
Day	90	55	45
Evening	83	49	37
Night	89	49	34

Note: Day – 7am to 6pm;
Evening – 6pm to 10pm; and
Night – 10pm to 7am.

The results indicate that the existing background (RBL) noise levels in the area surrounding the quarry were significantly higher than the noise limits provided in the EPL. As such, where the quarry complies with the EPL limits, it is expected that the quarry will be inaudible at nearby receptors.

Noise modelling was conducted using CadnaA (version 2018 build 163.4824) developed by DataKustik. This software incorporates the influence of meteorology, terrain, ground type and air absorption in addition to source characteristics.

Table 15 shows the predicted receptor noise levels for existing operations and 100 truck movements per day.

Table 16 shows the predicted receptor noise levels for the operation of the quarry, asphalt plant and 150 truck movements per day.

Table 15: Existing Operations Predicted Receptor Noise Levels (AE, 2018)

RECEPTOR	$L_{Aeq(15\ minute)}$	EPL LIMIT	COMPLIES
R1	29	35	Yes
R2	36	36	Yes
R3	<10	35	Yes
R4	21	35	Yes
R5	34	35	Yes
R6	18	35	Yes
R7	35	35	Yes

Table 16: Expanded Operations Predicted Receptor Noise Levels (AE, 2018)

RECEPTOR	$L_{Aeq(15\ minute)}$	EPL LIMIT	COMPLIES
R1	32	35	Yes
R2	36	36	Yes
R3	<10	35	Yes
R4	24	35	Yes
R5	34	35	Yes
R6	22	35	Yes
R7	36	35	No (<1dB exceedance)

The results of the assessment have identified that compliance with the existing EPL limits is expected to be achieved for all receptors except R7. For this receptor, noise modelling indicates that an exceedance of up to 1dB is possible. This is considered insignificant as most people will be unable to discern the difference of 1dB.

As such, based upon the results of the noise modelling, the risk of adverse impacts on existing residential uses in the area is considered to be low.

6.5 Air Quality

Assured Environmental (AE) were engaged to undertake an air quality assessment for the development. The full report is included in Appendix G. The following is an extract from the AE report:

6.5.1 Assessment Criteria

The AE report has provided assessment criteria for both air quality and odour.

6.5.1.1 Air Quality and Particulates

Condition 10 of the "*Notice of Modification – Section 75W of the EP&A Act 1979*", provides the project criteria for the Subject Site. The criteria in Table 17 is applicable at any residence on privately-owned land.

Table 17: Project Criteria from Approval Notice of Modification (AE, 2018)

POLLUTANT	AVERAGING PERIOD	CRITERION
PM_{10}	24-hours	50 µg/m^3 a) d)
	Annual	25 µg/m^3 b)
TSP	Annual	90 µg/m^3 a) d)
Deposited Dust c)	Annual	2 g/m^2/month maximum increase b)
		4 g/m^2/month total dust level a) d)

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.

It is noted however that these conditions of approval do not consider emissions of other compounds (notably odour, VOCs and combustion emissions) from on-site activities (in particular the asphalt plant operation). For additional compounds considered relevant to the operation of the asphalt plant, reference is made to the air quality criteria provided in the Approved Methods (see Table 18).

Table 18: Approved Methods Emission Standards (AE, 2018)

POLLUTANT	AVERAGING PERIOD	CRITERION	
		pphm	µg/m^3
Nitrogen Dioxide (NO_2)	1 hour	12	246
	Annual	3	62
Carbon monoxide (CO)	8 hour	9	10,000
Sulphur Dioxide (SO_2)	1 hour	20	570
	24 hours	8	228
	Annual	2	60

6.5.1.2 Odour

The Approved Methods note that the odour assessment criteria for complex mixtures of odorants need to be designed to consider the range of sensitivities to odours within the community, and to provide additional protection for individuals with a heightened response to odours. Therefore, the odour assessment criteria allow for population size, cumulative impacts, anticipated odour levels during adverse meteorological conditions and community expectations of amenity. Table 19 presents odour criteria for various population sizes, as specified by the EPA.

Table 19: NSW EPA Odour Criteria (AE, 2018)

POPULATION OF AFFECTED COMMUNITY	ODOUR ASSESSMENT CRITERIA (OU)
Rural single residence (≤)	7.0
~ 10	6.0
~ 30	5.0
~ 125	4.0
~ 500	3.0
Urban area (≥ a 2000) and/or schools and hospitals	2.0

The Blakebrook Quarry site is located in a rural area with a total of six (6) dwellings located within 1.5 km of the site. As such, the population potentially exposed to odour emissions from the Subject Site is expected to be around 16 people (assuming 2.6 persons per dwelling). On this basis, an odour assessment criterion of 5.5 has been considered in the assessment.

6.5.2 Modelling Methodology

Atmospheric dispersion modelling involves the mathematical simulation of the dispersion of air contaminants in the environment. The modelling utilises a range of information to estimate the dispersion of pollutants released from a source including:

- Meteorological data for surface and upper air winds, temperature and pressure profiles, as well as humidity, rainfall, cloud cover and ceiling height information;
- Emissions parameters including source location and height, source dimensions and physical parameters (e.g. exit velocity and temperature) along with pollutant mass emission rates;
- Terrain elevations and land use both at the source and throughout the surrounding region; and
- The location, height and width of any obstructions (such as buildings or other structures) that could significantly impact on the dispersion of the plume.

For the purpose of the assessment, meteorological modelling has been undertaken using TAPM (The Air Pollution Model) and CALMET to predict localised meteorological conditions.

The meteorological data derived from these models have been used as an input for the CALPUFF dispersion modelling.

6.5.3 Predicted Ground Level Concentrations

The following section details the predicted ground level concentrations for the proposal derived from the modelling undertaken.

6.5.3.1 Particulate Matter PM_{10} & $PM_{2.5}$

The modelling undertaken determined the maximum predicted 24-hour average cumulative (source plus background), the predicted annual average cumulative and the Maximum Predicted 24-Hour Average Source Contribution for PM_{10} and $PM_{2.5}$ receptor concentrations at each of the identified sensitive receptors and the across the modelling domain.

PM_{10}

Review of the maximum predicted concentration contours confirms that compliance with the 50 µg/m^3 criterion is predicted to be achieved for the all sensitive receptors. The maximum concentration is within the Subject Site boundary.

The results of the modelling presented confirm that the predicted concentrations are significantly below the 25 µg/m^3 criteria.

The results of the modelling confirm that emissions from the subject site are predicted to result in maximum off-site PM_{10} receptor concentrations of 49% of the relative criterion specified in the Approved Methods.

It is noted that as there are no sensitive receptors near the Subject Site boundary (and therefore no risk of exposure). Exceedences is considered immaterial.

$PM_{2.5}$

Review of the maximum predicted concentration contours confirms that compliance with the 25 µg/m^3 criterion is predicted to be achieved for the all sensitive receptors.

The results of the modelling presented confirm that the predicted concentrations are below the 8 µg/m^3 criteria for the sensitive receptors.

The results of the modelling confirm that emissions from the Subject Site are predicted to result in maximum concentrations of $PM_{2.5}$ concentrations at sensitive receptors of <20% of the relative criterion specified in the Approved Methods.

As with PM_{10}, exceedences of the $PM_{2.5}$ limits are predicted at the Subject Site. In the absence of any existing or future sensitive uses in this area, PM_{10} is considered immaterial.

6.5.3.2 Total Suspended Particles

The modelling undertaken determined the maximum predicted source contribution Total Suspended Particles (TSP) concentrations at each of the identified sensitive receptors and the maximum across the modelling domain.

This modelling confirms that emissions from the proposal are predicted to result in maximum concentrations of TSP concentrations at sensitive receptors of less than 35% of the relative criterion specified in the Approved Methods.

6.5.3.3 Dust Deposition

The modelling undertaken determined the maximum predicted source contribution dust deposition concentrations at each of the identified sensitive receptors and across the modelling domain.

The results of the modelling confirm that emissions from the subject site are predicted to result in maximum dust deposition at sensitive receptors of <10% of the relative criterion specified in the Approved Methods.

6.5.3.4 Nitrogen Dioxide, Sulphur Dioxide and Carbon Dioxide

Nitrogen Dioxide (NO_2)

The modelling undertaken determined the Maximum Predicted 1-Hour Average Cumulative (source plus background) and Maximum Predicted Source Contribution Receptor Concentrations at each of the identified sensitive receptors and the Predicted Annual Average Cumulative Concentrations across the modelling domain for Nitrogen Dioxide (NO_2).

Review of the maximum predicted concentration contours confirms that compliance with the 246 µg/m^3 criteria is predicted to be achieved for the all sensitive receptors.

The results also confirms that the predicted concentrations are significantly below the 62 µg/m^3 criteria for the predicted annual average cumulative.

The results of the modelling confirm that emissions from the cumulative operations are predicted to result in maximum off-site NO_2 concentrations of less than 50% of the relative criterion specified in the Approved Methods.

Sulphur Dioxide (SO_2)

The modelling undertaken determined the Maximum Predicted 1-Hour and 24 Hour Average Source and Cumulative Concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. The modelling also determined the predicted Cumulative Annual Average Concentrations across the modelling domain.

Review of the maximum predicted concentration contours confirms that compliance with the 570 µg/m^3 and 228 µg/m^3 criterion for the Maximum Predicted 1 hour and 24 hour Average Cumulative Concentrations (respectively) is predicted to be achieved for the all receptors.

The results of the modelling presented confirm that the predicted annual average cumulative concentrations across the modelling domain are below the 60 µg/m^3 criteria for all sensitive receptors.

The results also indicate the Maximum Predicted 1 Hour and 24 Hour Average Source Contribution Concentrations at sensitive receptors is less than 2% of the relative criteria (570 µg/m^3 and 228 µg/m^3 respectively) for both the 1 hour and 24 hour time periods as specified in the Approved Methods.

Carbon Monoxide (CO)

The modelling undertaken determined the Maximum Predicted Source Contribution CO Concentrations at each of the identified sensitive receptors and the maximum across the modelling domain.

The modelling confirms that emissions from the cumulative operations are predicted to result in maximum concentrations of CO concentrations at sensitive receptors of 5% of the relative criterion specified in the Approved Methods.

6.5.3.5 Odour

The modelling undertaken determined the Maximum Predicted Source Contribution 1-Second, 99th Percentile Odour Concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. This modelling confirmed that emissions from the cumulative operations are predicted to result in maximum concentrations of odour concentrations at sensitive receptors of <1% of the relative criteria specified in the Approved Methods.

6.5.4 Conclusions

The results of the air modelling indicate compliance with all air quality objectives is predicted to be achieved for all relevant averaging periods at the nearest sensitive receptors to the quarry upgrade.

Overall, based on the results of the predictive dispersion modelling, the risk of adverse impacts of the proposed upgrade of the quarry is considered to be low.

6.6 Traffic and Access

SECA Solutions were engaged to assess any potential impacts associated with an increase in traffic. The full report is included in Appendix H.

Presently, the approval allows up to 100 laden trucks per day for quarrying activities. Laden movements associated with the asphalt plant are an average of 14 to 20 movements per day. This can typically result in up to 120 laden truck movements combined per day.

The proposal seeks approval for an increase to the allowable amount to a maximum of 150 laden truck movements per day, inclusive of quarry and asphalt plant operations. At full production and output, the proposal could see an additional 50 movements per day. The proposal will generate typically five (5) – (6) additional truck movements per hour per direction when the site is operating at maximum capacity.

For both the current and future situation the absolute maximum number of outbound trucks per hour is 25, based upon the capacity of the weighbridge on site. The weighbridge will not be upgraded as part of this project and, as such this upper limit on hourly flows will remain.

There are no changes proposed to the existing access and transport routes for the development, with the internal site layout to operate as per the current situation.

All intersections along the primary transport route are currently operating well within their capacity, with sufficient spare capacity to accommodate the minor increase in peak hour vehicles movements as a result of this proposal.

Road safety has been reviewed and accident data obtained, which shows that the current operation of the road network in this location is safe and acceptable. The prior modification to consent for the quarry operations included a number of road upgrades that have since been completed, to ensure the heavy vehicle movements (up to 150 per day maximum) could be accommodated within the road network.

The key intersection of Nimbin Road and the Quarry Access Road has been assessed against Austroads Guidelines and sight lines exceed the requirements of this guide. The haulage route has been assessed to ensure adequate safety, with the current intersections providing sufficient capacity to cater for the turn movements associated with the heavy vehicles used for the material haulage.

All intersections along the primary transport route are currently operating well within their capacity, with sufficient spare capacity to accommodate the minor increase in peak hour vehicles movements as a result of this proposal.

The operation of Nimbin Road and Wilson Street has been observed during the morning peak hour and based upon these observations the overall intersection operates at a level of service of A. Delays of less than 20 seconds were observed for the right turn from Nimbin Road into Wilson Road indicating a level of service of B. The potential for 5-6 additional trucks per hour to turn right here shall have a minimal impact upon these delays and the future level of service shall remain at B.

The following table may be used as an initial guide to determine the need for a detailed traffic analysis in accordance with the procedure provided in Austroads Part 3 of the Guide to Traffic Management. When the volumes at an intersection are less than those shown, a detailed analysis to demonstrate that adequate capacity is available is unlikely to be necessary. Furthermore, flaring of the approaches is unlikely to be needed based on capacity. However, separate lanes for left or right-turning vehicles may be desirable on the major road for safety reasons.

Nimbin Road at the intersection with Wilson Street is considered to be carrying approximately 3900 vehicles per day. Based on 10% of the daily flows occur in the peak periods (as per the RMS Guide to Traffic Generating Developments) the peak hourly 2-way flows would be 390. Using the table below, the major flow is less than 400 vehicles per hour and therefore the minor road flow could be 250 vehicles per hour and the detailed intersection assessment is not required. The traffic flows on Wilson Street are less than those on Nimbin Road and therefore the level of service is expected to remain at A, indicating minimal delays and congestion, consistent with the current situation observed on site.

Table 20: Austroads Guide to Capacity Assessment for Priority Intersections (SECA Solutions, 2019)

MAJOR ROAD TYPE (1)	MAJOR ROAD FLOW (VPH) (2)	Minor ROAD FLOW (VPH) (3)
Two Lane	400	250
	500	200
	650	100
Four Lane	1,000	100
	1,500	50
	2,000	25

Notes:
1. Major road is through road (i.e. has priority)
2. Major over flow includes all major road traffic with priority over minor road traffic
3. Minor road design volumes include through and turning volumes

Other intersections along the haul routes typically operate very well with low delays and queues. The haul route via Wilson Street and Three Chain Road to the Bruxner Highway operates very well with minimal delays during the morning peak period. The roundabout controlled intersection with the Bruxner Highway operates very well with minimal delays and congestion and is considered to have capacity for the on-going use of the project site. The additional 6 truck movements per hour inbound and outbound shall have a minimal impact at this roundabout.

6.7 Material Handling and Storage

It is not proposed to increase the quantities of materials currently stored onsite, however, the proposal (in particular the increase in output) may require more regular deliveries of input materials during peak output periods.

The proponent will continue to store and handle all dangerous goods in accordance with industry best practise, dangerous goods storage requirements and relevant Australian Standards.

6.8 Hazard and Risk

6.8.1 Preliminary Hazard Analysis

The Project has been assessed in accordance with SEPP 33 to determine whether a Preliminary Hazard Analysis (PHA) is required to support the development application. A development is considered potentially hazardous and requires a PHA if the storage or transport of hazardous substances exceeds specific screening thresholds outlined in SEPP 33. A preliminary risk screening has been completed for the Project to determine whether a PHA is required.

SEPP 33 also applies to developments that are considered to be potentially offensive. A development is potentially offensive if it requires an EPL from the EPA.

6.8.1.1 Preliminary Offensive Screening

In accordance with Appendix 3 of '*Applying SEPP 33*' the proposal is identified as being an industry that may be potentially offensive.

Applying SEPP (DoP 2011) also indicates that potentially offensive development could effectively be regarded as development that would require a pollution control licence from the NSW EPA or other public authority. It is noted that the asphalt plant is currently included in the Blakebrook Quarry EPL.

Given the outcomes of the various environmental assessments (in particular Noise and Air Quality Assessments contained within Sections 6.4 and 6.5 respectively) undertaken as part of this document, the proposal is not considered to be more offensive to the surrounding locality than the current quarry / asphalt plant.

6.8.2 Preliminary Risk Screening

Preliminary risk screening is undertaken to determine the requirement for a PHA. SEPP 33 contains a number of criteria for hazardous material storage quantities that have the potential to create off site impacts.

Table 21 contains a list of hazardous materials to be stored and used within the asphalt plant and the SEPP 33 screening criteria.

Table 21: Hazardous Materials Inventory

MATERIAL	ADG CODE CLASS	ESTIMATED STORAGE CAPACITY (KG)/(L)	STORAGE METHOD & LOCATION	SCREENING THRESHOLD (KG/KM)	TRIGGER SEPP 33
Toluene – Drum 205lts	3PGII	410kg	Packaged (in quarry lab away from plant site)	Cumulative >1t	No, The separation distance between the asphalt plant to the site boundary is approximately 100 m & insufficient quantity stored.
Toluene Waste – Drum 205lts	3PGII	410kg	Packaged (in quarry lab away from plant site)		
Oil – Drum 205lts	3 / C1	205L	Packaged (in plant area)	N/A	N/A, Oils are not stored with other flammable materials, hence it is not considered to be potentially hazardous based on SEPP 33.
Oil – Drum 20lts	3 / C1	100L	Packaged (in plant area)	N/A	
LPG – Bottle 45lts	2.1 / C2	90L	Packaged (in plant area)	10t or 16m^3	No, The separation distance between the asphalt plant to the site boundary is approximately 100 m & insufficient quantity stored.
Diesel – Transtank (lts)	C1 PGIII	20,000L	Above Ground Tanks (bunded)	N/A	N/A, Diesel is not stored with other flammable materials, hence it is not considered to be potentially hazardous based on SEPP 33.
Diesel – Plant Day Tank (lts)	C1 PGIII	3,500L	Above Ground Tanks (bunded)	N/A	
Bitumen – Tank No.1 (lts)	9 / C2	37,000L	Above Ground Tanks (bunded)	N/A	N/A, Bitumen is a Class 9 dangerous good and not subject to the Applying SEPP 33 thresholds.
Bitumen – Tank No.2 (lts)	9 / C2	37,000L	Above Ground Tanks (bunded)	N/A	

ADG Code – Australian Dangerous Goods Code
Note that C1 combustible liquids are not a dangerous good under UN (United Nations) classification. They are defined as dangerous goods under workplace legislation. Applying SEPP 33 (January 2011)

As the diesel fuel (Class C1) and lubricating oils and greases (Class C2) are not stored adjacent to any other hazardous materials, DoP (2011) does not require these to be considered further.

The proponent will continue to store and handle all dangerous goods in accordance with industry best practise, approved management plans, dangerous goods storage requirements and relevant Australian Standards.

6.8.3 Conclusion

The Project is not considered to be a potentially hazardous development with respect to the storage or use of hazardous substances. Therefore, in accordance with SEPP 33, a PHA is not required for the storage or use of hazardous substances and no further risk assessment is required.

6.9 Soil and Water Management

The following section details the assessment of the impacts pf the proposal in relation to the existing soil and water management practises and the associated 2019 water balance prepared by Gilbert and Sutherland (G&S).

6.9.1 Catchment Areas

Information supplied to MHC indicated that the proposal does not require the augmentation or creation of the existing hardstand area or the wider catchment areas associated with the asphalt plant site.

6.9.2 Water Management Practices

6.9.2.1 Direction of Flows

The proposal does not seek to divert or argument any existing (or future) flow routes.

6.9.2.2 Sedimentation

It is noted that the proposal seeks to replace a permanent asphalt plant with a mobile plant, increase annual plant output and also include the plant in the development consent for the current quarry operation. The proposal does not seek to change the overall footprint (that there is also no increase in hardstand areas) or associated catchment conditions (roughness co-efficient and percentage of imperviousness) of the asphalt plant and, as such, the modelled conditions will remain the same as those used by G&S in the 'future' scenario.

RPQ have informed MHC that, with the exception of the occasional 'washing' of a front end loader, that there is no need for any plant wash down as the plant operates as a 'closed system' i.e. a dry baghouse system that reuses all particulates. The periodic washing of the loader occurs at the approved wash bay situated within the quarry operation. As such, the current asphalt plant does not generated any additional water runoff .It is noted that this arrangement will be maintained in the proposed amendment.

6.9.2.3 Usage

The proposed modification seeks to increase the total asphalt plant output to 50,000 tonnes per annum (currently 15,000 tonnes per annum). This is an increase of approximately 3.6 times the current output.

Currently 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 G&S model as a constant for the 6 days per week (excluding Sundays) when the plant is operating. The estimated annual plant water usage is 0.0616 ML.

As such, to allow for an assessment of the adequacy of the future water provisions, MHC has multiplied the future water usage rate as stated in by G&S (Refer to Table 5.1.3.1 of the G&S SWMP) by 3.6. This equates to an estimated water usage water requirement of 0.22ML

The assumed water (supply and usage) balance results (as modified from the G&S) for the Main Dam and Main Tank is presented in Table 22.

Given the complexities associated with water balance model the following table is based upon the assumptions made above. The following should be re-modelled and verified as part of the annual water balance report (as required by the current EPL) as part of the Annual Return for the quarry.

Table 22: Assumed Water Supply and Usage Balance – Northern Catchment Main Dam & Main Tank – Annual Volumes (based upon Table 5.1.3.1 G&S, 2019)

PARAMETER	AVERAGE YEAR	MINIMUM	MAXIMUM
Northern Catchment Main Dam – Existing Annual Volumes (Table 5.1.2.1 G&S, 2019)			
Dam inflow from direct rainfall (ML)	4.3	2.5	6.7
Dam inflow pumped from sediment basin (ML)	66.7	56.1	73.8
Total dam inflow (ML)	**71.0**	**62.3**	**76.4**
Evaporative losses (ML)	2.9	2.6	3.3
Seepage losses (ML)	1.1	1.1	1.1
Total losses (ML)	**4.0**	**3.6**	**4.3**
Usage – water truck for dust suppression (ML)	45.3	39.2	49.2
Usage – main tank top-up for other site usage (ML)	21.7	20	23.1
Total usage (ML)	**67.0**	**59.2**	**72.3**
Daily stored volume (ML) [a]	**29.6**	**26.4**	**31.0**
Main Tank – Existing Annual Volumes (Table 5.1.3.1 G&S, 2019)			
Inflow from direct rainfall (ML)	21.7	20	23.1
Usage –haul road sprinklers (ML)	6.3	6.2	6.3
Usage – asphalt plant (ML)	0.22	0.22	0.22
Usage – process/product water (ML)	15.4	13.3	16.9
Average daily stored volume (ML)	**0.67**	**0.37**	**1.00**

6.9.3 Conclusion

Based upon the information supplied, it is expected that there will be no increase in surface water flows generated onsite. As such, the current and future (as detailed in the G&S SWMP) storage arrangements (including sedimentation basins) are deemed to be adequate and will not require augmentation.

The (usage) water balance for the main tank indicates that (for the assumed asphalt plant usage of 0.22ML/year) the modelling suggests that the minimum water level in the rain tank prior to weekly top-up will be 0.37 ML.

The modelling results show that for predicted future conditions, the main dam will provide sufficient supply to service all water demands.

6.9.4 Recommendations

The following recommendations are made:

- That the various recommendations made within the G&G SWMP (and associated water balance) are complied with and/or implemented; and
- That a revision of the water balance model is undertaken as part of the annual water balance report (as required by the current EPL) to be prepared as part of the Annual Return for the quarry. If necessary, the updated water balance will detail any required changes to the current and proposed water management practices.

6.10 Heritage

6.10.1 Indigenous Heritage

As no Indigenous Heritage items have been identified onsite, there are no foreseeable impacts to Indigenous Heritage. If for any reason an item of Aboriginal significance is discovered, all work is to cease and the Department of NSW Environment and Heritage is to be contacted.

6.10.2 Non-Indigenous Heritage

Lismore City Council's Heritage maps indicate that the site has no heritage significance.

6.11 Waste Management

As no construction is proposed, the potential impacts of waste generation is extremely low. Minor earthworks may be conducted to enable suitable drainage from the site, however, this will be minimal and any spoil generated will be reused where possible.

6.11.1 Safeguards and Mitigation Measures

Excavated Material / Spoil

Where possible, excavated soil is to be reused onsite. Stockpiled areas are to utilise appropriate bunding and sediment fencing to prevent soil loss. If winds increase to a level causing the loss of stockpiled material, water carts should wet the stockpiled material to reduce soil loss.

General / Construction Waste

All waste generated by the proposal would be classified in accordance with the *NSW Waste Classification Guidelines Part 1: Classifying Wastes* (NSW EPA 2014).

All waste generated on site is to be transported off site and disposed of at landfill site approved to accept General Solid Waste (non-putrescible).

Resource management hierarchy principles are to be followed:

- Avoid unnecessary resource consumption as a priority;
- Avoidance is followed by resource recovery (including reuse of);
- Disposal is undertaken as a last resort (in accordance with the *Waste Avoidance and Resource Recovery Act 2001*); and
- Material and waste for disposal (including recyclable waste, general waste and oil contaminated waste) must be classified and transported by appropriately licensed contractors to approved facilities.

Any fuel, lubricant or hydraulic fluid spillages would be collected using absorbent material and the contaminated material disposed of at a licensed waste depot.

6.12 Community Consultation

Community consultation was undertaken by Mr Kevin Oszinski of MHC and Mr Phil Klepzig of LCC.

A notification via LCC social media page and community flyer invited concerned residents to attend a 'drop in session' at Goolmangar Hall on 11 October 2018 from 2pm to 6pm.

A total of five (5) residents attended at varying times. The primary concern was regarding potential increases in traffic and how the road network would cope. As detailed in Section 6.6, there is expected to be minimal impacts.

Attendees were briefed on this and were satisfied. Further impacts to the community are considered highly unlikely as a result of the development.

6.13 Cumulative Impacts

Due to the nature of the proposal, coupled with suitable environmental management measures, it is unlikely that there are any cumulative environmental effects.

6.14 Environmental Management

Table 23 briefly outlines the environmental impacts deemed to potentially occur as a result of the proposal. Management measures for these impacts have also been identified in Table 23.

Table 23: Impacts and Management

IMPACTS ADDRESSED	POTENTIAL SIGNIFICANCE	RECOMMENDATIONS
Physical And Pollution		
Air Quality	Nil to Minor	Predictive dispersion modelling indicates the risk of adverse impacts of the proposed upgrade of the quarry is considered to be low.
Groundwater	Nil	N/A
Soil and Water	Nil Minor	That the various recommendations made within the G&G SWMP (and associated water balance) are complied with and/or implemented. That a revision of the water balance model is undertaken as part of the annual water balance report (as required by the current EPL) to be prepared as part of the Annual Return for the quarry. If necessary, the updated water balance will detail any required changes to the current and proposed water management practices.
Site Contamination	Nil	N/A
Noise	Nil to Minor	Noise modelling indicates that there is a possible exceedance of 1dB at R7. This is considered negligible as most people will not be able to discern a 1 dB exceedance.
Traffic and Access	Minor	There will be minor increase in the number of truck movements from the site (i.e. 5-6 movements per hour). The current road network is considered adequate to deal with the minor increase.
Waste Management	Minor	All generated waste must be stored and disposed of at a suitably licensed landfill.

Biological		
Fauna	Nil	N/A
Flora	Nil	N/A
Ecological	Nil	N/A
Community		
Heritage/culture	Nil	N/A

7.0 Conclusion

An environmental assessment of the proposed development has been undertaken and presented in this SEE. The assessment has been undertaken in accordance with the requirements of the EP&A Act, 1979.

This SEE outlines the proposal, the regulatory framework, potential impacts from the project on the environmental and the local community and provides a number of mitigation measures to address these impacts.

In our opinion the proposed expansion to existing asphalt plant will have minimal impact on the environment. The long term effects of the proposal are considered to be negligible.

The development is in sympathy with the current land use and ensures the continued supply of asphalt to the LCC LGA (and surrounding areas). Because of the aforementioned, it is recommended the development as proposed, be approved.

8.0 References

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Trico Asphalt Pty Ltd / RPQ Group (2018), 'Emergency Response Plan, Asphalt Plant, Blakebrook Quarry, Nimbin Rd'

Trico Asphalt Pty Ltd / RPQ Group (2018), 'Safe Work Method Statement'

9.0 Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only.

The report only relates to the identified site referred to in the scope of works being the proposed development area within the Blakebrook Quarry (Lot 201 in DP 1227138), Nimbin Road, Blakebrook ('the site').

The findings and recommendations made in this report are based upon the results of the various assessments and information reviews undertaken for Blakebrook Quarry. This report was carried out in accordance with the relevant guidelines.

This report may not be relied upon by any third party not named in this report for any purpose, except with the prior written consent of Mitchel Hanlon Consulting Pty Ltd or Lismore City Council (which consent may or may not be given at the discretion of Mitchel Hanlon Consulting Pty Ltd or Lismore City Council).

It has been assumed that all investigations and information supplied by others (or not undertaken by MHC) is complete, accurate and correct. MHC has relied on this information in good faith and takes no responsibility for any subsequent damages or liabilities as a result of incomplete, inaccurate or misleading information.

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This report comprises the formal report, documentation sections, tables, figures and appendices as referred to in the index to this report and must not be released to any third party or copied in part without all the material included in this report for any reason.

The report relates to the site as at the date of the report as conditions may change thereafter due to natural processes and/or site activities.

No warranty or guarantee is made in regard to any other use than as specified in the scope of works and only applies to the extent of works in this report.

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Mitchel Hanlon Consulting Pty Ltd has prepared this report with the diligence, care and skill which a reasonable person would expect from a reputable environmental consultancy and in accordance with environmental regulatory authority and industry standards, guidelines and assessment criteria applicable as at the date of this report. Industry standards and environmental criteria change frequently, and may change at any time after the date of this report.

Appendix A Project Approval (MP 07_0020) – Blakebrook Quarry

Project Approval

Section 75J of the *Environmental Planning & Assessment Act 1979*

I approve the project referred to in schedule 1, subject to the conditions in schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the project.

SHaddad

Sam Haddad
Director-General
as delegate for the Minister for Planning

Sydney 24th November 2009

SCHEDULE 1

Application No.:	07_0020	
Proponent:	Lismore City Council	
Approval Authority:	Minister for Planning	
Land:	Extraction Areas	Lot 102 DP 817730, Lot 1 DP 845473
	Access Road	Lot 10 DP 243915 Lot 9 DP 243915 Lot 200 DP 1013944 Part Lot 6 DP 240441
Project:	Blakebrook Quarry Project	

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DEFINITIONS

AEMR	Annual Environmental Management Report
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 8 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
DECCW	Department of Environment, Climate Change and Water
Department	Department of Planning
DII	Department of Industry and Investment
Director-General	Director-General of Department of Planning, or delegate
EA	Environmental Assessment titled *Blakebrook Quarry Expansion, Environmental Assessment Report, Final Report*, January 2009 including the Response to Submissions
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPL	Environment Protection Licence issued by DECCW under the *Protection of the Environment Operations Act 1997*
Evening	The period from 6pm to 10pm
Land	Land means 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
Minister	Minister for Planning, or delegate
Night	The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
NOW	NSW Office of Water within DECCW
Privately-owned land	Land that is not owned by a public agency or a quarry company (or its subsidiary)
Project	The development as described in the EA
Proponent	Lismore City Council, or its successors in title
Quarrying Operations	Extraction of basalt and associated materials, processing of extracted materials and transport of extracted materials from the site
Reasonable and Feasible	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. Feasible relates to engineering considerations and what is practical to build
Response to Submissions	The Proponent's response to issues raised in submissions titled *Blakebrook Quarry Expansion, Response to Submissions, Final Report*, dated August 2009
RTA	Roads and Traffic Authority, now the part of the Department of Transport and Infrastructure
SEPP 44	*State Environmental Planning Policy No. 44 – Koala Habitat Protection*
Site	The land referred to in Schedule 1
Statement of Commitments	The Proponent's commitments included in the Response to Submissions, as shown in Appendix 2

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

Obligation to Minimise Harm to the Environment

1. The Proponent shall 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 shall carry out the project generally in accordance with the:
   (a) EA;
   (b) Statement of Commitments; and
   (c) conditions of this approval.

   Notes:
   - *The general layout of the project is shown in Appendix 1;*
   - *The Statement of Commitments is reproduced in Appendix 2.*

3. If there is any inconsistency between the above documents, 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 shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
   (a) any reports, plans, programs or correspondence that are submitted in accordance with this approval; and
   (b) the implementation of any actions or measures contained in these reports, plans, programs or correspondence.

5. The Proponent shall prepare revisions of any strategies, plans or programs required under this approval if directed to do so by the Director-General. Such revisions shall be prepared to the satisfaction of, and within a timeframe approved by, the Director-General.

6. By 30 June 2010, the Proponent shall surrender development consent DA 95/239 to the relevant consent authority to the satisfaction of the Director-General.

Limits on Approval

7. Quarrying operations may take place on site until 31 December 2039.

   Note: Under this approval, the Proponent is required to rehabilitate the site to the satisfaction of the Director-General. Consequently, this approval will continue to apply in all other respects other than the right to conduct quarrying operations until the site has been rehabilitated to a satisfactory standard.

8. The Proponent shall not transport more than 600,000 tonnes of quarry materials from the site per calendar year.

9. The Proponent shall not extract quarry materials or carry out any other work below 55 m AHD in the northern pit or 105 m AHD in the southern pit, other than the construction of sediment basins, bores or drillholes.

10. The Proponent shall not dispatch more than 100 laden trucks from the site per day.

    Note: In this condition, "trucks" means vehicles with more than a 5 tonne load limit.

Management Plans / Monitoring Programs

11. With the approval of the Director-General, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis.

Structural Adequacy

12. The Proponent shall 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

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

Operation of Plant and Equipment

14. The Proponent shall ensure that all plant and equipment used at the site is:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient condition.

Section 94 Contributions

15. The Proponent shall pay Council contributions for roadworks in accordance with the *Lismore City Council Section 94 Development Contributions Plan 2004*, as may be updated from time to time, to the satisfaction of the Director-General.

SCHEDULE 3
ENVIRONMENTAL PERFORMANCE CONDITIONS

IDENTIFICATION OF BOUNDARIES

1. Within 1 month of the date of approval of the Landscape and Biodiversity Management Plan (see condition 27 of schedule 3), the Proponent shall:
   (a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction;
   (b) submit a survey plan of these boundaries to the Director-General; and
   (c) ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.

NOISE

Noise Mitigation

2. The proponent shall install noise amenity bunds as described in the EA within 1 month of the date of the approval of the Landscape and Biodiversity Management Plan (see condition 27 of schedule 3).

3. The proponent shall replace all reverse alarm beepers with low frequency 'duck quack' beepers prior to 31 December 2010.

Impact Assessment Criteria

4. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1.

Table 1: Noise impact assessment criteria dB(A) $L_{Aeq\ (15min)}$

Location	***Day***
Location 2	36
All other locations	35

Notes:

- *To interpret the locations referred to Table 1, see the figure in Appendix 3.*
- *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.*
- *The noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.*

Operating Hours

5. The Proponent shall comply with the operating hours in Table 2.

Table 2: Operating hours

Activity	***Day***	***Time***
Quarrying Operations	Monday – Friday	7.00am to 6.00pm
	Saturday	7.00am to 3.00pm
	Sunday and Public Holidays	None

Notes:

- *Maintenance activities may be conducted outside the hours in Table 3 provided that the activities are not audible at any privately-owned residence.*
- *This condition does not apply to delivery of material if that delivery is required by police or other authorities for safety reasons, and/or the operation or personnel or equipment are endangered. In such circumstances, notification is to be provided to DECCW and the affected residents as soon as possible, or within a reasonable period in the case of emergency.*

Noise Monitoring

6. The Proponent shall prepare and implement a Noise Monitoring Program for the project to the satisfaction of the Director-General. This program must:
   (a) be submitted to the Director-General for approval prior to 30 June 2010;
   (b) include annual attended noise monitoring;
   (c) include details of how the noise performance of the project would be monitored; and
   (d) include a noise monitoring protocol for evaluating compliance with the noise criteria in this approval.

BLASTING AND VIBRATION

Note: Conditions 7 – 14 should be read in conjunction with the Statement of Commitments in Appendix 2 of this approval.

Airblast Overpressure Limits

7. The Proponent shall ensure that the airblast overpressure level from blasting at the project does not exceed the criteria in Table 3 at any residence on privately-owned land.

Table 3: Airblast overpressure impact assessment criteria

Airblast overpressure level (dB(Lin Peak))	Allowable exceedance
115	5% of the total number of blasts in a 12 month period
120	0%

Notes:

- *The overpressure values in Table 3 apply when the measurements are performed with equipment having a lower cut-off frequency of 2 Hz or less. If the instrumentation has a higher cut-off frequency a correction of 5 dB should be added to the measured value. Equipment with a lower cut-off frequency exceeding 10 Hz should not be used.*
- *The airblast overpressure noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher airblast overpressure noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.*

Ground Vibration Impact Assessment Criteria

8. The Proponent shall ensure that the ground vibration level from blasting, or any other activity at the project, does not exceed the levels in Table 4 at any residence on privately-owned land.

Table 4: Ground vibration impact assessment criteria

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

Note:The ground vibration limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher ground vibration levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Blasting Hours

9. The Proponent may only carry out blasting on site between 10 am and 3 pm Monday to Friday, with no blasting on weekends or public holidays.

Blasting Frequency

10. The Proponent shall not carry out more than 2 blasts a month on site, averaged over a 1 year period.

Property Inspections

11. Prior to 30 June 2010, the Proponent shall advise all landowners within 2 km of proposed blasting activities, and any other landowner nominated by the Director-General, that they are entitled to a property inspection to establish the baseline condition of the property.

12. If the Proponent receives a written request for a property inspection from any such landowner, the Proponent shall:
    (a) commission a suitably qualified person, whose appointment has been approved by the Director-General, 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

13. If any landowner within 2 km of proposed blasting activities, or any other landowner nominated by the Director-General, 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 Director-General 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 Director-General.

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

Monitoring

14. Prior to 30 June 2010, the Proponent shall prepare and implement a detailed Blast Monitoring Program for the project, in consultation with the DECCW, and to the satisfaction of the Director-General.

AIR QUALITY

Impact Assessment Criteria

15. The Proponent shall ensure that the dust emissions generated by the project do not cause additional exceedances of the air quality impact assessment criteria listed in Tables 5, 6 and 7 at any residence on privately-owned land, or on more than 25 percent of any privately-owned land.

Table 5: Long term impact assessment criteria for particulate matter

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

Table 6: Short term impact assessment criterion for particulate matter

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

Table 7: Long term impact assessment criteria for deposited dust

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

Note: Deposited dust is 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.

Air Quality Monitoring

16. The Proponent shall prepare and implement an Air Quality Monitoring Program for the project to the satisfaction of the Director-General. This program must:
    (a) be prepared in consultation with DECCW, and be submitted to the Director-General for approval prior to 30 June 2010; and
    (b) include details of how the air quality performance of the project will be monitored, and include a protocol for evaluating compliance with the relevant air quality criteria in this approval.

SOIL AND WATER

Water Supply

17. The Proponent shall ensure that it has sufficient water for dust suppression purposes, and if necessary, adjust the scale of operations to match its water supply.
    Note: The Proponent is required to obtain necessary water licences for the project under the Water Management Act 2000.

Pollution of Waters

18. Except as may be expressly provided for by an EPL, the Proponent shall comply with section 120 of the *Protection of the Environment Operations Act 1997* during the carrying out of the project.

Wastewater Treatment

19. The Proponent shall manage on-site sewage to the satisfaction of the relevant Council directorate and DECCW. The facility must comply with the requirements of the *Environment and Health Protection Guidelines – On-site Sewage Management for Single Households (1998)*.

Soil and Water Management

20. The Proponent shall undertake and implement a detailed ground water assessment to the satisfaction of the Director-General. This assessment must be:
    (a) prepared by a suitably qualified expert in consultation with NOW;
    (b) submitted to the Director-General for approval by 30 June 2010;
    (c) approved by the Director-General before any vertical extraction below 105 m AHD in the northern pit or the commencement of extraction in the southern pit;
    (d) adequately assess ground water resources affected by the northern and southern pits, to the proposed full extraction depths of those pits;
    (e) adequately assess all ground water impacts associated with proposed extraction;
    (f) provide data for predicted ground water pit inflows during and following extraction; and
    (g) propose satisfactory management measures to address pit inflows and impacts to ground water resources.

21. The Proponent shall prepare and implement a Soil and Water Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with DECCW and NOW, and be submitted to the Director-General for approval prior to 30 June 2010; and
    (b) include a:
        - Site Water Balance;
        - Erosion and Sediment Control Plan;
        - Surface Water Monitoring Program; and
        - Ground Water Monitoring Program.

    Note: The Department accepts that the initial Soil and Water Management Plan may not include a detailed Ground Water Monitoring Program. However, the detailed Ground Water Monitoring Program must be approved prior to undertaking extraction below the current northern pit floor level for the project.

22. The Site Water Balance must:
    (a) include details of:
        - sources and security of water supply;
        - water make and use on site;
        - water management on site;
        - any off-site water transfers; and
        - reporting procedures; and
    (b) investigate and describe measures to minimise water use by the project.

23. The Erosion and Sediment Control Plan must:
    (a) be consistent with the requirements of *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004* (Landcom);
    (b) identify activities that could cause soil erosion and generate sediment;
    (c) describe measures to minimise soil erosion and the potential for the transport of sediment off site;
    (d) describe the location, function, and capacity of erosion and sediment control structures; and
    (e) describe what measures would be implemented to maintain the structures over time.

24. The Surface Water Monitoring Program must include:
    (a) baseline data on surface water quality, where available;
    (b) surface water impact assessment criteria;
    (c) a program to monitor surface water quality (including quarry sediment basins); and
    (d) a protocol for the investigation, notification and mitigation of identified exceedances of the surface water impact assessment criteria.

25. The Ground Water Monitoring Program must include:
    (a) detailed baseline data on ground water levels and quality, based on statistical analysis;
    (b) ground water impact assessment criteria, including trigger levels for investigating any potentially adverse ground water impacts;
    (c) a program to monitor ground water levels and quality;

(d) a protocol for further ground water modelling to confirm the limits to excavation depth across the site would not adversely affect ground water availability for the environment or local users; and
(e) a protocol for the investigation, notification and mitigation of identified exceedances of the ground water impact assessment criteria.

REHABILITATION AND LANDSCAPE MANAGEMENT

Biodiversity Offset Strategy

26. The Proponent shall:
(a) implement the Biodiversity Offset Strategy (see also Table 8);
(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 Director-General,
to the satisfaction of the Director-General.

Table 8: 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

Landscape and Biodiversity Management Plan

27. The Proponent shall prepare and implement a Landscape and Biodiversity Management Plan for the project to the satisfaction of the Director-General. This plan must:
(a) be prepared by suitably qualified person(s), approved by the Director-General;
(b) be submitted to the Director-General for approval prior to the 30 June 2010; and
(c) include a:
- Koala Management Plan;
- Rehabilitation, Revegetation and Biodiversity Offset Strategy Management Plan; and
- Long Term Management Strategy.

Note: The Department accepts that the initial Landscape and Biodiversity Management Plan may not include the detailed Long Term Management Strategy. However, a conceptual strategy must be included in the initial plan, along with a timetable for augmentation of the strategy with each subsequent review of the plan.

28. The Koala Management Plan must be prepared by in accordance with SEPP 44 and in consultation with DECCW.

29. The Rehabilitation, Revegetation and Biodiversity Offset Strategy Management Plan must include:
(a) the rehabilitation objectives for the site and revegetation areas;
(b) a description of the measures that would be implemented to:
- rehabilitate and stabilise the site;
- minimise the removal of mature trees;
- implement the Biodiversity Offset Strategy; and
- manage the remnant vegetation and habitat on the site and in the revegetation areas;
(c) detailed performance and completion criteria for the revegetation, rehabilitation and stabilisation of the site;
(d) a detailed description of how the performance of the rehabilitation of the quarry and the revegetation areas would be monitored over time to achieve the stated objectives;
(e) a detailed description of what measures would be implemented to rehabilitate and manage the landscape of the site and revegetation areas including the procedures to be implemented for:
- progressively rehabilitating and stabilising areas disturbed by quarrying;
- implementing revegetation and regeneration within the disturbance areas and revegetation areas;
- protecting areas outside the disturbance areas, including the Biodiversity Offset Strategy areas and Core Koala Habitat;
- vegetation clearing protocols, including a protocol for clearing any trees containing hollows and the relocation of hollows from felled trees;
- managing impacts on fauna, in particular threatened species;
- controlling weeds and pests;
- controlling access;
- bushfire management; and
- reducing the visual impacts of the project;
(f) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and
(g) details of who is responsible for monitoring, reviewing, and implementing the plan.

30. The Long Term Management Strategy must:
    (a) define the objectives and criteria for quarry closure and post-extraction management;
    (b) investigate and/or describe options for the future use of the site;
    (c) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and
    (d) describe how the performance of these measures would be monitored over time.

Rehabilitation Bond

31. Prior to 30 June 2010, the Proponent shall lodge a rehabilitation bond for the project with the Director-General. The sum of the bond shall be calculated at:
    (a) $\$2.50/m^2$ for the area to be disturbed, which has not been previously disturbed by quarrying operations; and
    (b) $\$1.50/m^2$ for the area to be disturbed, which has been previously disturbed by quarrying operations;

    to the satisfaction of the Director-General.

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

32. Within 3 months of each Independent Environmental Audit (see condition 5 of schedule 5), the Proponent shall review, and if necessary revise, the sum of the rehabilitation bond to the satisfaction of the Director-General. This review must consider:
    (a) the effects of inflation;
    (b) any changes to the total area of disturbance; and
    (c) the performance of the rehabilitation and revegetation to date.

HERITAGE

Aboriginal Cultural Heritage Management Plan

33. The Proponent shall prepare and implement an Aboriginal Cultural Heritage Management Plan to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with all relevant Aboriginal communities;
    (b) be submitted to the Director-General for approval prior to 30 June 2010; and
    (c) include a:
        - description of the measures that would be implemented to salvage any identified Aboriginal sites within the disturbance area;
        - description of the measures that would be implemented to protect any Aboriginal sites outside the disturbance area; and
        - description of the measures that would be implemented if any new Aboriginal objects or skeletal remains are discovered during the project.

TRAFFIC AND TRANSPORT

Road Upgrades

34. The Proponent shall undertake the following road upgrade works generally in accordance with the recommendations in the EA, and to the satisfaction of the RTA:
    (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 RTA 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.

Traffic Management Plan

35. The Proponent shall prepare and implement a Traffic Management Plan to the satisfaction of the Director-General. This plan must:
    (a) be submitted to the Director-General for approval prior to 30 June 2010; and
    (b) include an induction program that all contracted or employed drivers must complete which details:
        - safety issues associated with the quarry products transport route;
        - quiet work practices (e.g. limiting compression breaking);
        - encouraging of the use of on-road radio communications with local bus drivers;
        - avoiding bunching of quarry vehicles along the quarry product transport route; and
        - minimising heavy vehicle dust generation along the quarry product transport route.

Traffic Restrictions

36. The Proponent shall restrict truck movements from the quarry to an average of 50 laden trucks a day until all road upgrades works required by condition 34 of schedule 3, are met or unless otherwise approved by the Director-General.

    Note: In this condition, "trucks" means vehicles with more then a 5 tonne load limit; "average" is to be determined with respect to the number of working days in any Monday-to-Saturday period.

Road Haulage

37. The Proponent shall ensure that:
    (a) all loaded vehicles entering or leaving the site are covered; and
    (b) all loaded vehicles leaving the site are cleaned of materials that may fall on the road, before they leave the site.

Parking

38. The Proponent shall provide sufficient parking on-site for all project-related traffic, in accordance with Council's parking codes, and to the satisfaction of the Director-General.

VISUAL

Visual Amenity

39. The Proponent shall minimise the visual impacts of the project to the satisfaction of the Director-General.

WASTE MANAGEMENT

Waste Minimisation

40. The Proponent shall minimise the amount of waste generated by the project to the satisfaction of the Director-General.

EMERGENCY AND HAZARDS MANAGEMENT

Dangerous Goods

41. The Proponent shall ensure that the storage, handling, and transport of fuels and dangerous goods are conducted in accordance with the relevant *Australian Standards*, particularly AS1940 and AS1596, and the *Dangerous Goods Code*.

Safety

42. The Proponent shall secure the project to ensure public safety to the satisfaction of the Director-General.

Bushfire Management

43. The Proponent shall:
    (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, if safe to do so, if there is a fire on-site.

PRODUCTION DATA

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

SCHEDULE 4
ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. If the results of monitoring required in schedule 3 identify that impacts generated by the project are greater than the relevant impact assessment criteria, then the Proponent shall notify the Director-General and affected landowners and tenants, and provide quarterly monitoring results to each of these parties until the results show that the project is complying with the relevant criteria.

INDEPENDENT REVIEW

2. If a landowner of privately-owned land considers that the project is exceeding any of the impact assessment criteria in schedule 3, then he/she may ask the Director-General in writing for an independent review of the impacts of the project on his/her land.

   If the Director-General is satisfied that an independent review is warranted, the Proponent shall within 3 months of the Director-General advising that an independent review is warranted:
   (a) consult with the landowner to determine his/her concerns;
   (b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to conduct monitoring on the land, to determine whether the project is complying with the relevant criteria in schedule 3, and identify the source(s) and scale of any impact on the land, and the project's contribution to this impact; and
   (c) give the Director-General and landowner a copy of the independent review.

3. If the independent review determines that the project is complying with the relevant criteria in schedule 3, then the Proponent may discontinue the independent review with the approval of the Director-General.

4. If the independent review determines that the project is not complying with the relevant criteria in schedule 3, and that the project is primarily responsible for this non-compliance, then the Proponent shall:
   (a) implement all reasonable and feasible measures, in consultation with the landowner, to ensure that the project complies with the relevant criteria; and
   (b) conduct further monitoring to determine whether these measures ensure compliance; or
   (c) secure a written agreement with the landowner to allow exceedances of the relevant criteria in schedule 3,

   to the satisfaction of the Director-General.

   If the additional monitoring referred to above subsequently determines that the project is complying with the relevant criteria in schedule 3, or the Proponent and landowner enter into a negotiated agreement to allow these exceedances, then the Proponent may discontinue the independent review with the approval of the Director-General.

5. If the landowner disputes the results of the independent review, either the Proponent or the landowner may refer the matter to the Director-General for resolution.

   If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 5).

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT AND MONITORING

ENVIRONMENTAL MANAGEMENT STRATEGY

1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. This strategy must:
   (a) be submitted to the Director-General for approval within 3 months of the date of this approval;
   (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 that would be implemented to:
      - keep the local community and relevant agencies informed about the operation and environmental performance of the project;
      - receive, handle, respond to, and record complaints;
      - resolve any disputes that may arise during the course of the project;
      - respond to any non-compliance; and
      - respond to emergencies; and
   (f) include:
      - copies of the various strategies, plans and programs that are required under the conditions of this approval once they have been approved; and
      - a clear plan depicting all the monitoring currently being carried out within the project area.

INCIDENT REPORTING

2. Within 24 hours of detecting an exceedance of the limits/performance criteria in this approval or the occurrence of an incident that causes (or may cause) material harm to the environment, the Proponent shall notify the Department and other relevant agencies of the exceedance/incident.

3. Within 6 days of notifying the Department and other relevant agencies of an exceedance/incident, the Proponent shall provide the Department and these agencies with a written report that must:
   (a) describe the date, time, and nature of the exceedance/incident;
   (b) identify the cause (or likely cause) of the exceedance/incident;
   (c) describe what action has been taken to date; and
   (d) describe the proposed measures to address the exceedance/incident.

ANNUAL REPORTING

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

INDEPENDENT ENVIRONMENTAL AUDIT

5. Within 3 years of the date of this approval, and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:
   (a) be conducted by a suitably qualified, experienced, and independent team of experts whose appointment has been approved by the Director-General;
   (b) assess the environmental performance of the project, and its effects on the surrounding environment;
   (c) assess whether the project is complying with the relevant standards, performance measures and statutory requirements;
   (d) review the adequacy of any strategy/plan/program required under this approval; and, if necessary,

(e) recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval.

6. Within 1 month of completion of each Independent Environmental Audit, the Proponent shall submit a copy of the audit report to the Director-General and relevant agencies, with a response to any of the recommendations in the audit report.

7. Within 3 months of submitting a copy of the audit report to the Director-General, the Proponent shall review and if necessary revise the:
   (a) strategies/plans/programs required under this approval; and
   (b) rehabilitation bond, to consider the:
      - effects of inflation;
      - changes to the total area of disturbance; and
      - performance of the rehabilitation against the completion criteria of the Landscape and Biodiversity Management Plan,

   to the satisfaction of the Director-General.

COMMUNITY CONSULTATIVE COMMITTEE

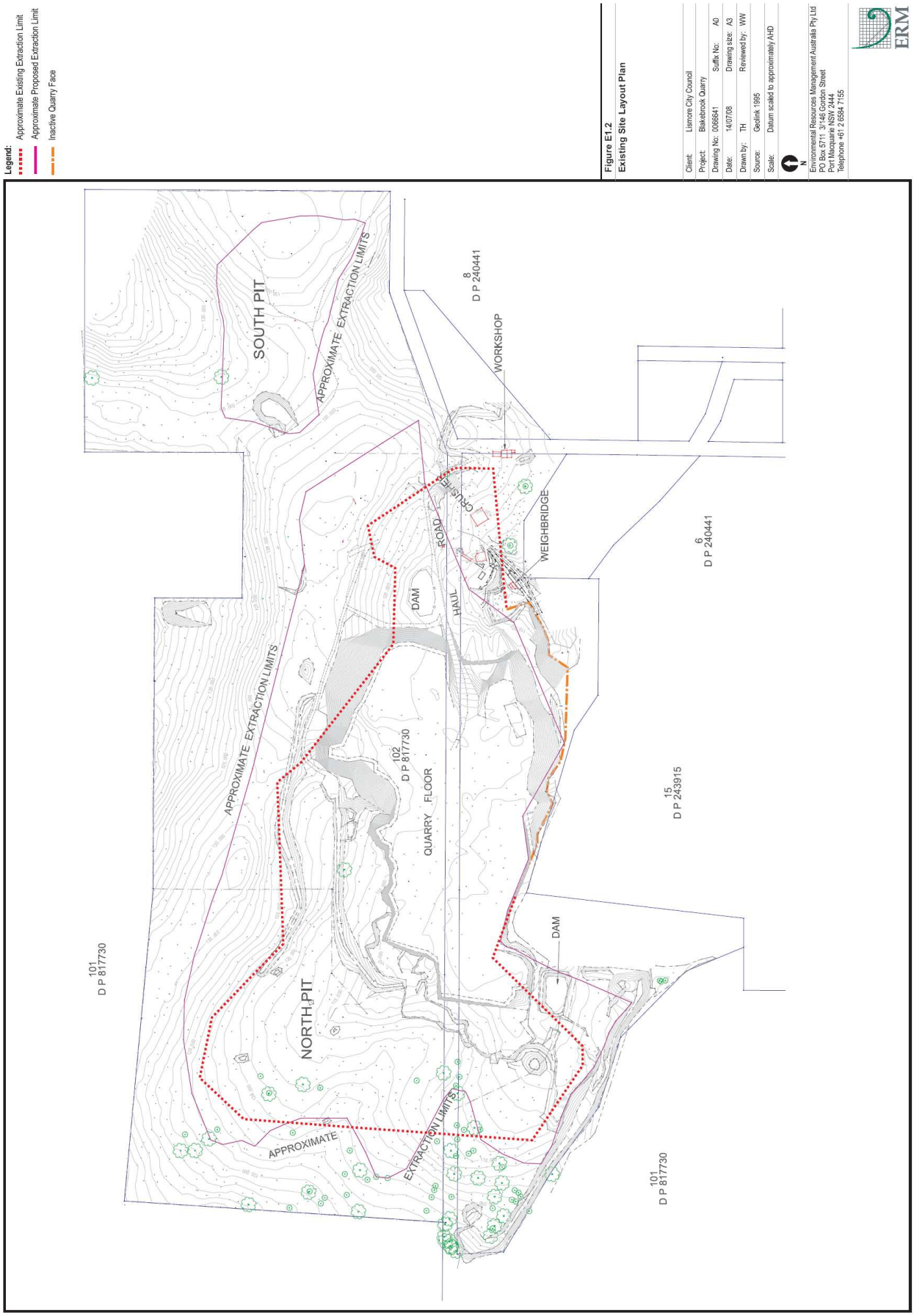
8. Within 3 months of the commencement of quarrying operations, the Proponent shall establish a Community Consultative Committee (CCC) for the project to the satisfaction of the Director-General, in accordance with the Department's *Guideline for Establishing and Operating Community Consultative Committees for Mining Projects*.

ACCESS TO INFORMATION

9. Within 1 month of the approval of any strategies/plans/programs required under this approval (or any subsequent revision of these strategies/plans/programs), or the completion of the audits or AEMR required under this approval, the Proponent shall:
   (a) provide a copy of the relevant document/s to the relevant agencies and to members of the general public upon request; and
   (b) ensure that a copy of the relevant document/s is made publicly available on its website and at the site.

10. During the project, the Proponent shall:
   (a) make a summary of monitoring results required under this approval publicly available on its website and at the council offices; and
   (b) update these results on a regular basis (at least every 6 months).

APPENDIX 1
PROJECT LAYOUT PLANS



APPENDIX 2
STATEMENT OF COMMITMENTS

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.

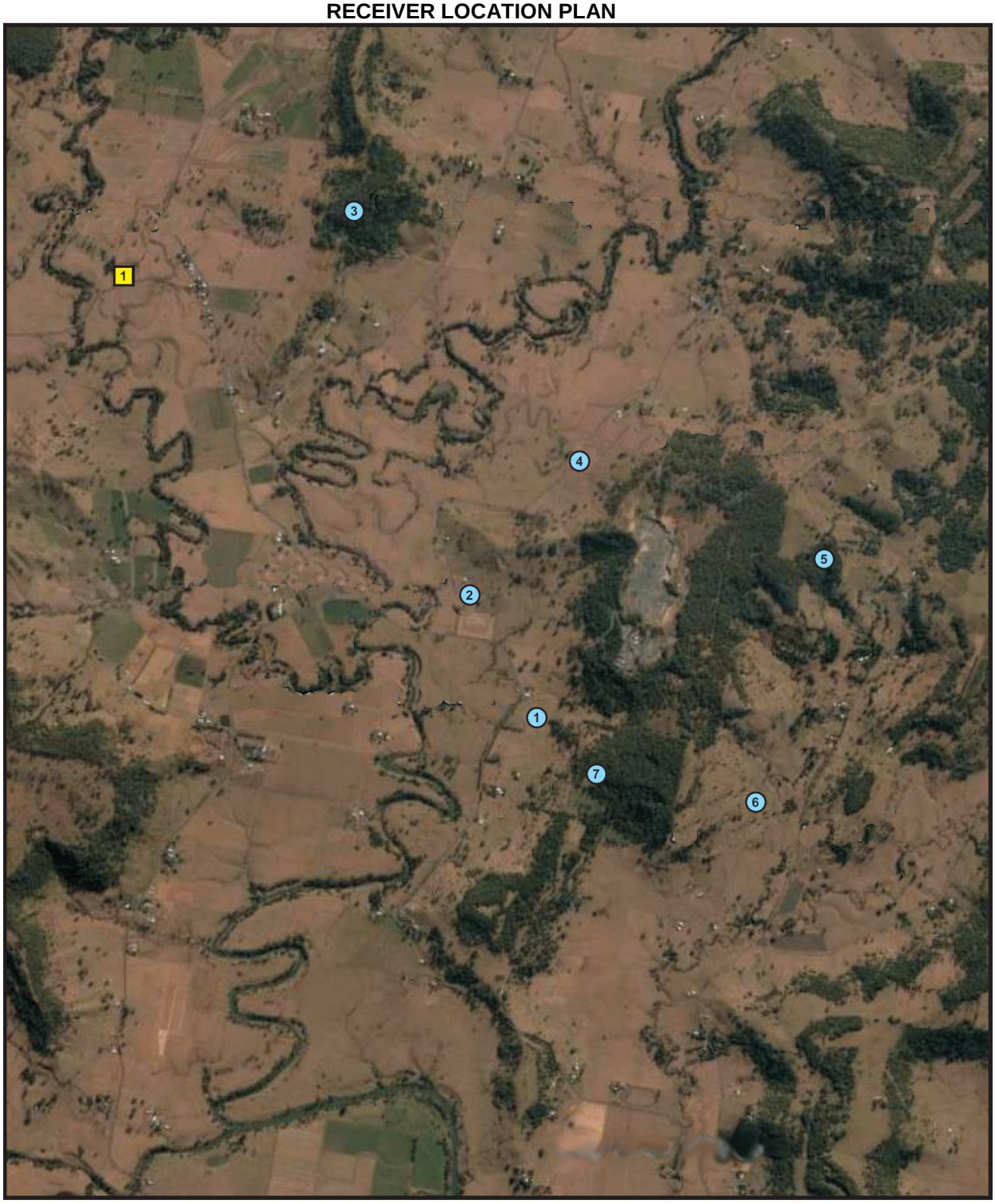
Item Number	Item	Commitment	Responsibility	Timing
5.9		Noise from Blakebrook Quarry is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance 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

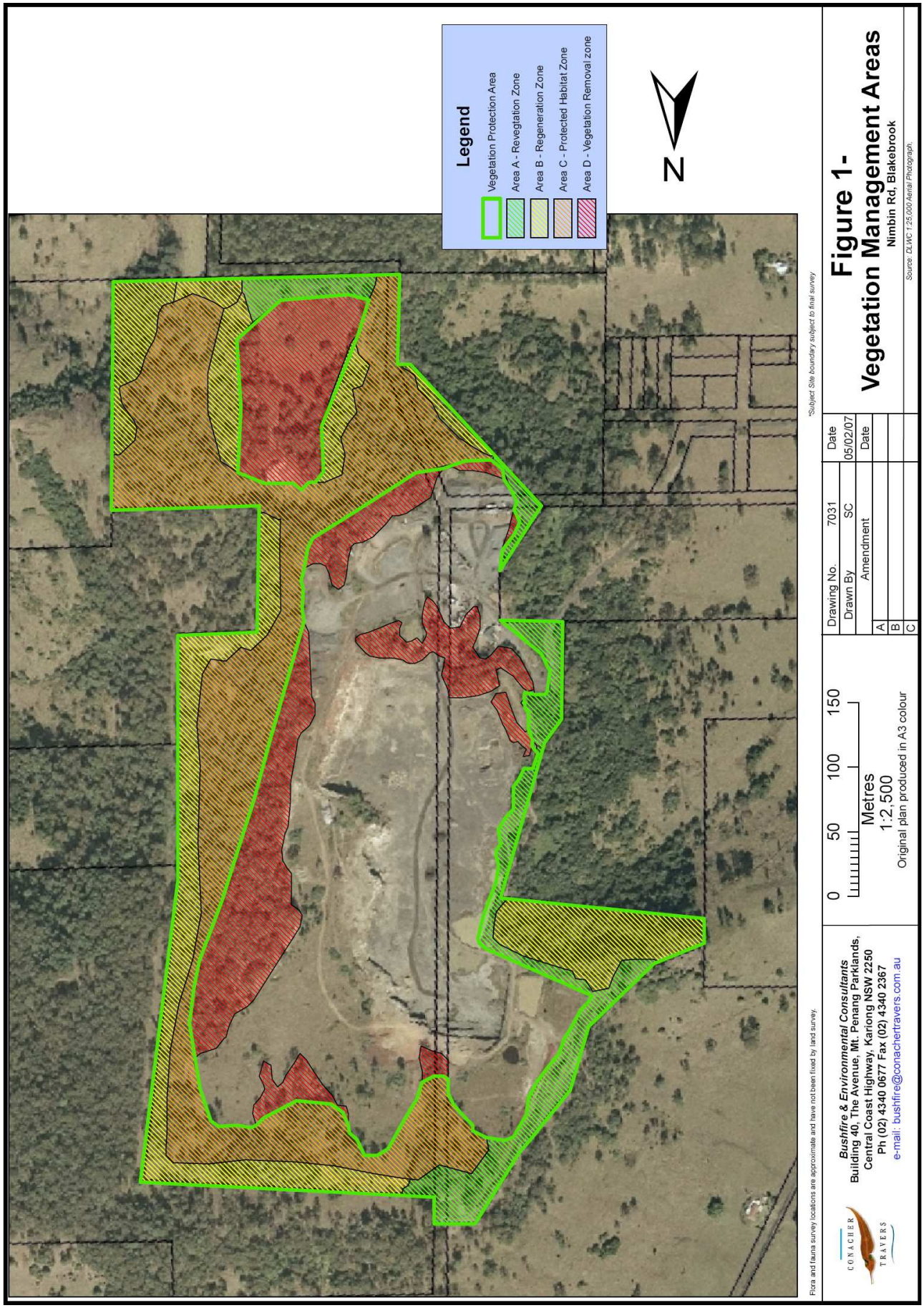
Client:	Lismore City Council	
Project:	Blakebrook Quarry Noise Assessment	
Drawing No:	0066641s_01_R1	
Date:	11/06/2009	Drawing size: A4
Drawn by:	GC	Reviewed by: MS
Source:	-	
Scale:	Not to Scale	

N

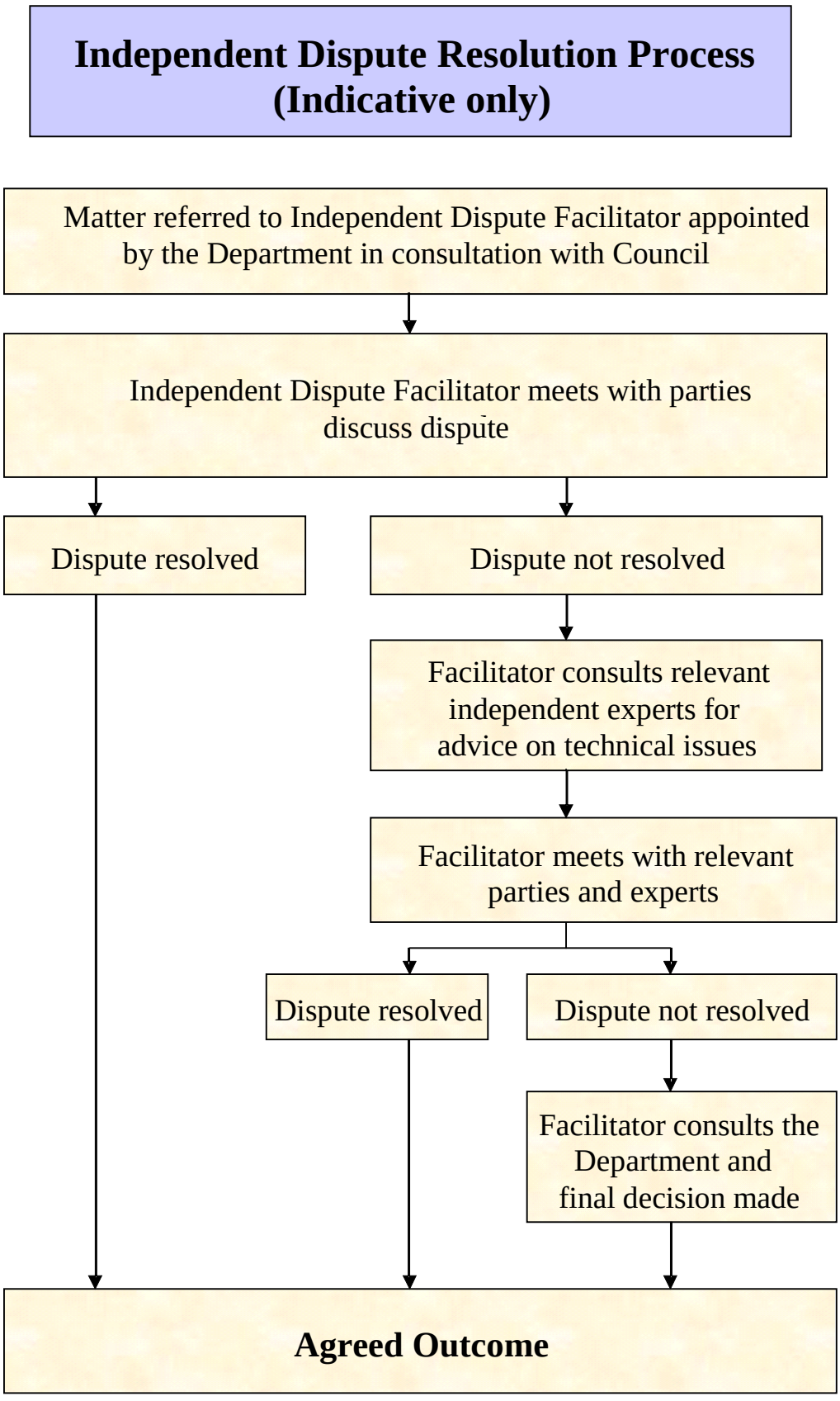
Environmental Resources Management Australia Pty Ltd
Building C, 33 Saunders St, Pyrmont, NSW 2009
Telephone +61 2 8584 8888

ERM

APPENDIX 4
ONSITE VEGETATION MANAGEMENT AREAS (COMPONENT OF BIODIVERSITY OFFSET STRATEGY)



APPENDIX 5
INDEPENDENT DISPUTE RESOLUTION PROCESS



Appendix B Project Approval (MP 07_0020 MOD 1) – Blakebrook Quarry

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:

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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.

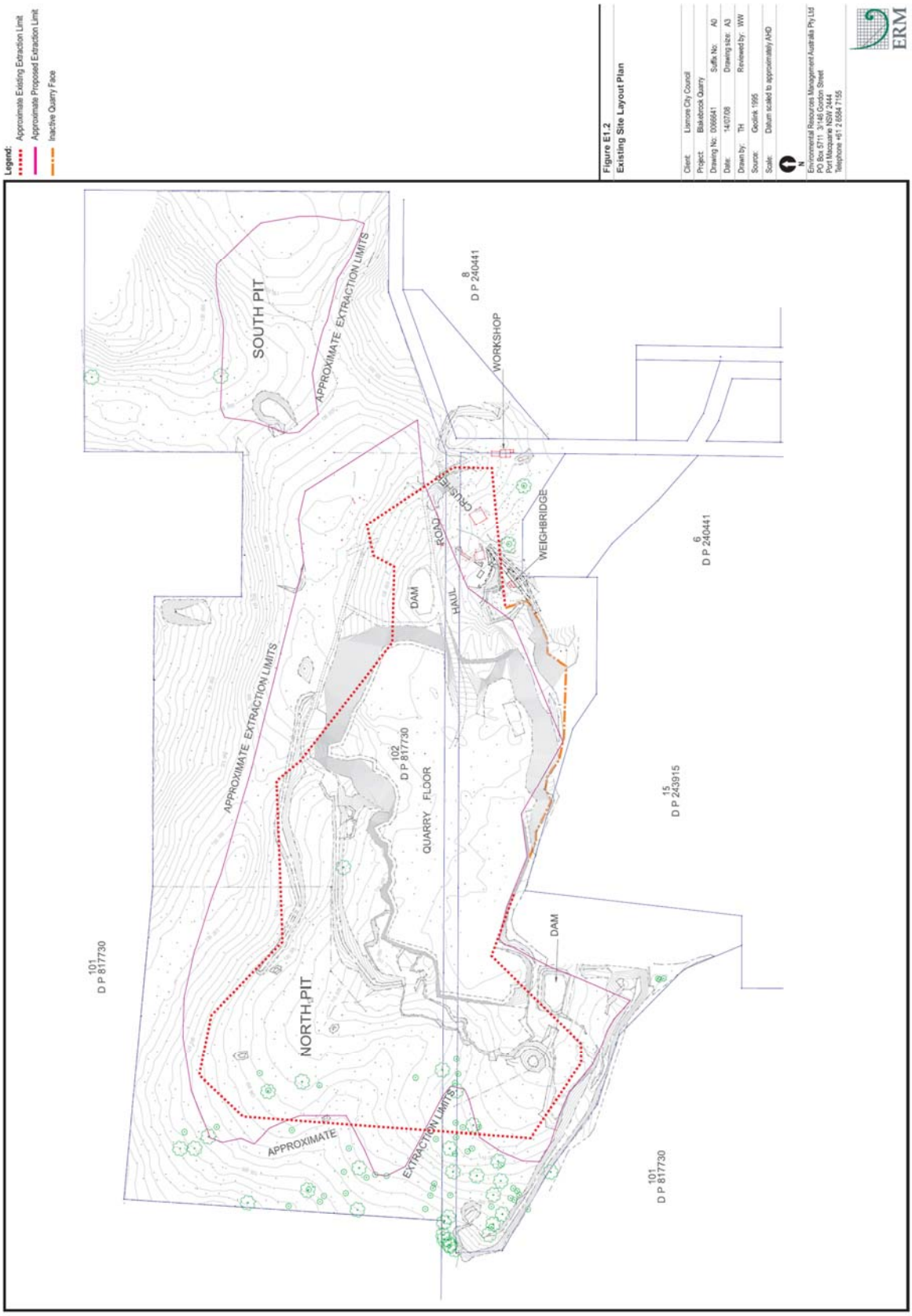
13. Within 12 weeks of commencing this audit, or as otherwise agreed by the Secretary, the Proponent must submit a copy of the audit report to the Secretary and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for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



APPENDIX 2
STATEMENT OF COMMITMENTS

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).				

ENVIRONMENTAL RESOURCES MANAGEMENT AUSTRALIA
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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		

ENVIRONMENTAL RESOURCES MANAGEMENT AUSTRALIA
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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.

ENVIRONMENTAL RESOURCES MANAGEMENT AUSTRALIA
0306441/FINAL/17 AUGUST 2009

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**			

ENVIRONMENTAL RESOURCES MANAGEMENT AUSTRALIA
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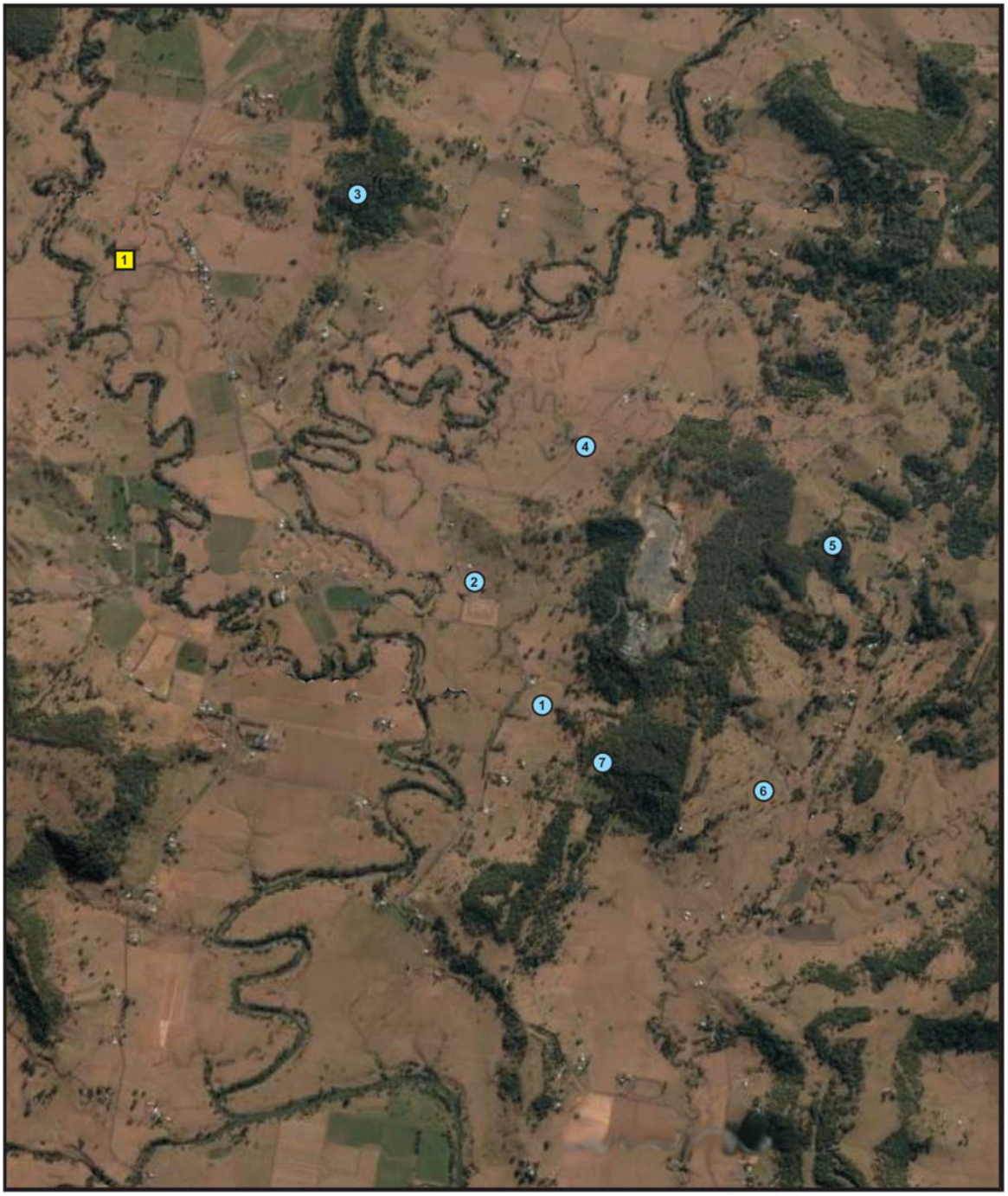
Item Number	Item	Commitment	Responsibility	Timing
8.1		A detailed groundwater assessment will be undertaken prior to the commencement of vertical extraction. This will involve the installation of nested ground water monitoring wells. The wells will be installed to at least two depths at a minimum of 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

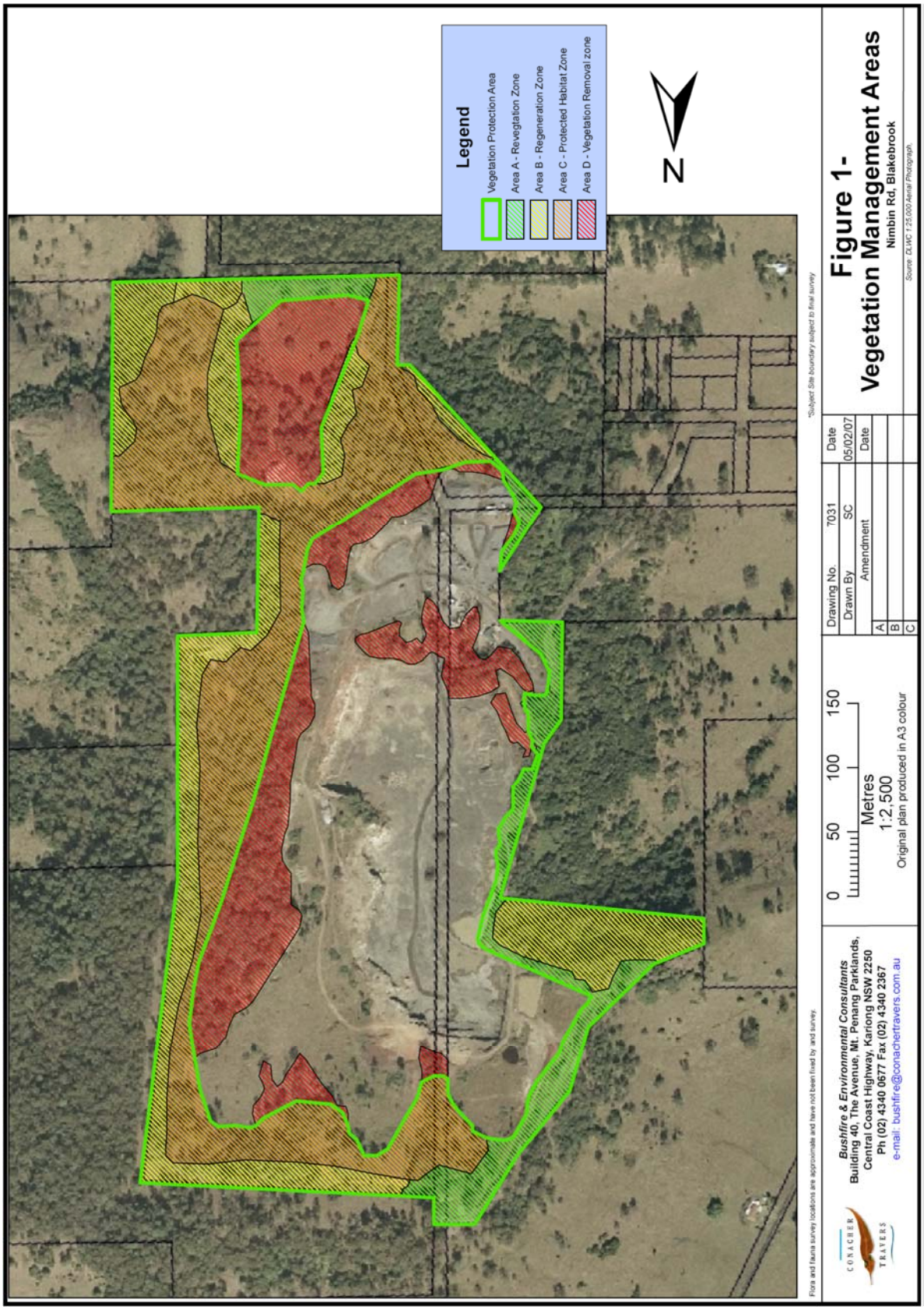
Client:	Lismore City Council	
Project:	Blakebrook Quarry Noise Assessment	
Drawing No:	0066641s_01_R1	
Date:	11/06/2009	Drawing size: A4
Drawn by:	GC	Reviewed by: MS
Source:	-	
Scale:	Not to Scale	

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.

Appendix C Notice of Determination (DA90/341) – Bitumous Hot Mix Plant

The Council of the City of Lismore

Council Chambers,
Molesworth Street, Lismore, N.S.W.

TELEPHONES:
ADMINISTRATION: 21 1501
ENGINEERING: 21 1499
ENVIRONMENT AND DEVELOPMENT 21 1479

P.O. BOX 23A,
LISMORE, 2480
DX 7761
FAX: (066) 21 9094
(066) 22 1592

ALL COMMUNICATIONS TO
BE ADDRESSED TO
GENERAL MANAGER/TOWN CLERK

IN REPLY PLEASE QUOTE

HAJ:VLW/90/341

CONTACT Planning Dept.
FOR FURTHER ENQUIRIES

5th December, 1990

Environmental Planning and Assessment Act, 1979.

NOTICE TO APPLICANT OF DETERMINATION OF A DEVELOPMENT APPLICATION.

Application No. 90/341

To: N. Fletcher,
Pioneer Asphalt Pty. Ltd. (N.S.W.),
P.O. Box 16, ST MARYS. N.S.W. 2760

Reference is made to the development application lodged 7/6/90 in respect of Lot 1 D.P 240441, 550G Nimbin Road, Blakebrook, for a hotmix plant.

Pursuant to Section 92 of the Environmental Planning and Assessment Act, notice is hereby given of the determination by the Council of the application by the granting of CONSENT for:

a bitumous hotmix plant;

SUBJECT TO THE CONDITIONS SPECIFIED in this notice being:

1. All buildings be constructed, works carried out, or use of buildings or land, subject to any amendment or modification called for in the following conditions or any subsequent building permit, be in accordance with the details contained in the plan(s) and the Environmental Impact Statement, and/or supporting documents submitted with the application, a copy of which is/are attached to this consent.

2. The landscape plan in the Environmental Impact Statement (Map 4) be amended to show plant distances between nominated tree species to be 4 metres with shrubs at 1.5 m centres. The areas between car park and access to quarry face also to be planted in for backdrop planting.

3. The control room also to be painted bronze olive (possibly at the same time as the quarry office).

4. Reject material stockpiling not be piled against trees.

5. The triangular unused area near N.R.E. powerboxes to be landscaped with 3-4 m high shrubs.

6. The site being landscaped in accordance with the approved landscape plan this being achieved prior to the 30th of April, 1991, and maintained at all times to the satisfaction of the Council.

7. Provision be made for four (4) car parking spaces, in accordance with the requirements of the Council's Car Parking Code, and arranged as shown on the plans with each bay marked on the pavement.

8. The normal hours of operation shall be within the period, 6.00 a.m. to 5.30 p.m., Mondays to Saturdays. Operation outside these hours will require the permission of Council and will only be considered for emergency or specific works where a traffic management problem is involved.

9. The settling pit to be emptied out regularly, so the level of solids does not reach a level of 30 cm below the concrete edge. The sludge/sand from the pit to be used in quarry rehabilitation where appropriate.

10. The operator ensuring by methods described in the Environmental Impact Statement that air and water pollution do not occur; any spillage and their impacts from the plant and trucks on site and access drive to be the responsibility of the operator of the plant.

11. The applicant ~~to~~ or developer contribute a road improvement levy of a minimum of 10 cents for each tonne of bituminous mix produced and road transported from the development site. This levy will be increased annually in accordance with Consumer Price Index as calculated by the Australian Bureau of Statistics. The levy shall apply from the date of this consent and shall be paid in monthly instalments based on tonnage measured on the applicants weighbridge. This condition does not in any way prevent the Council from increasing the abovementioned levy at any time, if this were to be agreed with the operator.

12. The provision of a drainage system uphill of the site to divert stormwater runoff around the premises, (to a standard satisfactory to the City Engineer).

13. That legal access be adequately documented so that traffic to Lot 5 and the adjoining Lot 3 has legal rights or carriageway over Lots 6, 14 and 17.

NOTE: The owner of the quarry should consider the dedication of a road reserve from Nimbin Road to the boundary of the quarry land over the existing bitumen access.

Conditions 1, 4, 8, 9, 10 and 11 are to be complied with at all times.

Conditions 2, 3, 5, 6, 7 and 13 relating to access, parking and landscaping to be completed prior to occupation.

Condition 12 relating to the construction is to be completed prior to occupation or as specified in the condition.

The reasons for the conditions are:

To correctly describe what has been approved. (E.P.A. Act Sec. 92(1) Reg. 44)

To ensure that appropriate landscaping is provided. (E.P.A. Act Sec. 90(1)(m)

To provide adequate off-street parking space for the anticipated traffic that will be generated by the development. (E.P.A. Act Sec. 90(1)(i)

To preserve the environment and existing or likely future amenity of the neighbourhood. (E.P.A. Act Sec. 90(1)(o)

In accordance with the conditions of Section 93, this decision is effective from 5/12/90 unless an appeal is lodged in accordance with Section 97.

Your attention is drawn to extracts from the Act printed on the attached sheet.

Yours faithfully,

(P. T. Muldoon)
GENERAL MANAGER/TOWN CLERK.

enc.

LISMORE CITY COUNCIL

INFORMATION RELATING TO COUNCIL'S DEVELOPMENT CONSENT

For Other than DESIGNATED DEVELOPMENT

Decisions Under the Environmental Planning and Assessment Act

Date from which Consent Operates

Section 91 of the Environmental Planning and Assessment Act provides that the consent shall become effective and operate from the date endorsed upon the notice, except in the case of designated development to which objections have been lodged, when the consent shall become effective 28 days after the consent is issued.

Where an appeal is lodged, either by the applicant or an objector in respect to designated development, the consent shall cease to be and not become effective until the appeal has been determined.

The consent shall be void if on appeal the development is refused.

Appeal by Applicant

Section 97 of the Act confers on an applicant who is dissatisfied with the determination of the consent authority, a right to appeal to the notice. If such an appeal is made, that Section entitles each person who objected against designated development under Section 87 of the Act, to be given notice of that appeal and, upon application being made to the Court, to be heard at the hearing of the appeal.

Appeals by Third Parties

There is no provision within the Act for a third party (objector) to appeal against the consent issued by the Council.

Lapsing of Consent

Where any person claims that the issue of a consent has been incorrectly granted or otherwise is invalid, action may be taken in accordance with Section 123 of the Act within three months of the public notice of the issue of the consent.

Section 99 of the Act provides that a consent shall lapse unless the development has commenced within two years of the date of the consent unless the Council has, before lapsing of the consent on application, extended the period to three years. Where development has been commenced, but the work not completed within the specified time, the Council may issue a notice requiring completion of the work within a specified time, being not less than twelve months.

Decisions Under the Local Government Act

Appeal by Applicant

Section 341 provides that any applicant who is aggrieved by any decision of a Council on his application under Part 12, Subdivision, may lodge an appeal with the Court.

For further explanation or details of the precise procedure and conditions, reference should be made to the respective Acts or contact the Council's Planning Department or your legal advisor.

Appeal forms are available from the Court of Petty Sessions.

Appendix D Notice of Determination (MC5.1990.341.5) – Bitumous Hot Mix Plant

Our ref: MJK:DA5.1990.341.5

Contact: Mr R C Mallam

6 March 2018

Newton Denny Chapelle
PO Box 1138
LISMORE NSW 2480

office@newtondennychapelle.com.au

Dear Sir/Madam

Development Application 5.1990.341.5
Lot 201 DP: 1227138, 550 Nimbin Road BLAKEBROOK

This letter is to advise you that your application to modify the above development application has been determined in the following manner: **Amend Condition No's 1, 7, 10, 14, 17 and 18, add new Condition No's 1B, 1C and Delete Condition No 1A**. The amended operational consent notice and approved plans (if applicable) are enclosed. Please read your consent conditions carefully as they contain important information that must be complied with at various stages. Failure to comply with relevant requirements may result in enforcement action.

If you are unclear about the requirements of any conditions of consent or approvals/certification that may be required, Council staff are always willing to discuss or clarify those requirements, however, you should note that Council staff are unable to vary requirements of development consent conditions without following proper process.

You are further advised that pursuant to Section 82A of the Environmental Planning and Assessment Act, 1979 (as amended), any request for review of determination must be lodged within 6 months of the date of this correspondence. The prescribed fee in connection with a request for a review must be paid at the time of lodgement of such request.

For your information, the following matters should be noted:

1 If you already have a Construction Certificate for works associated with the development, you may be required to **amend your Construction Certificate** to address the changes approved in the modification of this consent to ensure compliance with statutory requirements. You should consult your Certifying Authority to seek advice in this regard.

2 The modified consent has only approved the modifications that were identified in the application lodged with Council. Other changes to plans not specifically identified in the application for consideration by Council may not be approved, and if you have questions in this regard, please seek clarification before proceeding with the works.

Should you require any further information on this matter please contact Mr R C Mallam.

NOTICE TO APPLICANT OF DETERMINATION - APPROVAL

Issued under Section 81(1)(a) and 96 of the Environmental Planning and Assessment Act, 1979 (As Amended) and Section 73A of the Environmental Planning and Assessment Regulation
Section 138 of the Roads Act 1993 (as identified by notations)
Section 68 of the Local Government Act 1993 (as identified by notations)

CONSENT MODIFICATION
First Amendment: 22 August 2011 (MC5.1990.341.2) – *withdrawn*
Second Amendment: 19 November 2015 (MC5.1990.341.3)
Third Amendment: 7 October 2015(MC5.1990.341.4) - *withdrawn*
Fourth Amendment: 6 March 2018 (MC5.1990.341.5)

Development Application No. 5.1990.341.5

Assessing Officer	Mr R C Mallam – Senior Development Assessment Officer
Applicant	Newton Denny Chapelle PO Box 1138 LISMORE NSW 2480 office@newtondennychapelle.com.au On behalf of Lismore City Council.
Land to be developed	Lot 201 DP: 1227138, 550 Nimbin Road BLAKEBROOK

Notice is hereby given of the determination by the Council, as Consent Authority, of the Development Application lodged 05/10/2017 relating to the development of:

A Bitumous Hotmix Plant

This consent operates from	5 December 1990
Date of Determination	6 March 2018
Date of Amendment	6 March 2018 - **Amend Condition No's 1, 7, 10, 14, 17 and 18, add new Condition No's 1B, 1C and Delete Condition No 1A**

CONSENT is granted subject to the conditions specified in this notice.

IMPORTANT TO NOTE
THIS NOTICE IS A LEGAL DOCUMENT. ENSURE THAT YOU READ THE DOCUMENT CAREFULLY, AND PARTICULARLY NOTE ALL ATTENDANT INSTRUCTIONS AND CONDITIONS

Determination of Development Application No. 5.1990.341.5 (Amended)

The conditions of consent are set out as follows:

1. All buildings be constructed, works carried out, or use of buildings or land, subject to any amendment or modification called for in the following conditions or any subsequent building permit, be generally in accordance with the details contained in the stamped plans:
    - Plan 1 – Existing & Proposed Location of Asphalt Plant, drawn by Newton Denny Chapelle, Rev C, Dated 12.09.17; and
    - Dwg No. 10609238, Drawn by AMMANN, Dated 31.07.2014 (and checked 10.10.2014);

    and/or supporting documents submitted with the modified application 5.1990.341.5 and the Environmental Impact Statement submitted with the original application, a copy of which are attached to this consent.

    NOTE: *In the event of any inconsistency between documents submitted with the modified application 5.1990.341.5 and the Environmental Impact Statement submitted with the original application, the documents and plans submitted with the modified application 5.1990.341.5 and the conditions of this consent prevail.*

1A. Deleted by Section 96(2) Modification Application No. 5.1990.341.5.

1B. The original Asphalt Plant as approved on 5 December 1990 shall not be utilised for the production of asphalt. Equipment associated with the original Asphalt Plant is to be decommissioned and either:

- removed from the site and disposed of at an appropriately approved waste facility;
- adaptively reused and approved as part of the operation of Blakebrook Quarry; or
- sold and removed from the site.

NOTE: *Equipment from the decommissioned original asphalt plant can only be used as part of the operation of Blakebrook Quarry where all necessary approvals have been obtained.*

Reason: *To correctly describe what is approved.*

1C. **Within 3 months of the issue of modified development consent 5.1990.341.5** an Environmental Management Plan (EMP) must be prepared by and appropriately qualified person and be approved in writing by the Consent Authority (LCC). The EMP must be comprehensive, be related to the actual activities and operations of the development, include plans and written details and include, but not be limited to, the following matters:

- noise management;
- air quality management (odour and dust);
- soil and water management;
- hazard mitigation, health and safety (risk minimisation);
- traffic, access, internal vehicular circulation and on-site car parking;
- loading and unloading of heavy vehicles;
- waste storage, disposal and management;
- decommissioning of the original asphalt plant;
- rehabilitation of original asphalt plant area and modified asphalt plant area;
- key performance indicators;
- monitoring and auditing processes; and
- complaint and breach management and record keeping procedures.

The EMP must be reviewed at least every three (3) years and be updated to be in accordance with good environmental practice. The reviewed document must be submitted to the Consent Authority (LCC) for approval.

Reason: *To protect the environment. (EPA Act Sec 79C(b))*

2. The landscape plan in the Environmental Impact Statement (Map 4) be amended to show plant distances between nominated tree species to be 4 metres with shrubs at 1.5 m centres. The areas between car park and access to quarry face also to be planted in for backdrop planting.

3. The control room also to be painted bronze olive (possibly at the same time as the quarry office).

4. Reject material stockpiling not be piled against trees.

5. The triangular unused area near N.R.E. powerboxes to be landscaped with 3-4m high shrubs.

6. The site being landscaped in accordance with the approved landscape plan this being achieved prior to the 30th of April, 1991, and maintained at all times to the satisfaction of the Council.

7. Provision be made for four (4) car parking spaces, in accordance with the requirements of the Part A, Chapter 7 of the Lismore Development Control Plan. Details of the four (4) car spaces are to be submitted to and approved in writing by Council as part of the EMP required by **Condition 1C** of this consent.

8. The normal hours of operation shall be within the period, 6.00a.m. to 5.30p.m. Mondays to Saturdays. Operation outside these hours will require the permission of Council and will only be considered for emergency or specific works where a traffic management problem is involved.

9. The settling pit to be emptied out regularly, so the level of solids does not reach a level of 30 cm below the concrete edge. The sludge/sand from the pit to be used in quarry rehabilitation where appropriate.

10. The operator ensuring by methods described in the modified application 5.1990.341.5 and Environmental Impact Statement that air and water pollution do not occur; any spillage and their impacts from the plant and trucks on site and access drive to be the responsibility of the operator of the plant.

11. The applicant or developer contribute a road improvement levy of a minimum of 10 cents for each tonne of bituminous mix produced and road transported from the development site. This levy will be increased annually in accordance with Consumer Price Index as calculated by the Australian Bureau of Statistics. The levy shall apply from the date of this consent and shall be paid in monthly instalments based on tonnage measured on the applicants weighbridge.

    This condition does not in any way prevent the Council from increasing the abovementioned levy at any time, if this were so agreed with the operator.

12. The provision of a drainage system uphill of the site to divert stormwater runoff around the premises, (to a standard satisfactory to the City Engineer).

13. That legal access be adequately documented so that traffic to Lot 5 and the adjoining Lot 3 has legal rights or carriageway over Lots 6, 14 and 17.

    NOTE: The owner of the quarry should consider the dedication of a road reserve from Nimbin Road to the boundary of the quarry land over the existing bitumen access.

14. Asphalt production from the proposed mobile plant shall not exceed the maximum annual and daily amount permitted by the terms and conditions of DA 1990/341 and EPA Licence No. 3384, which is an average of 15,000 tonnes of asphalt per annum over any two (2) year period or any other period approved in writing by Council.

    Reason: *To ensure that output from the plant remains within the terms and conditions of its current consent and licence and the provisions of the EP&A Act 1979 and EP&A Regulation 2000.*

15. The mobile asphalt plant shall not result in the emission of offensive noise as defined in the Protection of the Environment (Operations) Act, 1997.

    Offensive noise means:

    (a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

        (i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or

        (ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

    (b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.

    Reason: *To preserve the environment and existing or likely future amenity of the neighbourhood. (EPA Act Sec 79C(b))*

16. The mobile asphalt plant shall not result in the emission of offensive odour as defined in the Protection of the Environment (Operations) Act, 1997.

    Offensive odour means an odour:

    (a) that, by reason of its strength, nature, duration, character or quality, or the time at which it is emitted, or any other circumstances:

        (i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or
        (ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

    (b) that is of a strength, nature, duration, character or quality prescribed by the regulations or that is emitted at a time, or in other circumstances, prescribed by the regulations.

    Reason: *To preserve the environment and existing or likely future amenity of the neighbourhood. (EPA Act Sec 79C(b))*

17. **Within six (6) months of the cessation of asphalt production activities at the site,** the applicant shall undertake a contaminated land assessment (CLA) relative to the asphalt production areas, both original and modified. The CLA must be submitted to and be approved by the Consent Authority (LCC). The assessment must be carried out by a suitably qualified professional in accordance with the requirements of relevant Guidelines made or approved by NSW EPA in accordance with the Contaminated Land Management Act.

The CLA must determine the status of the asphalt operational areas in relation to site contamination and recommend any responsive remediation action plan. The requirements of the approved CLA must be complied with within 12 months from the date of approval by the Consent Authority.

Reason: *To assess potential land contamination and to ensure effective remediation*.

Vehicular Access

18. **Within 3 months of the issue of modified development consent 5.1990.341.5**, the road centreline is to be repainted / refreshed from the new intersection works at Nimbin Road to an appropriate location near the weighbridge.

    Reason: *To ensure an adequate road network in accordance with adopted standards. (EPA Act Sec 79C(a))*

19. All loading and unloading shall take place within the property boundaries, as will the parking of construction and private vehicles associated with the development.

    Reason: *To provide adequate off street parking space for the anticipated traffic that will be generated by the development. (EPA Act Sec 79C(a))*

20. Vehicles using any off-street loading/unloading and/or parking area must enter and leave in a forward direction, in accordance with Council's Development Control Plan No. 1, Part A, Chapter 7 - Off Street Carparking Requirements. All driveways and turning areas shall be kept clear of obstructions that prevent compliance with this condition.

    Reason: *To ensure adequate access to and from the development. (EPA Act Sec 79C(c))*

Conditions 1, 1C, 4, 8, 9, 10, 11, 14, 15, 16, 19 and 20 are to be complied with at all times.

Conditions 2, 3, 5, 6, 7, 13 and 18 relating to access, parking and landscaping to be completed prior to occupation.

Condition 12 relating to the construction is to be completed prior to occupation or specified in the condition.

Condition 17 is to be complied within six (6) months of the cessation of asphalt production activities at the site.

The reasons for the conditions are:

To correctly describe what has been approved. (E.P.A. Act Sec. 92(1) Reg. 44)

To ensure that appropriate landscaping is provided. (E.P.A. Act Sec. 90(1)(m)

To provide adequate off-street parking space for the anticipated traffic that will be generated by the development. (E.P.A. Act Sec. 90(1)(i)

To preserve the environment and existing or likely future amenity of the neighbourhood. (E.P.A. Act Sec. 90(1)(o)

DATE FROM WHICH CONSENT OPERATES

Section 83 of the Environmental Planning and Assessment Act provides that the consent shall become effective and operate from the date endorsed upon the notice, **except** in the case of designated development to which objections have been lodged, when the consent shall become effective 28 days after the consent is issued.

Where an appeal is lodged, either by the applicant or an objector in respect of designated development, the consent shall remain in deferment and not become effective until the appeal has been determined. The consent shall be void if, on appeal, the development is refused.

COMPLIANCE

The development shall be carried out in accordance with the application, and "approved plans" as may be attached to this consent, and as amended by the foregoing conditions. **All conditions** shall be complied with prior to occupation of the development and, where appropriate, during the operating life of the development.

REVIEW OF DETERMINATION

Under the provisions of Section 82A of the Environmental Planning and Assessment Act 1979, an applicant may request the Council to review a determination of an application which is not Complying, Integrated, Designated or submitted by or on behalf of the Crown. The request for a review must be made within six (6) months after the date of the determination.

RIGHT OF APPEAL

If you are dissatisfied with this decision, Section 97 of the Environmental Planning and Assessment Act 1979 gives you the right of appeal to the Land and Environment Court within six (6) months after the date on which you receive this notice.

Where an appeal is made in the case of a designated development, each person who objected is required to be given notice of the appeal, and will have the right to be heard at that hearing.

Except in the case of designated development, there is no provision within the Act for a third party (objector) to appeal against the consent issued by the Council.

LAPSING OF CONSENT

Section 95 of the Environmental Planning & Assessment Act provides that a development consent lapses five (5) years after the date from which it operates.

This consent lapses five (5) years from the date of operation of this consent UNLESS:

- building, engineering, or construction work relating to this development is commenced on the land within the period of operation of the consent, or
- if no such works are required, the use of the premises commences within the period of operation of the consent.

NOTICE TO COMPLETE

Where development has been commenced, but the work not completed, Section 121B provides that the Council may issue an order requiring completion of the work within a specified time, being not less than twelve months.

For and on behalf of Lismore City Council.

Mr R C Mallam
Senior Development Assessment Officer

Attachment/s

Appendix E Environment Protection Licence 3384

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: Eleisha Went

Notice Number	1568156
File Number	EF13/3226
Date	06-Aug-2018

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. The previous version of the licence did not allow for the licensee to receive waste generated outside the premises. This variation is to allow the licensee to store and mix glass sand recovered from the Lismore Recycling and Recovery Centre on the licensed premises.

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:
   - Variation to condition L3.1

.....
Janelle Bancroft

Licence Variation

Acting Unit Head

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

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Information about this licence

Dictionary

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

Responsibilities of licensee

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

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

Variation of licence conditions

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

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

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

Duration of licence

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

Licence review

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

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

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

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, excluding the following:

a) Glass sand recovered from the Lismore Recycling and Recovery Centre.

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*.

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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
11	Licence varied by notice 1558031 issued on 27-Nov-2017

Appendix F Noise Impact Assessment

- Assured Environmental Pty Ltd

BLAKEBROOK QUARRY ASPHALT PLANT: NOISE IMPACT ASSESSMENT

MITCHEL HANLON CONSULTING PTY LTD

Project ID. 11558

R_3

DATE OF RELEASE: 3/05/2019

Assured Environmental Pty Ltd

ABN: 87 604 851 078

Unit 7, 142Tennyson Memorial Avenue – Tennyson – Queensland - 4105

Table 1: Document Approval

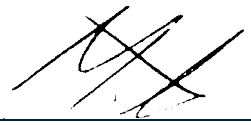
	Name	Position Title	Signature	Date
Author	Craig Beyers	Manager Consulting Services		3/05/2019
Reviewer	Michelle Clifton	Senior Consultant		3/05/2019
Approver	Craig Beyers	Manager Consulting Services		3/05/2019

Table 2: Revision Register

Revision	Date	Name	Issued to	Comment
R_0	10/10/2018	C. Beyers	K. Oszinski	Formal report release
R_1	12/11/2018	C. Beyers	T. McLean	Comments
R_2	14/03/2019	C. Beyers	T. McLean	RFI Response
R_3	3/05/2019	C. Beyers	T. McLean	Clarification

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Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to AE is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise.

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1 INTRODUCTION

1.1 Background

Blakebrook Quarry (the Subject Site) is owned by Lismore City Council with operations of the quarry including operation an asphalt plant (operated and maintained by RPQ), which is referenced as an auxiliary item in the Environmental Protection Authority (EPA) licence (EPL 3384). The EPL provides specific conditions relating to environmental noise for the operation of the whole quarry facility including the asphalt plant.

1.2 Scope of Assessment

Assured Environmental Pty Ltd (AE) was appointed by Mitchel Hanlon Consulting Pty Ltd to undertake a noise impact assessment for the upgrade of the asphalt plant (the **Project**) to a Benninghoven permanent mobile asphalt plant with annual production of up to 50,000 tonnes per annum. As part of this upgrade, the facility is also seeking to increase the permitted truck movements from the site to enable the operators to effectively manage daily product demand in the region.

The noise study has been undertaken to assess the potential impacts of the operation of the Project on nearby sensitive receptors in accordance with NSW Environmental Protection Authority NSW Noise Policy for Industry (NPfI) (EPA, 2017).

To determine the potential for adverse impacts associated with the asphalt plant upgrade, the following tasks have been undertaken:

- Review previous noise monitoring results at nearby sensitive receptors;
- Undertaken unattended noise monitoring at a nearby sensitive receptor;
- Obtained plant production data during the noise monitoring to determine the noise levels at receptors associated with the existing plant;
- Completion of computational modelling and first principal calculations for the plant upgrade and change in operating hours. The computational modelling utilised topographical data (including future site levels) and meteorological conditions at the site.
- This assessment will consider the following scenarios:
    - Asphalt plant upgrade in isolation; and
    - Cumulative impacts of the existing quarry operations with asphalt plant.
- Comparison of the existing noise measurements and future predicted noise levels at sensitive receptors with acceptable objectives.

1.3 This Report

This report summarises the methodology, results and conclusions of the noise impact assessment. A glossary of terms is presented in Appendix A to assist the reader.

1.4 Request for Information

A Request for Information (RFI) from NSW Department Planning and Environment dated 27 February 2019 was received in relation to the acoustic assessment of the quarry. The RFI requested clarification relating to some aspects of the noise assessment. Table 3 below

provides a summary of each of the issues raised in the RFI along with the relevant section of this report in which the issue is addressed.

Table 3: DPE Request for Information

DPE Comment	Assured Environmental Response
14. Please explain why 120 dB(A) has been used as a representative data for truck noise, as stated in section 4.13.	The sound power level (SWL) for truck movements is 114 dB(A), the 120 dB(A) SWL is a typo.
15. Section 4.13 states that 15 trucks per hour have been used. Please confirm that this is representative of the maximum number of trucks to leave the quarry during peak periods.	This is a typo, the noise model has assumed the maximum 150 vehicle movements each way (i.e. 300 vehicle movements) per hour (3,330 movements per day), for a worst-case assessment over a 1-hour period.
16. Section 4.1.2 states that data has been taken from AE's library to estimate the modification's potential impacts. Please advise how this data is representative of the subject modification.	AE have carried out noise source measurements at a number of asphalt facilities, including facilities that operate the same equipment and capacity as those proposed. The acoustical usage factors are derived from on-site measurements of all asphalt facilities measured. Where manufacturer's SPL data could not be obtained, data from our database of the equipment was utilised.

2 PROJECT DESCRIPTION

2.1 Site Location

The Subject Site is located on Lot 201 on DP1227138 as shown in Figure 1 and is surrounded by rural residential land uses.

The topography the Subject Site is presented in Figure 2. Review of the topography confirms that the quarry is located on elevated terrain varying in height from approximately 120 m for the asphalt plant to 130 m at the edge of the quarry pit. Further afield, the terrain is noted to fall away with nearby receptors located at elevated ranging from approximately 20 m to 110 m.

The quarry site is also noted to be surrounded by a relatively densely vegetated area on all sides. This vegetative buffer is also expected to provide some minor additional noise attenuation.

2.2 Existing Environment Protection Licence

In preparing this report, reference is made to the existing noise conditions provided in Environment Protection Licence (EPL) 3384 issued to Lismore City Council on 06 August 2018. The conditions as they relate to the subject of this report include provisions specifically focused on noise.

The EA provides the following conditions intended to place limitations on the operation of the facility such that potential adverse impacts on the surrounding environment are minimised:

> ***L4 Noise limits***
>
> *L4.1 Noise from the licenced premise must not exceed an $L_{Aeq\ (15\ minute)}$ noise emission criterion of 36 dB(A) at Location 2 and 35 dB(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 3°C/100 meters.*
>
> ***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.

These noise limits are considered in the assessment of potential impacts associated with the proposed changes to operations at the site. For residential dwellings, the noise limits are assessed at the most-affected point (i.e. highest noise level) on or within the property boundary. Where the property boundary is more than 30 m from the house, then the criteria applies at the most-affected point within 30 m of the house.

2.3 Description of Development

The Blakebrook Quarry facility provides a key resource for hard rock and infrastructure construction materials to the Lismore region. The facility, which includes both quarrying and asphalt production operations, has operated at the site for a considerable period of time.

The quarry is licenced for the extraction, processing and storage of 100,000 – 500,000 tonnes annually with a maximum of 100 laden trucks per day permitted under Condition 22 of the EPL. Quarrying at the facility is undertaken using a drill and blast technique with the operating plant and equipment on site including:

- Jaw Crusher (330hp);
- Scalper/reclaimer (140hp);
- Cone Crusher (540hp);
- VSI Crusher (540hp);
- 2 x Screendecks (100hp);
- 2 x Powered Stockpilers (75hp);

- Cat 336EH Excavator;
- Volvo 380 Excavator;
- Pugmill;
- Komatsu WA480 FEL;
- Komatsu WA500 FEL;
- Service Truck;
- Fuel Truck;
- Water Truck;
- Drill Rig; and
- Trucks (on-site and off-site transportation).

In addition to the quarrying operation, asphalt is also produced on-site through permanent mobile asphalt plant operated by an external contractor. Recently, asphalt operations at the have recently been taken over by RPQ. As part of the change of operations, RPQ have installed a Benninghoven portable asphalt plant with a production capacity of 80 tonnes per hour.

Key noise sources associated with the operation of the mobile asphalt plant include:

- Bag House;
- Bag House Fan;
- Burner/Blower;
- Conveyor Motor;
- Drum and Drum Drive;
- Truck Loading;
- Front End Loader; and
- Truck movements (including for deliveries of asphalt product, binder, fines and aggregate).

Aggregate material used in the asphalt production process are sourced from within the quarry and as such, these deliveries do not result on off-site truck movements.

To provide for the ongoing operation of the facility, Council are seeking to amend the EPL to permit a total of 150 laden trucks per day averaged over a 1-week period (600 laden trucks per week) with a total production rate of 50,000 tonnes per annum of asphalt. It is noted that production capacities for the quarry are not proposed to change beyond those permitted under the EPL as a result of this amendment. Rather, the increase in permitted truck movements would provide greater capacity to deal with peak supply requirements for both the quarry and asphalt plant.

2.4 Nearby Sensitive Receptors

There is a number of existing sensitive receptors surrounding the quarry. Review of the *"Notice of Modification – Section 75W of the Environmental Planning and Assessment Act 1979"*, referred to in the EPA licence number 3384 dated 6 August 2018, identifies seven (7) sensitive receptors that have previously been assessed for noise impacts. For consistency these receptors will be assessed in relation to the Subject Site.

Figure 1 and Table 4 below provide a summary of the nearest sensitive uses to the Subject Site.

Table 4: Nearby Sensitive Receptors

Receptor	Description	Address	Distance to Quarry
R1	Existing Dwelling	1 Nimbin Road, Blakebrook	0.65 km
R2	Existing Dwelling	122 Keerrong Road, Blakebrook	1.0 km
R3	Existing Dwelling	145 Pinchin Road, Goolmangar	2.9 km
R4	Existing Dwelling	166 Keerrong Road, Blakebrook	1.12 km
R5	Existing Dwelling	365 Booerie Creek Road, Booerie Creek	1.19 km
R6	Existing Dwelling	210 Booerie Creek Road, Booerie Creek	1.08 km
R7	Existing Dwelling	484 Nimbin Road, Blakebrook	0.87 km

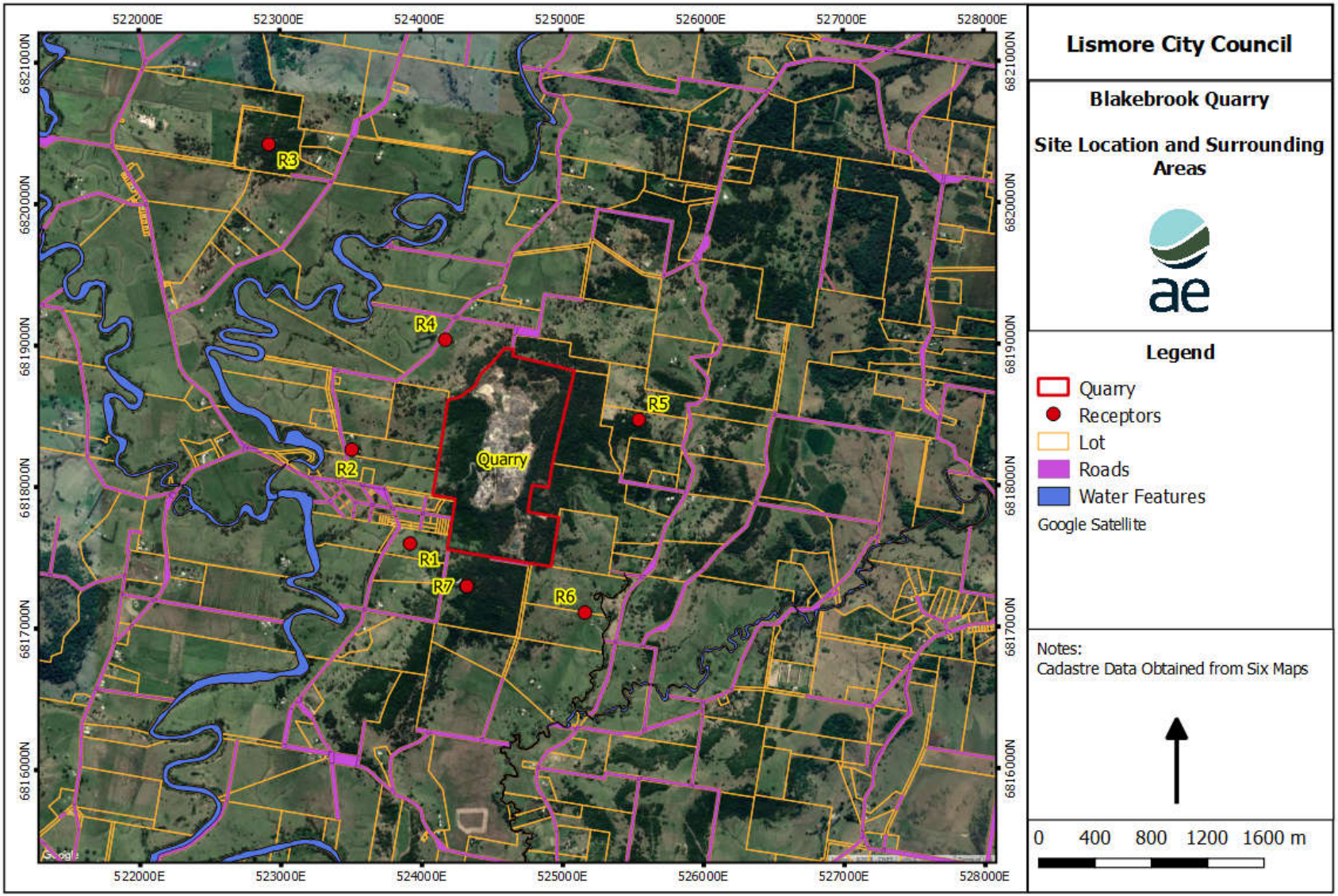


Figure 1: Site Location, Sensitive Receptors and Surrounding Land uses

Figure 2: Subject Site and Surrounding Topography

3 EXISTING ENVIRONMENT

3.1 Historic Noise Monitoring

Since 2012, attended noise monitoring has been undertaken at a number of sensitive receptors. Table 5 presents a summary of the noise monitoring results when the quarry was audible. Observations during the monitoring periods did not include comments about noise from the asphalt plant. It should be noted:

- The receptors where measurements were obtained are inconsistent and, in some cases, not provided, this is indicated in the table as "not measured". For the purposes of this assessment, it has been assumed that Receptor 1 is the same as the other Receptor 1 locations;
- Where receptors were measured but the site observations stated the quarry was not audible are notated "not audible"; and
- Where receptors were measured but the site observations stated the quarry was not operating are notated "not operating".

Excluding measurements when the quarry was not audible, the following can be determined:

- February 2012 – Only receptors 5 and 6 comply with the 36 dB(A) $L_{Aeq,15minute}$ criteria licence condition for noise;
- January 2013 – no receptors comply with the licence conditions for noise;
- August 2013 – of the six (6) valid measurements at three (3) receptors, compliance with the licence conditions for noise was not achieved;
- February 2015 – of the two (2) receptors where the quarry was audible, only receptor 4 complies with the 36 dB(A) $L_{Aeq,15minute}$ criteria licence condition;
- November 2015 – the quarry was only audible at receptor 6, which did not comply with the 36 dB(A) $L_{Aeq,15minute}$ criteria licence condition for noise;
- November 2016 – The quarry was not audible at any receptors; and
- November 2017 – of the three (3) receptors that were valid measurements, no receptors comply with the licence conditions for noise.

Full monitoring results, sensitive receptor references and weather conditions are presented in Appendix B.

Table 5: Summary of Historic Monitoring Data whilst Quarry was Audible

Rec ID	Meas No.	Feb 2012		Jan 2013		Aug 2013		Feb 2015		Nov 2015		Nov 2016		Nov 2017	
		$L_{Aeq,15\ min}$	L_{A90}	$L_{Aeq,15\ min}$	L_{A90}	$L_{Aeq,15\ min}$	L_{A90}	$L_{Aeq,15\ min}$	L_{A90}	$L_{Aeq,15\ min}$	L_{A90}	$L_{Aeq,15\ min}$	L_{A90}	$L_{Aeq,15\ min}$	L_{A90}
1	1	Not operating		Not audible		Not audible		Not audible		Not audible		Not audible		49.0	43.2
	2	47.7	37.1			Not measured								Not measured	
2	1	Not operating		Not audible		Not audible		39.8	30.6	Not audible		Not audible		45.4	32.7
	2	46.4	30.2			Not measured		Not measured						Not measured	
3	1	Not operating		Not audible		Not audible		43.0	35.8	Not audible		Not audible		44.7	34.9
	2	47.0	31.4	Not measured		Not measured		Not measured						Not measured	
4	1	Not operating		54.2	46.9	43.0	35.0	36.0	31.9	Not audible		Not audible		Not operating	
	2	45.0	32.0	56.8	52.3	Not measured		Not measured							
5	1	Not operating		Not measured		Not measured		Not measured		Not measured		Not measured		Not measured	
	2	34.2	30.5												
6	1	Not operating		49.2	45.5	Not measured		Not audible		41.4	34.9	Not audible		Not audible	
	2	36.0	33.0	56.8	52.3					Not measured					
7	1	Not operating		Not measured		Not measured		Not measured		Not measured		Not measured		Not measured	
	2	38.3	34.1												
8	1	Not measured		Not measured		Not measured		Not measured		Not measured		Not measured		Not measured	
	2			Not audible											
9	1	Not measured		44.7	37.9	42.0	35.0	45.5	38.9	Not audible		Not measured		Not measured	
	2			48.9	43.6	Not measured		Not measured							

3.2 Additional Baseline Noise Monitoring

3.2.1 Noise Monitoring Location

Background noise and weather monitoring was undertaken from 18 September to 26 September 2018 at Receptor 7 location shown in Figure 3.

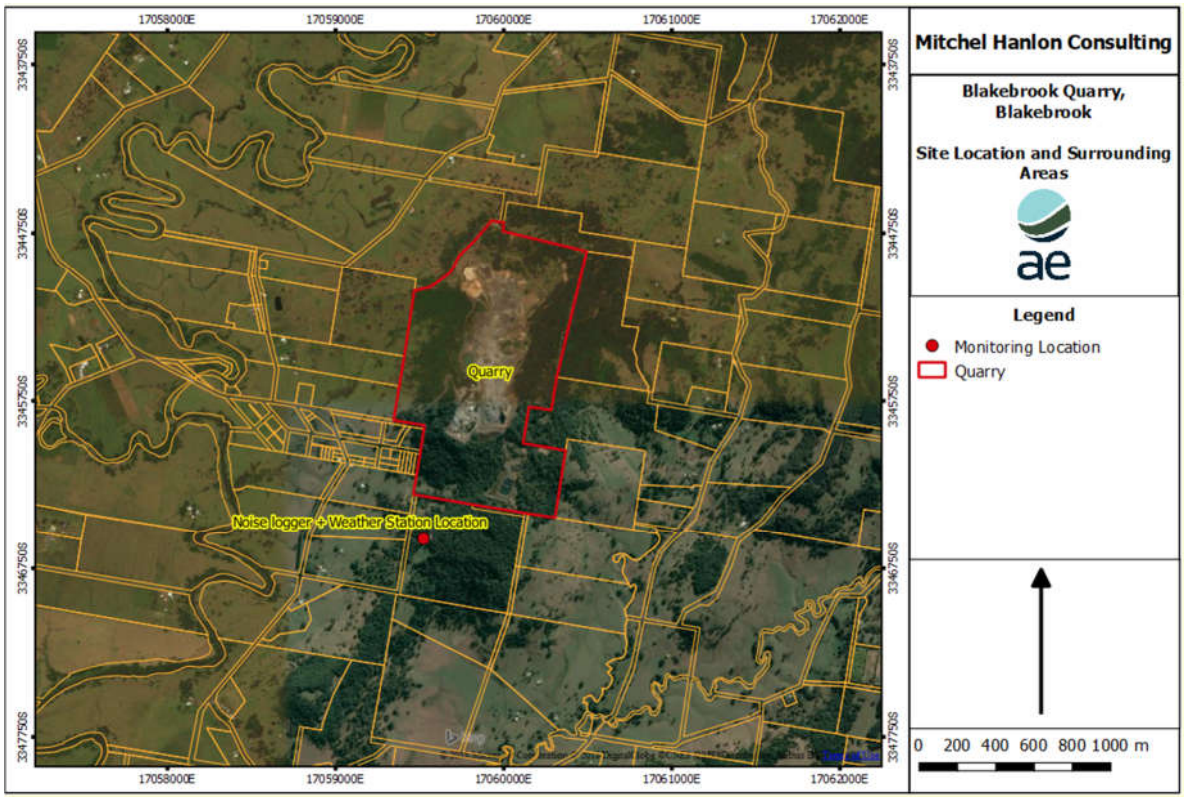


Figure 3: Monitoring Location

The noise logger was located approximately 130 m from Byrnes Road at a rural location. On-site observations identified that the dominant noise sources were bird and animal noises. Noise associated with the Subject Site was not audible at the noise monitoring location.

3.2.2 Noise Monitoring Methodology

Noise measurements were undertaken in accordance with the requirements of Australian Standard AS 1055-1997 *'Acoustics – Description and measurement of environmental noise'*. A Rion NL21 environmental noise logger and was used for the continuous monitoring. The Rion was situated in a free-field position and an averaging time of 15 minutes was adopted. Microphones positioned at a height of 1.2 metres above ground level and fitted with a windshield throughout the measurements.

The serial numbers and calibration information for the instruments are presented in Table 6.

Table 6: Equipment Information

Instrument	Serial No.	Monitoring Dates	NATA Calibration Current to:	Pre-/Post Calibration (dB)
Rion NL21	00187367	18-09-2018 / 26-09-2018	06/09/2020	94/93.4
Larson Davis: CAL200	8356	N/A	15/11/2018	N/A
Davis Vantage Vue Weather Station	Station Date	18-09-2018 / 26-09-2018	N/A	N/A

Noise monitoring has a potential to be affected by rainfall and wind speeds above 5 m/s (as described in the NSW NPfI). A review of meteorological data from the weather station installed onsite indicates that 3 hours were affected by rainfall or high wind speeds. These periods were excluded from the analysis to minimise the potential for weather related bias in the monitoring results.

3.2.3 Background Monitoring Results

This section a summary of average noise levels of each period for a variety of noise parameters. The periods are defined as follows:

- Day – 7 am to 6 pm;
- Evening – 6 pm to 10 pm; and
- Night – 10 pm to 7 am.

Table 7: Baseline Noise Monitoring Data for Each Day (dB(A))

Date	Period	L_{max}	L_1	L_{10}	L_{90}	L_{eq}	ABL
18-09-18 (Tue)	Day	89.5	64.3	55.7	47.2	55.3	44.4
	Evening	76.8	54.3	47.7	38.4	47.3	33.8
	Night	72.0	48.6	43.5	34.8	45.7	30.0
19-09-18 (Wed)	Day	81.6	63.6	57.1	48.9	55.5	47.1
	Evening	83.3	55.3	51.0	41.0	52.9	35.4
	Night	88.5	55.2	48.8	40.1	51.0	33.5
20-09-18 (Thu)	Day	88.9	60.2	53.7	47.1	53.4	45.2
	Evening	-	-	-	-	-	-
	Night	74.5	51.0	47.4	42.5	48.1	39.2
21-09-18 (Fri)	Day	84.3	62.0	54.8	47.7	54.3	45.9
	Evening	63.1	53.7	50.4	45.2	48.5	43.7
	Night	78.4	51.7	47.2	40.9	47.6	36.4
	Day	84.2	61.4	54.5	46.5	54.4	43.8

Date	Period	L_{max}	L_1	L_{10}	L_{90}	L_{eq}	ABL
22-09-18 (Sat)	Evening	62.8	51.4	47.9	38.7	47.2	35.9
	Night	70.2	50.1	43.9	35.0	44.0	31.9
23-09-18 (Sun)	Day	89.6	59.7	52.7	44.2	52.1	42.1
	Evening	71.3	52.0	47.5	39.1	48.2	35.2
	Night	80.5	51.1	45.8	37.6	51.7	29.2
24-09-18 (Mon)	Day	83.4	60.0	54.5	49.1	53.8	47.0
	Evening	-	-	-	-	-	-
	Night	-	-	-	-	-	-
25-09-18 (Tue)	Day	87.3	59.0	54.7	48.3	55.8	45.8
	Evening	59.7	51.5	48.4	41.7	46.3	38.6
	Night	69.3	49.9	45.9	39.2	46.6	35.0

Table 8: Baseline Noise Monitoring Data for All Days (dB(A))

Period	L_{max}	L_1	L_{10}	L_{90}	L_{eq}	RBL
Day	90	61	55	47	55	45
Evening	83	53	49	41	49	37
Night	89	51	46	39	49	34

A time history of the noise monitoring data is presented in Figure 4.

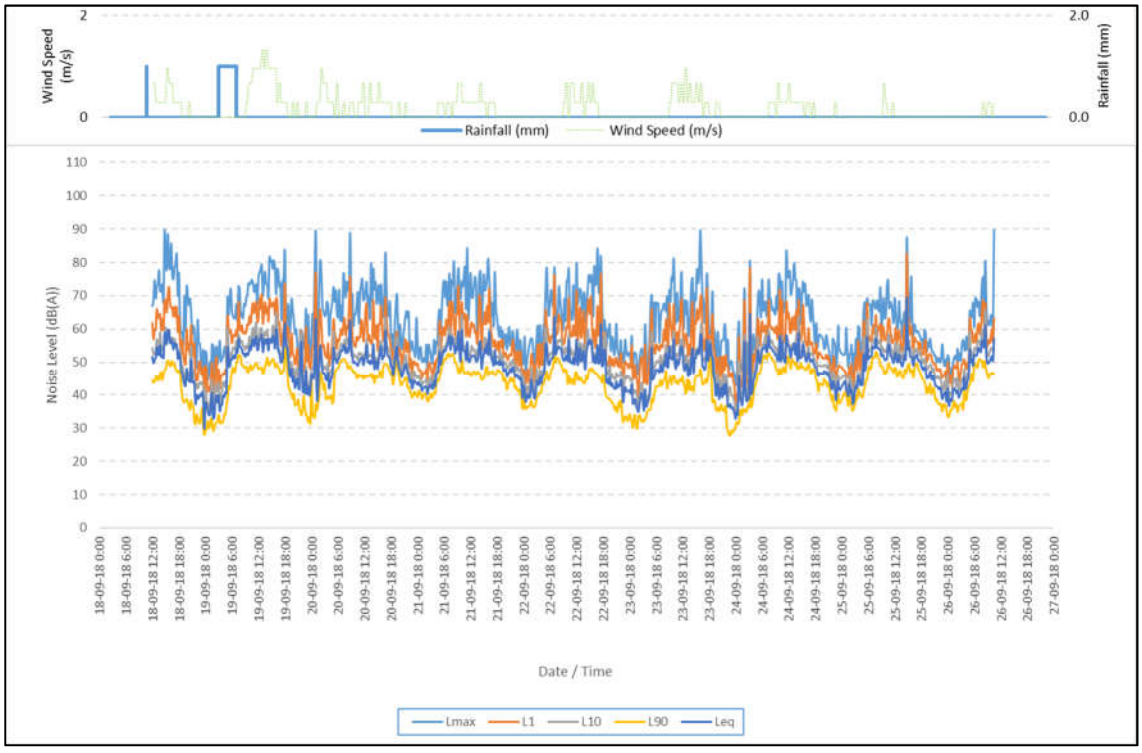


Figure 4: Time History of Monitoring Data

The results of the noise monitoring indicate that existing background (RBL) noise levels in the area surrounding the quarry were significantly higher than the noise limits provided in the EPL. In particular, for the week of monitoring undertaken, the measured day-time RBL of 45 dB(A) is 10 dB higher than the adopted noise limit for the site. Given this, where quarry noise complies with the EPL noise limits, it would be expected to be inaudible at nearby sensitive receptors for the majority of the time.

This finding appears consistent with the results of attended noise monitoring undertaken at sensitive receptors near to the quarry since 2012 (as summarised in Table 5).

4 NOISE ASSESSMENT METHODOLOGY

4.1 Noise Sources

4.1.1 Quarry Operations

Table 10 presents a summary of the source noise levels considered in the assessment. The sound power levels for the plant and equipment presented in the table below are as provided by the manufacturer or taken from information held in our library.

Table 9: Source Noise Levels: Existing Quarry Operations

Source	Annual Usage (%)	Quantity	Noise Level (L_{Aeq})
Jaw Crusher (330hp)	14	1	111
Scalper/reclaimer (140hp)	14	1	103
Cone Crusher (540hp)	14	1	111
VSI Crusher (540hp)	11	1	111
Screendeck (100hp)	11	2	103
Powered Stockpilers (75hp)	14	2	103
Cat 336EH Excavator	40	1	106
Volvo 380 Excavator	40	1	106
Pugmill	9	1	94
Komatsu WA480 FEL	40	1	100
Komatsu WA500 FEL	40	1	100
Service Truck	6	1	105
Fuel Truck	6	1	105
Water Truck	6	1	105
Drill Rig	1	1	127

4.1.2 Asphalt Plant

Table 10 presents a summary of the source noise levels considered in the assessment. The sound power levels for the plant and equipment presented in the table below are as provided by the manufacturer or taken from information held in our library.

Table 10: Source Noise Levels: Asphalt Plant

Source	Annual Usage (%)	Quantity	Noise Level (L_{Aeq})
Bag House	100	1	96
Bag House Fan	100	1	102
Burner/Blower	100	1	91
Conveyor Motor	100	1	88
Drum and Drum Drive	100	1	89
Truck Loading	10	1	105
Front End Loader	40	1	100

4.1.3 Truck Movements

The current quarry operation provides for a total of 100 laden trucks per day until all road upgrades works required by the EPL are completed (Condition 22 of EPL). As part of the plant upgrade, the facility is seeking an increase in the maximum daily traffic movements to provide for 150 trucks per day averaged over a 1-week period to enable the facility respond to normal daily product supply demands.

These truck movements would include off-site delivery of both quarry materials and asphalt.

For the purposes of the assessment, the modelling has considered a total of 150 two-way truck movements per hour over a full operational day (or 1,650 two-way vehicle movements per day), with a sound power level of 114 dB(A).

4.2 Noise Modelling Methodology

For the purposes of predicting impacts associated with noise emissions from the Subject Site on nearby sensitive receptors, noise modelling of the sources was completed using the proprietary software CadnaA (version 2018 build 163.4824) developed by DataKustik. CadnaA incorporates the influence of meteorology, terrain, ground type and air absorption in addition to source characteristics to predict noise impacts at receptor locations. All predictions have been undertaken in accordance with ISO Standard 9613 (1996) *"Acoustics - Attenuation of sound during propagation outdoors"*.

The model is utilised to assess the potential noise emissions from the Subject Site under a range of operating scenarios and meteorological conditions. The noise modelling also allows investigation of possible noise management solutions, in the event that non-compliance with the assessment criterion is predicted.

4.3 Meteorology

The site EPL requires that compliance with the noise limits is achieved under all meteorological conditions except the following:

- wind speeds greater than 3 m/s at 10 m above ground level; or
- 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
- temperature inversion conditions greater than 3°C/100 m

Therefore, for the purposes of the modelling, the noise modelling has considered source to receptor winds at 3 m/s representing a worst-case assessment with D class stability.

5 PREDICTED NOISE LEVELS

5.1 Existing Quarry Operations

Table 11 below presents predicted receptor noise levels for operation of the quarry based on existing production and truck movements (100 laden trucks per day). The results of the monitoring indicate noise levels of up to 36 dB(A) are expected at nearby sensitive receptors based on existing operations (excluding asphalt plant operation).

Table 11: Existing Operations Predicted Receptor Noise Levels

Receptor	$L_{Aeq\ (15\ minute)}$	EPL Noise Limit	Complies?
R1	29	35	Yes
R2	36	36	Yes
R3	< 10	35	Yes
R4	21	35	Yes
R5	34	35	Yes
R6	18	35	Yes
R7	35	35	Yes

5.2 Quarry Operations and Asphalt Production

Table 12 below presents predicted receptor noise levels for operation of the quarry and asphalt plant based on the proposed amended EPL (including 150 laden truck movements per day with operation of the asphalt plant and existing quarry activities). Review of the predicted noise levels indicates that compliance with the existing EPL limits is expected to be achieved for all receptors except Receptor R7.

For Receptor R7, the results of the noise modelling indicate that an exceedance of up to 1 dB is possible for the proposed expanded operations. In practical terms, this level of exceedance is considered to be insignificant with most people unable to discern a difference in noise levels of less than 1 dB. Furthermore, review of the baseline noise monitoring undertaken as part of this assessment (see Section 3.2.3) indicates that the predicted noise levels are significantly lower than existing background noise levels in the area. As such, based on the results of the noise modelling, the risk of adverse impacts on existing residential uses in the area is considered to be low.

Table 12: Expanded Operations Predicted Receptor Noise Levels

Receptor	$L_{Aeq\ (15\ minute)}$	EPL Noise Limit	Complies?
R1	32	35	Yes
R2	36	36	Yes
R3	< 10	35	Yes
R4	24	35	Yes
R5	34	35	Yes
R6	22	35	Yes
R7	36	35	No (< 1dB exceedance)

6 ROAD TRAFFIC NOISE ASSESSMENT

6.1 Introduction

As noted above, the proposed operation of the quarry is expected to result in an increase in the maximum laden truck movements from 100 per day to 150 per day. Given this, there is potential for the proposed increase in heavy vehicle movements on Nimbin Road to adversely impact on residents in the area.

Given this, the assessment has considered the potential impacts associated with noise emissions from the maximum expected 300 heavy vehicle movements per hour (or 3,330 vehicle movements over a full operational day), from the site entry along Nimbin Road (assuming all vehicles travel in the same direction).

6.2 Assessment Criteria

The assessment of potential road traffic noise impacts has considered the noise criteria provided in the NSW Road Noise Policy (RNP). Based on the type of roadway, Table 13 below presents the applicable road traffic noise criteria for existing residences affected by traffic on existing roadways generated by land use developments.

Table 13: Applicable Road Traffic Noise Criteria

Road Category	Type of Project & Land Use	Assessment Criteria
Freeway / arterial / sub-arterial road	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	Day: $L_{Aeq,15\ hour}$ 60 dB(A) Night: $L_{Aeq,9\ hour}$ 55 dB(A) (external)

6.3 Noise Modelling Methodology

For the purposes of predicting impacts associated with road traffic noise emissions was completed using the proprietary software Cadna (version 2018 build 163.4824) developed by DataKustik. The model incorporates the influence of terrain, ground type and air absorption in addition to source characteristics to predict noise impacts at receptor locations. All predictions have been undertaken in accordance with Calculation of Road Traffic Noise (CRTN) methodology developed by the UK Department of Transport. In accordance with the requirements of the RNP, the predictive noise modelling incorporated the following assumptions:

- L_{Aeq} values were calculated from the L_{A10} values predicted by the CRTN methodology using the approximation $L_{Aeq,1\ hour} = L_{A10,1\ hour} - 3$.
- Noise source heights were set at 0.5 m above road level for cars, 1.5 m for heavy vehicle engines and 3.6 m for heavily vehicle exhausts.
- Noise from heavy vehicle exhausts is 8 dB lower than the steady continuous engine noise; and
- Corrections established for Australian conditions applied through a negative correction to the CRTN predations of -1.7 dB for façade-corrected levels (Samuels and Saunders, 1982).

Table 14 below presents predicted noise levels for the nearest residential receptor to Nimbin Road which is setback at a distance of approximately 50 m from the road. This is considered to be representative of all dwellings in the area.

Review of the predicted noise level presented in Table 14 below confirms that compliance with the RNP is predicted and adverse amenity impacts due to peak traffic levels generated by the operation of the quarry is considered unlikely.

Table 14: Predicted $L_{Aeq,1\ hour}$ Noise Levels - Road Traffic Noise

Setback from Roadway	Period	Parameter	Criteria	Predicted Noise Level	Comply (Y/N)
50	Day	LAeq,1-hour	55	49	Yes

7 CONCLUSIONS AND RECOMMENDATIONS

Lismore Council operate the Blakebrook Quarry, an existing hard rock quarry with ancillary asphalt production facilities at Nimbin Road, Blakebrook in NSW. While quarry activities are undertaken and managed by Council, the ancillary asphalt production activities are undertaken by RPQ.

As part of the operation of a new asphalt production equipment on site, Assured Environmental was engaged to consider potential noise emissions from the facility to determine whether adverse amenity impacts on nearby sensitive receptors were likely. In addition, this assessment has also considered the potential for impacts associated with a proposed increase in traffic movements from 100 laden trucks per day to 150 laden trucks per day.

The results of the assessment have identified that compliance with the existing EPL limits is expected to be achieved for all receptors except Receptor R7. For this receptor, the results of the noise modelling indicate that an exceedance of up to 1 dB is possible for the expanded operations. In practical terms, this level of exceedance is considered to be insignificant with most people unable to discern a difference in noise levels of less than 1 dB. Furthermore, the predicted noise levels are noted to be well below existing baseline noise levels measured in the area.

As such, based on the results of the noise modelling, the risk of adverse impacts on existing residential uses in the area is considered to be low provided roadways are maintained to an acceptable standard (smooth roadways with all metal grates, cattle grid etc removed) .

APPENDIX A: GLOSSARY OF TERMS

A-Weighting	A response provided by an electronic circuit which modifies sound in such a way that the resulting level is similar to that perceived by the human ear.
dB (decibel)	This is the scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and the reference pressure (0.00002 N/m^2).
dB(A) or dBA	This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Free-field	Refers to a sound pressure level determined at a point away from reflective surfaces other than the ground with no significant contribution due to sound from other reflective surfaces; generally, as measured outside and away from buildings.
L_{Aeq}	This is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over the given period. Noise levels often fluctuate over a wide range with time. Therefore, when a noise varies over time, the L_{Aeq} is the equivalent continuous sound which would contain the same sound energy as the time varying sound. Many studies show that human reaction to level-varying sounds tends to relate closer to the L_{Aeq} noise level than any other descriptor.

APPENDIX B: HISTORICAL ATTENDED NOISE MONITORING DATA

Blakebrook Quarry Noise Monitoring results 2012

Date	Receptor Number	Criteria dB(A)Leq (15min)	Measure Result dB (A) Leq (15 min)	Max dB	L90 dB	Time	Wind Speed m/s	Weather Description	Comments
9/2/2012	1	35	59.3	93.2	39.9	5.00pm	0.5	Cloudy, calm	Crusher and Asphalt plant not in operation, tests taken as ambient at site locations. Location 3 test was taken outside gate as residents were not contactable. Locations 1 and 2 are roadside residences and traffic was one or two cars per 15 mins, which contributed to noise level. Aircraft, dogs, cicadas and other farm animals contributed to noise levels on a number of locations as well as Nimbin Road traffic.
	2	35	50.8	79.4	33.7	3.19pm	1.0	Cloudy, wind	
	3	35	48.3	73.7	37.1	2.20pm	0.3	Cloudy, calm	
	4	35	41.1	69.1	33.2	10.40am	0.6	Cloudy, wind	
	5	36	42.6	66.1	36.6	1.15pm	0.2	Cloudy, calm	
	6	35	45.8	67.8	40.1	11.05am	1.3	Cloudy, wind	
	7	35	47.1	72.7	40.1	4.25pm	0.2	Cloudy, calm	
20/2/2012	1	35	47.7	61.5	37.1	3.30pm	1.4	Cloudy, Wind	Crusher and Asphalt Plant in operation, tests taken as ambient at site locations. Location 3 was taken outside gate as residents were not contactable. Locations 1 and 2 are roadside residences and traffic was one or two cars per 15 mins, which contributed to noise level. Aircraft, dogs and other farm animals contributed to noise levels on a number of locations as well as Nimbin Road traffic.
	2	35	46.4	72.7	30.2	11.57am	1.0	Cloudy, Breeze	
	3	35	47.0	73.0	31.4	12.20pm	0.7	Cloudy, Calm	
	4	35	45.0	72.8	32.0	11.38am	1.2	Cloudy, Wind	
	5	36	34.2	47.4	30.5	1.42pm	0.2	Cloudy, Calm	
	6	35	36.0	58.2	33.0	12.52pm	0.4	Cloudy, Calm	
	7	35	38.3	51.5	34.1	2.02pm	1.0	Cloudy, Breeze	

Blakebrook Quarry Summary of Noise Monitoring results - 2013

Date	Time	Receptor Location	Criteria dB(A)Leq(15min)	Measure Results				Weather Conditions					Observed Quarry Noises During Monitoring Periods
				L_{Aeq} (dB)	L_{AFmax} (dB)	L_{AF10} (dB)	L_{AF90} (dB)	Temp ^0C	Humidity %RH	Wind Direction	Wind Speed	Cloud Cover	
7/1/2013	10.39am	1	35	39.0	57.5	41.1	31.3	28	55	W	0.5-1.5	4/8	Quarry not audible, trucks on haul road just audible
10/1/2013	12.09pm	1	35	37.6	59.3	40.2	30.4	32	55	NNW	0.5-1.5	5/8	Quarry not audible, trucks on haul road just audible – not measureable
7/1/2013	11.37am	2	36	47.2	69.6	47.8	40.9	30	50	W	0.5-1.5	3/8	Quarry not audible
11/1/2013	1.33pm	2	36	47.3	71.7	47.1	35.3	33	45	NNW	1.0-2.0	6/8	Quarry not audible when wind not blowing, increase in background due to wind
7/1/2013	11.30am	3	35	42.3	60.3	45.4	35.2	29	50	W	1.0-2.0	3/8	Quarry not audible
7/1/2013	1.50pm	4	35	46.3	62.9	49.3	41.8	34	35	SW	1.0-2.5	1/8	Quarry barely audible – not measureable
8/1/2013	1.20pm	4	35	54.2	65.5	57.7	46.9	36	35	W	2.5-3.5	2/8	Quarry audible when wind dropped but well below ambient – occasionally loader under full load, occasionally trucks on haul road
16/1/2013	9.38am	4	35	56.8	62.9	60.0	52.3	26	62	na	<0.5	2/8	Quarry barely audible, occasional 2-3 second periods of rocks being tipped
7/1/2013	1.19pm	6	35	43.4	62.6	44.9	36.9	32	40	na	<0.5	2/8	Quarry barely audible – not measureable
8/1/2013	12.45pm	6	35	49.2	66.6	51.5	45.5	36	30	W	1.5-3.5	3/8	Generally quarry not audible, occasional mechanical noise from crusher, occasional low level truck noise
16/1/2013	9.38am	6	35	56.8	62.9	60.0	52.3	25	70	na	<0.5	2/8	Quarry very faint at times, several 2-3 second periods of rocks being dumped – not measurable above background.
16/1/2013	10.34am	8	35	59.0	67.8	62.9	53.3	25	63	na	<0.5	4/8	Quarry not audible, quarry trucks audible on entry/exit road – not measureable against background.
7/1/2013	12.38am	9	35	44.7	63.8	47.8	37.9	30	45	SW	0.5-1.5	2/8	Cars on entry/exit road audible.
16/1/2013	11.11am	9	35	48.9	70.2	51.6	43.6	26	56	na	<0.5	4/8	Quarry machinery not audible, trucks on entry/exit road quite audible, trucks going over cattle grid halfway up hill very audible, cattle grid on bottom audible, truck engine brakes on entry/exit road.

Receptor Location	Street Address
1	122 Keerrong Road Blakebrook
2	126 Keerrong Road Blakebrook
3	190 Keerrong Road Blakebrook
4	365 Booerie Creek Road Booerie Creek
6	277 Booerie Creek Road Booerie Creek
8	484 Nimbin Road Blakebrook
9	506 Nimbin Road Blakebrook

Blakebrook Quarry Summary of Noise Monitoring results - August 2013

Date	Time	Receptor Location	Criteria dB(A)Leq (15min)	Measure Results						Weather Conditions					Observed Quarry Noises During Monitoring Periods
				LA max	LA 10	LA eq	LA 90	LAeq-LA90	>Design Level 35LAeq	Temp °C	Humidity %RH	Wind Direction	Wind Speed	Cloud Cover	
30/8/2013	0800	1	35	61	45	42	35	7	7	11.9	99	N	9	Clear	Quarry not audible, paused for passing traffic
30/8/2013	0820	2	36	54	49	46	37	9	11	12.6	99	NE	6	Clear	Quarry not audible, paused for passing traffic
30/8/2013	0840	3	35	52	43	40	35	5	5	13.4	99	N	4	Clear	Quarry not audible, birds, cows
30/8/2013	0915	4	35	59	45	43	35	6	8	15.4	99	NNW	4	Clear	Quarry occasionally audible
30/8/2013	0940	6	35	56	44	41	35	6	6	18.0	80	NNW	4	Clear	Quarry not audible
30/8/2013	1005	8	35	53	42	39	40	9	4	20.6	67	NNW	7	Clear	Quarry not audible, paused for passing traffic
30/8/2013	1025	9	35	65	45	42	35	7	11	21.7	60	N	4	Clear	Quarry occasionally audible, paused for passing traffic
30/8/2013	1200	10		55	44	41	35	6	6	25.2	51	NNW	19	Clear	Example of ambient for the area when quarry not operating

Receptor Location	Street Address
1	122 Keerrong Road Blakebrook
2	126 Keerrong Road Blakebrook
3	190 Keerrong Road Blakebrook
4	365 Booerie Creek Road Booerie Creek
6	277 Booerie Creek Road Booerie Creek
8	484 Nimbin Road Blakebrook
9	506 Nimbin Road Blakebrook

Blakebrook Quarry Summary of Noise Monitoring results – February 2015

Date	Time	Receptor Location	Criteria dB(A)Leq(15min)	Measure Results				Weather Conditions					Observed Quarry Noises During Monitoring Periods
				L_{Aeq} (dB)	L_{AFmax} (dB)	L_{AF10} (dB)	L_{AF90} (dB)	Temp °C	Humidity %RH	Wind Direction	Wind Speed	Cloud Cover	
2/2/2015	10.20am	1	35	41.9	58.3	44.0	35.6	22.2	86	South	1.0-1.5	8/8	Quarry not audible. Trucks audible on entry/exit haul road – not measurable against background. Trucks crossing middle cattle grid audible. Birds, distant brushcutter, insects, distant traffic on Nimbin Road.
2/2/2015	9.53am	2	36	39.8	62.0	41.7	30.6	21.6	91	Calm		8/8	Quarry barely audible when no other noises. Birds, distant cattle, distant overhead aircraft, vehicles on Keerrong Road.
2/2/2015	9.25am	3	35	43.0	62.7	45.2	35.8	21.7	92	Calm		8/8	Quarry barely audible when no other noises. Vehicles on Keerrong Road, distant cattle, birds, chickens, cattle herding, distant vehicle idling, insects, distant overhead aircraft.
2/2/2015	8.40am	4	35	36.0	57.1	37.5	31.9	21.1	93	Calm		8/8	Quarry audible. Occasionally trucks on eastern haul road 35-40dB. Occasional rocks 35-40dB. Occasional loader 35-40dB. Crushers not audible. Birds, dogs barking, distant overhead aircraft.
2/2/2015	8.05am	6	35	51.1	66.9	52.4	44.6	21.1	94	Calm		8/8	Quarry not audible. Birds, distant tractor, vehicle on Booerie Creek Road, chickens, distant cattle, insects.
2/2/2015	10.50am	9	35	45.5	61.2	48.6	38.9	22.8	82	South	1.0-1.5	8/8	Quarry just barely audible when no traffic on Nimbin Road. Occasional rock thud. No trucks on entry/exit haul road during monitoring. Birds, traffic on Nimbin Road, chickens, distant cattle, distant overhead aircraft.

Receptor Location	Street Address
1	122 Keerrong Road Blakebrook
2	126 Keerrong Road Blakebrook
3	190 Keerrong Road Blakebrook
4	365 Booerie Creek Road Booerie Creek
6	277 Booerie Creek Road Booerie Creek
9	506 Nimbin Road Blakebrook

Blakebrook Quarry Summary of Noise Monitoring results – November 2015

Date	Time	Receptor Location	Criteria dB(A)Leq(15min)	Measure Results				Weather Conditions					Observed Quarry Noises During Monitoring Periods
				L_{Aeq} (dB)	L_{AFmax} (dB)	L_{AF10} (dB)	L_{AF90} (dB)	Temp °C	Humidity %RH	Wind Direction	Wind Speed	Cloud Cover	
4/11/2015	10.44am	1	35	50.4	81.5	43.7	33.5	29	51	West	1.0-2.0	6/8	Quarry not audible. Birds, dogs barking, distant cattle, wind in trees, distant traffic on Nimbin Rd, local traffic on Keerong Rd
4/11/2015	11.17am	2	35	41.8	63.7	43.1	32.9	28	40	NWW	1.5-2.5	4/8	Quarry not audible. Wind in trees, birds, local traffic on Keerong Rd
4/11/2015	10.44am	3	35	38.9	60.8	38.2	32.3	28	56	NWW	1.5-2.5	5/8	Quarry not audible. Wind in trees, birds, local traffic on Keerong Rd
4/11/2015	8.29am	4	35	41.0	64.5	42.6	33.7	25	60	West	0.5-1.0	5/8	Just audible as a dull constant level. Not able to be accurately measured. Estimated from logged spectrum and sound recording to be below 30 dB(A)Leq,15min. Birds, insects, wind in trees, distant overhead aircraft.
4/11/2015	9.24am	6	35	41.4	63.7	42.7	34.9	28	50	West	0.5-1.5	5/8	Barely audible. Estimated from logged spectrum and sound recording to be below 30 dB(A)Leq,15min. Birds, chickens, wind in trees, insects, distant overhead aircraft, distant cattle.
4/11/2015	11.45am	9M1	35	50.6	63.4	53.4	44.7	30	38	NWW	1.5-2.0	2/8	Quarry operations not audible. Quarry trucks on entry/exit haul road audible when line of sight and not shielded by earth bund on haul road. Middle cattle grid audible. Quarry truck Lamax estimated to be 45-55 depending on vehicle. LAeq,15min level dependant on number and type of trucks using haul road. Wind in trees, birds, distant cattle, chickens, distant overhead aircraft.
4/11/2015	12.00pm	9M2	35	49.4	60.5	52.2	43.7	30	38	NWW	1.5-2.0	2/8	Quarry operations not audible. Quarry trucks on entry/exit haul road audible when line of sight and not shielded by earth bund on haul road. Middle cattle grid audible. Quarry truck Lamax estimated to be 45-55 depending on vehicle. LAeq,15min level dependant on number and type of trucks using haul road. Wind in trees, birds, distant cattle, traffic on Nimbin Rd, chickens, distant overhead aircraft.

Receptor Location	Street Address
1	122 Keerrong Road Blakebrook
2	126 Keerrong Road Blakebrook
3	190 Keerrong Road Blakebrook
4	365 Booerie Creek Road Booerie Creek
6	277 Booerie Creek Road Booerie Creek
9	506 Nimbin Road Blakebrook

Blakebrook Quarry Summary of Noise Monitoring results – November 2016

Date	Time	Receptor Location	Criteria dB(A)Leq(15min)	Measure Results				Weather Conditions					Observed Quarry Noises During Monitoring Periods
				L_{Aeq} (dB)	L_{AFmax} (dB)	L_{AF10} (dB)	L_{AF90} (dB)	Temp °C	Humidity %RH	Wind Direction	Wind Speed	Cloud Cover	
10/11/2016	8.44 am	1	35	48.9	71.4	47.6	34.4	24	80		calm	1/8	Quarry not audible. Birds, distant overhead aircraft, occasional vehicle on Keerong Rd, distant cattle.
10/11/2016	9.17 am	2	35	40.6	63.4	43.1	28.7	27	70		calm	0/8	Quarry not audible. Birds, insects, distant overhead aircraft, occasional vehicle on Keerong Rd, distant cattle.
10/11/2016	9.51 am	3	35	35.7	69.7	36.6	27.7	28	65	North west	0.5-1.5	1/8	Quarry not audible. Birds, insects, distant overhead aircraft, light aircraft.
8/11/2016	8.53 am	4	35	40.6	56.6	40.5	32.2	23	75	west	0.5-1.5	0/8	Quarry not audible. Birds, insects, distant overhead aircraft.
10/11/2016	8.12 am	6	35	50.1	76.3	50.2	34.3	22	75		calm	3/8	Quarry not audible. Birds, insects, distant overhead aircraft, chickens, occasional vehicle on Booerie Creek Rd, cattle.

Receptor Location	Street Address
1	18 Keerrong Road Blakebrook (was 122)
2	166 Keerrong Road Blakebrook (was 126)
3	190 Keerrong Road Blakebrook
4	365 Booerie Creek Road Booerie Creek
6	277 Booerie Creek Road Booerie Creek

*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.

Blakebrook Quarry Summary of Noise Monitoring results – November 2017

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

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

Appendix G Air Quality Assessment

- Assured Environmental Pty Ltd

BLAKEBROOK QUARRY ASPHALT PLANT: AIR QUALITY ASSESSMENT

MITCHEL HANLON CONSULTING PTY LTD

Project ID. 11558

R_3

DATE OF RELEASE: 1/04/2019

Assured Environmental Pty Ltd

ABN: 87 604 851 078

Unit 7, 142Tennyson Memorial Avenue – Tennyson – Queensland - 4105

Table 1: Document Approval

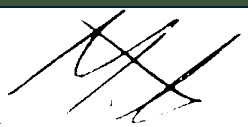
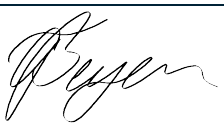
	Name	Position Title	Signature	Date
Author	Michelle Clifton	Senior Consultant		1/04/2019
Reviewer	Craig Beyers	Manager Consulting Services		1/04/2019
Approver	Craig Beyers	Manager Consulting Services		1/04/2019

Table 2: Revision Register

Revision	Date	Name	Issued to	Comment
R_0	5/11/2018	M. Clifton	T. McLean	Formal report release
R_1	12/11/2018	M. Clifton	T. McLean	Comments
R_2	14/12/2018	M. Clifton	T. McLean	Comments
R_3	1/04/2019	M. Clifton	T. McLean	RFI Response

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Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to AE is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise.

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1 INTRODUCTION

1.1 Background

Blakebrook Quarry (the Subject Site) is owned by Lismore City Council with operations of the quarry including operation an asphalt plant (operated and maintained by RPQ), which is referenced as an auxiliary item in the Environmental Protection Authority (EPA) licence (EPL 3384). The EPL provides specific conditions relating to air impacts for the operation of the whole quarry facility including the asphalt plant.

1.2 Scope of Assessment

Assured Environmental Pty Ltd (AE) was appointed by Mitchel Hanlon Consulting Pty Ltd to undertake an air quality impact assessment for the proposed upgrade of the asphalt plant (the **Project**) to a Benninghoven permanent mobile asphalt plant with annual production of up to 50,000 tonnes per annum. As part of this upgrade, the facility is also seeking to increase the permitted truck movements from the site to enable the operators to effectively manage daily product demand in the region.

The air quality study has been undertaken to assess the potential impacts of the operation of the proposed Project on nearby sensitive receptors in accordance with NSW Environmental Protection Authority *'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW'* (**Approved Methods**) (EPA, 2016).

To determine the potential for adverse impacts associated with the asphalt plant upgrade, the following tasks have been undertaken:

- Review activities undertaken at the quarry (including the proposed asphalt production);
- Estimate emissions from the quarry and asphalt production process based on the proposed operations.
- Undertake predictive dispersion modelling to assess the potential for adverse impacts as a result of the proposed change in operations.
- Comparison of the predicted receptor concentrations with the acceptable objectives provided in the Approved Methods.

1.3 This Report

This report summarises the methodology, results and conclusions of the air quality impact assessment. A glossary of terms is presented in Appendix A to assist the reader.

1.4 Request for Information

A Request for Information (RFI) from NSW Department Planning and Environment dated 27 February 2019 was received in relation to the acoustic assessment of the quarry. The RFI requested clarification relating to some aspects of the air quality assessment. Table 3 below provides a summary of each of the issues raised in the RFI along with the relevant section of this report in which the issue is addressed.

Table 3: DPE Request for Information

DPE Comment	Assured Environmental Response
4. Please provide your rational as to why air quality data for Bathurst (780 km) and Wyong (643 km) is considered representative for the local area and why data from closer stations is not available.	OEH undertake air monitoring throughout NSW and hourly data is available for review. Both particulate and gaseous pollutants are monitored in urban centres, however in rural locations particulate monitoring is not readily available. For this assessment, PM_{10} and $PM_{2.5}$ hourly data was obtained from Tamworth, not Bathurst. Wyong ambient data was considered to be most representative to the Subject Site as it is the nearest monitoring station that is not near industrial facilities and has similar emissions sources to Lismore.
5. The assessment lists Bathurst as the source of background particulate matter data, but the assessment later lists the relevant station as Tamworth. Please clarify the source of air quality data used for the assessment.	This is a typo. The data was obtained from Tamworth. It is considered the most representative location as it is also a rural monitoring station with no nearby industrial sources, similar to Lismore.
6. In section 5.3 of the air quality assessment, AE uses its own data for asphalt plants to estimate emissions associated with this modification. Please confirm how this data used is representative of the subject modification.	The emissions data was obtained from a number of mobile asphalt plants with a similar capacity to the proposed plant. Where necessary, the emissions of TSP and PM_{10} were corrected to 50 mg/m^3 from the baghouse which is representative of the performance specifications for the baghouse. The emissions rates for a drum mix plant have been calculated in accordance with USEPA AP42 Chapter 11.1 Hot Mix Asphalt Plants. The calculated emission rates based on 300 t/hour drum plant are lower than the measured emission rates presented in Table 9. Therefore, the emission rates in Table 9 have been modelled.
7. Table 10 uses 30 trucks per day to assess current emissions, and 60 trucks per day to predict future emissions. These truck numbers are not consistent with the current approval or modification applications. Please clarify the numbers of trucks on which the air quality assessment has been conducted.	This is a typo. The air quality model has assumed the maximum truck movements of 150 per day (i.e. 300 vehicle movements per day, averaged over a full day).
8. Tables 14, 17, 22, 26 and 27 show background levels for various air quality criteria which vary considerately between each receptor. Please explain the variations in background levels.	The air quality assessment is a Level 2 assessment in accordance with the Approved Methods. As such it utilises hourly background data contemporaneously with the hourly (or daily) predicted concentrations. The Approved Methods requires analysis of the highest total concentrations when driven

DPE Comment	Assured Environmental Response
	by a) highest incremental concentrations and b) highest background concentrations. Due to the wind directions at any given receptor when the highest concentrations are predicted, the contemporaneous background concentration may differ as the highest impacts can occur on different days.
9. Tables 16 and 18 predict that annual average $PM_{2.5}$ contributions from the quarry are higher than the quarry's annual average TSP contributions. The Department notes that $PM_{2.5}$ is a component of TSP and, therefore predicted TSP levels should be higher than the predicted $PM_{2.5}$. Please review and advise.	Review of the model identified slight discrepancies in the calculation of annual average of TSP in the model compared to manual calculations. Tables have been updated.
10. Table 20 shows inconsistent results for 1-hour average NO_2 concentrations, namely that: a) background levels for R7 are considerably lower than the other receptors; and b) the quarry's contribution to 1-hour average NO_2 concentrations are considerably higher for R7 than other receptors. The Department notes that R1 and R7 are located approximately 170 m apart, and any significant variation in results for these two receptors should be explained within the assessment.	As discussed in our response to No. 8, the varying background concentrations are a result of the day on which the highest impacts occur for each receptor. For Table 20, the data presented is the highest cumulative concentrations, which, with the exception of R7 and R2, occur on 13/06/2016 as a direct result of background NO_2. For R2 the small source contributions do not affect the overall hour of the highest prediction, therefore the background concentrations remain the same as the other receptors. In the case of R7, the highest total concentration is driven by the source, not the background. This occurs on a different day when the background concentrations are lower. In addition, R7 is located on a ridge (RL 130 m) whereas R1 is at the bottom of the hill (RL 20 m), therefore R7 is closer to the source of emissions. Terrain elevations in Figure 2 has been updated with receptor locations.
11. The point source for SO_2 emissions in Figure 18 is considerably different to Figures 19 and 20. Please review and confirm that the modelling is accurate.	The SO_2 concentration contours are representative of different time averaging periods. The sources modelled are the same location (not identified on the figures), however due to the predicted plume movements over short term 1 hour (Figure 18) and longer-term periods (Figure 19 and 20) the prediction contours have highest impacts in slightly different locations.
12. Please assess any impacts that the proposed modification will have on vacant land, with	The Voluntary Land Acquisition and Mitigation Policy 2018 (VLAPM) applies to

DPE Comment	Assured Environmental Response
specific reference to acquisition and mitigation criteria set out in the Voluntary Land Acquisition and Mitigation Policy 2018 (VLAPM)	private land that may be affected by particulate matter from extractive industries. The assessment criteria are the same as presented in Table 4 and Table 5. Review of the cumulative isopleths in Appendix D shows that compliance is achieved for all pollutants outside the quarry boundary. The only exception is PM_{10} annual average which is driven by high background levels, however area of exceedence is around the haul road which is owned by the quarry.
13. Please clarity which isopleths in the air quality assessment represent incremental impacts and which represent cumulative impacts.	All isopleths are of cumulative impacts as detailed in Section 6.1.

2 PROJECT DESCRIPTION

2.1 Site Location

The Subject Site is located on Lot 201 on DP1227138 as shown in Figure 1 and is surrounded by rural residential land uses.

The topography the Subject Site is presented in Figure 2. Review of the topography confirms that the quarry is located on elevated terrain varying in height from approximately 120 m for the asphalt plant to 130 m at the edge of the quarry pit. Further afield, the terrain is noted to fall away with nearby receptors located at elevated ranging from approximately 20 m to 110 m.

The quarry site is also noted to be surrounded by a relatively densely vegetated area on all sides. This vegetative buffer is also expected to provide some minor additional reduction of particulate concentrations with the vegetation acting as a filtration media for dust emissions.

2.2 Existing Environment Protection Licence

In preparing this report, reference is made to the existing noise conditions provided in Environment Protection Licence (EPL) 3384 issued to Lismore City Council on 06 August 2018. The conditions as they relate to the subject of this report include provisions specifically focused on air emissions.

The EA provides the following conditions intended to place limitations on the operation of the facility such that potential adverse impacts on the surrounding environment are minimised:

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.

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

These limits are considered in the assessment of potential impacts associated with the proposed changes to operations at the site.

2.3 Description of Development

The Blakebrook Quarry facility provides a key resource for hard rock and infrastructure construction materials to the Lismore region. The facility, which includes both quarrying and asphalt production operations, has operated at the site for a considerable period of time.

The quarry is licenced for the extraction, processing and storage of 100,000 – 500,000 tonnes annually with a maximum of 100 laden trucks per day permitted under Condition 22 of the EPL. Quarrying at the facility is undertaken using a drill and blast technique with the operating plant and equipment on site including:

- Jaw Crusher (330hp);
- Scalper/reclaimer (140hp);
- Cone Crusher (540hp);
- VSI Crusher (540hp);
- 2 x Screendecks (100hp);
- 2 x Powered Stockpilers (75hp);
- Cat 336EH Excavator;
- Volvo 380 Excavator;
- Pugmill;
- Komatsu WA480 FEL;
- Komatsu WA500 FEL;
- Service Truck;
- Fuel Truck;
- Water Truck;
- Drill Rig; and
- Trucks (on-site and off-site transportation).

In addition to the quarrying operation, asphalt is also produced on-site through permanent mobile asphalt plant operated by an external contractor. Recently, asphalt operations at the have recently been taken over by RPQ. As part of the change of operations, RPQ have installed a Benninghoven portable asphalt plant with a production capacity of 80 tonnes per hour.

Key components of the mobile asphalt plant include:

- Bag House;
- Bag House Fan;
- Burner/Blower;
- Conveyor Motor;
- Drum and Drum Drive;
- Truck Loading;
- Front End Loader; and
- Truck movements (including for deliveries of asphalt product, binder, fines and aggregate).

As a double drum plant, aggregate material is added to the drum via hoppers and conveyor with mix proportions as required by the end user. Once dried and heated in the drum, binder material (in the form of bitumen and other modified binders) is added to produce the desired asphalt mix.

In terms of emissions to air, the principal source of these emissions include:

- Dust emission associated with aggregate handling including stockpile management and loading of raw aggregate materials into the feed hoppers;
- Combustion gas emissions associated with the burner used to heat materials in the drum; and
- Dust, odour and volatile organic compounds from addition of binder material into the drum.

To provide for the ongoing operation of the facility, Council are seeking to amend the EPL to permit a total of 150 laden trucks per day averaged over a 1-week period (600 laden trucks per week) with a total production rate of 50,000 tonnes per annum of asphalt. It is noted that production capacities for the quarry are not proposed to change beyond those permitted under the EPL as a result of this amendment. Rather, the increase in permitted truck movements would provide greater capacity to deal with peak supply requirements for both the quarry and asphalt plant.

2.4 Nearby Sensitive Receptors

There is a number of existing sensitive receptors surrounding the quarry. Review of the *"Notice of Modification – Section 75W of the Environmental Planning and Assessment Act 1979"*, referred to in the EPA licence number 3384 dated 6 August 2018, identifies seven (7) sensitive receptors. For consistency these receptors will be assessed in relation to the Subject Site.

Figure 1 and Table 4 below provide a summary of the nearest sensitive uses to the proposed development.

Table 4: Nearby Sensitive Receptors

Receptor	Description	Address	Distance to Quarry
R1	Existing Dwelling	1 Nimbin Road, Blakebrook	0.65 km
R2	Existing Dwelling	122 Keerrong Road, Blakebrook	1.0 km
R3	Existing Dwelling	145 Pinchin Road, Goolmangar	2.9 km
R4	Existing Dwelling	166 Keerrong Road, Blakebrook	1.12 km
R5	Existing Dwelling	365 Booerie Creek Road, Booerie Creek	1.19 km
R6	Existing Dwelling	210 Booerie Creek Road, Booerie Creek	1.08 km
R7	Existing Dwelling	484 Nimbin Road, Blakebrook	0.87 km

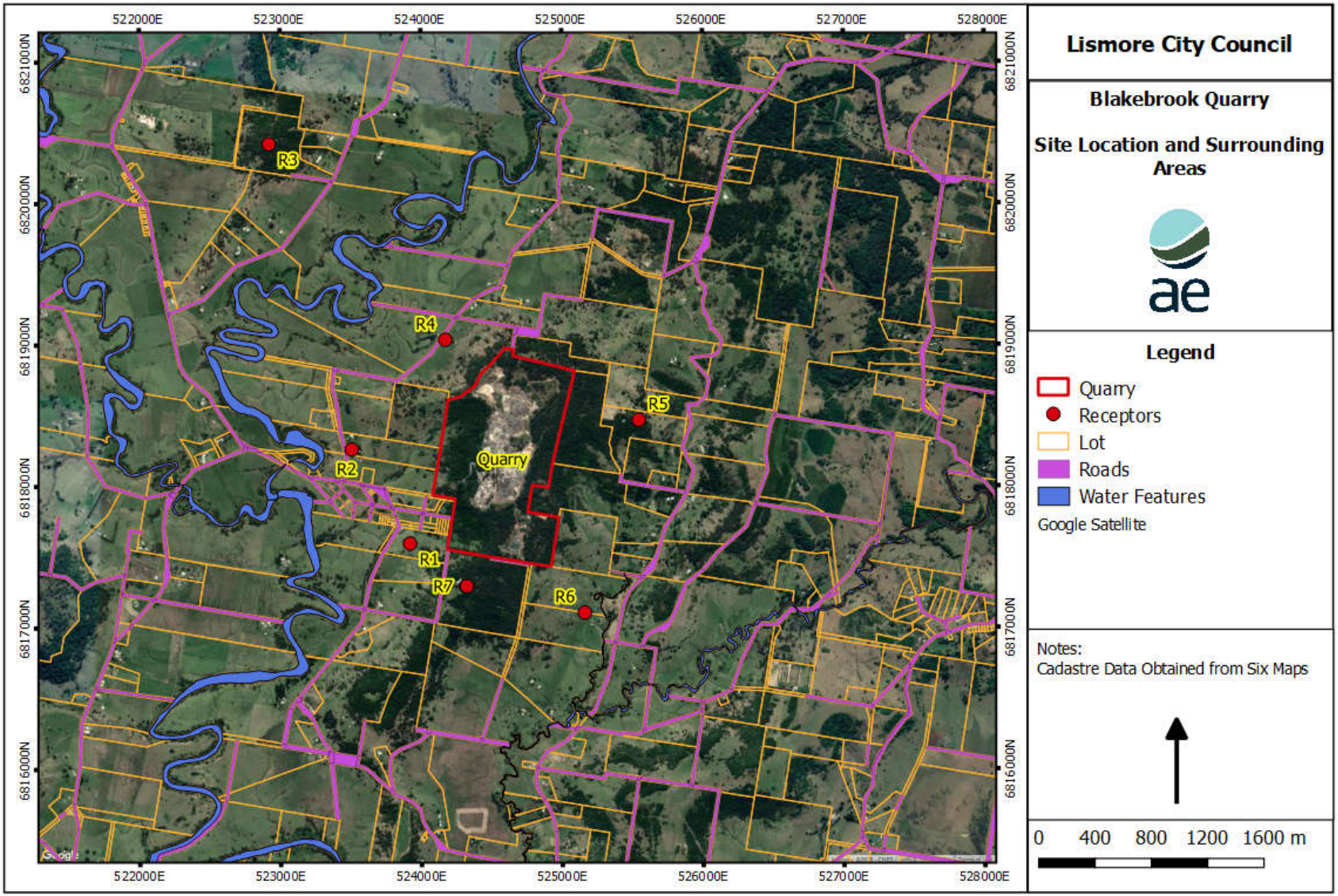


Figure 1: Site Location, Sensitive Receptors and Surrounding Land uses

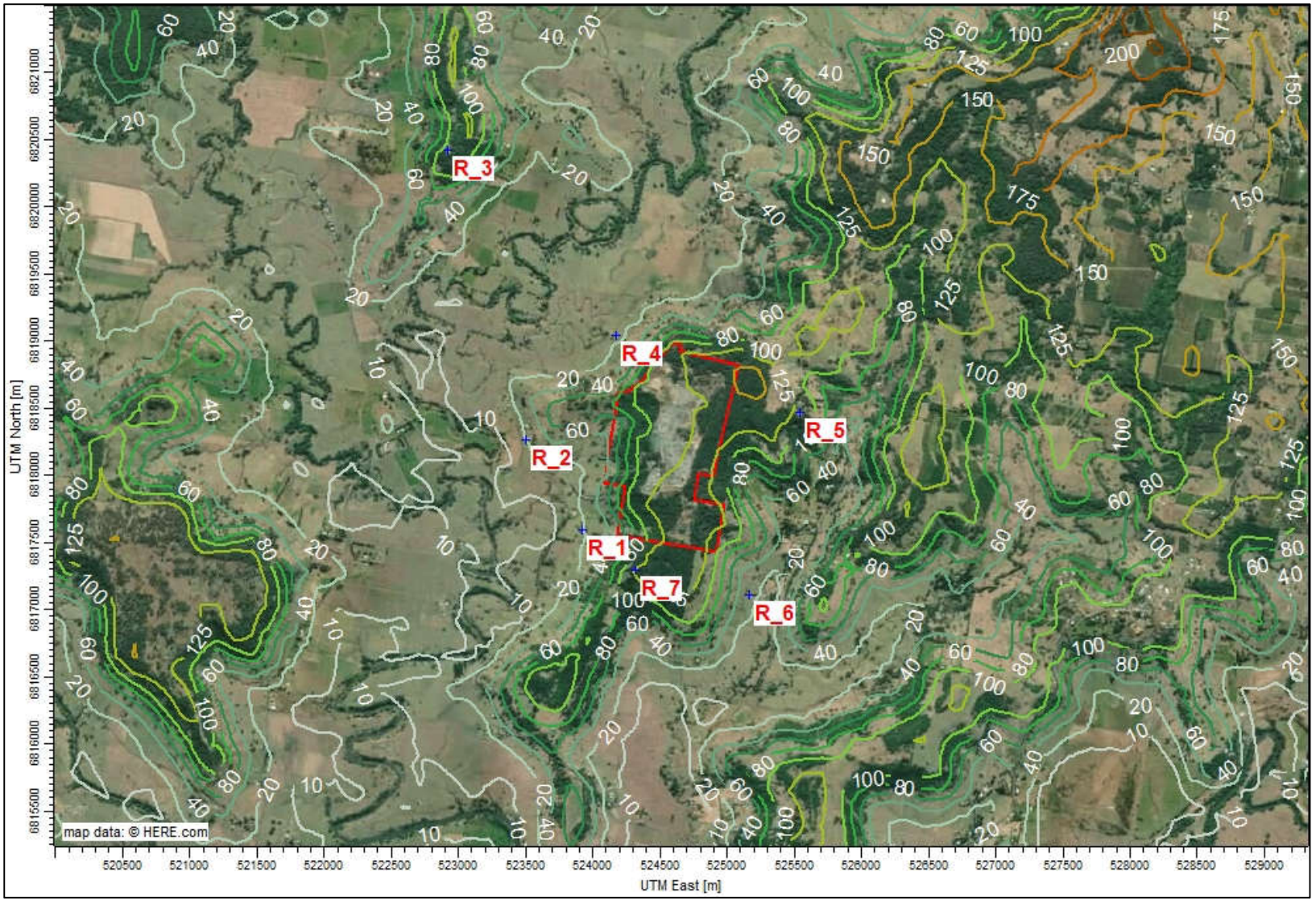


Figure 2: Subject Site and Surrounding Topography

3 ASSESSMENT CRITERIA

Condition 10 of the *"Notice of Modification – Section 75W of the Environmental Planning and Assessment Act 1979",* provides the project criteria for the Subject Site. The criteria in Table 5 is applicable at any residence on privately-owned land.

Table 5: Project Criteria from Approval Notice of Modification

Pollutant	Averaging Period	Criterion
PM_{10}	24-hours	50 µg/m^3 a) d)
	Annual	25 µg/m^3 b)
TSP	Annual	90 µg/m^3 a) d)
Deposited Dust c)	Annual	2 g/m^2/month maximum increase b)
		4 g/m^2/month total dust level a) d)

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.

It is noted however that these conditions of approval do not consider emissions of other compounds (notably odour, VOCs and combustion emissions) from on-site activities (in particular the asphalt plant operation). For these compounds, reference is made to the air quality criteria provided in the Approved Methods. Table 6 provides a summary of the criteria provided in the approved methods for the additional compounds considered relevant to the operation of the asphalt plant.

Table 6: Approved Methods Emission Standards

Pollutant	Averaging Period	Criteria	
		pphm	µg/m^3
Nitrogen dioxide (NO_2)	1 hour	12	246
	Annual	3	62
$PM_{2.5}$	24 hours	-	25
	Annual	-	8
Carbon monoxide (CO)	8-hour	9	10,000
Sulphur dioxide (SO_2)	1 hour	20	570
	24 hours	8	228
	Annual	2	60

The Approved Methods note that the odour assessment criteria for complex mixtures of odorants need to be designed to consider the range of sensitivities to odours within the community, and to provide additional protection for individuals with a heightened response to odours. Therefore, the odour assessment criteria allow for population size, cumulative impacts, anticipated odour levels during adverse meteorological conditions and community expectations of amenity. Table 7 presents odour criteria for various population sizes, as specified by the EPA.

Table 7: NSW EPA Odour Criteria

Population of Affected Community	Odour Assessment Criteria (OU)
Rural single residence (≤)	7.0
~ 10	6.0
~ 30	5.0
~ 125	4.0
~ 500	3.0
Urban area (≥ a 2000) and/or schools and hospitals	2.0

Alternatively, the framework identifies that the following equation may be applied:

$$\textit{Odour assessment criterion (OU)} = (\log_{10}(\textit{population}) - 4.5)/-0.6$$

The Blakebrook Quarry site is located in a rural area with a total of 6 dwellings located within 1.5 km of the site. As such, the population potentially exposed to odour emissions from the Subject Site is expected to be around 16 people (assuming 2.6 persons per dwelling[a]). On this basis, an odour assessment criterion of 5.5 has been considered in assessment.

For comparison to the assessment criteria, impacts in odour units are reported as peak nose response time concentrations (i.e. approximately one second average) and as the 99th percentile of predicted concentrations based on a Level 2 assessment methodology.

In assessing compliance of predicted ground level odour concentrations, it is necessary to estimate the peak-to-mean concentration ratios for the source being considered. These peak-to-mean ratios allow estimation of 1-second average (nose response time) concentrations based on the predicted 1-hour average concentrations generated by the air dispersion model.

In the case of the Blakebrook Quarry asphalt plant, the sources of emissions include minor releases from binder storage ranks and emissions from a short exhaust stack. Given this, the Approved Methods recommends the use of a peak-to-mean ratio of 2.3 be considered.

[a] Australian Bureau of Statistics, 2016 Census QuickStats – New South Wales

As such, all predicted 1-hour average concentrations have been multiplied by a peak-to-mean ratio of 2.3 to estimate 1-second (nose-response time) average concentrations.

4 MODELLING METHODOLOGY

4.1 Overview

Atmospheric dispersion modelling involves the mathematical simulation of the dispersion of air contaminants in the environment. The modelling utilises a range of information to estimate the dispersion of pollutants released from a source including:

- Meteorological data for surface and upper air winds, temperature and pressure profiles, as well as humidity, rainfall, cloud cover and ceiling height information;
- Emissions parameters including source location and height, source dimensions and physical parameters (e.g. exit velocity and temperature) along with pollutant mass emission rates;
- Terrain elevations and land use both at the source and throughout the surrounding region; and
- The location, height and width of any obstructions (such as buildings or other structures) that could significantly impact on the dispersion of the plume.

For the purpose of the assessment, meteorological modelling has been undertaken using TAPM (The Air Pollution Model) and CALMET to predict localised meteorological conditions. The meteorological data derived from these models have been used as an input for the CALPUFF dispersion modelling.

4.2 TAPM Predictions

In accordance with the Approved Methods, a site-specific meteorological dataset has been determined using the prognostic model TAPM (The Air Pollution Model). Prognostic models, such as TAPM, permit the development of localised meteorological datasets, based on synoptic weather conditions. The model predicts the regional flows important to dispersion, such as sea breezes and terrain induced flows, against a background of larger-scale meteorology provided by synoptic analyses. The output of this model, when used with a diagnostic meteorological model, such as CALMET, provides a meteorological dataset suitable for introduction into the diagnostic wind field results. This methodology is the recommended approach for the modelling of contaminant concentrations using CALMET[b].

Predictions of meteorological parameters for the year 2016 for the region in the surroundings of the Subject Site were undertaken using TAPM (Version 4). The model was configured with a series of nested grids chosen to provide an appropriate communication and transfer of information from the broad synoptic to the local scale.

[b] TRC Environmental Corporation (March 2011) 'Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia' prepared on behalf of the NSW Office of Environment and Heritage

The model was configured to use a domain consisting of 50 x 50 x 25 grid points with nesting spacing of 30 km, 10 km, 3 km, 1 km and 0.3 km. The 0.3 km domain grid was used to develop the CALMET input file.

4.3 Meteorological Modelling

4.3.1 Overview

A three-dimensional prognostic dataset derived from the TAPM model was input to CALMET to predict meteorological conditions near the Subject Site. TAPM 2016 data has been used to allow for validation against historical meteorological data collected by the Bureau of Meteorology at Lismore Airport. The following sections provide an overview of the data utilised in the CALMET modelling, along with details of some of the key parameters selected to establish calculation limits within CALMET.

4.3.2 Vertical Stations

For the purposes of the modelling, CALMET was initialised with a total of 12 vertical layers with layer boundaries at 20 m, 50 m, 75 m, 150 m, 200 m, 500 m, 750 m, 1,000 m, 1,500 m, 2,000 m, 3,000 m and 4,000 m respectively. The vertical levels used in the modelling were selected to provide the model with the ability to predict a generic range of atmospheric conditions near to the site.

4.3.3 Terrain and Land Use Data

Terrain height data was based on data from the Shuttle Radar Imaging Mission (SRTM), and obtained from the United States Geological Survey (USGS) web site. This produced terrain height data on a 3 arc-second longitude/latitude grid (approximately 0.03 km) for a grid domain of 14 km x 14 km encompassing the site region. Figure 2 below presents the modelling domain considered for both CALMET and CALPUFF along with the terrain variation observed across the domain. Land use data was also obtained from the USGS and incorporated into the CALMET model.

4.4 Meteorology

4.4.1 Wind Predictions

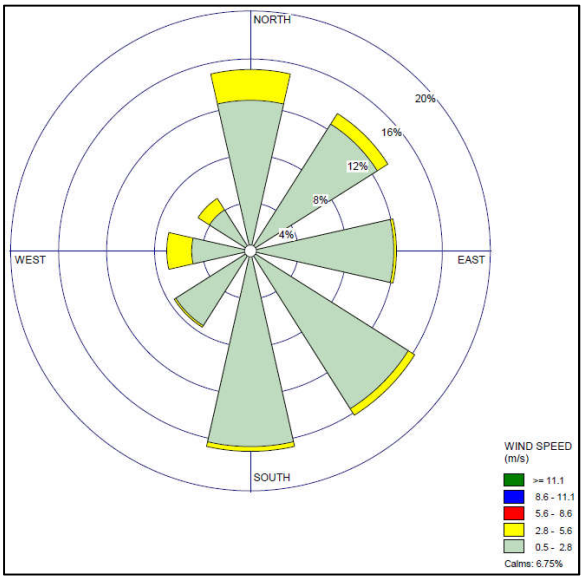
Figure 3 presents the predicted 9 am and 3 pm wind roses respectively for the Subject Site. Figure 4 presents historical wind roses for the Bureau of Meteorology (BOM) Lismore Airport station (number 058214) between 2012 – 2016 as purchased from BOM which is located approximately 6.5 km to the south of the Subject Site. Historical data from Lismore Airport is used to assess the viability of the predicted data.

Comparison of the wind roses predicted for the Subject Site (Figure 3) and observed data from Lismore Airport (Figure 4) predict the following wind conditions for the Subject Site.

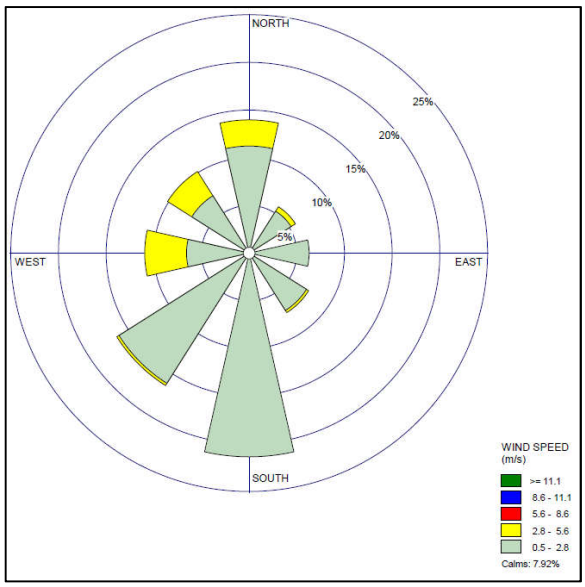
- South and south westerly winds are dominant in the morning (0900 hours) at the Subject Site whereas the long-term BOM data shows dominant northly winds;
- South easterly winds are dominant in the afternoon (1500 hours) at both the Subject Site and Lismore Airport; and

- The occurrence of calm conditions is under-predicted by the model based on the annual calm conditions however the model is notes to significantly under-predict wind speeds in the region.

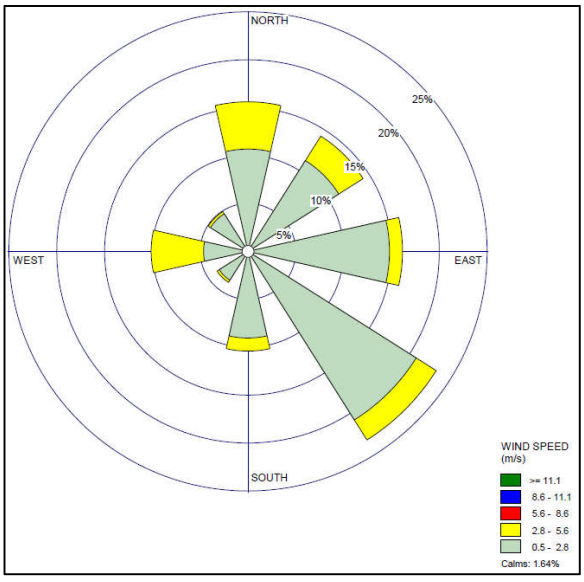
Review of the wind fields around the surrounding topography show that the wind direction and strength can vary significantly across the modelling domain. Overall, the observed variations between predicted and observed meteorology in the area is not expected to significantly impact on dispersion of emissions. In the absence of site-specific monitoring data, the predicted meteorology is considered suitable for the purposes of the assessment. It is also noted that the apparent over-prediction of light winds is expected to result in a more conservative assessment of potential impacts.



Annual

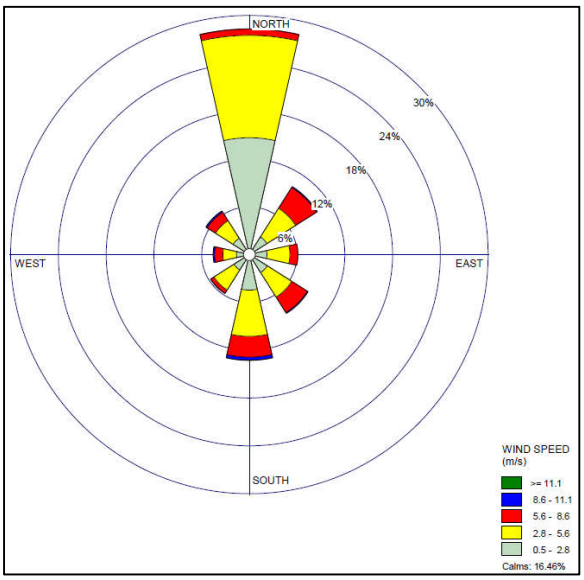


09:00 hours

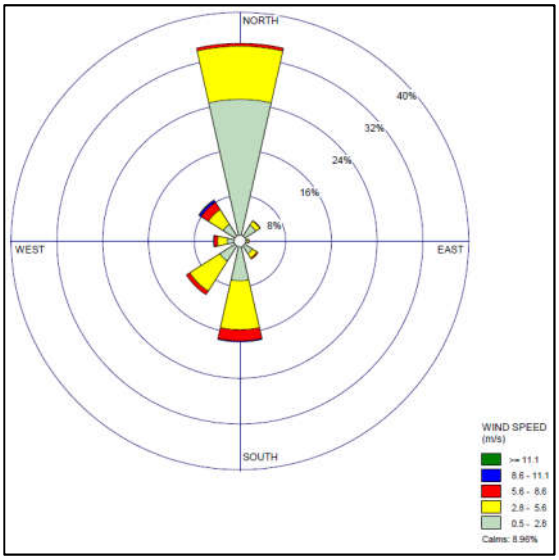


15:00 hours

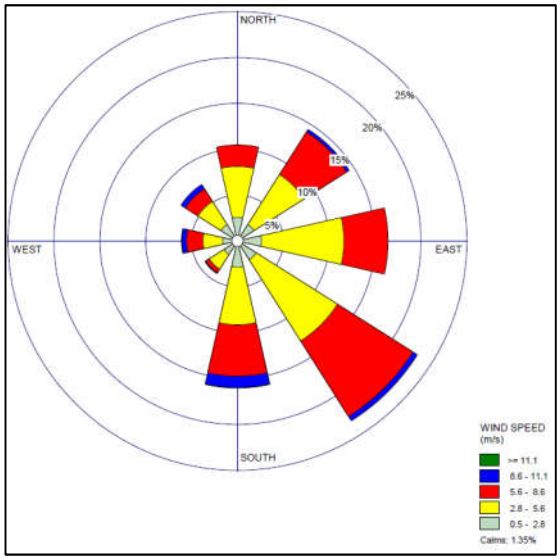
Figure 3: Predicted wind rose for Subject Site (2016)



Annual



09:00 hours



15:00 hours

Figure 4: 9 am and 3 pm wind roses for Lismore Airport 2012 - 2016 (Bureau of Meteorology)

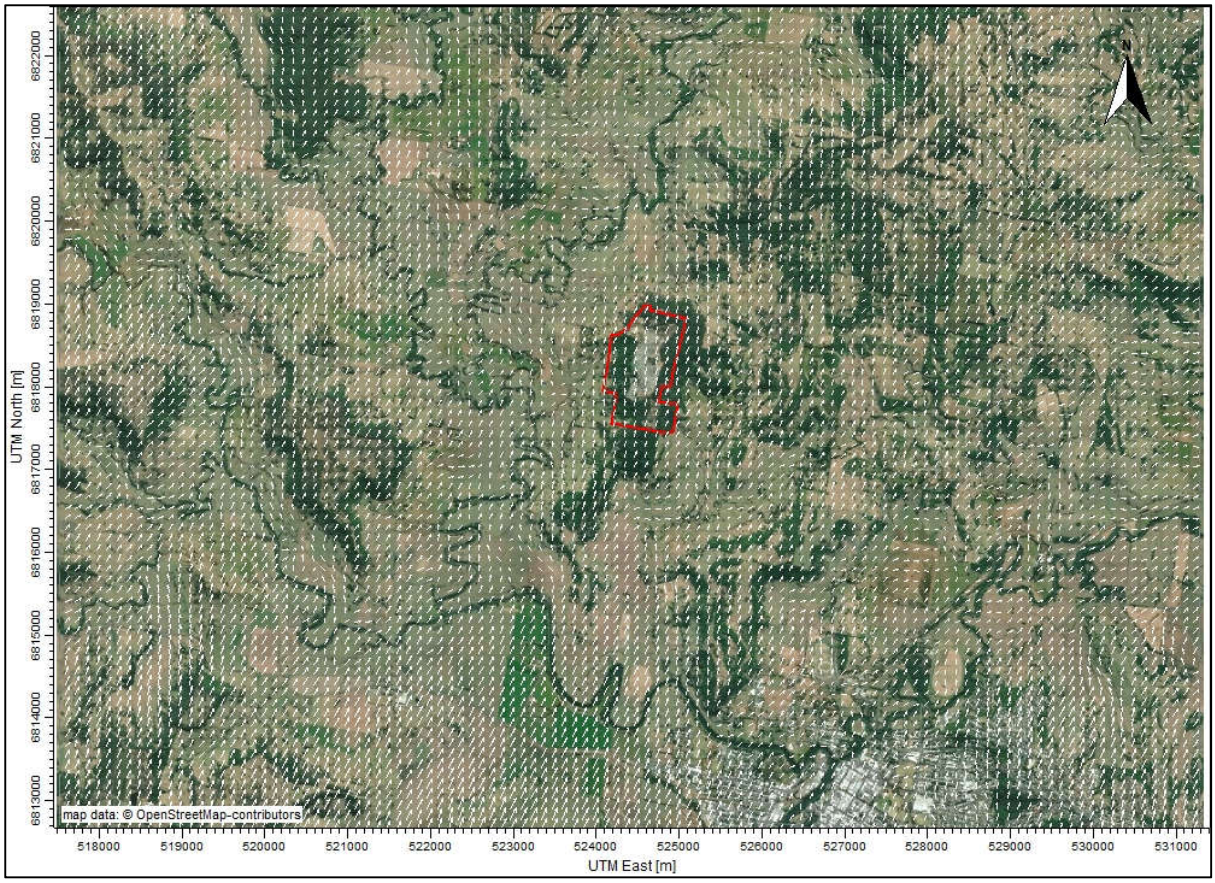


Figure 5: Example CALMET Wind Fields Around Topography

4.4.2 Predicted Atmospheric Stability

The amount of turbulence in the ambient air has a major effect upon the rise and dispersion of emissions. In particular, the amount of turbulence in the atmosphere plays a key role in diffusion of an emitted plume in the air with stronger turbulence (increased instability) increasing the rate of diffusion. Where the atmosphere exhibits weak turbulence (increased stability), downwind contaminant concentrations can be expected to increase due to the limited diffusion.

Figure 6 presents the diurnal variability in atmospheric stability identified in the predicted meteorological dataset. As can be seen, atmospheric instability increased during the day where the influence of the solar energy drives convection in the atmosphere. Conversely, increased stability can be seen during night periods where stable conditions are predicted for more than 90 % of the time.

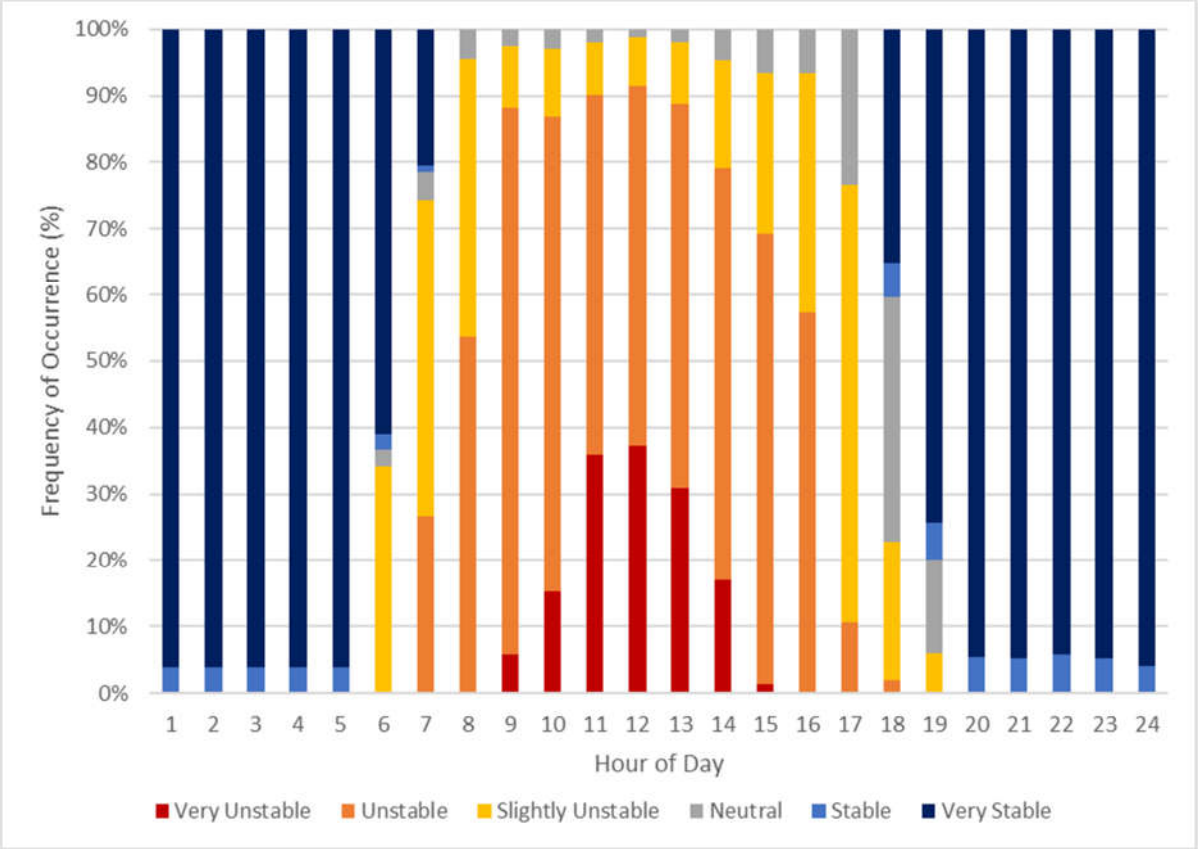


Figure 6: Annual Distribution of Diurnal Atmospheric Stability Variability

4.4.3 Monin-Obukhov Length

The Monin-Obukhov Length represents a parameter (with dimension of length) which provides a relationship between parameters characterising dynamic, thermal, and buoyant processes. The parameter, first described by Obukhov in 1946, is the characteristic height scale of the dynamic sub-layer of the atmosphere and is positive for stable stratifications and negative for unstable stratifications.

Figure 7 below presents a graphical representation of the reciprocal of the Monin-Obukhov length (1/L) for the 2016 prognostic (CALMET) dataset. In this figure, neutral stability conditions have the 1/L value of zero (0), stable conditions have positive values of 1/L and unstable conditions have negative values of 1/L. The more positive 1/L value, the more stable the atmosphere is assumed to be by the model. Similarly, the more negative 1/L becomes, the more unstable the atmosphere is assumed to be by the model.

4.4.4 Predicted Atmospheric Mixing Height

Figure 8 presents an illustration of diurnal variations in maximum and average mixing heights predicted by CALMET at the Development Site across the 2016 prognostic meteorological dataset. As expected, an increase in mixing height during the morning is apparent, arising due to the onset of vertical mixing following sunrise. Maximum mixing heights occur in the mid to late afternoon, due to the dissipation of ground-based temperature inversions and growth of the convective mixing layer.

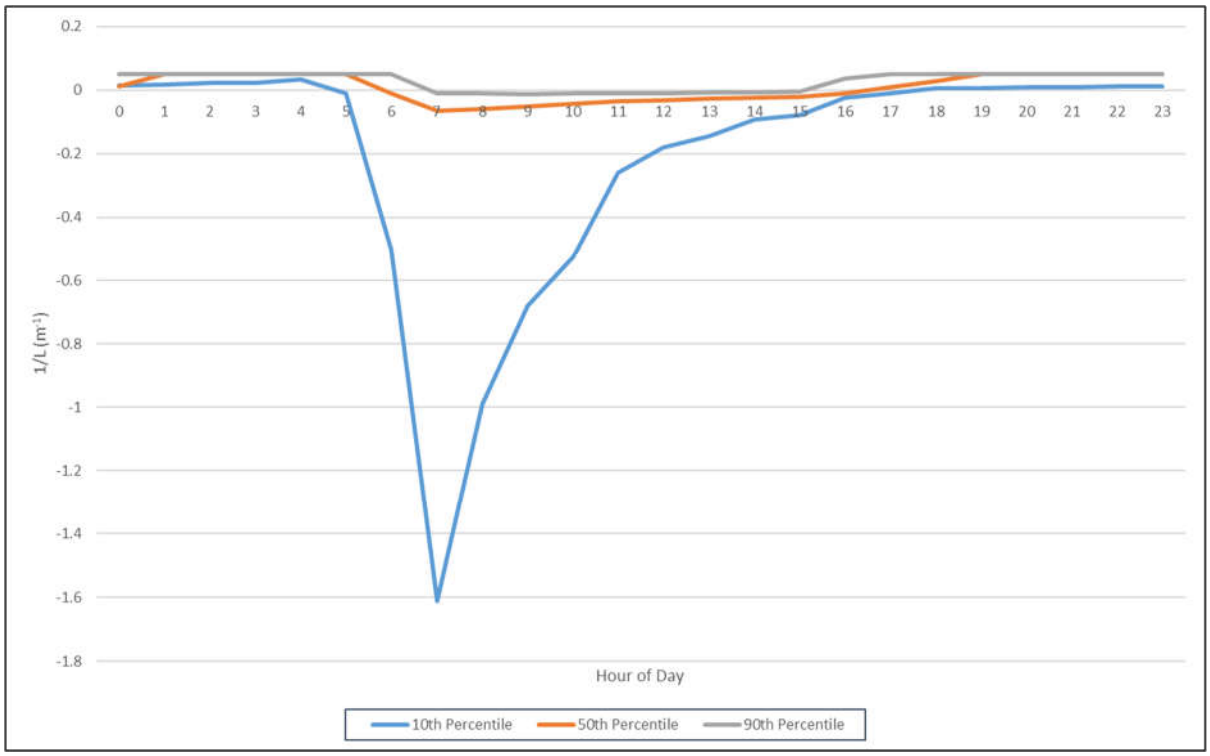


Figure 7: Annual Variability of Monin-Obukhov Length by Hour

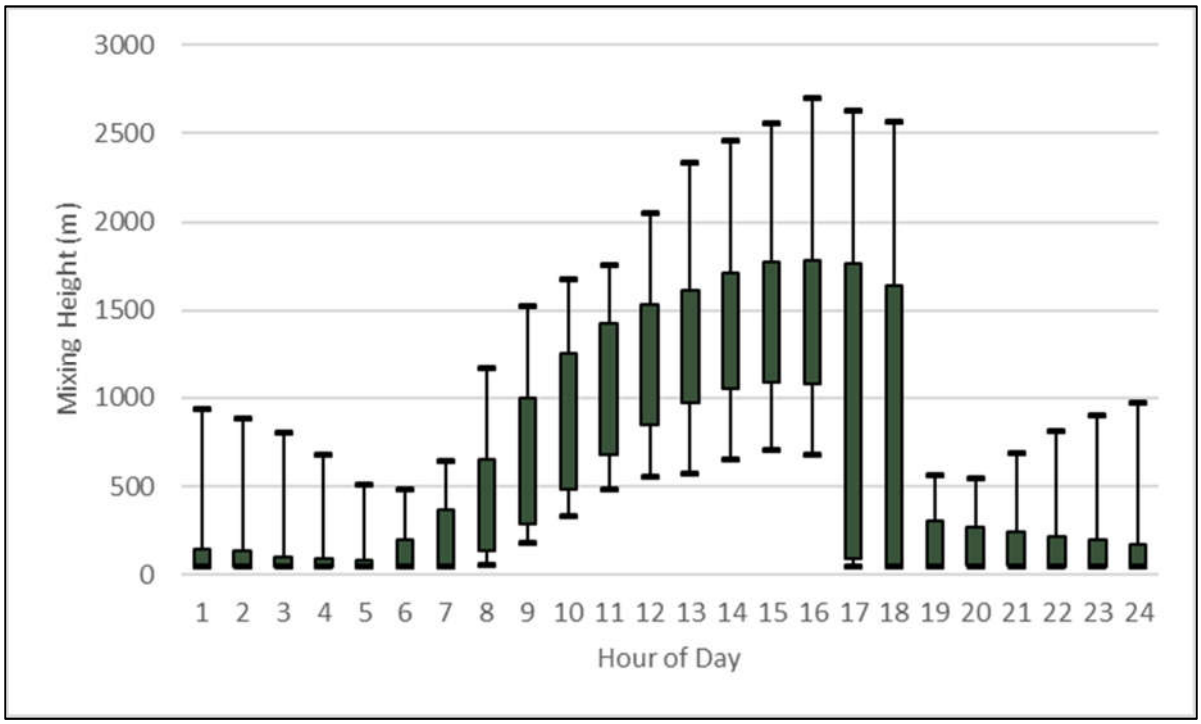


Figure 8: Atmospheric Mixing Height by Hour

5 AIR DISPERSION MODELLING

5.1 Introduction

5.1.1 CALPUFF Dispersion Modelling

The CALPUFF modelling system treats emissions as a series of puffs. These puffs are then dispersed throughout the modelling area and allowed to grow and bend with spatial variations in meteorology. In doing so, the model is able to retain a memory of the plume's movement throughout a single hour and from one hour to the next while continuing to better approximate the effects of complex air flows.

CALPUFF utilises the meteorological processing and prediction model CALMET to provide three-dimensional wind field predictions for the area of interest. The final wind field developed by the model (for consideration by CALPUFF) includes an approximation of the effects of local topography, the effects of varying surface temperatures (as is observed in land and sea bodies) and surface roughness (resulting from varied land uses and vegetation cover in an area). The CALPUFF model is able to resolve complex terrain influences on local wind fields including consideration of katabatic flows and terrain blocking.

5.1.2 CALPOST

Post processing of modelled emissions is undertaken using the CALPOST package. This allows the rigorous analysis of pollutant predictions generated by the CALPUFF system. In particular, CALPOST is able to provide an analysis of predicted pollutant concentrations for a range of averaging periods from 1 hour to 1 year. For the purposes of this assessment, predicted pollutant concentrations have been analysed to provide 24-hour, monthly and annual average concentrations at every gridded receptor across the modelling domain.

5.2 Background Concentrations

To assess cumulative impacts, daily background air quality data has been obtained from the Office of Environment & Heritage (OEH) website for 2016.

The nearest and most representative monitoring stations have been used for this assessment. Due to the remote location of the Subject Site, the nearest representative monitoring stations are Tamworth and Wyong.

Table 9 details the background monitoring data used in the contemporaneous modelling. It should be noted that where data gaps were identified, the 70th percentile of the daily data was applied. It is noted that no exceedences of pollutants were recorded for the year of assessment[c].

[c] According to information provided in the Annual Air Quality Statement 2016 (OEH, 2017)

Review of the hourly monitoring data determines that the existing air quality concentrations comply with the criteria listed in Table 6.

Ambient monitoring of TSP is undertaken at Armidale as part of the Regional Air Monitoring Network, however data is not readily available. In lieu of this, research indicates that in rural areas, PM_{10} typically represents 49% of total TSP, therefore, TSP concentrations have been estimated based on the application of this ratio[d].

Since 2012, dust deposition monitoring has been undertaken at three (3) locations as presented in Figure 9. Table 8 presents an annual summary of the dust deposition results and the number of months where the deposition exceeded 4 g/m^2/month for insoluble matter. However, it should be noted that compliance of dust deposition from the quarry is measured by ash content not insoluble matter (as detailed in Table 8.4 of the 'Blakebrook Quarry Air Quality Management Plan' as approved by the NSW DPE).

Full monthly insoluble and ash results and observations are provided in Appendix B. for the purposes of this assessment, a background dust deposition of 1.5 g/m^2/month as insoluble matter has been used in accordance with the Approved Methods.

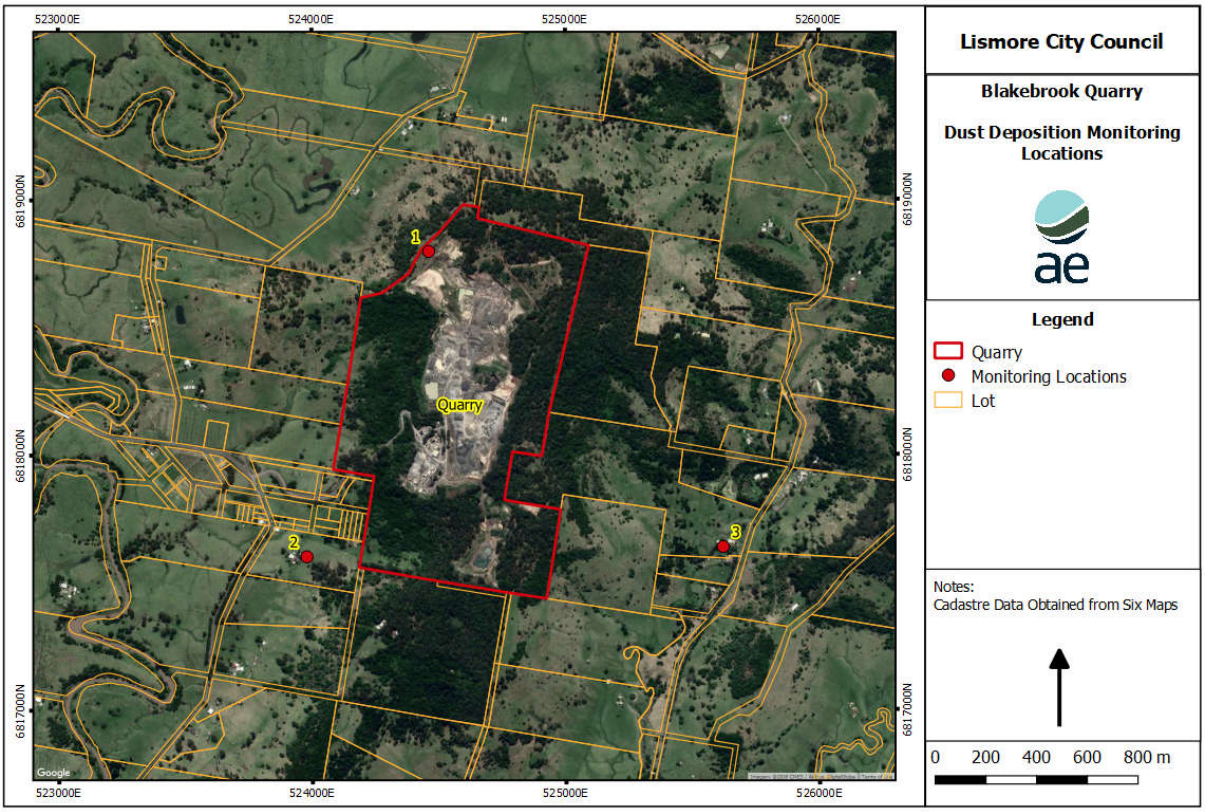


Figure 9: Dust Deposition Monitoring Locations

[d] Air Noise Environment Pty Ltd (1999) 'Fine dust and the implications for the coal industry', ACARP Project C7009.

Table 8: Historic Annual Average Dust Deposition Results (Insoluble Solids)

Year	Description	Monitoring Location		
		1	2	3
2012	g/m²/month	0.79	0.72	0.98
	No. of Exceedences	0	0	0
2013	g/m²/month	1.25	1.13	1.05
	No. of Exceedences	0	0	0
2014	g/m²/month	0.90	2.17	0.97
	No. of Exceedences	0	1	0
2015	g/m²/month	0.76	2.53	1.35
	No. of Exceedences	0	3	2
2016	g/m²/month	0.74	2.16	2.28
	No. of Exceedences	0	2	1
2017	g/m²/month	0.89	2.03	2.91
	No. of Exceedences	0	1	3
2018 a)	g/m²/month	1.51	1.70	3.19
	No. of Exceedences	0	1	3
Overall Average	**g/m²/month**	**0.53**	**1.50**	**1.44**

Table 9: Background Concentrations

Compound	Missing Data (%)	24-Hour Concentration (µg/m³)				OEH Station
		Maximum	90th Percentile	70th Percentile	Average	
PM_{10}	2%	34.1	21.5	15.6	13.2	Tamworth
$PM_{2.5}$	14%	15.0	9.6	7.6	6.4	
CO	6%	1000	250	125	149	Wyong
NO_2	7%	94.3	22.6	12.3	9.6	
SO_2	6%	91.5	2.9	0.0	1.5	

5.3 Sources of Emissions – Asphalt Plant

Emissions to air from a mobile asphalt plant vary dependent on the production rate, asphalt blend being produced, mix temperature and binder type. To provide an estimate of likely emissions from the asphalt plant, reference has been made to the results of monitoring of emissions from an existing mobile plant undertaken by AE.

It should be noted that both odour and PM_{10} have not been monitored at this site. Hence, for these contaminants, reference is made to other monitoring data held by AE for permanent asphalt plants of similar design.

Based on the available monitoring data held by AE, the highest emission rate for each pollutant has been used for this assessment as listed below.

Table 10: Emission Data for Asphalt Plant

Parameter	Assumed Value
Production	300 tph
Velocity [a)]	8.0 m/s
Exhaust Temperature	70 degrees Celsius
TSP [b)]	0.7 g/s
PM_{10} [b)]	0.7 g/s
NO_X as NO_2	2.7 g/s
CO	2.3 g/s
SO_2	0.02 g/s
Odour [c)]	6000 OU/s

a) TSP and PM_{10}: 0.7 g/sec based on typical design specification of 50 mg/m^3 from the baghouse.

b) Odour: 6,000 OU/sec based on the highest odour concentration measured at Boral asphalt facilities during production using RAP as feed material[e].

The emissions rates for a drum mix plant have been calculated in accordance with USEPA AP42 Chapter 11.1 Hot Mix Asphalt Plants. The calculated emission rates based on 300 t/hour drum plant are lower than the measured emission rates presented in Table 10. Therefore, the emission rates in Table 10 have been modelled.

5.4 Sources of Emissions – Quarry

Emissions to atmosphere from the Project can be categorised into the following activities:

- Drilling and blasting;
- Material Transfers;
- Screening and crushing;
- Vehicle Movements;
- Wind Erosion (stockpiles and exposed areas).

Table 11 presents a summary of the equipment for each modelling scenario and their location within the quarry.

Table 11: Equipment Details - Quarry

[e] Beyers, C and Clifton, M. (2017). "*Land Use Planning and the Impacts of Odour Emissions from Waste Recycling in Asphalt Production*". 17th AAPA International Flexible Pavements Conference 2017, Melbourne.

Source	Qty	Location	Existing	Future
Excavator	2	Pit	✓	✓
Front End Loader	2	Quarry	✓	✓
Mobile jaw crusher	2	Pit	✓	✓
Haulage Trucks	1	Quarry	✓	✓
Crushing Plant & Screens	1	Pit	✓	✓
Conveyors	9	Pit	✓	✓
Heavy Vehicles		Haul road	100/day	150/day

Emissions estimates for the above activities have been derived based on the following methodologies:

- National Pollution Inventory (NPI) Manual for Mining (Commonwealth of Australia, 2012); and
- USEPA AP-42: Compilation of Air Emission Factors (US Environmental Protection Agency, Various Dates).

Emission factors within these documents are used to estimate emissions of TSP, PM_{10} and $PM_{2.5}$ to the air from various sources. Emission factors relate the quantity of a substance emitted from a source to some measure of activity associated with the source.

Emission factors are used to estimate a facility's emissions by the general equation:

$$E_{i\,(kg/yr)} = \left[A_{(t/h)} \times OP_{(h/yr)} \right] \times EF_{i\,l(kg/t)} \times \left[1 - \frac{CE_i}{100} \right]$$

Where:

- E_i (kg/yr) = Emission rate of pollutant
- A (t/h) = Activity rate
- OP (h/yr) = operating hours
- EF_i l(kg/t) = uncontrolled emission factor of pollutant
- CE_i = overall control efficiency for pollutant

The equations, activity rates and control measures are presented in Appendix B. A summary of annual emission rates based on the maximum hourly plant throughout (for the existing and future operations) modelled for all operational hours are presented in Table 12.

Table 12: Summary of Emission Rates

Activity	Units	Existing Operations		
		TSP	PM_{10}	$PM_{2.5}$
Drilling	t/yr	42.3	22.0	1.3
Blasting	t/yr	4.0	2.1	0.1
Material Transfers	t/yr	4.4	2.1	0.3
Screening	t/yr	36.7	12.6	0.9

Activity	Units	Existing Operations		
		TSP	PM_{10}	$PM_{2.5}$
Crushing	t/yr	1.8	0.8	0.01
Vehicle Movements	t/yr	197.9	60.2	5.8
Wind Erosion	t/yr	0.004	0.002	0.0002
	Total	**287.1**	**99.8**	**8.4**

6 PREDICTED GROUND LEVEL CONCENTRATIONS

6.1 Overview

In accordance with the Approved Methods, the individual dispersion model predictions for each receptor is added to the corresponding measured background concentration. In doing so, the tables presented in this Section show the highest predicted cumulative (source contribution plus existing background) receptor concentrations along with the highest predicted source contribution concentrations (for the Project) and the corresponding predicted date of occurrence. The maximum ground level cumulative concentration contours (isopleths) are presented in Appendix D.

6.2 Particulate Matter PM_{10}

Table 13 presents the maximum predicted 24-hour average cumulative (source plus background) PM_{10} receptor concentrations at each of the identified sensitive receptors and the maximum concentrations across the modelling domain. Appendix D presents the maximum ground level cumulative concentration contours (isopleths). Review of the maximum predicted concentration contours confirms that compliance with the 50 µg/m^3 criterion is predicted to be achieved for the all sensitive receptors. The maximum concentration is within the Subject Site boundary. It is noted that there are no sensitive uses existing or proposed at or near the boundary of the quarry. As such, the predicted exceedance at the plant boundary is not considered significant.

Table 13: Maximum Predicted 24-Hour Average Cumulative PM_{10} Concentrations (µg/m^3)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations			
	Date	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	16/04/2016	0.5	33.0	33.4
R2	16/04/2016	1.1	33.0	34.1
R3	16/04/2016	0.5	33.0	33.5
R4	16/04/2016	0.5	33.0	33.5
R5	16/04/2016	0.5	33.0	33.5
R6	16/04/2016	0.5	33.0	33.5
R7	16/04/2016	0.5	33.0	33.5
Maximum [a)]	16/04/2016	102.1	33.0	135.1
		Air Quality Objective		***50***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 14 presents the predicted annual average cumulative PM_{10} concentrations across the modelling domain. The results of the modelling presented confirm that the predicted concentrations are significantly below the 25 µg/m^3 criteria. The maximum concentration is within the Subject Site boundary.

It is noted that as there are no sensitive receptors near the Subject Site boundary (and therefore no risk of exposure), exceedences is considered immaterial.

Table 14: Predicted Annual Average Cumulative PM_{10} Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.8	13.1	13.9
R2	0.7	13.1	13.8
R3	0.5	13.1	13.6
R4	0.8	13.1	13.9
R5	0.7	13.1	13.8
R6	0.6	13.1	13.7
R7	1.3	13.1	14.3
Maximum [a)]	50.9	13.1	64.0
	Air Quality Objective		***25***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 15 presents maximum predicted source contribution PM_{10} receptor concentrations at each of the identified sensitive receptors and the maximum concentrations across the modelling domain. Also presented in this table is the coincident background concentration and predicted cumulative receptor concentration for the same period. The results of the modelling confirm that emissions from the Subject Site are predicted to result in maximum off-site PM_{10} receptor concentrations of 49% of the relative criterion specified in the Approved Methods.

Table 15: Maximum Predicted 24-Hour Average Source Contribution PM_{10} Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	3.1	21.3	24.5
R2	2.4	14.8	17.2
R3	1.3	12.2	13.5
R4	2.0	18.3	20.2
R5	3.3	13.7	17.0
R6	1.9	5.6	7.5
R7	9.2	5.6	14.8
Maximum [a)]	126.9	8.4	135.3

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
	Air Quality Objective		***50***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

6.3 Particulate Matter $PM_{2.5}$

Table 16 presents the maximum predicted 24-hour average cumulative (source plus background) $PM_{2.5}$ receptor concentrations at each of the identified sensitive receptors and the maximum concentrations across the modelling domain. Appendix D presents the maximum ground level cumulative concentration contours (isopleths). Review of the maximum predicted concentration contours confirms that compliance with the 25 µg/m^3 criterion is predicted to be achieved for the all sensitive receptors.

Table 17 presents the predicted annual average cumulative $PM_{2.5}$ concentrations across the modelling domain. The results of the modelling presented confirm that the predicted concentrations are below the 8 µg/m^3 criteria for the sensitive receptors. As noted previously, exceedences of the $PM_{2.5}$ limits are predicted at the Subject Site, however, in the absence of any existing or future sensitive uses in this area, are considered immaterial.

Table 16: Maximum Predicted 24-Hour Average Cumulative $PM_{2.5}$ Concentrations (µg/m^3)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations			
	Date	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	21/5/16	0.7	15.0	15.8
R2	21/5/16	0.9	15.0	15.9
R3	21/5/16	0.8	15.0	15.8
R4	21/5/16	1.1	15.0	16.1
R5	21/5/16	0.7	15.0	15.8
R6	21/5/16	0.7	15.0	15.8
R7	21/5/16	0.7	15.0	15.8
Maximum	21/5/16	71.1	15.0	86.2
		Air Quality Objective		**25**

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 17: Predicted Cumulative Annual Average $PM_{2.5}$ Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.2	7.2	7.4
R2	0.1	7.2	7.3
R3	0.1	7.2	7.3
R4	0.1	7.2	7.3
R5	0.1	7.2	7.3
R6	0.1	7.2	7.3
R7	0.3	7.2	7.5
Maximum [a)]	12.2	7.2	19.4
	Air Quality Objective		***8***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 18 presents maximum predicted source contribution $PM_{2.5}$ receptor concentrations at each of the identified sensitive receptors and the maximum concentrations across the modelling domain. Also presented in this table is the coincident background concentration and predicted cumulative receptor concentration for the same period. The results of the modelling confirm that emissions from the Subject Site are predicted to result in maximum concentrations of $PM_{2.5}$ concentrations at sensitive receptors of <20% of the relative criterion specified in the Approved Methods.

Table 18: Maximum Predicted 24-Hour Average Source Contribution $PM_{2.5}$ Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	1.5	7.5	9.0
R2	1.1	8.2	9.3
R3	0.5	7.7	8.2
R4	0.7	5.2	5.9
R5	0.6	5.0	5.7
R6	0.8	3.8	4.5
R7	3.5	6.4	9.8
Maximum [a)]	80.8	5.2	86.0
	Air Quality Objective		***25***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

6.4 Total Suspended Particles

Table 19 presents maximum predicted source contribution TSP concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. Also presented in this table is the coincident background concentration and predicted cumulative receptor concentration for the same period.

The results of the modelling confirm that emissions from the Subject Site are predicted to result in maximum concentrations of TSP concentrations at sensitive receptors of less than 35% of the relative criterion specified in the Approved Methods.

Table 19: Predicted Cumulative Annual Average TSP Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.3	27.5	27.8
R2	0.2	27.5	27.7
R3	0.0	27.5	27.5
R4	0.3	27.5	27.8
R5	0.1	27.5	27.6
R6	0.1	27.5	27.6
R7	0.4	27.5	27.9
Maximum [a)]	109.1	27.5	136.6
	Air Quality Objective		***90***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

6.5 Dust Deposition

Table 20 presents maximum predicted source contribution dust deposition concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. No background values for dust deposition have been applied as discussed in Section 5.2.

The results of the modelling confirm that emissions from the Subject Site are predicted to result in maximum dust deposition at sensitive receptors of <10% of the relative criterion specified in the Approved Methods.

Table 20: Predicted Cumulative Annual Average Dust Deposition (g/m²/month)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.13	-	0.13
R2	0.08	-	0.08

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R3	0.01	-	0.01
R4	0.11	-	0.11
R5	0.04	-	0.04
R6	0.05	-	0.05
R7	0.15		0.15
Maximum [a)]	0.13	-	0.13
Air Quality Objective			2

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

6.6 Nitrogen Dioxide (NO_2)

Table 21 presents the maximum predicted 1-hour average cumulative (source plus background) NO_2 receptor concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. Appendix D presents the maximum ground level cumulative concentration contours (isopleths).

Review of the maximum predicted concentration contours confirms that compliance with the 246 µg/m^3 criterion is predicted to be achieved for the all sensitive receptors.

Table 21: Maximum Predicted 1-Hour Average Cumulative NO_2 Concentrations (µg/m^3)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations			
	Date	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	13/6/16	0.0	94.3	94.3
R2	13/6/16	1.2	94.3	95.5
R3	13/6/16	0.0	94.3	94.3
R4	13/6/16	0.0	94.3	94.3
R5	13/6/16	0.0	94.3	94.3
R6	13/6/16	0.0	94.3	94.3
R7	2/9/16	78.5	36.9	115.4
Maximum [a)]	13/6/16	990.4	36.9	1027.3
Air Quality Objective				***246***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 22 presents the predicted annual average cumulative NO_2 concentrations across the modelling domain. The results of the modelling presented confirm that the predicted concentrations are significantly below the 62 µg/m^3 criteria.

Table 22: Predicted Annual Average Cumulative NO_2 Concentrations (µg/m^3)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.3	9.8	10.2
R2	0.4	9.8	10.0
R3	0.2	9.8	9.9
R4	0.4	9.8	10.0
R5	0.3	9.8	9.9
R6	0.3	9.8	9.9
R7	0.6	9.8	10.3
Maximum [a)]	22.7	9.8	32.3
	Air Quality Objective		***62***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 23 presents maximum predicted source contribution NO_2 receptor concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. Also presented in this table is the coincident background concentration and predicted cumulative receptor concentration for the same period.

The results of the modelling confirm that emissions from the cumulative operations are predicted to result in maximum off-site NO_2 concentrations of less than 50% of the relative criterion specified in the Approved Methods.

Table 23: Maximum Predicted 1-Hour Average Source Contribution NO_2 Concentrations (µg/m^3)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	21.2	16.4	37.6
R2	27.5	10.3	37.8
R3	8.4	4.1	12.5
R4	13.0	24.6	37.6
R5	12.5	6.2	18.6
R6	12.3	14.4	26.6

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R7	78.5	26.7	105.2
Maximum [a)]	1,017.0	18.5	1,035.5
	Air Quality Objective		***246***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

6.7 Sulphur Dioxide (SO_2)

Table 24 presents the maximum predicted 1-hour average cumulative (source plus background) SO_2 receptor concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. Appendix D presents the maximum ground level cumulative concentration contours (isopleths). Review of the maximum predicted concentration contours confirms that compliance with the 570 µg/m^3 criterion is predicted to be achieved for the all receptors.

Table 24: Maximum Predicted 1-Hour Average Cumulative SO_2 Concentrations (µg/m^3)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations			
	Date	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	13/1/16	0.0	91.5	91.5
R2	13/1/16	0.0	91.5	91.5
R3	13/1/16	0.0	91.5	91.5
R4	13/1/16	0.0	91.5	91.5
R5	13/1/16	0.0	91.5	91.5
R6	13/1/16	0.0	91.5	91.5
R7	13/1/16	0.0	91.5	91.5
Maximum [a)]	13/1/16	0.0	91.5	91.5
		Air Quality Objective		**570**

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 25 presents the maximum predicted 24-hour average cumulative (source plus background) SO_2 receptor concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. Appendix D presents the maximum ground level cumulative concentration contours (isopleths). Review of the maximum predicted concentration contours confirms that compliance with the 228 µg/m^3 criterion is predicted to be achieved for the all receptors.

Table 25: Maximum Predicted 24-Hour Average Cumulative SO_2 Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations			
	Date	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	8/12/16	11.6	0.01	11.6
R2	8/12/16	11.6	0.00	11.6
R3	8/12/16	11.6	0.00	11.6
R4	8/12/16	11.6	0.00	11.6
R5	8/12/16	11.6	0.00	11.6
R6	8/12/16	11.6	0.00	11.6
R7	8/12/16	11.6	0.01	11.6
Maximum [a)]	8/12/16	11.6	0.68	12.2
		Air Quality Objective		**228**

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 26 presents the predicted annual average cumulative SO_2 concentrations across the modelling domain. The results of the modelling presented confirm that the predicted concentrations are below the 60 µg/m³ criteria for all sensitive receptors.

Table 26: Predicted Cumulative Annual Average SO_2 Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.005	1.5	1.5
R2	0.003	1.5	1.5
R3	0.001	1.5	1.5
R4	0.003	1.5	1.5
R5	0.001	1.5	1.5
R6	0.002	1.5	1.5
R7	0.006	1.5	1.5
Maximum [a)]	0.3	1.5	1.8
	Air Quality Objective		***60***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 27 presents maximum predicted source contribution SO_2 receptor concentrations at each of the identified sensitive receptors and the maximum across the modelling domain.

Also presented in this table is the coincident background concentration and predicted cumulative receptor concentration for the same period.

The results of the modelling confirm that emissions from the cumulative operations are predicted to result in maximum concentrations of SO_2 concentrations at sensitive receptors of less than 2% of the relative criterion specified in the Approved Methods.

Table 27: Maximum Predicted 1-Hour Average Source Contribution SO_2 Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.3	0.0	0.3
R2	0.4	5.7	6.1
R3	0.1	0.0	0.1
R4	0.2	0.0	0.2
R5	0.2	2.9	3.0
R6	0.2	0.0	0.2
R7	1.1	5.7	6.8
Maximum [a)]	15.1	0.0	15.1
	Air Quality Objective		***570***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

Table 28 presents maximum predicted source contribution SO_2 receptor concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. Also presented in this table is the coincident background concentration and predicted cumulative receptor concentration for the same period.

The results of the modelling confirm that emissions from the cumulative operations are predicted to result in maximum concentrations of SO_2 concentrations at sensitive receptors of less than 2% of the relative criterion specified in the Approved Methods.

Table 28: Maximum Predicted 24-Hour Average Source Contribution SO_2 Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.04	1.0	1.0
R2	0.03	1.4	1.4
R3	0.01	0.0	0.0
R4	0.02	0.0	0.0

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R5	0.01	0.0	0.0
R6	0.02	0.0	0.0
R7	0.08	6.0	6.1
Maximum [a)]	2.26	0.5	2.8
	Air Quality Objective		***228***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

6.8 Carbon Monoxide (CO)

Table 29 presents maximum predicted source contribution CO concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. Also presented in this table is the coincident background concentration and predicted cumulative receptor concentration for the same period.

The results of the modelling confirm that emissions from the cumulative operations are predicted to result in maximum concentrations of CO concentrations at sensitive receptors of 5% of the relative criterion specified in the Approved Methods.

Table 29: Predicted Cumulative Annual Average CO Concentrations (µg/m³)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	382.5	149.2	531.7
R2	384.7	149.2	534.0
R3	382.2	149.2	531.4
R4	382.5	149.2	531.7
R5	382.0	149.2	531.3
R6	382.0	149.2	531.3
R7	382.0	149.2	531.3
Maximum [a)]	696.0	149.2	845.2
	Air Quality Objective		***10,000***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

6.9 Odour

Table 30 presents maximum predicted source contribution 1-second, 99th percentile odour concentrations at each of the identified sensitive receptors and the maximum across the modelling domain. Also presented in this table is the coincident background concentration and predicted cumulative receptor concentration for the same period.

The results of the modelling confirm that emissions from the cumulative operations are predicted to result in maximum concentrations of odour concentrations at sensitive receptors of <1% of the relative criterion specified in the Approved Methods.

Table 30: Predicted 1-seocnd, 99th percentile Odour Concentrations (OU)

Receptor	Maximum Predicted Cumulative (Source plus Background) Receptor Concentrations		
	Source Contribution (A)	Existing Background (B)	Cumulative (A + B)
R1	0.051	-	0.051
R2	0.028	-	0.028
R3	0.006	-	0.006
R4	0.028	-	0.028
R5	0.017	-	0.017
R6	0.022	-	0.022
R7	0.062	-	0.062
Maximum [a)]	3.38	-	3.38
	Air Quality Objective		***5.5***

a) Maximum predicted concentration across the whole modelling domain including the Subject Site

7 CONCLUSIONS AND RECOMMENDATIONS

Lismore Council propose to upgrade the asphalt plant (the **Project**) to a Benninghoven permanent mobile asphalt plant with annual production of up to 50,000 tonnes per annum. As part of this upgrade, the facility is also seeking to increase the permitted truck movements from the site to enable the operators to effectively manage daily product demand in the region. In order to confirm the suitability of air quality at the closest residential receptors, an air quality impact assessment has been undertaken.

Air dispersion modelling (which includes contemporaneous background concentrations) has been undertaken using the CALMET/CALPUFF modelling system for the proposed upgrade of quarry operations to assess the potential impacts of particulate and gaseous emissions upon nearby receptors.

The results of the air modelling indicate compliance with the all air quality objectives is predicted to be achieved for all relevant averaging periods at the nearest sensitive receptors to the quarry upgrade.

Overall, based on the results of the predictive dispersion modelling, the risk of adverse impacts of the proposed upgrade of the quarry is considered to be low.

8 REFERENCES

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APPENDIX A: GLOSSARY OF TERMS

Conversion of ppm to mg/m^3	Where R is the ideal gas constant; T, the temperature in kelvin (273.16 + T°C); and P, the pressure in mm Hg, the conversion is as follows: $\mu g\ m^{-3}$ = (P/RT) x Molecular weight x (concentration in ppm) $= \frac{P \times \text{Molecular weight} \times (\text{concentration in ppm})}{62.4 \times (273.2 + T°C)}$
g/s	Grams per second
mg/m^3	Milligrams (10^{-3}) per cubic metre. Conversions from mg/m^3 to parts per volume concentrations (i.e., ppm) are calculated at 0 °C as required by the SEPP(AQM).
µg/m^3	Micrograms (10^{-6}) per cubic metre. Conversions from µg/m^3 to parts per volume concentrations (i.e., ppb) are calculated at 0 °C.
ppb	Parts per billion.
ppm	Parts per million.
PM_{10}, $PM_{2.5}$, PM_1	Fine particulate matter with an equivalent aerodynamic diameter of less than 10, 2.5 or 1 micrometres respectively. Fine particulates are predominantly sourced from combustion processes. Vehicle emissions are a key source in urban environments.
50th percentile	The value exceeded for 50 % of the time.
NOx	Oxides of nitrogen – a suite of gaseous contaminants that are emitted from road vehicles and other sources. Some of the compounds can react in the atmosphere and, in the presence of other contaminants, convert to different compounds (e.g., NO to NO_2).
VOC	Volatile Organic Compounds. These compounds can be both toxic and odorous.

APPENDIX B: HISTORICAL DUST DEPOSITION MONITORING DATA

Blakebrook Quarry Dust Monitoring 2012

Sample Point	Month	Exposure period	Sample comments	Sampling Days (30 days +/- 2)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of:	
						($g/m^2/mth$) **Limit - 4g/m^2/mth**	($mg/m^2/mth$)	Ash ($g/m^2/mth$) **Limit – 2g/m^2/mth**	Combustible Matter ($g/m^2/mth$)
1	March	20/2/12 to 22/3/12	-	31	3.200	0.53	17.5	-	-
	April	22/3/12 to 20/4/12	-	29	1.440	0.45	14.9	-	-
	May	20/4/12 to 22/5/12	-	32	1.670	0.24	8.1	-	-
	June	22/5/12 to 19/6/12	-	28	3.960	1.55	51.8	-	-
	July	19/6/12 to 18/7/12	-	29	2.700	0.81	26.9	-	-
	August	18/7/12 to 20/8/12	-	33	0.160	0.4	12	0.2	0.2
	September	20/8/12 to 16/9/12	-	27	0.200	0.5	15	0.3	0.2
	October	14/9/12 to 19/10/12	Dark Colour	35	0.030	0.9	29	0.7	0.2
	November	19/10/12 to 29/11/12	-	41	2.720	1.3	45	0.9	0.5
	December	29/11/12 to 9/1/13	-	41	1.190	1.2	41	0.8	0.4
Sample Point One - Monthly Average						0.79	26.12	0.58	0.30
2	March	20/2/12 to 22/3/12	Ants present	31	3.000	1.41	47.1	-	-
	April	22/3/12 to 20/4/12	-	29	1.650	0.08	2.6	-	-
	May	20/4/12 to 22/5/12	-	32	1.130	0.28	9.3	-	-
	June	22/5/12 to 19/6/12	-	28	2.780	1.14	37.9	-	-
	July	19/6/12 to 18/7/12	-	29	2.080	0.87	29.1	-	-
	August	18/7/12 to 20/8/12	-	33	0.060	0.3	9	0.1	0.2
	September	20/8/12 to 16/9/12	-	27	0.200	0.4	15	0.2	0.2
	October	14/9/12 to 19/10/12	Cloudy	35	0.050	0.9	29	0.5	0.3
	November	19/10/12 to 29/11/12	-	41	2.500	0.9	31	0.5	0.4
	December	29/11/12 to 9/1/13	-	41	0.960	0.9	31	0.4	0.5
Sample Point Two - Monthly Average						0.72	24.10	0.34	0.32
3	March	20/2/12 to 22/3/12	Ants present	31	3.400	0.62	20.7	-	-
	April	22/3/12 to 20/4/12	-	29	1.950	1.35	44.9	-	-
	May	20/4/12 to 22/5/12	-	32	1.730	0.35	11.7	-	-
	June	22/5/12 to 19/6/12	-	28	4.100	0.65	21.5	-	-
	July	19/6/12 to 18/7/12	-	29	2.530	0.95	31.7	-	-
	August	18/7/12 to 20/8/12	-	33	0.380	0.5	16	0.3	0.2
	September	20/8/12 to 16/9/12	-	27	0.260	0.8	28	0.5	0.3
	October	14/9/12 to 19/10/12	Flies present	35	0.250	1.9	63	1.1	0.8
	November	19/10/12 to 29/11/12	Ants/ beetles present	41	3.050	1.3	43	0.5	0.8
	December	29/11/12 to 9/1/13	Ants present	41	1.320	1.4	47	0.5	0.9
Sample Point Three - Monthly Average						0.98	32.75	0.58	0.60

Blakebrook Quarry Dust Monitoring 2013

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) **Limit - 4g/m^2/mth**	(mg/m^2/day)	Ash (g/m^2/mth) **Limit – 2g/m^2/mth**	Combustible Matter (g/m^2/mth)
1	9/1/2013 to 4/2/2013	-	26	5.130	0.6	20	0.2	0.4
	4/2/2013 to 18/3/2013	-	42	5.350	0.5	12	0.5	0.0
	18/3/2013 to 24/4/2013	-	37	3.100	0.8	21	0.3	0.4
	24/4/2013 to 23/5/2013	Ants present	29	1.500	0.8	26	0.4	0.4
	23/5/2013 to 27/6/2013	-	35	1.890	0.5	16	0.4	0.1
	27/6/2013 to 30/7/2013	-	33	2.600	0.5	16	0.3	0.6
	26/7/2013 to 30/8/2013	-	35	0.200	0.4	13	0.4	0.1
	30/8/2013 to 1/10/2013	Red dirt present	32	0.450	3.5	110	3.0	0.5
	1/10/2013 to 30/10/2013	Brown colour, org matter present	29	0.590	3.6	123	2.7	0.9
	30/10/2013 to 27/11/2013	Leaves & winged insects present	28	2.880	1.0	36	0.8	0.2
	27/11/2013 to 6/1/2014	Insects present	39	1.560	1.5	38	0.9	0.6
Sample Point One - Monthly Average					1.25	39.18	0.9	0.38
2	9/1/2013 to 4/2/2013	-	26	5.160	0.8	27	0.1	0.7
	4/2/2013 to 18/3/2013	-	42	5.170	1.1	25	0.3	0.8
	18/3/2013 to 24/4/2013	-	37	2.200	0.7	19	0.1	0.5
	24/4/2013 to 23/5/2013	-	29	1.160	0.6	20	0.1	0.5
	23/5/2013 to 27/6/2013	-	35	1.250	0.2	7	0.1	0.1
	27/6/2013 to 30/7/2013	cloudy	33	1.610	0.7	21	0.1	0.6
	26/7/2013 to 30/8/2013	-	35	0.200	0.3	8	0.2	0.1
	30/8/2013 to 1/10/2013	-	32	0.280	0.5	16	0.4	0.1
	1/10/2013 to 30/10/2013	Brown colour	29	0.300	3.2	110	1.4	1.8
	30/10/2013 to 27/11/2013	Beetles & winged insects present	28	3.080	2.4	87	0.9	1.5
	27/11/2013 to 6/1/2014	Cloudy, insects present	39	1.380	1.9	48	0.8	1.1
Sample Point Two - Monthly Average					1.13	35.27	0.41	0.71
3	9/1/2013 to 4/2/2013	-	26	5.200	1.5	50	0.7	0.8
	4/2/2013 to 18/3/2013	Cloudy, yellowish, organic matter	42	5.270	2.3	56	1.7	0.6
	18/3/2013 to 24/4/2013	-	37	2.920	0.7	18	0.4	0.3
	24/4/2013 to 23/5/2013	Dry – 1.00L milliQ added	29	1.000	0.1	4	0.0	0.1
	23/5/2013 to 27/6/2013	-	35	1.640	0.3	8	0.2	0.0
	27/6/2013 to 30/7/2013	-	33	2.450	0.3	10	0.1	0.2
	26/7/2013 to 30/8/2013	-	35	0.200	0.3	8	0.2	0.1
	30/8/2013 to 1/10/2013	-	32	0.370	1.0	31	0.7	0.2
	1/10/2013 to 30/10/2013	-	29	0.500	1.2	42	0.9	0.3
	30/10/2013 to 27/11/2013	Beetles present	28	3.750	0.9	31	0.5	0.3
	27/11/2013 to 6/1/2014	Cloudy, grey colouration, beetles present	39	0.660	2.9	74	1.3	1.6
Sample Point Three - Monthly Average					1.05	30.18	0.61	0.41

Blakebrook Quarry Dust Monitoring Summary 2014

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) **Limit - 4g/m^2/mth**	(mg/m^2/day)	Ash (g/m^2/mth) **Limit – 2g/m^2/mth**	Combustible Matter (g/m^2/mth)
1	6/1/14 – 10/2/14	-	35	1.47	1.2	35	0.9	0.3
	10/2/14 –12/3/2014	Leaves & Dirt present	30	0.910	0.5	15	0.2	0.2
	12/3/2014-11/4/2014	-	30	3.850	1.2	39	0.7	0.5
	11/4/2014-12/5/2014	Some dirt in sample	31	1.310	0.4	14	0.2	0.3
	12/5/2014-12/6/2014	-	31	0.390	0.3	9	0.2	0.0
	12/6/2014-10/7/2014	-	28	0.500	0.3	11	0.1	0.2
	10/7/2014-14/8/2014	-	35	0.480	0.5	14	0.4	0.1
	14/8/2014-10/9/2014	-	27	5.000	1.0	37	0.1	0.8
	10/9/2014-8/10/2014	Bugs & leaves in sample	28	0.200	0.6	23	0.5	0.1
	8/10/2014-7/11/2014	-	30	0.450	1.0	32	0.8	0.1
	7/11/2014-8/12/2014	Leaf matter and dirt present	31	0.900	1.4	45	0.7	0.6
	8/12/2015 – 8/1/2015	Cloudy, beetles in sample	31	2.600	2.4	77	0.7	1.7
Sample Point One - Monthly Average					0.90	29.25	0.46	0.41
2	6/1/14 – 10/2/14	Ants present	35	1.0	1	30	0.7	0.4
	10/2/14 –12/3/2014	Cloudy; yellow in colour	30	0.500	3.8	128	1.8	2.0
	12/3/2014-11/4/2014	Organic matter present & yellowish colour	30	3.660	4.0	135	1.2	2.8
	11/4/2014-12/5/2014	Cloudy, yellow in colour, dirt and insects in sample	31	1.520	2.6	83	0.4	2.2
	12/5/2014-12/6/2014	Cloudy, slightly green	31	0.370	2.4	77	1.5	0.8
	12/6/2014-10/7/2014	-	28	0.520	0.5	18	0.2	0.3
	10/7/2014-14/8/2014	Brown Colour	35	0.450	4.1	116	1.8	2.3
	14/8/2014-10/9/2014	Ants present	27	4.350	0.8	31	0.0	0.8
	10/9/2014-8/10/2014	Bugs in sample	28	0.060	0.3	12	0.2	0.1
	8/10/2014-7/11/2014	-	30	0.300	0.8	27	0.5	0.3
	7/11/2014-8/12/2014	Dark colour, cloudy, bugs	31	0.770	3.3	105	0.7	2.6
	8/12/2014-8/1/2015	Cloudy, beetles in sample	31	2.540	2.4	77	0.6	1.8
Sample Point Two - Monthly Average					2.17	69.92	0.8	1.37
3	6/1/14 – 10/2/14	-	35	0.5	0.4	12	0.2	0.2
	10/2/14 –12/3/2014	Bugs present	30	0.700	1.2	41	0.5	0.7
	12/3/2014-11/4/2014	-	30	3.000	2.5	85	1.0	1.6
	11/4/2014-12/5/2014	Slightly colour, yellow,insects in sample	31	1.350	1.9	62	0.5	1.5
	12/5/2014-12/6/2014	-	31	0.410	0.2	8	0.2	0.1
	12/6/2014-10/7/2014	-	28	0.400	0.2	8	0.1	0.1
	10/7/2014-14/8/2014	-	35	0.400	0.3	8	0.2	0.0
	14/8/2014-10/9/2014	-	27	4.280	1.0	38	0.4	0.6
	10/9/2014-8/10/2014	Bugs in sample	28	0.080	0.3	9	0.2	0.1
	8/10/2014-7/11/2014	-	30	0.080	0.4	13	0.3	0.1
	7/11/2014-8/12/2014	Cloudy, bugs present	31	0.790	2.6	82	1.0	1.5
	8/12/2014-8/1/2015	Clear, some organic matter present	31	2.680	0.6	20	0.4	0.2
Sample Point Three - Monthly Average					0.97	32.17	0.42	0.56

Blakebrook Quarry Dust Monitoring Summary 2015

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) **Limit - 4g/m^2/mth**	(mg/m^2/day)	Ash (g/m^2/mth) **Limit – 2g/m^2/mth**	Combustible Matter (g/m^2/mth)	Soluble Matter (g/m^2/mth)	Total Solids (g/m^2/mth)
1	8/1/2015 – 6/2/2015	-	29	2.420	0.4	1.5	0.3	0.1	1.9	2.3
	6/2/2015 – 9/3/2015	-	31	3.470	0.7	23	0.5	0.3	2.3	3.0
	9/3/2015 - 7/4/2015	-	29	1.090	0.5	16	0.2	0.2	1.1	1.6
	7/4/2015 -6/5/2015	-	29	4.320	1.8	63	0.7	1.2	2.3	4.2
	6/5/2015 – 5/6/2015	-	30	0.380	0.2	8	0.2	0.1	0.7	0.9
	5/6/2015 – 6/7/2015	-	31	1.000	0.6	18	0.1	0.5	1.5	2.1
	6/7/2015- 3/8/2015	-	28	0.570	0.7	24	0.3	0.3	0.7	1.4
	3/8/2015 – 31/8/2015	-	28	0.630	0.2	8	0.2	0.1	0.5	0.7
	31/8/2015 – 28/9/2015	-	28	1.020	0.2	8	0.2	0.0	1.9	2.2
	18/9/2015 – 26/10/2015	-	28	0.200	1.1	38	0.8	0.3	1.0	2.0
	26/10/15 – 23/11/15	-	28	3.100	0.6	22	0.5	0.1	2.5	3.1
	23/11/15 – 21/12/15	-	28	1.630	2.1	77	2.1	0.1	1.7	3.8
2	8/1/2015 – 6/2/2015	Dark, cloudy, bugs in sample	29	1.990	0.5	16	0.5	0.0	11.0	11.4
	6/2/2015-9/3/2015	Cloudy, sediment at bottom	31	3.900	4.2	136	1.2	3.0	6.0	10.2
	9/3/2015 – 7/4/2015	-	29	1.145	1.0	35	0.5	0.5	1.9	2.9
	7/4/2015 -6/5/2015	-	29	5.100	5.8	199	2.4	3.4	8.7	14.4
	6/5/2015 – 5/6/2015	Cloudy	30	0.390	1.4	46	0.3	1.1	5.0	6.4
	5/6/2015 – 6/7/2015	Yellowish colour	31	0.870	2.4	77	0.5	1.9	3.2	5.5
	6/7/2015- 3/8/2015	Cloudy Colour	28	0.860	3.0	107	2.1	0.9	3.3	6.3
	3/8/2015 – 31/8/2015	-	28	0.680	0.4	16	0.3	0.2	0.7	1.2
	31/8/2015 – 28/9/2015	-	28	1.030	0.2	9	0.2	0.0	2.2	2.4
	28/9/2015-26/10/2015	-	28	0.300	1.0	34	0.6	0.3	1.5	2.4
	26/10/15 – 23/11/15	Beatles, brown	28	3.000	7.5	267	3.7	3.7	20.9	28.4
	23/11/15 – 21/12/15	Very cloudy, beatles	28	1.510	3.0	107	0.7	2.3	21.2	24.2
3	8/1/2015 – 6/2/2015	Slightly cloudy, bugs in sample	29	2.000	0.3	11	0.3	0.1	2.4	2.7
	6/2/2015- 9/3/2015	-	31	3.870	1.3	42	0.4	0.9	2.8	4.1
	9/3/2015 – 7/4/2015	-	29	0.960	0.3	9	0.1	0.1	1.3	1.6
	7/4/2015 -6/5/2015	-	29	4.860	0.8	28	0.1	0.7	3.0	3.9
	6/5/2015 – 5/6/2015	-	30	0.330	0.2	6	0.1	0.1	0.8	1.0
	5/6/2015 – 6/7/2015	-	31	0.930	0.3	10	0.1	0.2	1.2	1.5
	6/7/2015- 3/8/2015	-	28	0.540	0.2	7	0.1	0.1	0.5	0.8
	3/8/2015 – 31/8/2015	Cloudy	28	0.520	1.2	44	0.8	0.4	1.2	2.4
	31/8/2015 – 28/9/2015	Brown colour, dirt in sample	28	0.940	0.7	24	0.3	0.4	7.9	8.5
	28/9/2015-26/10/2015	Brown colour	28	0.200	4.1	146	1.5	2.6	7.0	11.1
	26/10/15 – 23/11/15	Beatles, brown	28	2.530	2.1	77	1.4	0.7	20.9	23.1
	23/11/15 – 21/12/15	Cloudy, beatles	28	1.340	4.7	168	0.9	3.8	22.1	26.8

Blakebrook Quarry Dust Monitoring Summary 2016

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/m²/mth)	(mg/m²/day)	Ash (g/m²/mth) **Limit – 4g/m²/mth**	Combustible Matter (g/m²/mth)	Soluble Matter (g/m²/mth)	Total Solids (g/m²/mth)
1	21/12/15 – 18/1/16	Only 50ml sample – 200 ml Milli-Q added	28	0.050	0.4	16	0.2	0.2	1.8	2.3
	18/1/16 – 15/2/16	Organic matter present	28	1.530	1.2	41	0.6	0.5	2.4	3.6
	15/2/16 – 14/3/16	-	29	3.400	0.5	17	0.5	0.0	3.2	3.7
	14/3/16 – 11/4/16	-	28	0.295	1.0	36	0.7	0.3	0.3	1.3
	11/4/16 – 9/5/16	-	28	0.940	1.2	42	0.8	0.4	1.6	2.7
	9/5/16 – 6/6/16	-	28	4.750	1.3	47	0.2	1.1	3.1	4.4
	6/6/16 – 4/7/16	Pine needles/small amount	31	0.950	0.4	12	0.2	0.2	0.9	1.3
	4/7/16 – 1/8/16	-	28	0.330	0.5	17	0.2	0.3	1.4	1.8
	3/8/16 – 1/9/16	-	29	3.470	0.4	15	0.4	0.1	2.2	2.6
	29/8/16 – 26/9/16	-	28	0.630	0.5	19	0.3	0.2	0.6	1.2
	26/9/16 – 24/10/16	Light brown colour	28	0.025	0.4	16	0.3	0.2	0.0	0.4
	24/10/16 – 21/11/16	-	28	0.450	0.6	22	0.3	0.4	1.0	1.7
	21/11/16 – 19/12/16	-	28	0.880	0.6	21	0.3	0.3	1.5	2.1
2	21/12/15 – 18/1/16	-	28	1.050	2.2	78	1.8	0.4	9.3	11.4
	18/1/16 – 15/2/16	Light Brown	28	1.920	1.3	47	1.1	0.2	6.6	7.9
	15/2/16 – 14/3/16	Yellow, slightly cloudy	29	3.440	4.5	154	1.2	3.3	13.3	17.8
	14/3/16 – 11/4/16	Brown / organic matter	28	0.300	2.3	83	0.2	2.2	5.3	7.7
	11/4/16 – 9/5/16	Brown / organic matter present	28	0.670	6.3	1.5	1.5	4.7	9.2	15.5
	9/5/16 – 6/6/16	-	28	4.270	1.1	39	0.1	1.0	3.3	4.4
	6/6/16 – 4/7/16	Cloudy	31	0.720	1.4	46	0.6	0.8	1.6	3.0
	4/7/16 – 1/8/16	Yellowish	28	0.180	0.6	22	0.3	0.3	1.1	1.7
	3/8/16 – 1/9/16	Fine organic matter present/cloudy	29	2.780	1.7	57	0.9	0.8	4.3	6.0
	29/8/16 – 26/9/16	-	28	0.450	0.7	23	0.5	0.1	0.2	0.9
	26/9/16 – 24/10/16	Light brown colour	28	0.015	0.3	12	0.3	0.0	0.0	0.3
	24/10/16 – 21/11/16	Cloudy	28	0.410	3.4	122	1.7	1.7	3.3	6.7
	21/11/16 – 19/12/16	Cloudy	28	0.590	2.3	83	1.1	1.2	2.2	4.5
3	21/12/15 – 18/1/16	-	28	0.216	0.8	29	0.2	0.6	3.2	4.0
	18/1/16 – 15/2/16	Beetles, ants	28	1.150	1.2	42	0.7	0.4	3.3	4.4
	15/2/16 – 14/3/16	-	29	2.900	2.3	79	0.8	1.5	4.2	6.5
	14/3/16 – 11/4/16	Brown / organic matter	28	0.017	1.1	41	0.3	0.9	1.3	2.4
	11/4/16 – 9/5/16	Brown / organic matter present	28	0.850	3.7	131	0.3	3.4	7.8	11.5
	9/5/16 – 6/6/16	Cloudy	28	4.390	2.0	71	0.1	1.9	4.0	6.0
	6/6/16 – 4/7/16	Cloudy	31	0.820	1.1	37	0.6	0.6	1.3	2.4
	4/7/16 – 1/8/16	Cloudy	28	0.200	0.8	30	0.5	0.4	0.7	1.5
	3/8/16 – 1/9/16	Fine organic matter present/cloudy	29	2.880	2.4	82	1.0	1.4	8.9	11.3
	29/8/16 – 26/9/16	Brown	28	0.480	1.9	68	1.0	1.0	6.7	8.6
	26/9/16 – 24/10/16	Dry/0.25L milli-Q added, organic matter present	28	0.250	3.9	140	1.1	2.9	7.5	11.4
	24/10/16 – 21/11/16	Contained dirt	28	0.110	5.9	209	2.1	3.8	7.9	13.7
	21/11/16 – 19/12/16	Very cloudy, brown	28	0.380	2.5	91	1.0	1.5	5.6	8.2

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/m²/mth)	(mg/m²/day)	Ash (g/m²/mth) **Limit – 4g/m²/mth**	Combustible Matter (g/m²/mth)	Soluble Matter (g/m²/mth)	Total Solids (g/m²/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

RESULTS OF DUST MONITORING (Page 1 of 1)

3 dust samples supplied by Lismore City Council on the 16th January, 2018 - Lab Job No. G6539

Exposure Period 18/12/17 - 15/1/18

Analysis requested by Riccardo Martinez.

PO Box 23a LISMORE NSW 2480

Sample Site	EAL Code	Sample Comments	Diameter of Funnel (mm)	Sampling Days (days)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of: Ash	Combustible Matter	Soluble Matter	Total Solids
						(g/m^2/month)	(mg/m^2/day)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)
Method Reference						*a*	*a*	*a*	*a*	*a*	*a*
S18-0010,D1	*G6539/1*	..	150	28	3.400	1.2	41	0.4	0.8	2.0	3.2
S18-0010,D2	*G6539/2*	..	150	28	2.600	0.5	18	0.1	0.4	2.7	3.2
S18-0010,D3	*G6539/3*	yellowish	150	28	2.200	1.2	39	0.7	0.5	4.3	5.5

METHODS REFERENCE

a. Australian Standard AS 3580.10.1.8.2.2-1991(1mm pre-sieving then using Whatman 42 Ashless filter)

NOTES

1. .. No data/ information
2. Total Suspended Solids = Mass deposition rate of insoluble solids
3. Per Month calculations incorporate 'Sampling Days' hence per Month actually refers to number of days sampled.

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checked: .....
Graham Lancaster
Laboratory Manager

RESULTS OF DUST MONITORING (Page 1 of 1)

3 dust samples supplied by Lismore City Council on the 14th February, 2018 - Lab Job No. G7411

Exposure Period 15/01/18 - 12/02/18

Analysis requested by Riccardo Martinez.

PO Box 23a LISMORE NSW 2480

Sample Site	EAL Code	Sample Comments	Diameter of Funnel (mm)	Sampling Days (days)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of: Ash	Combustible Matter	Soluble Matter	Total Solids
						(g/m^2/month)	(mg/m^2/day)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)
Method Reference						*a*	*a*	*a*	*a*	*a*	*a*
S18-0044 D1	*G7411/1*	brown/org. matter	150	28	1.000	4.0	133	1.5	2.5	2.0	6.0
S18-0044 D2	*G7411/2*	cloudy/org. matter	150	28	0.800	1.6	53	0.7	0.8	2.6	4.2
S18-0044 D3	*G7411/3*	cloudy/org. matter	150	28	0.720	3.4	115	1.1	2.3	3.5	7.0

METHODS REFERENCE

a. Australian Standard AS 3580.10.1.8.2.2-1991(1mm pre-sieving then using Whatman 42 Ashless filter)

NOTES

1. .. No data/ information
2. Total Suspended Solids = Mass deposition rate of insoluble solids
3. Per Month calculations incorporate 'Sampling Days' hence per Month actually refers to number of days sampled.

checked: .....
Graham Lancaster
Laboratory Manager

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RESULTS OF DUST MONITORING (Page 1 of 1)

3 dust samples supplied by Lismore City Council on the 14th March, 2018 - Lab Job No. G8364

Exposure Period 12/02/18 - 12/03/18

Analysis requested by Riccardo Martinez.

PO Box 23a LISMORE NSW 2480

Sample Site	EAL Code	Sample Comments	Diameter of Funnel (mm)	Sampling Days (days)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of: Ash	Combustible Matter	Soluble Matter	Total Solids
						(g/m^2/month)	(mg/m^2/day)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)
Method Reference						*a*	*a*	*a*	*a*	*a*	*a*
S18-0082, D1	*G8364/1*	insects/org. matter	150	28	3.510	2.4	79	1.5	0.9	2.5	4.9
S18-0082, D2	*G8364/2*	cloudy/org. matter	150	28	3.270	6.7	223	1.1	5.6	4.1	10.8
S18-0082, D3	*G8364/3*	cloudy/org. matter	150	28	3.190	7.5	249	1.4	6.1	11.1	18.6

METHODS REFERENCE

a. Australian Standard AS 3580.10.1.8.2.2-1991 (1mm pre-sieving then using Whatman 42 Ashless filter)

NOTES

1. .. No data/ information
2. Total Suspended Solids = Mass deposition rate of insoluble solids
3. Per Month calculations incorporate 'Sampling Days' hence per Month actually refers to number of days sampled.

checked: .....
Graham Lancaster
Laboratory Manager

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RESULTS OF DUST MONITORING (Page 1 of 1)

3 dust samples supplied by Lismore City Council on the 11th April, 2018 - Lab Job No. G9246

Exposure Period 12/3/18 - 9/4/18

Analysis requested by Riccardo Martinez.

PO Box 23A LISMORE NSW 2480

Sample Site	EAL Code	Sample Comments	Diameter of Funnel (mm)	Sampling Days (days)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of: Ash	Combustible Matter	Soluble Matter	Total Solids
						(g/m^2/month)	(mg/m^2/day)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)
Method Reference						*a*	*a*	*a*	*a*	*a*	*a*
S18-0104.D1	*G9246/1*	..	150	28	1.420	0.9	31	0.1	0.8	1.6	2.5
S18-0104.D2	*G9246/2*	..	150	28	1.500	0.5	18	0.0	0.5	1.7	2.2
S18-0104.D3	*G9246/3*	green/org. matter	150	28	1.490	4.8	159	0.8	4.0	12.4	17.2

METHODS REFERENCE

a. Australian Standard AS 3580.10.1.8.2.2-1991 (1mm pre-sieving then using Whatman 42 Ashless filter)

NOTES

1. .. No data/ information
2. Total Suspended Solids = Mass deposition rate of insoluble solids
3. Per Month calculations incorporate 'Sampling Days' hence per Month actually refers to number of days sampled.

checked: .....
Graham Lancaster
Laboratory Manager

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RESULTS OF DUST MONITORING (Page 1 of 1)

3 dust samples supplied by Lismore City Council on the 8th May, 2018 - Lab Job No. H0066

Exposure Period 9/4/18 - 7/5/18

Analysis requested by Riccardo Martinez

PO Box 23A LISMORE NSW 2480

Sample Site	EAL Code	Sample Comments	Diameter of Funnel (mm)	Sampling Days (days)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of: Ash	Combustible Matter	Soluble Matter	Total Solids
						(g/m^2/month)	(mg/m^2/day)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)
Method Reference						*a*	*a*	*a*	*a*	*a*	*a*
S18-0142,D1	*H0066/1*	leaves/some org. matter	150	28	0.670	0.5	16	0.3	0.2	1.0	1.5
S18-0142,D2	*H0066/2*	..	150	28	0.690	0.4	14	0.3	0.1	1.1	1.5
S18-0142,D3	*H0066/3*	cloudy	150	28	0.660	1.5	51	0.5	1.0	1.4	3.0

METHODS REFERENCE

a. Australian Standard AS 3580.10.1.8.2.2-1991(1mm pre-sieving then using Whatman 42 Ashless filter)

NOTES

1. .. No data/ information
2. Total Suspended Solids = Mass deposition rate of insoluble solids
3. Per Month calculations incorporate 'Sampling Days' hence per Month actually refers to number of days sampled.

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checked: .....
Graham Lancaster
Laboratory Manager

RESULTS OF DUST MONITORING (Page 1 of 1)

3 dust samples supplied by Lismore City Council on the 5th June, 2018 - Lab Job No. H1100

Exposure Period 7/5/18 - 4/6/18

Analysis requested by Riccardo Martinez.

PO Box 23a LISMORE NSW 2480

Sample Site	EAL Code	Sample Comments	Diameter of Funnel (mm)	Sampling Days (days)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of: Ash	Combustible Matter	Soluble Matter	Total Solids
						(g/m^2/month)	(mg/m^2/day)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)
Method Reference						*a*	*a*	*a*	*a*	*a*	*a*
S18-0177.D1	*H1100/1*	Organic matter	150	28	0.22	0.6	21	0.5	0.2	0.7	1.3
S18-0177.D2	*H1100/2*	Brown/ organic matter	150	28	0.15	0.8	27	0.3	0.5	0.0	0.8
S18-0177.D3	*H1100/3*	Cloudy/ organic matter	150	28	0.15	0.3	12	0.1	0.2	0.3	0.6

METHODS REFERENCE

a . Australian Standard AS 3580.10.1.8.2.2-1991(1mm pre-sieving then using Whatman 42 Ashless filter)

NOTES

1. .. No data/ information
2. Total Suspended Solids = Mass deposition rate of insoluble solids
3. Per Month calculations incorporate 'Sampling Days' hence per Month actually refers to number of days sampled.

checked: .....
Graham Lancaster
Laboratory Manager

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RESULTS OF DUST MONITORING (Page 1 of 1)

3 dust samples supplied by Lismore City Council on the 3rd July, 2018 - Lab Job No. H2000

Exposure Period 04/06/18 - 02/07/18

Analysis requested by Riccardo Martinez.

PO Box 23a LISMORE NSW 2480

Sample Site	EAL Code	Sample Comments	Diameter of Funnel (mm)	Sampling Days (days)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of: Ash	Combustible Matter	Soluble Matter	Total Solids
						(g/m^2/month)	(mg/m^2/day)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)
Method Reference						*a*	*a*	*a*	*a*	*a*	*a*
S18-233, D1	*H2000/1*	org. matter	150	28	0.57	2.1	69	1.1	0.9	0.0	2.1
S18-233, D2	*H2000/2*	..	150	28	0.41	0.6	18	0.1	0.5	0.0	0.6
S18-233, D3	*H2000/3*	yellowish/org. matter	150	28	0.40	4.3	144	1.0	3.3	2.1	6.4

METHODS REFERENCE

a. Australian Standard AS 3580.10.1.8.2.2-1991(1mm pre-sieving then using Whatman 42 Ashless filter)

NOTES

1. .. No data/ information
2. Total Suspended Solids = Mass deposition rate of insoluble solids
3. Per Month calculations incorporate 'Sampling Days' hence per Month actually refers to number of days sampled.

checked: .....
Graham Lancaster
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RESULTS OF DUST MONITORING (Page 1 of 1)

3 dust samples supplied by Lismore City Council on the 1st August, 2018 - Lab Job No. H2732

Exposure Period 2/7/18 - 30/7/18

Analysis requested by Riccardo Martinez.

PO Box 23a LISMORE NSW 2480

Sample Site	EAL Code	Sample Comments	Diameter of Funnel (mm)	Sampling Days (days)	Sample Volume (L)	Deposit rate of Insoluble Solids Total Suspended Solids (SSt)		Deposit rate of: Ash	Combustible Matter	Soluble Matter	Total Solids
						(g/m^2/month)	(mg/m^2/day)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)	(g/m^2/month)
Method Reference						*a*	*a*	*a*	*a*	*a*	*a*
S18-0286, D1	*H2732/1*	Organic matter	150	28	0.280	0.4	15	0.3	0.2	1.9	2.4
S18-0286, D2	*H2732/2*	Cloudy / organic matter	150	28	0.070	2.5	84	1.6	1.0	3.1	5.6
S18-0286, D3	*H2732/3*	Cloudy / organic matter	150	28	0.080	2.5	83	1.3	1.2	2.5	5.0

METHODS REFERENCE

a . Australian Standard AS 3580.10.1.8.2.2-1991(1mm pre-sieving then using Whatman 42 Ashless filter)

NOTES

1. .. No data/ information
2. Total Suspended Solids = Mass deposition rate of insoluble solids
3. Per Month calculations incorporate 'Sampling Days' hence per Month actually refers to number of days sampled.

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checked: .....
Graham Lancaster
Laboratory Manager

APPENDIX C: EMISSION ESTIMATION EQUATIONS

The major air emission from quarrying is fugitive dust. Emission factors can be used to estimate emissions of TSP, PM_{10} and $PM_{2.5}$ to the air from various sources.

Drilling and blasting emissions:

Emission factors for overburden/raw material detailed in AP-42 Chapter 11.9 "Western Surface Coal Mining" have been used. The calculation is based on 90 holes drilled per blast covering an area 810 m^2, with one blast per day.

Wind Erosion:

Emission factors for TSP from active stockpile wind erosion is detailed in AP-42 Chapter 11.9 "Western Surface Coal Mining". The wind erosion (kg/ha/hr) is determined by multiplying the average wind speed by 1.8. The wind speed has been determined form the CALMET analysis. PM_{10} and $PM_{2.5}$ scaling factors from NPI Manual for Mining were applied. A 50% control efficiency factor for water trucks was applied.

Emission factors for TSP from exposed areas wind erosion is detailed in AP-42 Chapter 11.9 "Western Surface Coal Mining". The wind erosion (Mg/ha/hr) is determined by multiplying the average wind speed by 0.85. The wind speed has been determined form the CALMET analysis. PM_{10} and $PM_{2.5}$ scaling factors from NPI Manual for Mining were applied.

Screening:

Emission factors for TSP from active stockpile wind erosion is detailed in AP-42 Chapter 11.9.2 "Crushed Stone Processing and Pulverised Mineral Processing".

TSP: 0.0125 kg/t;

PM_{10}: 0.0043 kg/t; and

$PM_{2.5}$: Derived from $\frac{EF_{PM10}\ x\ 0.000025}{0.00037}$

Crushing:

Emission factors for TSP from active stockpile wind erosion is detailed in AP-42 Chapter 11.9.2 "Crushed Stone Processing and Pulverised Mineral Processing". Emission factors are based on raw quarry material and control efficiency factors for tertiary crushing and grinding were applied.

TSP: 0.0027 kg/t;

PM_{10}: 0.0012 kg/t; and

$PM_{2.5}$: Derived from $\frac{EF_{PM10}\ x\ 0.00005}{0.0027}$

Material Transfers:

Emission factors for TSP from active stockpile wind erosion is detailed in AP-42 Chapter 13.2.4 "Aggregate Handling and Storage Piles". Emission factors are based on mean wind speed (U) and moisture (M) content of material and no control efficiency factors were applied. The mean wind speed was 3.5 m/s as derived from CALMET and the moisture content for overburden is 7.9% and 2.1% for raw and product material.

Emission factors:

TSP: $EF_{TSP} = 0.74\ x\ 0.0016\ x\ \frac{(\frac{U}{2.2})^{1.3}}{(\frac{M}{2})^{1.4}}$

PM_{10}: $EF_{PM10} = 0.35\ x\ 0.0016\ x\ \frac{(\frac{U}{2.2})^{1.3}}{(\frac{M}{2})^{1.4}}$

$PM_{2.5}$: $EF_{PM2.5} = 0.53\ x\ 0.0016\ x\ \frac{(\frac{U}{2.2})^{1.3}}{(\frac{M}{2})^{1.4}}$

Vehicle Movements:

Light and heavy vehicle movements have been derived from the NPI "Manual for Mining" for wheel generated dust from unpaved roads. The calculations consider the gross vehicle weight (W), silt and moisture content (s and M), speed (S).

Table 31: Vehicle Movement Emission Factors

	TSP	PM_{10}
Light vehicles	$EF_{TSP} = 1.69 \times \frac{(s/12) \times (S/48)^{0.3}}{(M/0.5)^{0.3}} - 0.0013$	$EF_{PM_{10}} = 0.51 \times \frac{(s/12) \times (S/48)^{0.5}}{(M/0.5)^{0.2}} - 0.0013$
Heavy vehicles	$EF_{TSP} = \frac{0.4536}{1.6093} \times 4.9 \times \left(\frac{s}{12}\right)^{0.7} \times \left(\frac{W \times 1.1023}{3}\right)^{0.45}$	$EF_{PM_0} = \frac{0.4536}{1.6093} \times 1.5 \times \left(\frac{s}{12}\right)^{0.9} \times \left(\frac{W \times 1.1023}{3}\right)^{0.45}$

A control efficiency of 50% for level 1 watering has been applied.

APPENDIX D: POLLUTION PREDICTION CONTOURS (CUMULATIVE)

Contour plots illustrate the spatial distribution of ground-level concentrations across the modelling domain for each time period of interest. However, this process of interpolation causes a smoothing of the base data that can lead to minor differences between the contours and receptor model predictions.

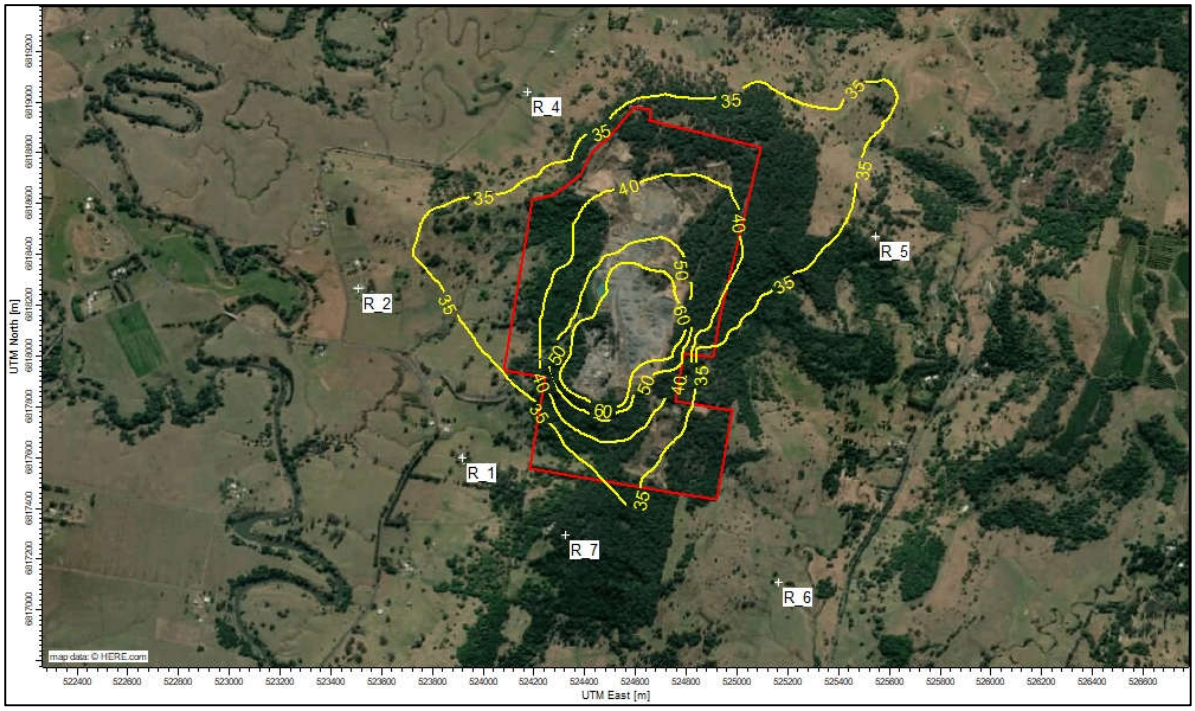

Figure 10: Max Predicted 24-hour Average PM_{10} Concentrations ($\mu g/m^3$)

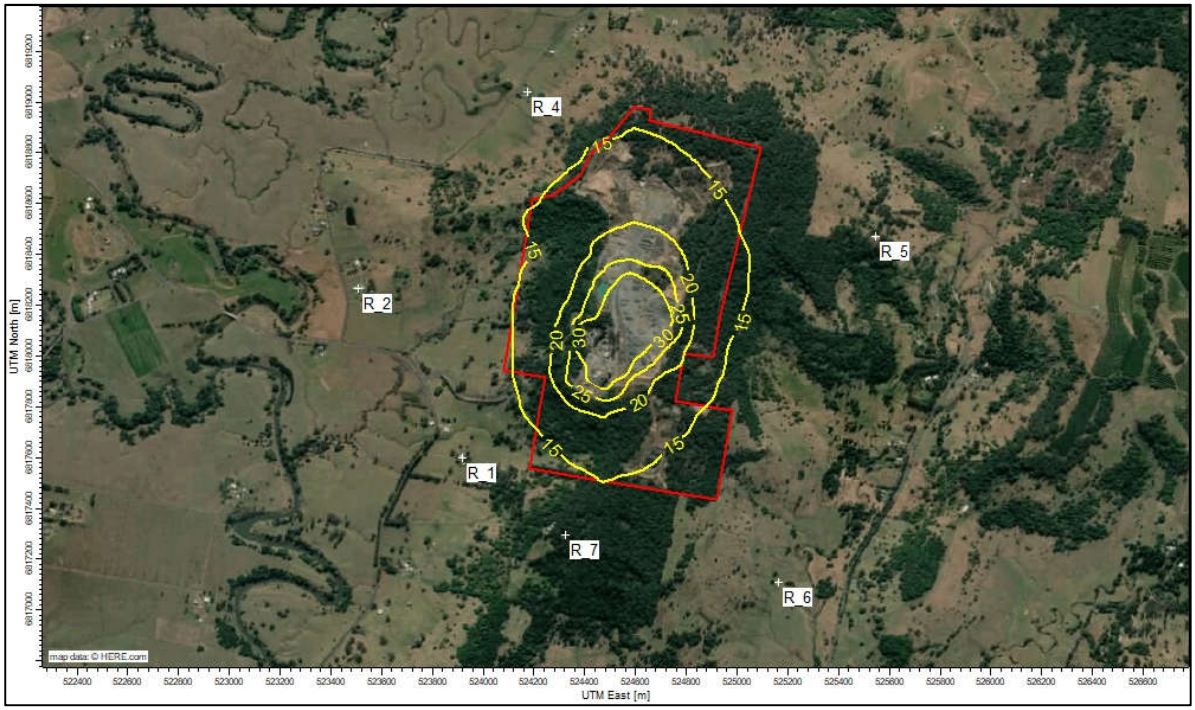

Figure 11: Predicted Annual Average PM_{10} Concentrations ($\mu g/m^3$)

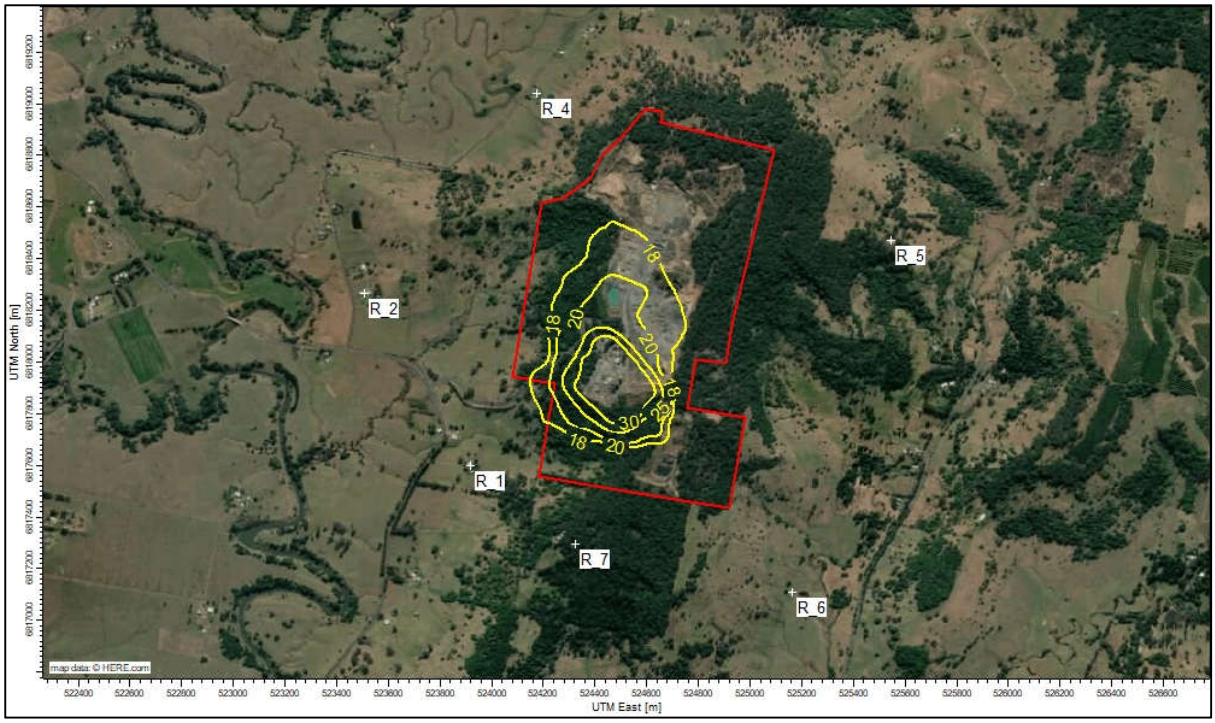

Figure 12: Max Predicted 24-hour Average $PM_{2.5}$ Concentrations ($\mu g/m^3$)

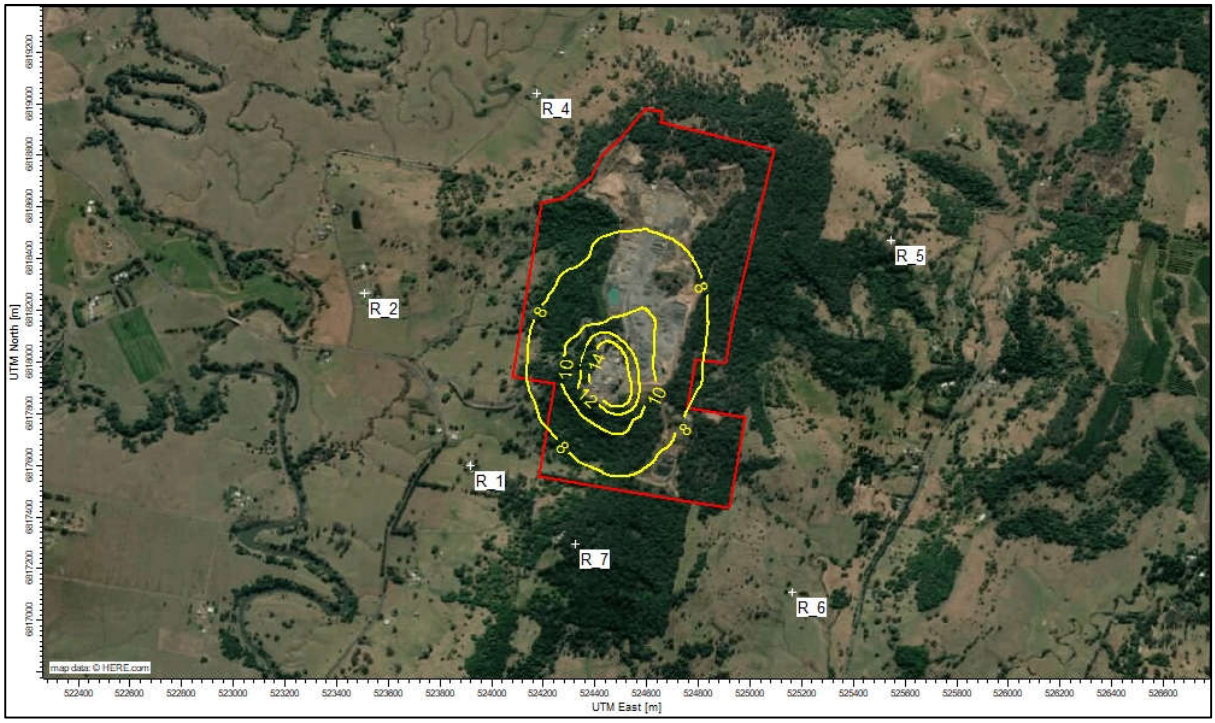

Figure 13: Predicted Annual Average $PM_{2.5}$ Concentrations ($\mu g/m^3$)

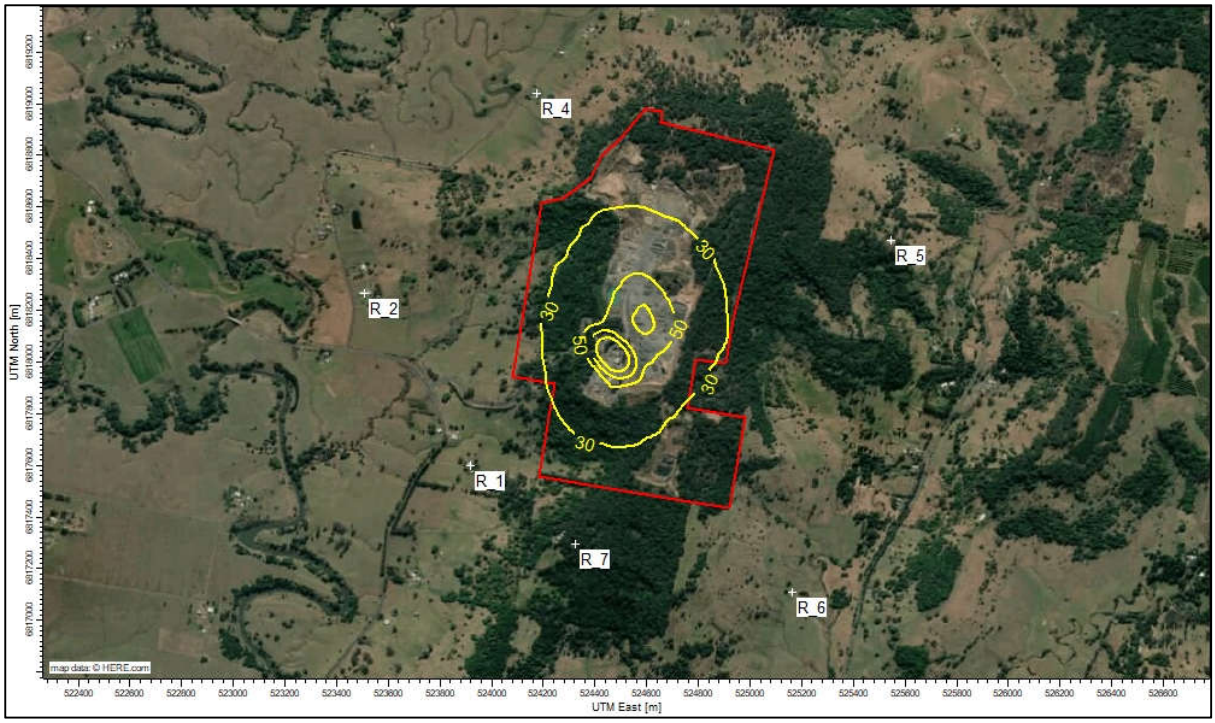

Figure 14: Annual Average TSP Concentrations (µg/m^3)

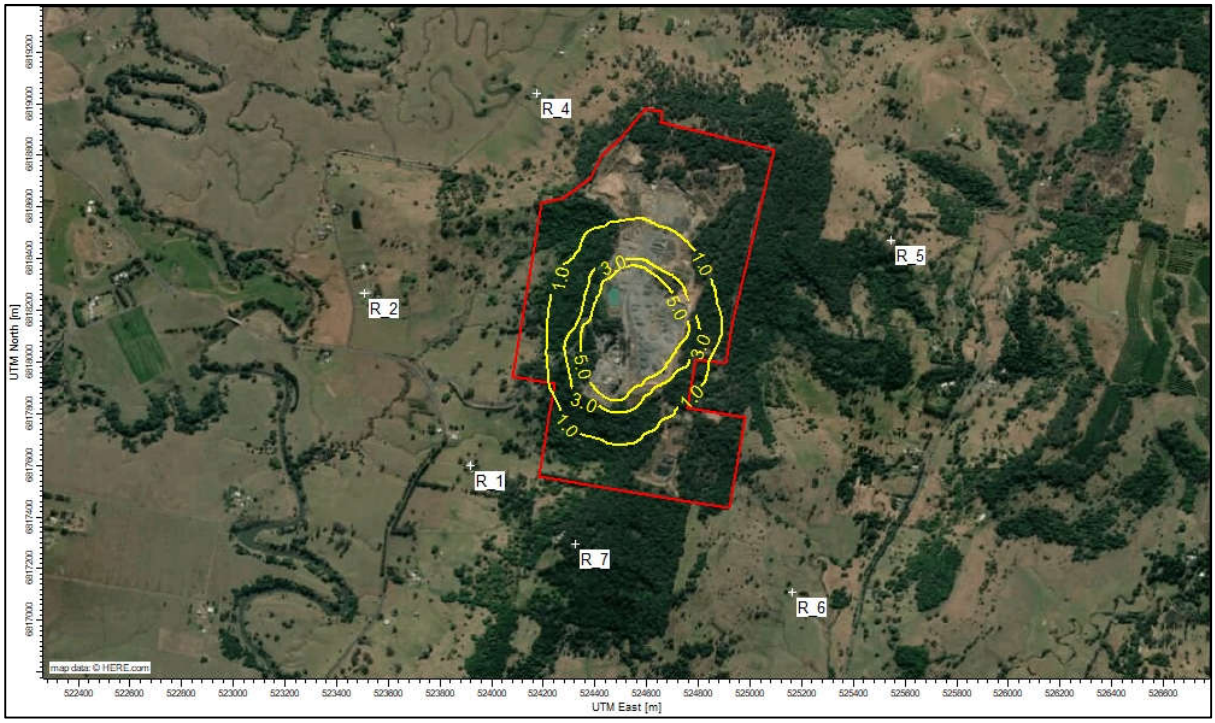

Figure 15: Predicted Dust Deposition (g/m^2/month)

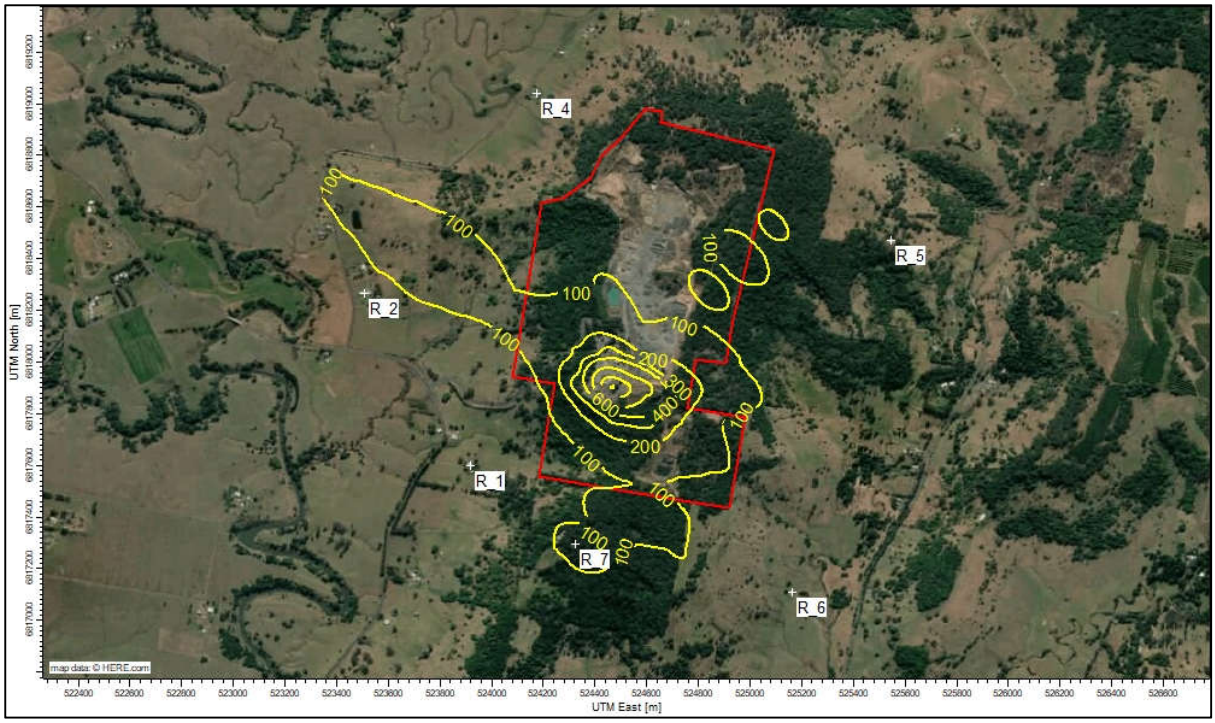

Figure 16: Max Predicted 1-hour Average NO_2 Concentrations (µg/m^3)

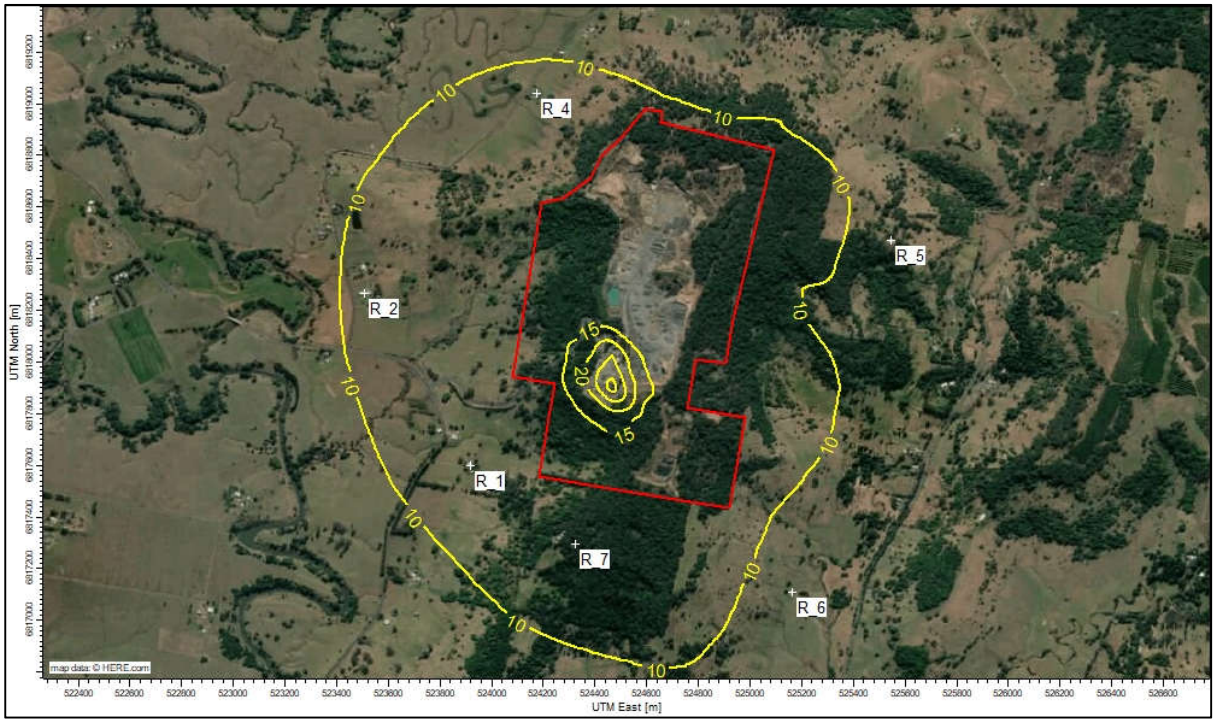

Figure 17: Predicted Annual Average NO_2 Concentrations (µg/m^3)

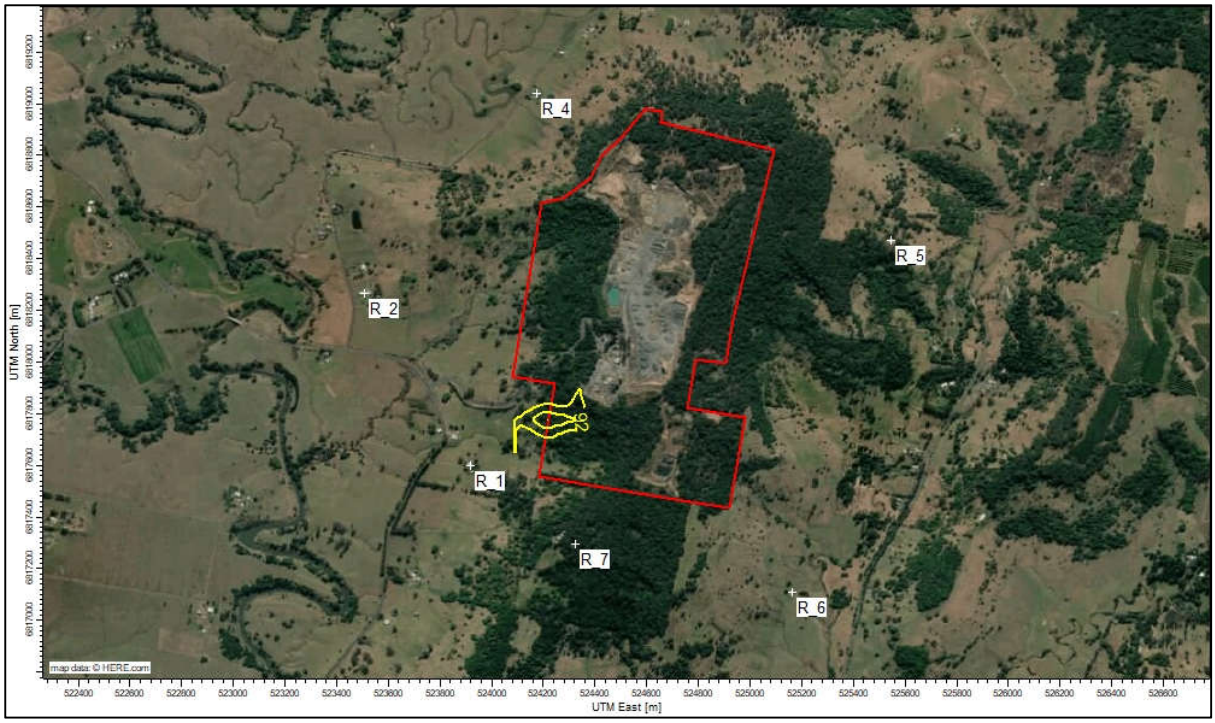

Figure 18: Max Predicted 1-hour Average SO_2 Concentrations (µg/m^3)

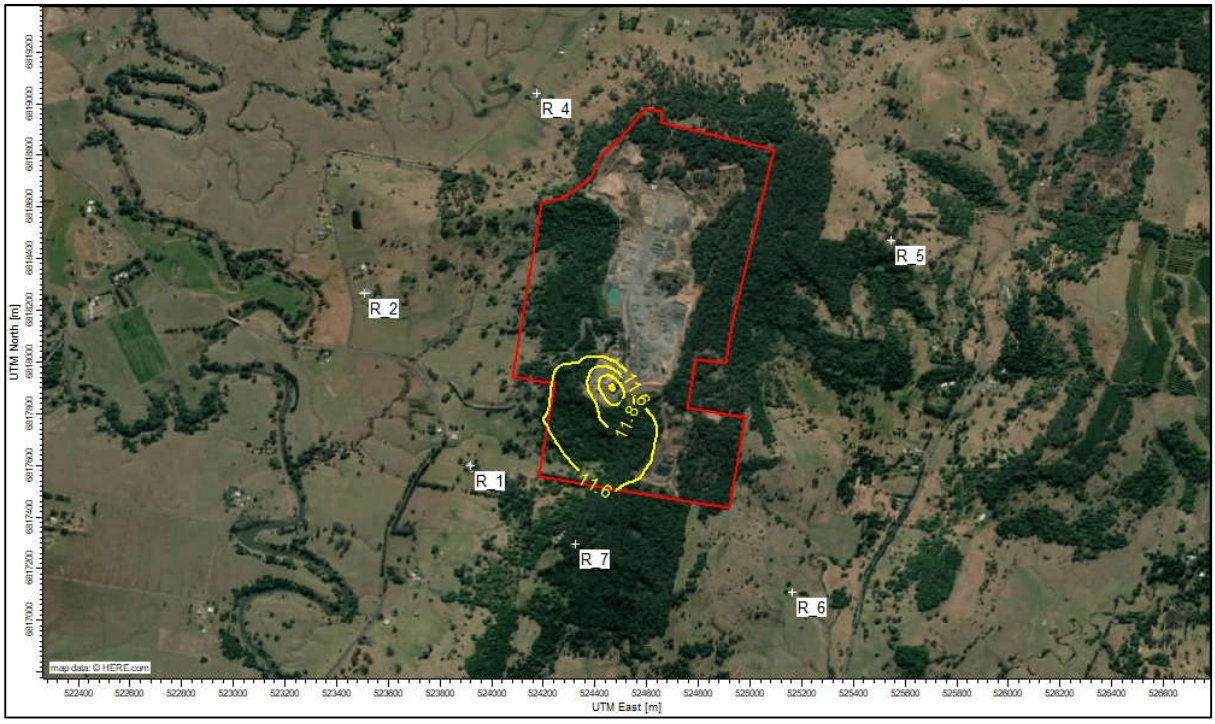

Figure 19: Max Predicted 24-hour Average SO_2 Concentrations (µg/m^3)

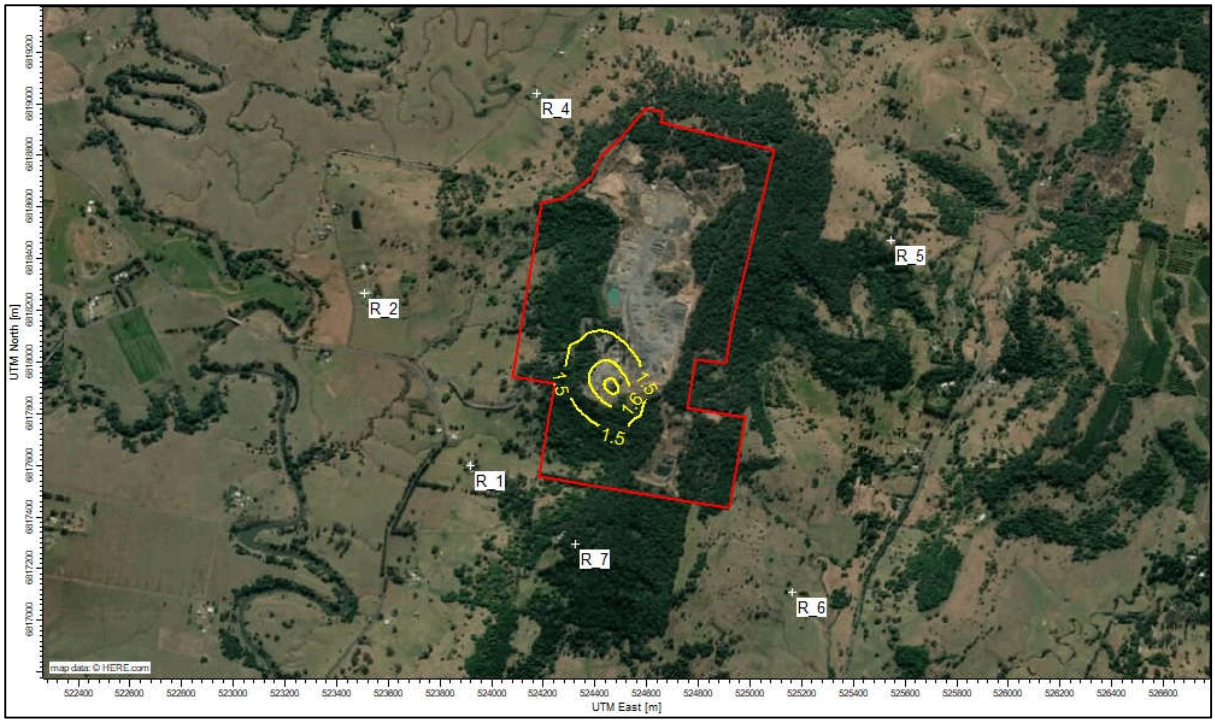

Figure 20: Predicted Annual Average SO_2 Concentrations (µg/m^3)

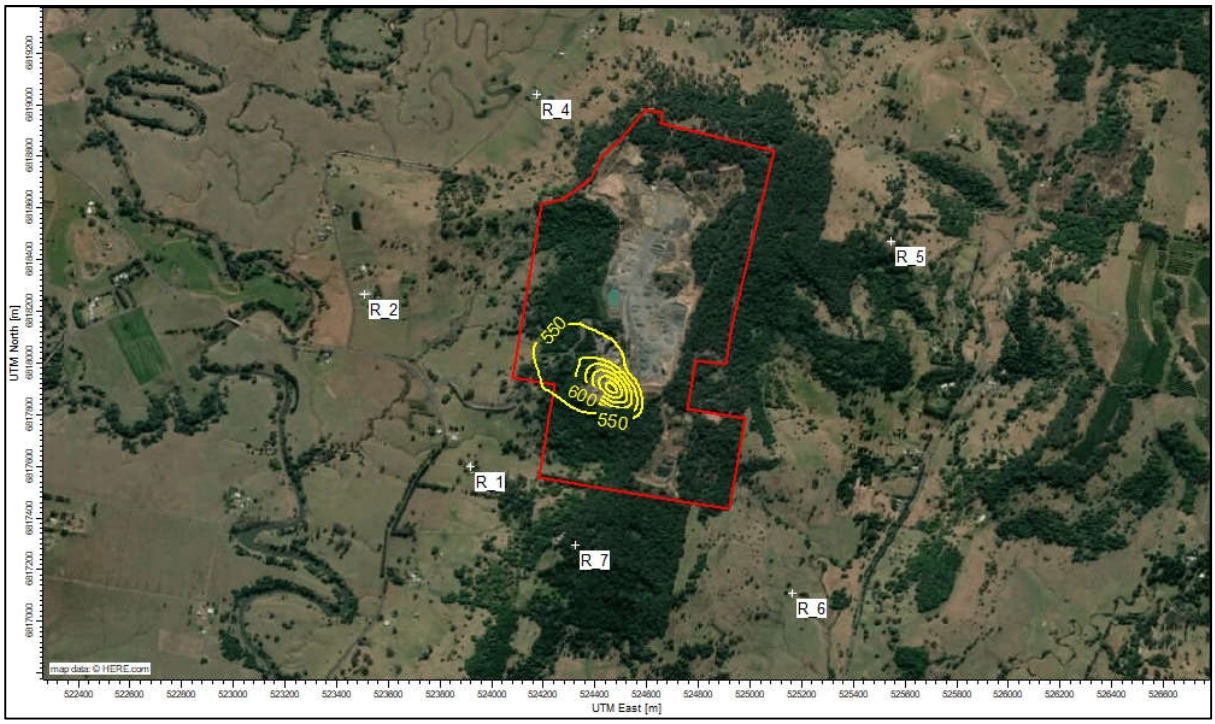

Figure 21: Maximum 8-Hour Average CO Concentrations (µg/m^3)

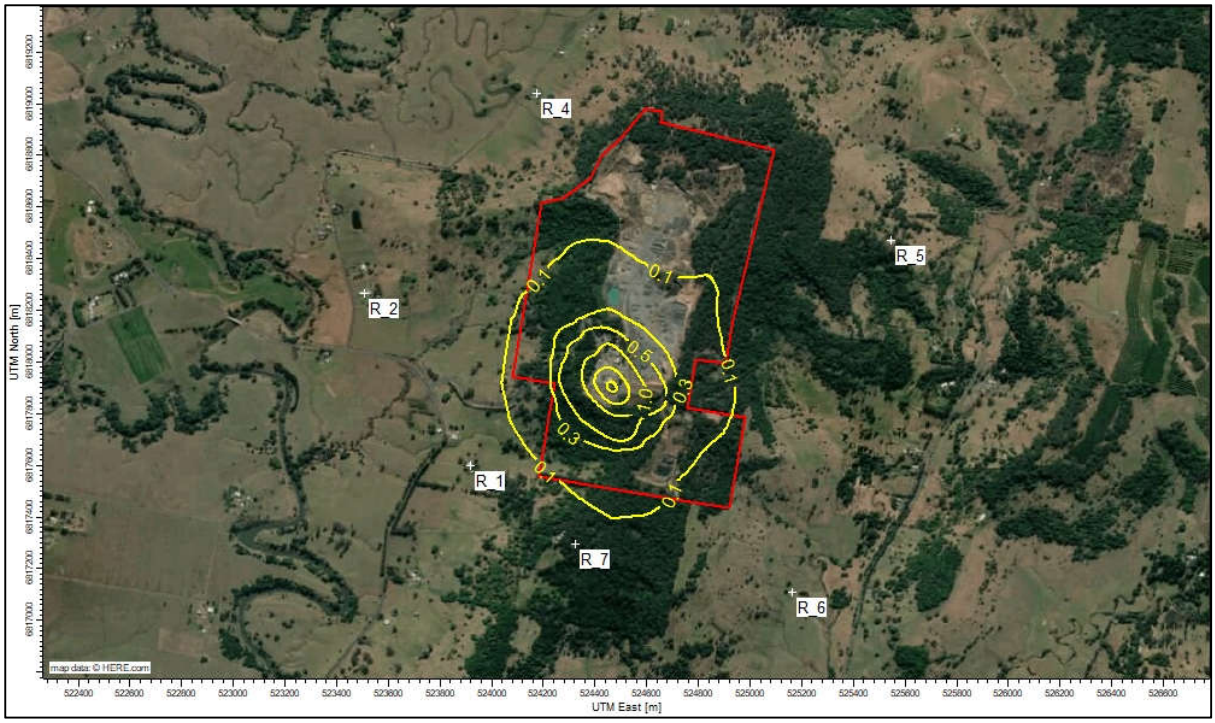

Figure 22: Predicted 1-second, 99th Percentile Odour Concentrations (OU)

Appendix H Traffic Impact Assessment

- SECA Solutions

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2 May 2019

P1292 MH Blakebrook Quarry Lismore

Mitchell Hanlon Consulting
P O Box 1568
Tamworth NSW 2340

Attn: Tim McLean

Dear Tim,

Proposed modification to Blakebrook Quarry, north of Lismore, NSW

Further to our site visit and review of the documentation provided for the above development we provide the following Traffic Impact Assessment. This assessment has been prepared in accordance with the Austroads Guidelines and Section 2.3 of the RMS Guide to Traffic Generating Developments which provides the structure for the reporting of key issues to be addressed when determining the impacts of traffic associated with a development. This guide indicates that the use of this format and checklist ensures that the most significant matters are considered by the relevant road authority.

Lismore City Council (LCC) is the owner and operator of the Blakebrook Quarry which is classified as a State Significant Project (SSP). There is an existing asphalt plant that operates as an ancillary activity within the Blakebrook Quarry footprint area, with the plant having approval under a standard council DA. LCC is proposing to modify the SSP development consent to include the Asphalt plant activities, with this traffic report providing an assessment of the overall development and impact on road safety as it relates to the project and the site access.

The subject site is located to the north of Lismore off Nimbin Road, as shown in Figure 1 to follow.

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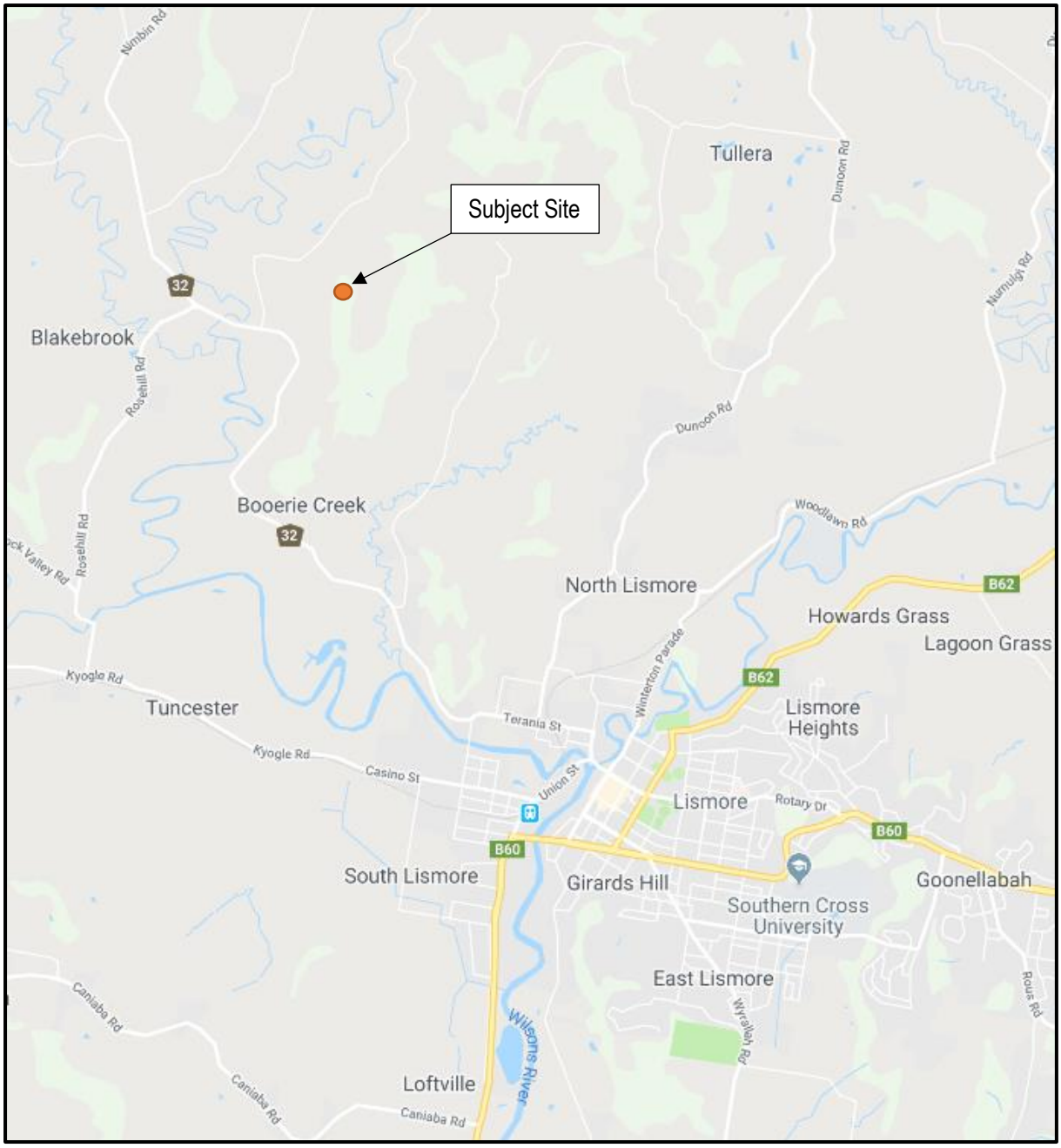

Figure 1 – Subject site in the context of the surrounding road network

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Traffic Impact Assessment:

Item	Comment
Existing Situation	
2.1 Site Location and Access	The subject site is located approximately 6 kilometres north west of Lismore Town Centre, with access off Nimbin Road via a sealed access roadway (Quarry Access Road).
2.2.1 Road Hierarchy	The main road through the locality is **Nimbin Road** which forms part of the regional road network providing connection between Lismore and Nimbin, with the network continuing on to Murwillumbah to the north. In the locality of the subject site it allows for a single lane of travel in each direction, with a pavement width varying between 6-8 metres. The posted speed limit is 80 km/hr in this location, with no kerb and guttering or street lighting. An auxiliary right turn treatment is provided for northbound vehicles, to allow for through traffic to pass vehicles turning into the quarry access road. The **Quarry Access Road** provides a sealed surface along its length until reaching the quarry operations, where the movements are distributed across the unsealed internal roads. It operates under the posted speed limit of 40km/hr with no kerb and guttering or street lighting provided. It has a pavement width in the order of 8.5 metres along the majority of its length, with the road widening significantly at the intersection with Nimbin Road to allow for more efficient turning movements for heavy vehicles into and out of Nimbin Road. To the south of the site, towards Lismore, Nimbin Road meets **Wilson Street** at a priority controlled T-intersection, with Nimbin Road having priority. On the southern approach to this intersection, Wilson Street provides a left turn slip lane allowing for free flow for vehicles turning left onto Nimbin Road, with an acceleration lane (140 metres) provided after which drivers are required to merge to form one lane. A channelised right turn is also provided on Nimbin Road.
2.2.2 *Current and Proposed Roadworks, Traffic Management Works and Bikeways*	There are currently no roadworks or traffic management works planned in the immediate vicinity of the subject site and no roadworks are currently occurring in this location. The previous conditions of consent for this development included upgrades along the quarry route all of which have been completed, including: • Upgrade the intersection of the Quarry Access and Nimbin Road to a 'Type AUR Intersection Treatment', prior to 31 December 2010; • Upgrade the guard rails on the approaches to Booerie Creek Bridge prior to 31 December 2010; • 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;

Item	Comment
	• Upgrade the Wilson Street and Nimbin Road intersection to a 'Type CHR Right Turn Bay Treatment' prior to 31 December 2010; and • 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.
2.3 Traffic Flows	Observations on site during the morning peak hour indicate that the intersection of Nimbin Road and the Quarry Access Road operates very well with relatively low traffic flows through the area.
2.3.1 Daily Traffic Flows	Daily traffic flows through the area were quantified as part of the Operational Traffic Management Plan (OTMP) completed by ERM in 2018 for the quarry. These flows were taken from the previous Traffic Impact Report (Roadnet 2008) completed for the approved Quarry expansion. Traffic flows along Nimbin Road were as follows: • Average weekday traffic volume of 2,700 vehicles north of the quarry access • Average weekday traffic volume of 3,200 vehicles near Wilson Street. These volumes were composed of Light Trucks (including single unit tippers) and buses accounting for 5.2% of the traffic stream and heavy trucks accounting for 2.2%. It is predicted in the prior Traffic Impact Report (Roadnet 2008) that traffic growth along Nimbin Road is approximately 2.2% per annum, based on a comparison of count data between 1970 to 2007. As such, allowing for 10 years growth the current flows along Nimbin Road could be in the order of: • Average weekday traffic volume of 3,300 vehicles north of the quarry access • Average weekday traffic volume of 3,900 vehicles near Wilson Street. The RMS Guide to Traffic Generating Developments provides advice on peak hour flows typically representing 8-12% (average 10%) of daily flows. As such, the current peak hour flows along Nimbin Road would be in the order of 330 vehicles per hour near the quarry access and 390 vehicles per hour near Wilson Street.
2.3.2 Annual Average Daily Traffic (AADT)	There is no AADT data available in the locality.
2.3.3 Daily Traffic Flow Distribution	The majority of vehicles along Nimbin Road passing the Quarry Access Road would be southbound in the AM, reflecting drivers travelling to work or school in the Lismore area, with the reverse pattern expected to occur in the PM.

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Item	Comment
2.3.4 Vehicle Speeds	No speed surveys were completed as part of the survey work. It is considered drivers travel at or just above the posted speed limit of 80 km/hr along Nimbin Road passing the subject site, given the low traffic flows and relatively easy flowing road geometry in this location.
2.3.5 Existing Site Flows	The current DPE approval for the Quarry allows for up to 100 laden trucks per day, with the potential increase of this value based on future amendments to the project approval. The maximum production level for the quarry is 600,000 tonnes per annum. The bulk of material is transported via 30 tonne truck and dog trailer combinations (80%), with the remainder completed using 13 tonne single unit tippers (20%), giving 80 truck and dog and 20 single unit tippers per day. The number of trucks travelling on Nimbin Road is double these figures allowing for empty trucks returning to the quarry. All trucks pass over the existing on-site weighbridge which places a limit of 25 trucks per hour that can exit the site.
2.3.6 Current Road Network Operation	Observations on site indicate that the local roads currently operate well with minimal delays or congestion observed during the survey work, undertaken during a typical morning peak period (Wednesday 12th September 2018). There were sufficient gaps in the flow of traffic to allow turning movements onto Nimbin Road at the intersection with the quarry access, with all heavy vehicles turning left out of the site. Right turns into the site also occurred in an efficient manner given the low through movements in this location. The intersection of Nimbin Road and Wilson Street operated well with low delays for turning traffic. The previous upgrade to allow for a sheltered right turn lane has improved the overall operation of this intersection. This intersection was observed during the morning peak period between 8.00 and 8.30 when there were trucks associated with the current operations on site travelling through this intersection, together with peak hour demands associated with school and work trips by commuters. The queue for the right turn from Nimbin Road into Wilson Street was a maximum of 2 vehicles and the delays were less than 20 seconds. Based on Table 4.2 of the RMS Guide to Traffic Generating Developments this would indicate that the right turn movement into Wilson Street is operating at a level of service of B. All other movements experienced lower delays and overall it is considered that the intersection operates at a level of service of A. During the afternoon peak period, the impact of the quarry would be less at this intersection, as the peak occurs at around 4.30 to 5.30 PM and at this time of the day, there would be little if any demand for trucks exiting the quarry. Normal construction demands for quarry material require the material to be delivered in the morning for the material to be used during the day and deliveries to construction sites typically d not occur late in the afternoon accordingly.

Item	Comment
2.4 Traffic Safety and Accident History	A review of the accident data provided by the RMS, for the period between July 2012 to June 2017, has found a total of 27 accidents occurred along the main quarry route on Nimbin Road between the quarry access and Wilson Street. Of these accidents: In the year of 2013 there were 17 accidents were recorded. It is noted that since 2014 (inclusive), when all road upgrades associated with the conditions of consent for the previous expansion of Quarry operations had been completed, there have been 9 accidents based on the current road layout. Of these 9 accidents: • No accidents occurred at the intersection of Nimbin Road and Wilson Street. • No accidents occurred at the intersection of Nimbin Road and the Quarry Access Road. • No accidents involved heavy vehicles larger than light trucks. • 5 injury accidents resulting in 7 total injuries. • Speeding was determined as a contributing factor for 7 of the 9 accidents. Fatigue was determined as a contributing factor for 1 of the 9 accidents. Only 2 of the 9 accidents did not identify a contributing factor. • The vast majority of accidents related to vehicles going off-road accounting for 8 out of 9 which could relate to speeding, with the remaining accident being a head on collision. • 8 out of 9 involved a single vehicle which could again relate to speeding, with 1 accident including 2 vehicles. A further 7 accidents were recorded in the vicinity of the roundabout intersection of Wilson Street and Casino Street in the same period, with 6 different crash types determined indicating there are no obvious safety concerns at this intersection. Given the spread of accident types, as well as the distribution over the length of the route studied, it is considered the road layout provides an adequate level of safety for road users. There were no accidents recorded at the key intersections on Nimbin Road, whilst the roundabout intersection of Wilson Street and Casino Street recorded no accidents involving heavy vehicles larger than light trucks. The accident data provided by the RMS can be found in **Attachment A.**
2.5 Parking Supply and Demand	
2.5.1 On-street Parking Provision	There is no provision for vehicles to park along Nimbin Road passing the subject site, with minimal shoulder width available. Similarly, there is no provision for vehicles to park along the quarry access road.
2.5.2 Off-street Parking Provision	No formal off street parking in the general locality of the subject site.
2.5.3 Parking Demand and Utilisation	No vehicles observed parked on the local streets in the vicinity of the subject site, with the local residents parked within the individual lots.

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Item	Comment
2.5.4 Set down or pick up areas	No set down or pick up areas are provided in locality.
2.6 Public Transport	
2.6.1 Rail Station Locations	The site is not serviced by a train line, with Lismore Station being located over 5.5 kilometres to the south.
2.6.2 Bus Stops and Associated Facilities	There are no formal bus stops or facilities in the locality of the subject site. There is a widened road verge along the eastern side of Nimbin Road, approximately 50 metres south of the Quarry Access Road, that allows sufficient area for a bus to pull in off the roadway for pick up/ set down.
2.6.3 Transport Services	There is minimal public transport in this location reflecting the rural nature of the site. Bus route 650 operates along Nimbin Road passing the subject site, with this service provided by Waller's Bus Company. Services are provided Monday to Friday at limited times throughout the day, with services centred around school pick up and drop off periods. Bus Route 652 operates between Lismore and Tuntable Creek, passing the subject site, with limited services Monday to Friday. Tourist coaches and Community Transport buses also use the road network comprising the haul route.
2.7 Pedestrians Network	There are no pedestrian or cyclist's facilities in the locality of the subject site. Given the relatively remote location of the area it can be seen that there is little if any demand for pedestrians or cyclists in this location. There are no pedestrian paths in the locality of the subject site, reflective of its semi-rural setting and lack of demand. No pedestrians were observed during the site work.
2.8 Other Proposed Developments	No other significant developments have been noted in the locality.
The Development	
3.1.1 Nature of Development	This proposal relates to the modification to the existing State Significant Project (SSP) consent for the Blakebrook Quarry, to include the Asphalt Plant operations which currently occur as an ancillary activity on site under a separate consent (Council DA). The current approval for the site allows for: • Quarry Operations (including loading and dispatch of trucks) between 7am-6pm Monday to Friday and 7am-3pm on Saturdays, with no operations on Sundays/Public Holidays • Asphalt Plant operations between 6am-5:30pm Monday to Saturday, with no operations on Sundays/Public Holidays There are no changes proposed to the existing operating hours for the site. This proposal seeks approval for a *maximum* of 150 laden truck movements per day with 125 per day on average, inclusive of quarry and

Item	Comment
	asphalt plant operations, with the asphalt production to increase from 15,000 tonnes per annum to 50,000 tonnes per annum.
3.1.2 Access and Circulation Requirements	There are no changes proposed to the existing access and transport routes for the development, with the internal site layout to operate as per the current situation. A Driver Code of Conduct is applicable to all heavy vehicle drivers for the site, which enforce all relevant conditions of consent for the development.
3.2 Access	
3.2.1 Driveway Location	The existing Quarry Access Road, off Nimbin Road, shall continue to provide access to the subject site. The internal road layout for the quarry and asphalt plant is well defined, with no changes as part of this proposal.
3.2.2 Sight Distances	Sight distance requirements for intersections are outlined in the Austroads Guide to Road Design Part 4A, the critical requirement being safe intersection sight distance (SISD). SISD has been assessed for the critical intersections associated with the project site development. *Nimbin Road / Quarry Access Road Intersection* For the posted speed limit of 80km/hr on Nimbin Road the Austroads Guide states an SISD of 181 metres. The access road was recently realigned to allow for improved visibility in both directions. There is a minimum of 190 metres of visibility available to the left (south) out of the site access. The regular trimming of vegetation along the interior of the road curve in this location allows for visibility to the right (north) of approximately 240 metres. As such, sight distance out of the Quarry Access Road satisfies the requirements of Austroads.
3.2.3 Service Vehicle Access	The site requires minimal waste vehicle access. The site will cater for truck and dog combinations and as such will cater for waste vehicle movements when required. There may be occasional servicing/maintenance requirements for the plant on site but this is minimal.
3.2.4 Queuing at entrance to site	The access road layout ensures no vehicle queues will extend back onto Nimbin Road, with this road travelling for approximately 900 metres, with no potential hold points, prior to reaching the Quarry operations.
3.2.5 Comparison with existing site access	There is no change proposed as part of the project work to the existing driveway which was upgraded as part of the prior approval to ensure that safety is maintained.
3.2.6 Access to Public Transport	The site is not easily accessible by public transport and it is considered that there is no demand for public transport associated with the site.
3.3 Circulation	

Item	Comment
3.3.1 Pattern of circulation	All vehicles can enter and exit the site in a forward direction and circulate within the site using the various internal roads as required.
3.3.2 Internal Road width	The existing access road to the site allows for two-way traffic movements including heavy vehicles, with a width of approximately 8.5 metres along the majority of its length including narrow sealed shoulders. The internal roads for the site provide sufficient width for heavy vehicles (up to truck and dog trailer combinations) to circulate through the Quarry, as well as access the Asphalt Plant. There are no changes to the existing internal circulation or road widths as part of this proposal.
3.3.3 Internal Bus Movements	No requirement for buses to access the development.
3.3.4 Service Area Layout	No dedicated service area is required. Any on-site servicing requirements for machinery is performed adjacent to the machines on site and can be completed in a safe manner. There shall be internal site controls under OH&S requirements which govern these activities.
3.4 Parking	There are no changes proposed to the existing supply of parking on site. The existing on-site parking provision is sufficient to meet the demands of the work force based on site, with no increases to this work force as part of this proposal. Parking for visitors and any maintenance/servicing personnel can be catered for on site as required.
3.5 Pedestrian and Bicycle Facilities	There are no demands for on-site pedestrian or cyclist movements by the general public. All staff movements on the site are controlled by existing OH&S requirements for the site. Drivers associated with transport of materials follow appropriate controls and signage within the site, in accordance with the existing Driver Code of Conduct.
Traffic Assessment	
4.1 Traffic Generation	The existing approval for the site allows for up to 100 laden trucks per day in association with the Quarry. It is understood that based on the current high demand for materials the Quarry is distributing close to its production limit over the course of the year. Laden movements associated with the asphalt plant vary throughout the year, with an average of 14 heavy vehicles per day and in the order of 20 per day during periods of higher demand. The site is physically limited to 25 laden trucks outbound per hour by the on-site weighbridge operations. The proposed movements inclusive of both operations entails an increase to a maximum of 150 laden trucks per day, with an average in the order of 125 trucks per day. As such, the proposal could see an additional 50 laden truck movements per day during periods of high demand due to the maximum daily increasing from 100 to 150 trucks per day.

Item	Comment
	Based on the site operations occurring over 11 hours, the proposal could generate 14 trucks per hour, an increase of 5 per hour over the current 9 trucks per hour. However, the average number of outbound trucks is considered to be 125 per day, generating 11 outbound truck movements per hour. For both the current and future situation the absolute maximum number of outbound trucks per hour is 25, based upon the capacity of the weighbridge on site. The weighbridge will not be upgraded as part of this project and as such this upper limit on hourly flows will remain.
4.1.1 Daily and Seasonal Factors	The traffic generated by the subject site is dictated by the demand for materials which can vary throughout the year, with high demand seeing the site operate at the upper limit of the approval being sought (150 per day outbound) and low demand periods potentially seeing much lower movements over the course of the day.
4.1.2 Pedestrian Movements	There are no external pedestrian demands generated by the project.
4.2 Traffic Distribution and Assignments	
4.2.1 Origin / destinations assignment	Currently, the quarry delivers approximately 5% of product to the north of the site. The remaining material is transported towards Lismore, south of the quarry. From this material, approximately 30% is taken along Terania Street. Approximately 70% of the material is transported via Wilson Street to the Bruxner Highway or Ballina Road and deposited in the industrial area and the CBD. It is considered the asphalt plant truck movements would be distributed in a similar manner.
4.3 Impact on Road Safety	The surrounding roads and intersections have been upgraded in recent years in order to ensure road safety can be managed. There are no changes proposed to the current transport routes. Given the minor increase in additional movements per hour, it is considered there are no further safety issues generated by the proposed modification to consent for the site operations. A review of the accident data provided by the RMS indicates there has been a low number of accidents along the primary transport route since 2014 (the year all road works required for the previous modification approval to the Quarry were completed), with no accidents occurring involving vehicles related to the dispatch of materials from the subject site. Drivers associated with the quarry and asphalt plant are required to follow road rules and signage at all times. Safety and appropriate driver behaviour is reinforced through the existing OH&S Guidelines and Drivers Codes of Conduct. During the site work trucks associated with the quarry were observed driving along Wilson Street and past the Lismore South Public School during the morning drop off period. The drivers of these trucks were all observing the 40 km/h speed zone and driving in an appropriate and safe manner. This is reinforced through the Drive Code of Conduct for the project site.

Quality Traffic Advice

Item	Comment
4.4.1 Impact on Daily Traffic Flows	There will be an increase in daily flows of up to 100 heavy vehicles (50 laden/50 unladen) during periods of peak demand as a result of this proposal. This increase shall be distributed across the normal 11 hour working day, thereby limiting the impact upon the capacity of the road network which currently operates well based on observations on site. This will give typically around 5-6 extra truck movements per hour (5-6 inbound and 5-6 outbound).
4.4.2 Peak Hour Impacts on Intersections	The key intersections impacted by the project site have been observed to ensure road safety. The increase in heavy vehicles per day could see an additional 6 vehicles per hour per direction, including during the peak periods. All intersections along the primary transport route are currently operating well within their capacity, with sufficient spare capacity to accommodate the minor increase in peak hour vehicles movements as a result of this proposal. Previous road upgrades have improved the safety at the site access and at Wilson Street whilst also increasing the capacity of these two intersections by providing a sheltered right turn lane. These turn lanes ensure that through traffic movements experience minimal delays due to right turning traffic. The operation of Nimbin Road and Wilson Street has been observed during the morning peak hour and based upon these observations the overall intersection operates at a level of service of A. Delays of less than 20 seconds were observed for the right turn from Nimbin Road into Wilson Road indicating a level of service of B. The potential for 5-6 additional trucks per hour to turn right here shall have a minimal impact upon these delays and the future level of service shall remain at B. Other intersections along the haul routes typically operate very well with low delays and queues. The haul route via Wilson Street and Three Chain Road to the Bruxner Highway operates very well with minimal delays during the morning peak period. The roundabout controlled intersection with the Bruxner Highway operates very well with minimal delays and congestion and is considered to have capacity for the on-going use of the project site. The additional 6 truck movements per hour inbound and outbound shall have a minimal impact at this roundabout.
4.4.3 Impact of Construction Traffic	No construction work is required as part of the project.
4.4.4 Other Developments	No other developments noted in the general vicinity of the site.
4.5 Public Transport	
4.5.1 Options for improving services	None proposed or required.
4.5.2 Pedestrian Access to Bus Stops	No bus stops and no demands.
4.6 Recommended Works	
4.6.1 Improvements to Access and Circulation	OH&S controls should be maintained to ensure on-site safety is maximised.

Item	Comment
4.6.2 Improvements to External Road Network	None required. The site will not generate additional traffic demands over the existing use on the site during the peak hours which are well within the capacity of the surrounding road network. The existing Driver Code of Conduct stipulates access routes in and out of the project site to ensure that the routes nominated in this assessment are utilised by the truck drivers.
4.6.3 Improvements to Pedestrian Facilities	No pedestrian footpath upgrades required as part of this development.
4.6.4 Effect of Recommended Works on Adjacent Developments	No works proposed that will impact on adjacent developments.
4.6.5 Effect of Recommended Works on Public Transport Services	None.
4.6.6 Provision of LATM Measures	None Required
4.6.7 Funding	No external works to be funded.

Quality Traffic Advice

Site Photos

Photo 1 – View to right for drivers exiting the Quarry Access Road onto Nimbin Road

Photo 2 – View to the left for drivers exiting the Quarry Access Road onto Nimbin Road

Photo 3 – AUR provided on Nimbin Road for the right turn movement into the Quarry Access Road

Photo 4 – Trucks turning signage on the southbound approach to the access road

Quality Traffic Advice

Conclusion:

From the site work undertaken and the review of the development proposal against the requirements of the RMS Guide to Traffic Generating Developments and Austroads Guide to Traffic Management, it is considered that the proposed modification of the SSP consent for the existing Blakebrook Quarry to include the ancillary Asphalt Plant operations should be approval based on traffic and access grounds.

There are no changes proposed to the existing staff arrangement, with an increase in the production limit for the Asphalt Plant from the current 15,000 tonnes to 50,000 tonnes. As such, there shall be an increase in daily traffic volumes as a result of the proposal, with maximum daily flows increasing from the current approval of 100 laden trucks to 150 per day maximum. This will generate typically 5-6 additional truck movements per hour per direction when the site is operating at maximum capacity.

Road safety has been reviewed and accident data obtained, which shows that the current operation of the road network in this location is safe and acceptable. The prior modification to consent for the quarry operations included a number of road upgrades, that have since been completed, to ensure the heavy vehicle movements (up to 150 per day maximum) could be accommodated within the road network.

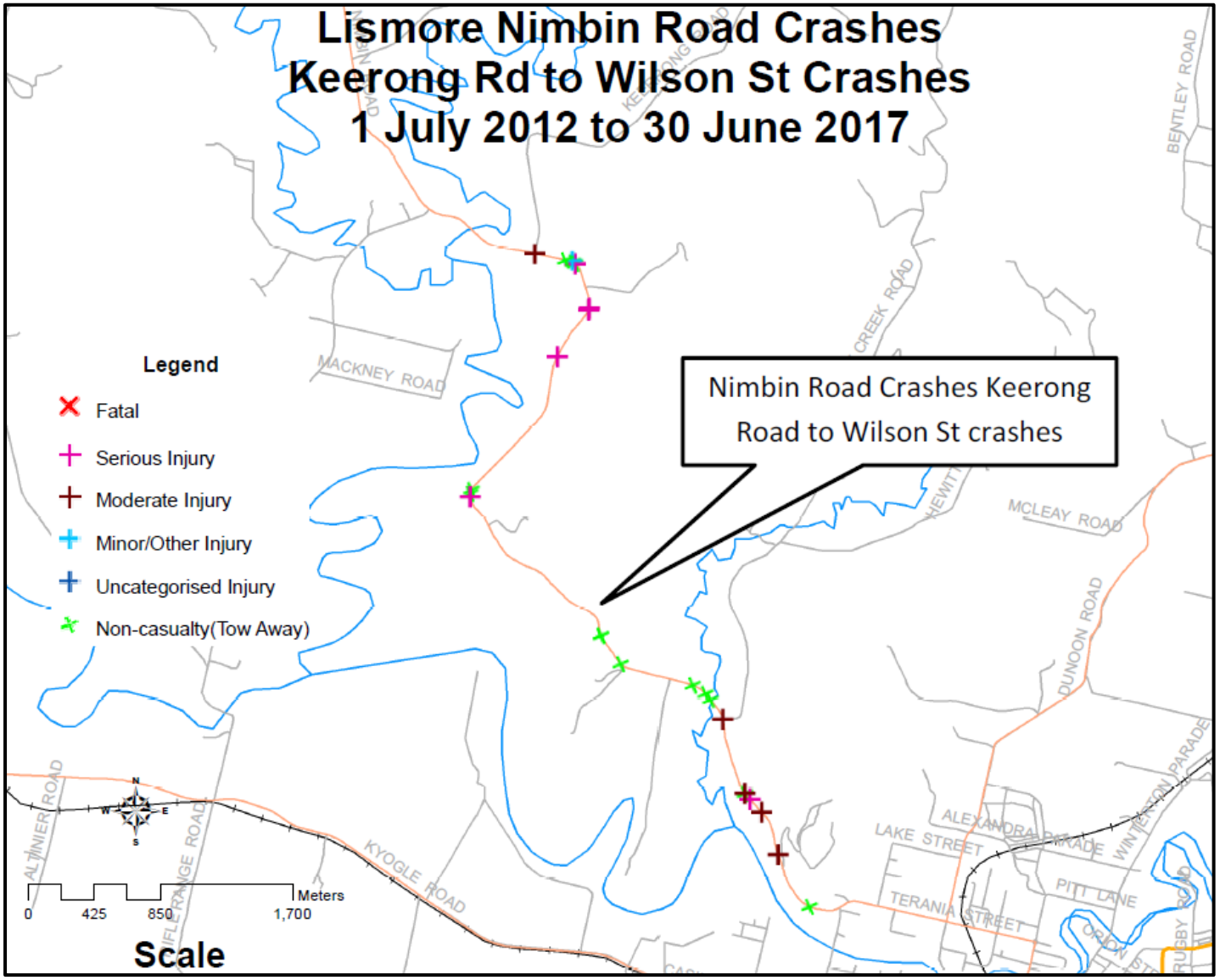
The key intersection of Nimbin Road and the Quarry Access Road has been assessed against Austroads Guidelines and sight lines exceed the requirements of this guide. The haulage route has been assessed to ensure adequate safety, with the current intersections providing sufficient capacity to cater for the turn movements associated with the heavy vehicles used for the material haulage.

Please feel free to contact me our office on 4032 7979, should you have any queries.

Yours sincerely,

Tyler Neve
Traffic Engineer

Attachment A: Accident Data



Summary Crash Report

Transport for NSW — Centre for Road Safety

# Crash Type		
Car Crash	21	77.8%
Light Truck Crash	3	11.1%
Rigid Truck Crash	0	0.0%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	*(0)*	*(0.0%)*
Bus Crash	0	0.0%
"Heavy Vehicle Crash	*(0)*	*(0.0%)*
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	4	14.8%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	2	7.4%
Non intersection	25	92.6%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	25	92.6%
Multi Vehicle	2	7.4%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	27	100.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	19	70.4%
Fatigue	6	22.2%

Weather		
Fine	17	63.0%
Rain	6	22.2%
Overcast	2	7.4%
Fog or mist	2	7.4%
Other	0	0.0%

Road Surface Condition		
Wet	10	37.0%
Dry	17	63.0%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	1	3.7%
Daylight	19	70.4%
Dusk	0	0.0%
Darkness	7	25.9%

Crash Movement		
Intersection, adjacent approaches	0	0.0%
Head-on (not overtaking)	2	7.4%
Opposing vehicles; turning	0	0.0%
U-turn	0	0.0%
Rear-end	0	0.0%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	1	3.7%
Off road, on straight	0	0.0%
Off road on straight, hit object	3	11.1%
Out of control on straight	0	0.0%
Off road, on curve	3	11.1%
Off road on curve, hit object	18	66.7%
Out of control on curve	0	0.0%
Other crash type	0	0.0%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	23 85.2%
50 km/h zone	1	3.7%	90 km/h zone	0 0.0%
60 km/h zone	1	3.7%	100 km/h zone	2 7.4%
70 km/h zone	0	0.0%	110 km/h zone	0 0.0%

~ 07:30-09:30 or 14:30-17:00 on school days ~ 40km/h or less 0 0.0% ~ School Travel Time Involvement 8 29.6%

Day of the Week												
Monday	7	25.9%	Wednesday	1	3.7%	Friday	5	18.5%	Sunday	4	14.8%	WEEKEND 7 25.9%
Tuesday	5	18.5%	Thursday	2	7.4%	Saturday	3	11.1%	WEEKDAY	20	74.1%	

CRASHES	27	
Fatal	0	0.0%
Serious inj.	7	25.9%
Moderate inj.	6	22.2%
Minor/Other inj.	1	3.7%
Uncategorised inj.	0	0.0%
Non-casualty	13	48.1%

Self Reported Crash	2	7.41%

Time Group		% of Day	
00:01 - 02:59	1	3.7%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	1	3.7%	4.2%
06:00 - 06:59	1	3.7%	4.2%
07:00 - 07:59	0	0.0%	4.2%
08:00 - 08:59	3	11.1%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	2	7.4%	4.2%
11:00 - 11:59	4	14.8%	4.2%
12:00 - 12:59	1	3.7%	4.2%
13:00 - 13:59	2	7.4%	4.2%
14:00 - 14:59	1	3.7%	4.2%
15:00 - 15:59	3	11.1%	4.2%
16:00 - 16:59	3	11.1%	4.2%
17:00 - 17:59	1	3.7%	4.2%
18:00 - 18:59	0	0.0%	4.2%
19:00 - 19:59	2	7.4%	4.2%
20:00 - 21:59	1	3.7%	8.3%
22:00 - 24:00	1	3.7%	8.3%

Street Lighting Off/Nil		% of Dark
7	of 7	in Dark 100.0%

CASUALTIES	18	
Killed	0	0.0%
Seriously inj.	8	44.4%
Moderately inj.	8	44.4%
Minor/Other inj.	2	11.1%
Uncategorised inj.	0	0.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Crashes		Casualties
1	2017	1
3	2016	1
3	2015	4
2	2014	1
17	2013	11
1	2012	0

McLean Periods		% Week	
A	3	11.1%	17.9%
B	2	7.4%	7.1%
C	6	22.2%	17.9%
D	2	7.4%	3.5%
E	2	7.4%	3.6%
F	5	18.5%	10.7%
G	4	14.8%	7.1%
H	0	0.0%	7.1%
I	2	7.4%	12.5%
J	1	3.7%	10.7%

#Holiday Periods

New Year	0	0.0%	Easter	0	0.0%	Queen's BD	0	0.0%	Christmas	0	0.0%	Easter SH	1	3.7%	Sept./Oct. SH	1	3.7%	
Aust. Day	0	0.0%	Anzac Day	0	0.0%	Labour Day	1	3.7%	January SH	1	3.7%	June/July SH	2	7.4%	December SH	0	0.0%	

Crashid dataset SECA Lismore Nimbin Rd Keerong Rd to Wilson St 1July 2012 to 30 June 2017

Detailed Crash Report

Transport for NSW — Centre for Road Safety

Crash No.	Data Source	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash-Detailed	Killed	Seriously Inj.	Moderately Inj.	Minor/Other Inj.	Uncateg'd Inj.	Factors
Northern Region																									
Lismore LGA																									
Blakebrook																									
Nimbin Rd																									
839059	P	20/05/2013	Mon	16:00	1 km	N	BOOERIE CREEK RD	2WY	STR	Fine	Dry	80	1	CAR	M U	N in NIMBIN RD	50	Proceeding in lane	NC	0	0	0	0	0	
E51417075								RUM	71	Off rd left => obj				Tree/bush											
834256	P	09/04/2013	Tue	00:01	1 km	W	BOOERIE CREEK RD	2WY	CRV	Fine	Dry	80	1	CAR	U U	W in NIMBIN RD	80	Proceeding in lane	NC	0	0	0	0	0	S F
E50903627								RUM	80	Off left/right bend															
1028602	P	01/06/2014	Sun	05:00	100 m	E	KEERONG RD	2WY	CRV	Fog or mist	Wet	80	1	CAR	F48	N in NIMBIN RD	65	Proceeding in lane	NC	0	0	0	0	0	S
E55078764								RUM	87	Off lft/lft bnd=>obj				Embankment											
824113	P	21/01/2013	Mon	08:00	200 m	E	KEERONG RD	2WY	CRV	Raining	Wet	80	1	4WD	F46	W in NIMBIN RD	50	Proceeding in lane	NC	0	0	0	0	0	S
E51194139								RUM	87	Off lft/lft bnd=>obj				Fence (prior to 2014)											
856369	P	20/09/2013	Fri	15:30	575 m	S	KEERONG RD	2WY	CRV	Fine	Dry	80	1	TRK	M34	N in NIMBIN RD	Unk	Proceeding in lane	SC	0	1	0	1	0	S F
E52385627								RUM	81	Off left/rt bnd=>obj				Fence											
1135455	P	12/02/2017	Sun	14:58	600 m	S	KEERONG RD	2WY	CRV	Fine	Dry	80	1	M/C	M24	S in NIMBIN RD	80	Proceeding in lane	SC	0	1	0	0	0	S
E65729877								RUM	81	Off left/rt bnd=>obj				S/Barrier - Guardrail											
840949	P	31/05/2013	Fri	15:20	2 km	S	KEERONG RD	2WY	CRV	Fine	Dry	80	1	CAR	F25	S in NIMBIN RD	50	Proceeding in lane	NC	0	0	0	0	0	S
E51410406								RUM	85	Off rt/lft bnd=>obj				Fence (prior to 2014)											
1045576	P	07/09/2014	Sun	10:37		at	KEERRONG RD	TJN	STR	Fine	Dry	80	1	WAG	M44	W in NIMBIN RD	20	Proceeding in lane	MC	0	0	1	0	0	
E56129277								RUM	71	Off rd left => obj				Tree/bush											
849432	P	15/02/2013	Fri	08:30	270 m	E	KEERRONG RD	2WY	CRV	Overcast	Wet	80	2	CAR	M57	W in NIMBIN RD	70	Incorrect side	SC	0	1	0	0	0	
E50345814								RUM	20	Head on				4WD	F34	E in NIMBIN RD	65	Proceeding in lane							
1106933	P	14/06/2016	Tue	15:00	5 km	N	LISMORE TN	2WY	CRV	Raining	Wet	80	1	CAR	F36	N in NIMBIN RD	55	Proceeding in lane	MC	0	0	1	0	0	S
E61760131								RUM	87	Off lft/lft bnd=>obj				Embankment											
1120454	S	21/11/2016	Mon	16:02	170 m	N	NUMBER 540 HN	2WY	CRV	Fine	Dry	50	1	UTE	M61	N in NIMBIN RD	Unk	Proceeding in lane	NC	0	0	0	0	0	S
E62737452								RUM	87	Off lft/lft bnd=>obj				S/Barrier - Guardrail											
856429	P	07/10/2013	Mon	12:57	5 km	N	TERANIA ST	2WY	CRV	Fine	Dry	80	1	M/C	M30	S in NIMBIN RD	Unk	Proceeding in lane	SC	0	2	0	0	0	S F
E101825901								RUM	85	Off rt/lft bnd=>obj				Fence (prior to 2014)											
Booerie Creek																									
Nimbin Rd																									
1075264	P	07/05/2015	Thu	16:02		at	BOOERIE CREEK RD	TJN	CRV	Fine	Dry	80	1	TRK	M65	S in NIMBIN RD	80	Proceeding in lane	MC	0	0	1	0	0	S
E58383542								RUM	80	Off left/right bend															
1090093	P	07/12/2015	Mon	11:55	150 m	N	BOOERIE CREEK RD	2WY	CRV	Fine	Dry	80	1	WAG	M54	S in NIMBIN RD	60	Proceeding in lane	NC	0	0	0	0	0	S F
E59910438								RUM	81	Off left/rt bnd=>obj				Drain/culvert											

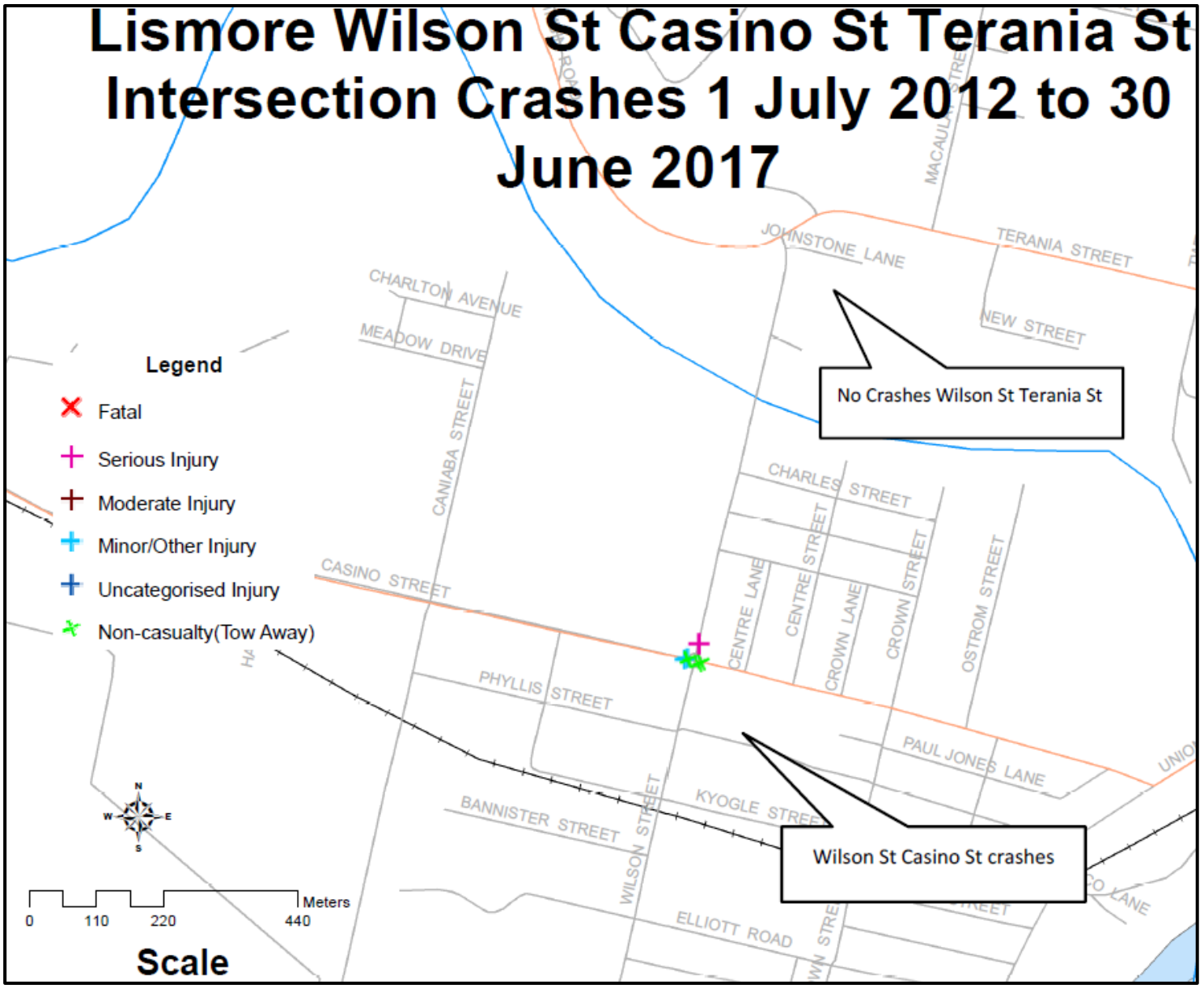
Detailed Crash Report

Transport for NSW — Centre for Road Safety

Crash No.	Data Source	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash-Detailed	Killed	Seriously Inj.	Moderately Inj.	Minor/Other Inj.	Uncateg'd Inj.	Factors
																									S F
1095520	S	03/03/2016	Thu	08:33	200 m	N	BOOERIE CREEK RD	2WY	CRV	Raining	Wet	80	1	WAG	F64	N in NIMBIN RD	Unk	Proceeding in lane	NC	0	0	0	0	0	S
E60582557								RUM: 87	Off lft/lft bnd=>obj					Fence											
1005284	P	20/09/2013	Fri	19:30	300 m	N	BOOERIE CREEK RD	2WY	CRV	Fine	Dry	80	1	TRK	M43	N in NIMBIN RD	80	Proceeding in lane	NC	0	0	0	0	0	
E451962191								RUM: 67	Struck animal					Straying stock											
837083	P	14/05/2013	Tue	11:00	2.3 km	N	BOOERIE CREEK RD	2WY	CRV	Raining	Wet	80	1	CAR	M50	N in NIMBIN RD	60	Proceeding in lane	NC	0	0	0	0	0	S
E51302005								RUM: 82	Off right/right bend																
846071	P	13/07/2013	Sat	06:45	500 m	S	BOOERIE CREEK RD	2WY	CRV	Fog or mist	Wet	80	1	CAR	M19	S in NIMBIN RD	60	Proceeding in lane	NC	0	0	0	0	0	F
E51896475								RUM: 85	Off rt/lft bnd=>obj					Fence (prior to 2014)											
845393	P	14/07/2013	Sun	22:00	500 m	S	BOOERIE CREEK RD	2WY	CRV	Overcast	Wet	80	1	CAR	M18	S in NIMBIN RD	100	Proceeding in lane	MC	0	0	1	0	0	S
E54583388								RUM: 87	Off lft/lft bnd=>obj					Fence (prior to 2014)											
847688	P	31/07/2013	Wed	17:53	500 m	S	BOOERIE CREEK RD	2WY	CRV	Fine	Dry	80	1	4WD	M30	S in NIMBIN RD	80	Proceeding in lane	SC	0	1	0	0	0	S
E52158554								RUM: 87	Off lft/lft bnd=>obj					Fence (prior to 2014)											
855925	P	28/10/2013	Mon	11:57	550 m	S	BOOERIE CREEK RD	2WY	CRV	Fine	Dry	80	1	M/C	M61	S in NIMBIN RD	80	Proceeding in lane	SC	0	1	0	0	0	S F
E55109589								RUM: 85	Off rt/lft bnd=>obj					Drain/culvert											
839872	P	13/04/2013	Sat	13:15	250 m	E	KEERONG RD	2WY	CRV	Raining	Wet	80	1	CAR	F68	W in NIMBIN RD	70	Proceeding in lane	OC	0	0	0	1	0	S
E51532273								RUM: 85	Off rt/lft bnd=>obj					Tree/bush											
1067922	P	28/02/2015	Sat	11:25		at	NUMBER 359 HN	2WY	CRV	Fine	Dry	80	2	M/C	M45	S in NIMBIN RD	70	Incorrect side	SC	0	1	2	0	0	
E57440161								RUM: 20	Head on					VAN	M57	N in NIMBIN RD	55	Proceeding in lane							
853703	P	16/09/2013	Mon	19:40	4.3 km	S	ROSEHILL RD	2WY	CRV	Raining	Wet	100	1	CAR	F17	N in NIMBIN RD	80	Proceeding in lane	NC	0	0	0	0	0	S
E52956073								RUM: 83	Off rt/rt bnd=>obj					Tree/bush											
Lismore																									
Nimbin Rd																									
830740	P	19/03/2013	Tue	13:35	10 m	S	NUMBER 90 HN	2WY	STR	Fine	Dry	80	1	VAN	M20	E in NIMBIN RD	100	Incorrect side	MC	0	0	1	0	0	S
E51365428								RUM: 71	Off rd left => obj					Drain/culvert											
North Lismore																									
Nimbin Rd																									
811287	P	07/09/2012	Fri	21:45	200 m	W	WILSON ST	2WY	CRV	Fine	Dry	60	1	CAR	F61	W in NIMBIN RD	60	Proceeding in lane	NC	0	0	0	0	0	
E49123157								RUM: 81	Off left/rt bnd=>obj					Utility pole											
852685	P	17/09/2013	Tue	10:45	600 m	W	WILSON ST	2WY	CRV	Fine	Dry	100	1	4WD	M66	W in NIMBIN RD	60	Proceeding in lane	MC	0	0	1	0	0	
E52366611								RUM: 85	Off rt/lft bnd=>obj					Drain/culvert											

Report Totals: Crashes: 27 Fatal Crashes(FC): 0 Serious Injury Crashes(SC): 7 Moderate Injury Crashes(MC): 6 Minor/Other Injury Crashes(OC): 1 Uncategorised Injury Crashes(UC): 0 Non-Casualty Crashes(NC): 13

Killed(K): 0 Seriously Injured(S): 8 Moderately Injured(M): 8 Minor/Other Injured(O): 2 Uncategorised Injured(U): 0


Lismore Wilson St Casino St Terania St Intersection Crashes 1 July 2012 to 30 June 2017
Legend
Fatal
Serious Injury
Moderate Injury
Minor/Other Injury
Uncategorised Injury
Non-casualty(Tow Away)
No Crashes Wilson St Terania St
Wilson St Casino St crashes
JOHNSTONE LANE
TERANIA STREET
NEW STREET
CHARLTON AVENUE
MEADOW DRIVE
CANIABA STREET
CHARLES STREET
CENTRE LANE
CENTRE STREET
CROWN LANE
CROWN STREET
OSTROM STREET
CASINO STREET
PHYLLIS STREET
PAUL JONES LANE
BANNISTER STREET
KYOGLE STREET
WILSON STREET
ELLIOTT ROAD
N
W
E
S
0
110
220
440
Meters
Scale

Summary Crash Report

Transport for NSW — Centre for Road Safety

# Crash Type		
Car Crash	7	100.0%
Light Truck Crash	3	42.9%
Rigid Truck Crash	0	0.0%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	(0)	(0.0%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(0)	(0.0%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	0	0.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	6	85.7%
Non intersection	1	14.3%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	2	28.6%
Multi Vehicle	5	71.4%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	6	85.7%
Unclassified Road	1	14.3%

Contributing Factors		
Speeding	0	0.0%
Fatigue	0	0.0%

Weather		
Fine	6	85.7%
Rain	1	14.3%
Overcast	0	0.0%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	1	14.3%
Dry	6	85.7%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	0	0.0%
Daylight	4	57.1%
Dusk	2	28.6%
Darkness	1	14.3%

Crash Movement		
Intersection, adjacent approaches	2	28.6%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	1	14.3%
U-turn	0	0.0%
Rear-end	1	14.3%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	1	14.3%
Off road on straight, hit object	1	14.3%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	0	0.0%
Out of control on curve	0	0.0%
Other crash type	1	14.3%

Speed Limit					
40 km/h or less	0	0.0%	80 km/h zone	0	0.0%
50 km/h zone	7	100.0%	90 km/h zone	0	0.0%
60 km/h zone	0	0.0%	100 km/h zone	0	0.0%
70 km/h zone	0	0.0%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days | ~ 40km/h or less 0 0.0% | ~ School Travel Time Involvement 0 0.0%

Day of the Week												
Monday	1	14.3%	Wednesday	0	0.0%	Friday	3	42.9%	Sunday	1	14.3%	WEEKEND	2	28.6%
Tuesday	0	0.0%	Thursday	1	14.3%	Saturday	1	14.3%	WEEKDAY	5	71.4%			

CRASHES	7	
Fatal	0	0.0%
Serious inj.	1	14.3%
Moderate inj.	0	0.0%
Minor/Other inj.	2	28.6%
Uncategorised inj.	0	0.0%
Non-casualty	4	57.1%

CASUALTIES	4	
Killed	0	0.0%
Seriously inj.	1	25.0%
Moderately inj.	0	0.0%
Minor/Other inj.	3	75.0%
Uncategorised inj.	0	0.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Self Reported Crash	3	42.86%

Time Group		% of Day	
00:01 - 02:59	0	0.0%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	0	0.0%	4.2%
07:00 - 07:59	0	0.0%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	1	14.3%	4.2%
10:00 - 10:59	2	28.6%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	0	0.0%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	0	0.0%	4.2%
15:00 - 15:59	0	0.0%	4.2%
16:00 - 16:59	1	14.3%	4.2%
17:00 - 17:59	2	28.6%	4.2%
18:00 - 18:59	1	14.3%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	0	0.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil	% of Dark		
1	of	1	in Dark 100.0%

Crashes		Casualties
1	2016	2
2	2015	0
1	2014	0
2	2013	2
1	2012	0

McLean Periods		%	% Week
A	0	0.0%	17.9%
B	0	0.0%	7.1%
C	2	28.6%	17.9%
D	1	14.3%	3.5%
E	0	0.0%	3.6%
F	1	14.3%	10.7%
G	2	28.6%	7.1%
H	1	14.3%	7.1%
I	0	0.0%	12.5%
J	0	0.0%	10.7%

#Holiday Periods																
New Year	0	0.0%	Easter	0	0.0%	Queen's BD	0	0.0%	Christmas	0	0.0%	Easter SH	0	0.0%	Sept./Oct. SH	0	0.0%
Aust. Day	0	0.0%	Anzac Day	0	0.0%	Labour Day	0	0.0%	January SH	0	0.0%	June/July SH	2	28.6%	December SH	0	0.0%

Crashid dataset SECA Lismore Wilson St Casino St Terania St Crashes

SECAsolution

Detailed Crash Report

NSW GOVERNMENT Transport for NSW — Centre for Road Safety

Crash No.	Data Source	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash-Detailed	Killed	Seriously Inj.	Moderately Inj.	Minor/Other Inj.	Uncateg'd Inj.	Factors
																								S F
Northern Region																								
Lismore LGA																								
Lismore																								
Casino St																								
803529	P	02/07/2012	Mon	17:10		at WILSON ST	RDB	STR	Fine	Dry	50	1	CAR	M17	E in CASINO ST	45	Proceeding in lane	NC	0	0	0	0	0	
E48777468							RUM 70	Off road to left																
South Lismore																								
Casino St																								
1026239	P	09/05/2014	Fri	18:00		at WILSON ST	RDB	STR	Fine	Dry	50	2	CAR	M34	W in CASINO ST	50	Proceeding in lane	NC	0	0	0	0	0	
E56560087							RUM 10	Cross traffic					CAR	M37	S in WILSON ST	50	Proceeding in lane							
1074187	S	12/07/2015	Sun	16:55		at WILSON ST	RDB	STR	Fine	Dry	50	2	VAN	M U	E in CASINO ST	Unk	Other forward	NC	0	0	0	0	0	
E253229394							RUM 39	Other same direction					TRK	M U	E in CASINO ST	Unk	Other forward							
1081281	S	09/10/2015	Fri	10:15		at WILSON ST	RDB	STR	Fine	Dry	50	2	4WD	F52	N in WILSON ST	Unk	Proceeding in lane	NC	0	0	0	0	0	
E59772451							RUM 10	Cross traffic					TRK	F49	E in CASINO ST	Unk	Proceeding in lane							
1109142	S	12/03/2016	Sat	09:59		at WILSON ST	RDB	CRV	Fine	Dry	50	2	TRK	M42	W in CASINO ST	Unk	Turning right	OC	0	0	0	2	0	
E217479998							RUM 21	Right through					4WD	F48	E in CASINO ST	Unk	Proceeding in lane							
850485	P	12/09/2013	Thu	10:20	10 m	W WILSON ST	RDB	STR	Fine	Dry	50	3	VAN	F38	E in CASINO ST	30	Proceeding in lane	OC	0	0	0	1	0	
E53026671							RUM 30	Rear end					CAR	F27	E in CASINO ST	0	Stationary							
													CAR	M59	E in CASINO ST	0	Stationary							
Wilson St																								
836317	P	12/04/2013	Fri	17:34	25 m	N CASINO ST	2WY	STR	Raining	Wet	50	1	WAG	M31	S in WILSON ST	50	Proceeding in lane	SC	0	1	0	0	0	
E52924982							RUM 73	Off rd rght => obj					Tree/bush											

Report Totals: Crashes: 7 Fatal Crashes(FC): 0 Serious Injury Crashes(SC): 1 Moderate Injury Crashes(MC): 0 Minor/Other Injury Crashes(OC): 2 Uncategorised Injury Crashes(UC): 0 Non-Casualty Crashes(NC): 4

Killed(K): 0 Seriously Injured(S): 1 Moderately Injured(M): 0 Minor/Other Injured(O): 3 Uncategorised Injured(U): 0

Crashid dataset SECA Lismore Wilson St Casino St Terania St Crashes

Crash self reporting, including self reported injuries began Oct 2014. Trends from 2014 are expected to vary from previous yrs. More unknowns are expected in self reported data.
Reporting yrs 1996-2004 and 2018 onwards contain uncategorised inj crashes.

Appendix I Soil and Water Management Plan – Blakebrook Quarry

- Gilbert & Sutherland Pty Ltd

PROJECT

SOIL AND WATER MANAGEMENT PLAN BLAKEBROOK QUARRY BLAKEBROOK NEW SOUTH WALES

PREPARED FOR

LISMORE CITY COUNCIL

DATE

FEBRUARY 2019

GILBERT SUTHERLAND

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PROJECT MANAGER C. Anderson

AUTHOR(S) C. Anderson, A. Fullagar, S. McGhee & B. McRae

CLIENT Lismore City Council

CLIENT CONTACT Eleisha Went

CLIENT REFERENCE –

SYNOPSIS This soil and water management plan (SWMP) establishes responsibilities and procedures for the management of Lismore City Council's hard rock quarry located on Lot 201 DP 1227138, Blakebrook, New South Wales.

REVISION HISTORY

REVISION #	DATE	EDITION BY	APPROVED BY
1	12/17	A. Fullagar	C. Anderson
2	12/18	S. McGhee	C. Anderson
3	12/02/19	B. McRae	C. Anderson
4	13/02/19	A. Fullagar	C. Anderson

DISTRIBUTION

	REVISION NUMBER									
Distribution	1	2	3	4	5	6	7	8	9	10
Lismore City Council	1	1	1	1						
G&S library & file	1	1	1	1						

SUMMARY

Lismore City Council (LCC) commissioned Gilbert & Sutherland Pty Ltd (G&S) to prepare a Soil and Water Management Plan (SWMP) to address the 'Pollutant Studies and Reduction Programs' requirements of the NSW Environmental Protection Authority's (EPA) Licence Variation (issued 27 November 2017) for Blakebrook Quarry, located on premises described as Lot 201 on DP1227138.

Under the Licence Variation, an SWMP is required to detail the type, design, location and appropriate sizing of soil and water management measures for the site, as well as their operational management.

LCC has operated Blakebrook Quarry since 1979. In 2009, a Modification Application was approved to permit expansion of the operations within the Northern Pit. An SWMP was prepared by Environmental Resources Management (ERM) in support of that application, and subsequently approved.

A further Notice of Modification was issued by the former NSW Department of Planning (DoP) on 18 September 2017 in relation to expansion of operations to the Southern Pit. This current SWMP has been prepared in response to that Notice of Modification, and specifically to address Condition 19 of the approval. It both updates the previous SWMP to reflect current site operations and expands the scope to address works within the Southern Pit.

This SWMP incorporates a surface water assessment, a water balance assessment and sediment and erosion control techniques. These components form the basis of the SWMP tables.

The driving principles of this SWMP are to:

- divert clean water around the site operations (where possible)
- retain dirty water within the pits for reuse and/or treatment
- discharge waters from the pits as necessary, and only if they comply with water quality criteria
- update the SWMP (in particular water management drawings and plans) to align with site operations as they progress
- ensure a robust and straightforward approach to the management of soils and water on the site.

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1 Introduction

1.1 Background

Lismore City Council (LCC) commissioned Gilbert & Sutherland Pty Ltd (G&S) to prepare a Soil and Water Management Plan (SWMP) for Blakebrook Quarry to address the requirements of a *Notice of Variation of Licence No. 3384* (notice number 1558031, file number EF13/3226,) issued by NSW Environmental Protection Authority (EPA) on 17 November 2017.

The Environmental Protection Licence (No. 3384, version dated 17 November 2017) now includes the following requirement under *Section 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.*

This SWMP has been prepared to address the above requirement in respect to the current operations of the quarry.

This report is divided into sections detailing the physical characteristics of the site and the findings of site assessments. The SWMP proposes management measures to prevent and/or minimise potential impacts during the operational phase of the works. It is these management sections that form the basis of the Soil and Water Management Plan for the site.

The report is based on site observations undertaken by G&S staff, a desktop assessment using available topographic and landscape information, on-site investigations and also utilises information from previous reports for Blakebrook Quarry, including:

- Blakebrook Quarry Expansion, Environmental Assessment Report, Final Report, prepared by ERM, dated January 2009.
- Blakebrook Quarry Expansion, Soil and Water Management Sub-Plan, prepared by ERM, dated April 2011.
- Blakebrook Quarry Water Balance Model 2016, prepared by NDC, dated February 2017.

1.2 Notice of Modification - Specific Environmental Conditions

Under the Notice of Modification, Schedule 3 Specific Environmental Conditions, under condition 19 the Proponent is required to prepare a SWMP for the project to the satisfaction of the Secretary.

To address this condition, this SWMP is prepared by G&S under the requirement of the Notice of Modification.

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:
  a. Site Water Balance that includes:
    i. details of:
      1. sources and security of water supply;
      2. water use and management on site;
      3. any off-site water transfers; and
      4. reporting procedures; and
    ii. measures to be implemented to minimise clean water use on site;
  b. Surface Water Management Plan, that includes:

i. *a program for obtaining detailed baseline data on surface water flows and quality in water bodies that could potentially be affected by the project;*
ii. *a detailed description of the surface water management system on site including the:*
    1. *clean water diversion system;*
    2. *erosion and sediment controls;*
    3. *dirty water management system; and*
    4. *water storages; and*
iii. *a program to monitor and report on:*
    1. *any surface water discharges;*
    2. *the effectiveness of the water management system,*
    3. *the quality of water discharged from the site to the environment;*
    4. *surface water flows and quality in local watercourses;*

c. *Groundwater Management Plan that includes:*
i. *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*
ii. *a monitoring program to manage potential impacts, if any, on any alluvium and associated surface water source near the proposed extraction area that includes:*
    1. *identification of a methodology for determining threshold water level criteria;*
    2. *contingency measures in the event of a breach of thresholds; and*
    3. *a program to regularly report on monitoring.*

1.3 Quarry operating conditions under EPA Licence 3384

The Environment Protection Licence for the quarry (EPA Licence 3384) permits land-based extractive activities on a production scale of 100,000 tonnes to 500,000 tonnes per annum for extraction, processing and storage. Ancillary activities permitted to be carried out at the premises include bitumen pre-mix or hot-mix industries.

The licence regulates water pollution resulting from the activities carried out at the site.

Currently, the licence permits site discharge from a single location, described as:

> *'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.'*

Quarrying activities including loading and dispatch of trucks as well as the asphalt plant are permitted to operate during specified hours six days a week (Monday to Saturday) whilst blasting activities are limited to five days (Monday to Friday). No activities (with the exception of maintenance or government work) are permitted on Sundays or Public Holidays.

The operating conditions are detailed in Section 4 of the licence. The conditions specifically relating to water management are:

> ***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 by Environmental Resources Management Australia on behalf of Lismore City Council.

This report addresses the above operating conditions in respect to current and future operations at the quarry.

The drawings in Appendix 1 and the corresponding attachments have been designed to be updated over time to reflect the progress of works on site.

2 Site description and physical characteristics

2.1 Site description

LCC has owned and operated Blakebrook Quarry since 1979. The quarry is located on premises described as Lot 201 on DP 1227138 and is situated off Nimbin Road at Blakebrook, approximately seven kilometres northwest of Lismore, New South Wales ('the site').

The site occupies an area of approximately 126ha, with elevations (prior to commencement of quarrying operations) ranging from approximately 30 metres Australian Height Datum (mAHD) to 140 mAHD.

It is proposed that, once completed, the quarry pits will occupy a total area of 44.2 ha within the site, comprising the primary 40 ha northern pit to a maximum depth of 55 mAHD and a smaller 4.2 ha pit in the south of the site to a depth of 105 mAHD.

2.2 Catchment description

The site is situated on a ridge between Blakebrook Creek to its east and Terania Creek to its west. The main northern pit is located on the west-facing side of the ridge, within the natural terrain draining westwards via existing ephemeral gullies to Terania Creek.

The smaller southern pit is located on the eastern side of the ridge, with the natural terrain in this locale draining via existing ephemeral flow paths to the east towards Blakebrook Creek.

2.3 Vegetation

A large area, central to the site has previously been cleared and is occupied by the existing quarry pits, surrounding access roads and quarry and process plant infrastructure. The remainder of the site is occupied by vegetation of varying density, with some areas having been cleared for previous agricultural site uses and other areas occupied by dense tree cover.

2.4 Soils and landform

A review of the Morand (1994) 1:100,000 Soil Landscape Series 9540-9640 (Lismore-Ballina) indicates that the site geology is comprised of residual landscapes of the Frederick (fr) origin, surrounded by colluvial landscapes of the Georgica (ge and gea) type, as shown on Drawing No. 11737-003 (in Appendix 1).

The Frederick landscape type is characterised by low undulating rises on flat basalt plateau surfaces. Relief of 5-30 m, elevations of 130-180 m and slopes of 1-10%. Soils comprise shallow (<100 cm), poorly drained Prarie Soils (Gn3.42), localised moderately deep (100-150 cm), well drained Krasnozems (Uf5.2, Gn3.11, Gn4.11) on iron-rich material and deep (>150 cm), poorly drained Black Earths/Weisenboden (Ug5.15, Ug5.17) and Dense Clays (Uf6.61) within drainage depressions.

The surrounding Georgica landscapes are characterised by high rolling and steep waning hills on Lismore Basalts. Relief of 90-200 m and slopes of 15-30%. Sideslopes, ridgeslopes, and narrow, sharp ridges and crests are common. Widespread mass movement has created a hummocky microrelief and tarracettes are common. Soils comprise shallow (50-100 cm), moderately will drained Chocolate Soils (Db3.11) and Prarie Soils (Gn3.21, Um5.51) on crests and upper slopes. Shallow to moderately deep (50-150 cm), moderately well-drained Chocolate Soils (Db3.11, Db3.12) on upper slopes. Shallow to moderately deep (60-150 cm), well-drained Prarie Soils and Chocolate Soil/Prarie Soil intergrades (Gn3.21) on mid-slopes. Deep (>150 cm), poorly to moderately well-drained Black Earths (Ug5.17, Ug5.15) on lower slopes and footslopes.

2.5 Geology and Hydrogeology

The Quarry is located within Booerie Hill, an igneous outcrop composed of Tertiary-age basalts ascribed to the Lamington Group. The Quarry extracts these basalts that comprise a series of sub-horizontal, stacked and layered, massive and vesicular, ancient lavas of varying thickness and composition.

The bulk of the Quarry workings are hosted within a near-surface, local-scale, unconfined aquifer that is, in turn, hosted in the Krasnozem soils and an underlying regolith of weathered, fractured massive and vesicular basalt.[1] Below this aquifer, there is a deeper, intermediate-scale confined to semi-confined groundwater flow system within the interlayered and fractured horizons of the basalt.[2]

Deeper aquifers are effectively separated and confined by a relatively thick sequence of massive, poorly fractured basalt. The water bearing layers are; shallow (113 mAHD to 109 mAHD), the intermediate – upper (95 mAHD to 87.5 mAHD), intermediate – lower (72 mAHD to 65 mAHD) and deep (28.5 mAHD to 22.5 mAHD).[3]

The shallow aquifer responds to rainfall-recharge reflected in the formation of seeps. Groundwater flow in this shallow regolith-hosted aquifer is a function of topography whereby groundwater is recharged via the surrounding hills and ridge slopes. The deeper aquifers do not respond quickly to rainfall-recharge events.[4]

A characteristic of aquifers such as these is that the groundwater flow systems are likely isolated into groundwater flow 'cells', rather than homogenous aquifer systems.[5] This implies that the overall effect of quarrying on these aquifers is predicted to be only in the immediate vicinity of the Quarry, with minor and localised groundwater drawdown occurring.

The shallow aquifer is already intersected by the approved extraction in the northern pit to approximately 105 mAHD. The intermediate aquifers would be affected by extraction to the ultimate depth of 55 mAHD in the northern pit. Similarly, the shallow aquifer would be affected by excavation to the ultimate depth of 105 mAHD in the southern pit.

Once the northern pit intersects the intermediate aquifers (87.5 mAHD) the groundwater inflow to the pit is estimated to approximate 190kL/day (2.2 L/s).[6]

---

[1] Environmental Resources Management (ERM) (2011). *Blakebrook Quarry Expansion, Groundwater Monitoring and Management Sub-Plan*. Prepared for Lismore City Council. ERM 0066641. April 2011.

[2] Ibid.

[3] Gilbert & Sutherland (2019). *Hydrogeological Review: Groundwater Monitoring & Management Blakebrook Quarry Nimbin Road, Lismore, New South Wales.* Prepared for Lismore City Council January 2019. Which can be downloaded at: https://www.dropbox.com/s/uqkp2l6yyh0ajr7/11737%20GWA%20RER7F.pdf?dl=0.

[4] Environmental Resources Management (ERM) (2011). *Blakebrook Quarry Expansion, Groundwater Monitoring and Management Sub-Plan*. Prepared for Lismore City Council. ERM 0066641. April 2011.

[5] Ibid.

[6] Gilbert & Sutherland (2019). *Hydrogeological Review: Groundwater Monitoring & Management Blakebrook Quarry Nimbin Road, Lismore, New South Wales.* Prepared for Lismore City Council January 2019. Which can be downloaded at: https://www.dropbox.com/s/uqkp2l6yyh0ajr7/11737%20GWA%20RER7F.pdf?dl=0.

3 Soil and Water Management Plan

3.1 Intent

This Soil and Water Management Plan (SWMP) has been prepared to address requirements of Environment Protection Licence No. 3384. The SWMP details the Proponent's commitments to mitigate the potential environmental impacts associated with the operation of the quarry and associated approved activities at Lot 201 on DP 1227138.

3.2 Aims and objectives

The control measures stated in this SWMP are designed to minimise any potential environmental impacts associated with the hard rock quarry operations and asphalt and processing plant activities at Blakebrook Quarry.

The SWMP aims to achieve the following:

- Provide evidence of practical and achievable plans for the management of site activities.
- Ensure that legislative and environmental requirements are complied with by producing an integrated planning framework for comprehensive monitoring and control of operational impacts. Specific commitments on strategies and design standards to be employed are also given.
- Provide a framework for regulatory authorities and the proponent to confirm compliance with policies and conditions.
- Provide evidence to the community that the operation is being managed in an environmentally responsible manner.

The objectives of the SWMP are to ensure the following:

- All reasonable and practical measures are taken to prevent and/or minimise the likelihood of environmental harm being caused.
- On-site activities occur without adverse environmental impact or causing nuisance to nearby sensitive receptors.
- Identify both existing and potential future environmental considerations relating to the project site and surrounding area.
- Provide mitigation measures to assist in the minimisation of any potential impacts.
- Good stewardship of natural resources, consistent with current good extractive industry practice.
- Potential impacts on adjoining land users are minimised.

3.3 Implementation

This SWMP requires the Proponent(s) to mitigate the potential environmental impacts associated with the hard rock quarrying operations and asphalt and processing plant activities at the site. The SWMP addresses each component of Condition 19 of the Notice of Modification. The summary table included as Attachment 5 identifies where each condition is addressed in this SWMP.

The Proponent is also responsible for all persons (including employees, plant operators, contractors, subcontractors, delivery drivers, etc) whose activities/actions breach the management measures specified in the SWMP. This responsibility also extends to adjacent properties in the event that operational activities encroach upon and cause potential environmental degradation.

3.4 SWMP structure

This SWMP acknowledges the potential environmental impacts associated with the operations at the Blakebrook Quarry site. Each SWMP control strategy is based upon proven environmental management methods and is presented as a commitment. The commitments made within this document will form the basis of future assessments which will be made available to LCC and other statutory authorities for review.

The SWMP is based on a series of tables, with the person responsible for the implementation of the measures clearly stated. The tables describe the issue, performance criteria, implementation strategy, monitoring, auditing and reporting requirements, failure/incident identification procedures and corrective actions. The format is presented below for reference purposes.

#.# Title

Person responsible	The person(s) who is responsible for implementing the SWMP provisions detailed in this table.
Issue	The issue with which the table deals.
Operational policy	The operational policy or management objective that applies to this issue.
Performance criteria	Performance criteria (outcomes) for this issue.
Implementation strategy	The strategies or tasks (to nominated operational design standards) that will be implemented to achieve the performance criteria.
Monitoring	The monitoring requirements which will document actual performance (i.e. specified limits to pre-selected indicators of change).
Auditing	The auditing requirements that will verify implementation of the strategies and compliance with agreed performance criteria.
Reporting	Content, timing and responsibility for reporting, including auditing of monitoring results.
Identification of incident or failure	The circumstances under which the agreed performance criteria are unlikely to be met and environmental harm is likely to result.
Corrective action	The action(s) to be implemented when a performance requirement is not reached and the company(s) responsible for action.

Commitment #

What the management has committed to on behalf of the proponent.

An objective of the tabular format is to allow for change and allow the SWMP to be a working document. If items need altering, changes will be made to the individual tables after appropriate consultation with the statutory authorities.

3.4.1 General commitments

Commitment 1

The Proponents undertake to comply with the environmental implementation strategy as contained within the approved SWMP.

Commitment 2

The Proponents undertake to fulfil all commitments made in this SWMP and to carry out their activities on the project site in accordance with relevant current statutory requirements and approved amendments.

Definitions

In this SWMP these terms have the following meanings;

- SWMP means the approved Soil and Water Management Plan and includes any amendments that are approved from time to time.
- Development means the development of the site for the purposes of the hard rock quarrying operations and asphalt and processing plant activities.
- Operational means the period when quarrying activities (including loading and dispatching of trucks and blasting) are occurring and/or the asphalt plant is operating.
- Proponent(s) means the person undertaking the development and/or operation of the site and includes the person(s) nominated as having responsibility for implementing the provisions of the SWMP.
- LCC means Lismore City Council.
- EPA means the NSW Environment Protection Authority
- DPE means the NSW Department of Planning and Environment

3.5 Management of potential impacts – operational phase

3.5.1 Extraction of quarry material

Person responsible:	Quarry manager
Issue	Extraction of Quarry Material
Operational policy	To control the progress of extraction in order to allow for effective environmental management.
Performance criteria	Environmental values shall be protected as defined in the Protection of the Environmental Operations Act 1997. Environmental impacts will be within the limits set by the approval conditions.
Implementation strategy	The limit of extraction will be clearly and permanently marked (by a licensed surveyor) with delineator posts on the ground. Extraction will not exceed the nominated depth. Extraction rates will not exceed a maximum quantity of 500,000 tonnes/year.
Monitoring	Monthly extraction rates will be calculated and recorded. Annual extraction rates will be calculated and recorded. Depth of extraction will be monitored annually using survey to ensure that extraction does not exceed the nominated depth. All records will be kept for at least 4 years after the monitoring or event to which they relate took place.
Auditing	Auditing will be undertaken by the Site Manager and/or the Proponent's nominated representative or independent consultant. The audit will include an inspection of site activities and a review of monitoring, complaints, corrective actions and reporting to assess compliance with this SWMP.
Reporting	Monthly records of accrued extraction rates will be maintained on-site and made available to DPE and/or EPA upon request. Annual return (including monitoring and complaints summary and statements of compliance) will be completed and supplied to the EPA via eConnect EPA or by registered post not later than 60 days after the end of each reporting period (based on the Licence Anniversary date of 17 January). A copy of each Annual Return supplied to the EPA will be kept by the licensee for a period of at least 4 years after the return was due to be supplied to the EPA.
Identification of incident or failure	Monitoring results of extraction rates and depth will indicate to management if extraction rate is too high, extraction depth too deep or limit of extraction is exceeded.

Corrective action	Extraction will be slowed or ceased if extraction operations are inappropriate, under instruction from Production Manager or General Manager.

Commitment 3

All extraction processes will be conducted in a manner that minimises adverse effects to the surrounding environment.

Commitment 4

An extraction plan will be implemented to ensure that extraction rates will be effectively monitored throughout the project's operational life.

3.5.2 Dust minimisation onsite

Person responsible:	Site nominated Environmental Manager/Quarry manager
Issue	Minimisation of movement of dust offsite
Operational policy	To minimise dust movement offsite.
Performance criteria	To control dust within the site so as to minimise movement offsite, to minimise complaints and, when complaints do arise, to respond in a manner that is timely, effective and consistent with this SWMP and relevant policies and legislation. Environmental values shall be protected as defined in the Protection of the Environment Operations (Clean Air) Regulation 2010 and Protection of the Environmental Operations Act 1997. Compliance with legislation regarding environmental nuisance.
Implementation strategy	• The transport and handling of materials will be minimised by placing adequately sized storage facilities close to processing areas. • Additional management measures that will be implemented as appropriate include: - Reducing drop heights of loading and unloading activities and protecting them from the wind; - Dampening of stored material; - Screening material to remove dusty fractions prior to external storage; - Restricting vehicle speeds; - Watering unsurfaced roads; - Wheel or body wash at appropriate distances from the site entrance; - Sheeting or covering of vehicles; and - Use of water sprays to moisten material. • All permanent bunds will be revegetated as quickly as possible. • Soil stockpiles will be covered or vegetated if they are to remain onsite for an extended period of time. The speed limit on all haulage roads onsite will be a maximum of 40km/hr. All loads will be secured prior to leaving the site in accordance with the Roads and Maritime guidelines. Haulage roads onsite will be maintained according to the following standards: • Temporary roads with a life of up to three (3) months will have no treatment. • Temporary roads with a life of three (3) to twelve (12) months will be gravel.

	• Permanent roads with a life of one (1) year and over will be gravel. • The haulage roads will be wetted down daily or as needed.
Monitoring	A site weather station will be used to measure and record wind speed and direction to assist in understanding weather conditions upon the receipt of a complaint. Monitoring will be undertaken in accordance with AS 3580.10.1 (2003) upon the receipt of complaints. The monitoring program will assess the success of the dust management programs implemented onsite. Monitoring records/results will be recorded, compiled and made available for inspection upon request by statutory authorities.
Auditing	Auditing will be undertaken by the Site Manager and/or the Proponent's nominated representative or an independent consultant. The audit will include an inspection of site activities and a review of monitoring, complaints, corrective actions and reporting to assess compliance with this SWMP.
Reporting	Any dust mitigation measures implemented (such as cessation of crushing, cessation of loading, application of water to stockpiles etc) shall be recorded in the Site Diary. Any incidents/complaints will be recorded in Council's customer complaints register and will be available for inspection by DPE and/or EPA upon request. Reporting to EPA required upon receipt of complaints will include the nature of the complaint, the weather conditions at the time and any necessary remedial actions undertaken or planned to be undertaken. The complaints will be recorded using Council's customer management system. If no complaints are received, a summary of dust management will be included within the Annual Return to be submitted to EPA. Annual return (including monitoring and complaints summary and statements of compliance) will be completed and supplied to the EPA via eConnect EPA or by registered post not later than 60 days after the end of each reporting period (based on the Licence Anniversary date of 17 January). A copy of each Annual Return supplied to the EPA will be kept by the licensee for a period of at least 4 years after the return was due to be supplied to the EPA.
Identification of incident or failure	Dust problems will be identified by complaints to Council by residents or monitoring.
Corrective action	Complaints by residents will be recorded by Council, using its customer management system, including any corrective actions undertaken and any outcomes achieved. Depending on the source of the dust the following measures will be implemented as appropriate:

	• Dampen exposed areas; • Dampen stockpiles; • Cease crushing; • Vegetate soil stockpiles; and • Dampen roads.

Commitment 5

Dust generating sources onsite will be managed to ensure that the local air quality complies with standards outlined by the EPA.

3.5.3 Sediment and erosion control

Person responsible:	Site nominated Environmental Manager/Quarry manager
Issue	Sediment and erosion control
Operational policy	To control the displacement of sediment across and off site and responsibly manage water, notably rainfall runoff.
Performance criteria	No uncontrolled erosion or sediment accumulation results from on-site activities. 'Clean water', notably from undisturbed catchment areas around the pits, is appropriately diverted away from site operational areas. 'Dirty water' from operational areas is appropriately managed to promote sediment control, beneficial water reuse on-site, and discharge as necessary of suitable quality water to nominated off-site receiving waters.
Implementation strategy	Drainage, erosion and sediment controls will be installed, managed and/or implemented continuously as works progress. These controls will be installed in general accordance with drawing 11737-004 and 11737-005. It must be noted that LPD2 and LPD3 depicted on drawing 11737-005 '*Future Quarry Water Management',* will not come into effect until approved under EPL 3384. Temporary erosion measures (e.g. hay bales, straw fences) will be employed on-site where necessary. The following controls in accordance with *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, will be employed during the operation: 1. Clean water diversion bunds and associated drainage infrastructure will be installed upslope of the pits to divert runoff from undisturbed catchment areas around the pits. 2. Maintenance of the clean water diversion controls, including bunds, inlets and outlets, will be conducted as necessary to ensure the system functions as designed and supports this SWMP. 3. If any vegetation clearing or similar works occurs within the clean water catchment area, appropriate sediment and erosion controls will be identified and installed prior to the works commencing. 4. Stockpiled soil material will be stored in a manner to prevent sediment being washed off-site. 5. Water within the pits will be directed to the sediment basins located within each pit. 6. Runoff from operational areas outside the pits (processing areas etc.) will be directed to separate sediment basins located downslope of the respective catchment areas. 7. Where necessary, sediment basins will be dosed with flocculating agents as necessary to meet the water quality requirements specified in Table 3.5.4 below.

	8. Subject to meeting these specified water quality requirements, any water within sediment basins will be discharged within five days to ensure capacity for future rainfall events. 9. All discharges will be to points nominated on the attached drawings. Water from the sediment basin within the main (northern) pit will (where capacity exists) be pumped to the water storage dam for beneficial reuse on-site to support quarry operations. 10. Sediment will be cleaned out of sediment basins when accumulated sediment volume reaches 50% of the basin's design capacity. A marker will be installed to delineate this level. Removed materials will be placed upgradient of a sediment basin, so that water within in the sediment can drain back into the basin. The sediment is to be located such that it will not be re-entrained by stormwater flows discharging into the basin. The drained sediment will then be incorporated into products or mixed with topsoil (if necessary) and used onsite for rehabilitation.
Monitoring	Visual inspections monthly and following rainfall events (defined as >25mm in 24 hours) to ensure controls are sufficient, appropriately maintained and functional. A record of the inspections will be included in the Site Diary.
Auditing	Auditing will be undertaken by the Site Manager and/or the Proponent's nominated representative or an independent consultant. The audit will include an inspection of site activities, monitoring, complaints, corrective actions and reporting to assess compliance with this SWMP.
Reporting	Reporting (more frequently than the annual return) is only required if insufficient sediment and erosion control measures are identified. Annual return (including monitoring and complaints summary and statements of compliance) will be completed and supplied to the EPA via eConnect EPA or by registered post not later than 60 days after the end of each reporting period (based on the Licence Anniversary date of 17 January). A copy of each Annual Return supplied to the EPA will be kept by the licensee for a period of at least 4 years after the return was due to be supplied to the EPA.
Identification of incident or failure	• Signs of erosion on site. • Accumulation of debris within clean water diversion controls • Erosion adjacent to diversion controls that indicates failure • Excessive sediment within basins • Damaged or failed erosion controls
Corrective action	Improve, repair and/or redesign controls

Commitment 6

Appropriate sediment and erosion controls will be implemented on site in a timely manner to minimise sediment movements across and offsite during storm events.

Commitment 7

Clean water from the undisturbed upslope catchment will be diverted around the pits to a point of discharge.

Commitment 8
Dirty water will be appropriately managed to promote sediment control, beneficial water reuse on-site, and discharge as necessary of suitable quality water to nominated off-site receiving waters.

3.5.4 Surface water management and monitoring

Person responsible:	Site nominated Environmental Manager/Quarry manager
Issue	Management of surface water quality downstream of the quarry
Operational policy	To maintain surface water quality downstream of the quarry.
Performance criteria	Downstream surface water quality will not be adversely impacted by on-site operations. Surface water quality will be assessed against established background conditions. Where information regarding background quality is not available water quality will be assessed against the ANZECC (2000) guideline limits.
Implementation strategy	• Water quality monitoring will be undertaken on sediment basins prior to water from them being actively discharged from the site. The water will be tested for pH and total suspended solids (TSS). A visual inspection will also to be carried out for oil and grease. Discharge of the sedimentation basins will only occur if: ◦ pH is between 6.5 and 8.5; ◦ TSS < 50mg/L; and ◦ No visual oil or grease. • Over a minimum of 12 monitoring rounds turbidity will also be analysed. A statistical analysis will then be performed to establish a correlation between TSS and turbidity (the correlation will be undertaken on data of varying water quality i.e. near LOR to >50mg/L TSS). Once a correlation is successfully established (identified as an R^2 >0.7) the equivalent turbidity value to TSS 50mg/L will be used to provide rapid feedback on the suitability or otherwise for discharge of sediment basins. • Where necessary, settlement of the sediment basins will be assisted by dosing with a flocculant such as gypsum. • Reliable in situ monitoring equipment (pH and turbidity) will be available to quarry staff at all times and staff will be given appropriate training and supervision to ensure the accuracy and adequacy of monitoring. • Surface water conditions outside the excavation area will be monitored in accordance with the specifications in Attachment 6 to ensure that any significant variance from background conditions is identified in a timely manner and potential impacts from site operations can be assessed and, as appropriate, corrected.
Monitoring	• Monitoring of the waters contained within the sediment basin prior to its active discharge.

	• Daily monitoring of the waters contained within the sediment basin during active discharge from sedimentation basins. • Monitoring of offsite surface waters at the discharge points nominated in Attachment 6 prior to and during discharge operations.
Auditing	Auditing will be undertaken by the Site Manager and/or the Proponent's nominated representative or an independent consultant. The audit will include an inspection of site activities and a review of monitoring, complaints, corrective actions and reporting to assess compliance with the SWMP.
Reporting	• Results of the monitoring program will be compiled and records kept on-site for inspection by DPE and/or EPA upon request. • Results (including interpretation against the site specific targets contained in Attachment 6) will be compiled and forwarded to DPE and/or EPA upon request.
Identification of incident or failure	• Discharge of non-compliant waters from sedimentation basins • Deterioration in surface water quality downstream of the quarry.
Corrective action	If the test results for any parameter fail to meet the water quality targets and are likely to be attributable to site activities, further investigations will be conducted. The investigation will seek to ascertain if the incident/failure is an anomaly or if a sustained decline in surface water quality is present. If a trend exists for declining surface water quality, the likely cause(s) of contamination shall be identified and addressed. If the investigation indicates that site activities are triggering the incident/failure, the following will be implemented: • Locate the source of the contamination and take all possible actions to contain and control the contaminant. Investigate the cause of the contamination and take action to prevent a recurrence. • All extraction and processing activities taking place at the time of the incident/failure will be reviewed to verify compliance with the provisions of the SWMP and, if necessary, procedures shall be adjusted.

Commitment 9

Management will ensure downstream surface water quality is not degraded by site activities.

3.5.5 Groundwater management and monitoring

Person responsible:	Site nominated Environmental Manager/Quarry manager
Issue	Management of groundwater quality.
Operational policy	To prevent the degradation of groundwater quality and minimise potential impacts on the groundwater regime external to the site.
Performance criteria	Groundwater quality is not adversely impacted by on-site operations.
Implementation strategy	Monitoring of the groundwater bores at a frequency and for parameters as specified in specified in Attachment 7. Site specific groundwater quality targets for the monitoring locations are contained in Attachment 7, which provides information on the methodology used to derive the targets. Groundwater inflow monitoring will be undertaken in accordance with the below requirements. 1. Once the northern pit reaches an extraction depth of 87.5 mAHD the volumes of the groundwater inflows to the pit will be monitored . 2. Once the southern pit reaches an extraction depth of 113 mAHD the volumes of the groundwater inflows to the pit is to be monitored. 3. A water licence will be obtained, as required, to cover the volume of any unforeseen groundwater inflows into the quarry from the quarry face or floor.
Monitoring	• Monitoring of the groundwater bores at a frequency and for parameters as specified in specified in Attachment 7. • Download and review the water levels from the data loggers deployed in the bores on the frequency specified in Attachment 7. The loggers must record the water level on a minimum daily basis, this will allow for the quantification of quarry related activities on groundwater levels. • A water balance will be prepared for the site annually. The volume of groundwater inflows to the pit will be estimated based on a 'back calculation' from the rainfall runoff volume (from site specific rainfall data) and pumping/reuse records. This estimated actual groundwater inflow will be reviewed against the previous annual estimate and any drawdown observed in the groundwater bores. • Observed seepage areas and rates (if possible) will be recorded in the site diary. • On an annual basis the water level information, water quality information, water balance information and site logs will be reviewed by a suitability qualified person to confirm that site impacts are in accordance with those impacts anticipated by the GWA.[7]

[7] Gilbert & Sutherland (2019). *Hydrogeological Review: Groundwater Monitoring & Management Blakebrook Quarry Nimbin Road, Lismore, New South Wales.* Prepared for Lismore City Council January 2019. Which can be downloaded at: https://www.dropbox.com/s/uqkp2l6yyh0ajr7/11737%20GWA%20RER7F.pdf?dl=0.

Auditing	Auditing will be undertaken by the Site Manager and/or the Proponent's nominated representative or an independent consultant. The audit will include an inspection of site activities and a review of monitoring, complaints, corrective actions and reporting to assess compliance with the SWMP.
Reporting	Results of the monitoring program will be compiled and records kept on-site for inspection by DPE and/or EPA upon request. The assessment must adequately assess groundwater quality against the site specific triggers derived and contained in Attachment 7.
Identification of incident or failure	• Deterioration of groundwater quality due to on-site activities. • Continual non-compliance with the water quality targets. • Unanticipated drawdown within the groundwater bores (i.e. outside the expected drawdown) • Sudden or unexpected changes in groundwater levels recorded within the bores by the data loggers. • Reductions in flows within the landform downgradient of the site • Vegetation die-off in the downgradient landform
Corrective action	If the test results for any parameter fail to meet the water quality objectives or identification of a sudden and un-characteristic change in water levels are likely to be attributable to site activities, further investigations will be conducted. The investigation will seek to ascertain if the incident/failure is an anomaly or if a sustained decline in groundwater quality is present. If a trend exists for declining groundwater quality, the likely cause(s) of contamination will be identified and addressed. If the investigation indicate that site activities are triggering the incident/failure, the following will be implemented: • Locate the source of the contamination and take all possible actions to contain and control the contaminant. Investigate the cause of the contamination and take action to prevent a recurrence. • All extraction and processing activities taking place at the time of the incident/failure shall be reviewed to verify compliance with the provisions of the SWMP and, if necessary, procedures shall be adjusted. • If the issue is a change in level outside the expected drawdown then the GWA conceptual groundwater model will be revisited to determine if the changes identify potential offsite impacts and/or whether any corrective actions are recommended. • If a reduction in the seepage down-gradient of the site is identified, feasibility planning will be undertaken for active rehydration of the landform by pumping of suitable quality waters from within the sediment

	basins to downgradient recharge areas. These recharge areas will take the form of an existing gully, a strategically located flow spreading swale, of sub surface gravel recharge trenches. The form of any rehydration device is the subject of detailed design and, as appropriate, consultation. • Apply for the appropriate water licence(s) to cover the volume of any unforeseen groundwater inflows into the quarry from the quarry face or floor.

Commitment 10

Management will ensure that on-site activities do not appreciably impact the quality or quantity of groundwater resources and/or their use by GDE and surrounding landholders.

4 Administration of the SWMP

4.1 Amendment of the SWMP

If amendments to this SWMP are sought, the proponent will make application to EPA to amend the provisions of this SWMP. The application shall:

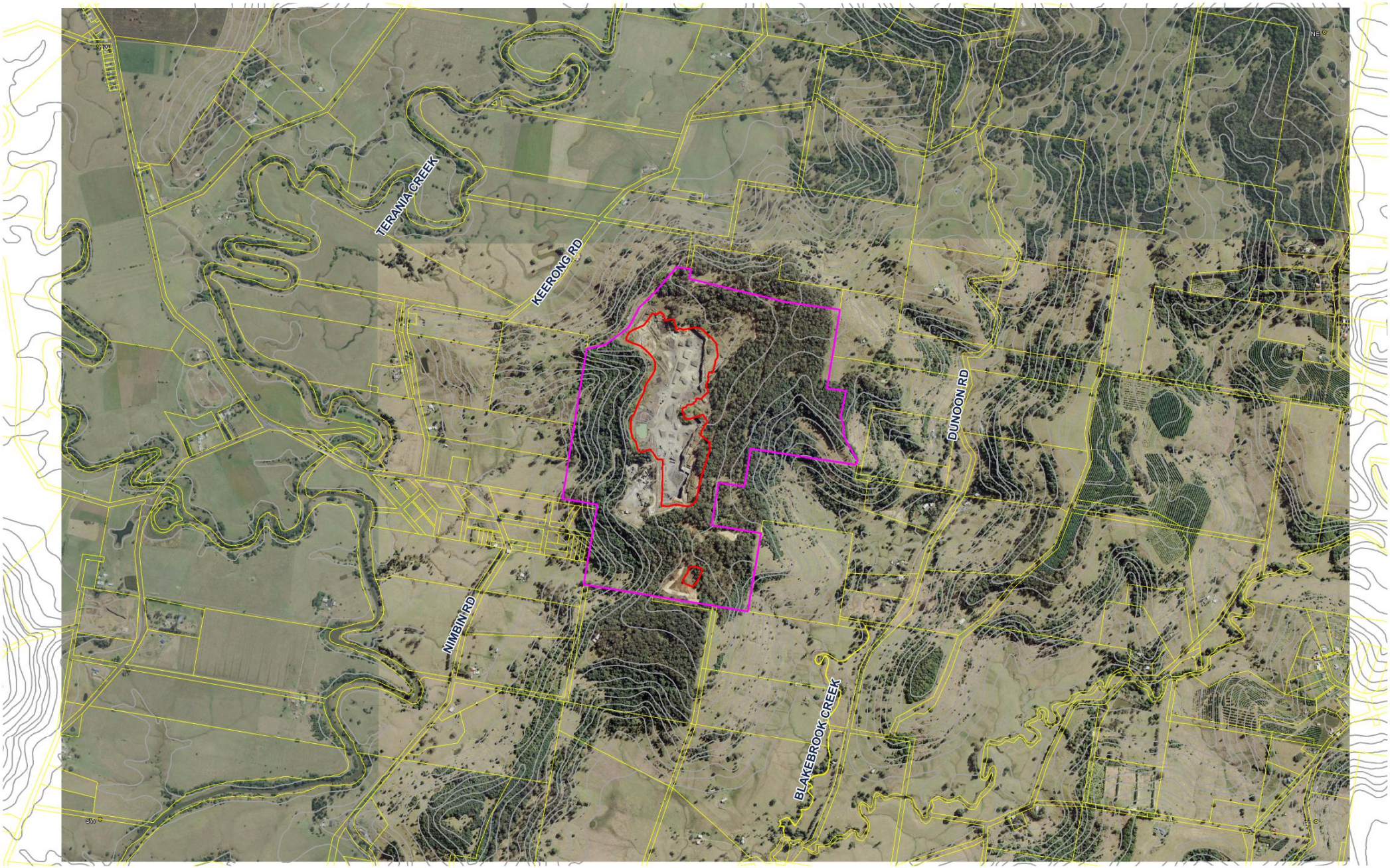
- be in writing;
- specify the provisions of the SWMP to which the application relates; and
- state how the proposed amendments achieve the objectives of the provisions to which the amendments relate.

EPA shall approve the amendment where it is satisfied acting reasonably that the proposed amendments achieve the objective of the provisions to which the amendment relates.

4.2 Incident management

The Proponent and any person appointed by the Proponent as having responsibility for a control strategy set out in this SWMP have clearly defined responsibilities under the *Protection of Environment Operations Act 1997* to report any incidents likely to cause material or serious environmental harm.

5 Attachment 1 – Drawings



ORIENTATION

SCALE
150 300 450 600 750
metres

ROBINA
PO Box 4115 Robina QLD4230
Email robina@access.gs
07 5578 9944
www.access.gs

LEGEND

- Quarry pit (existing)
- Site boundary
- Cadastral boundaries
- Contours (10m interval)

SOURCES

Image source: Google Earth - NSW Globe
Image dates: 4 September 2012

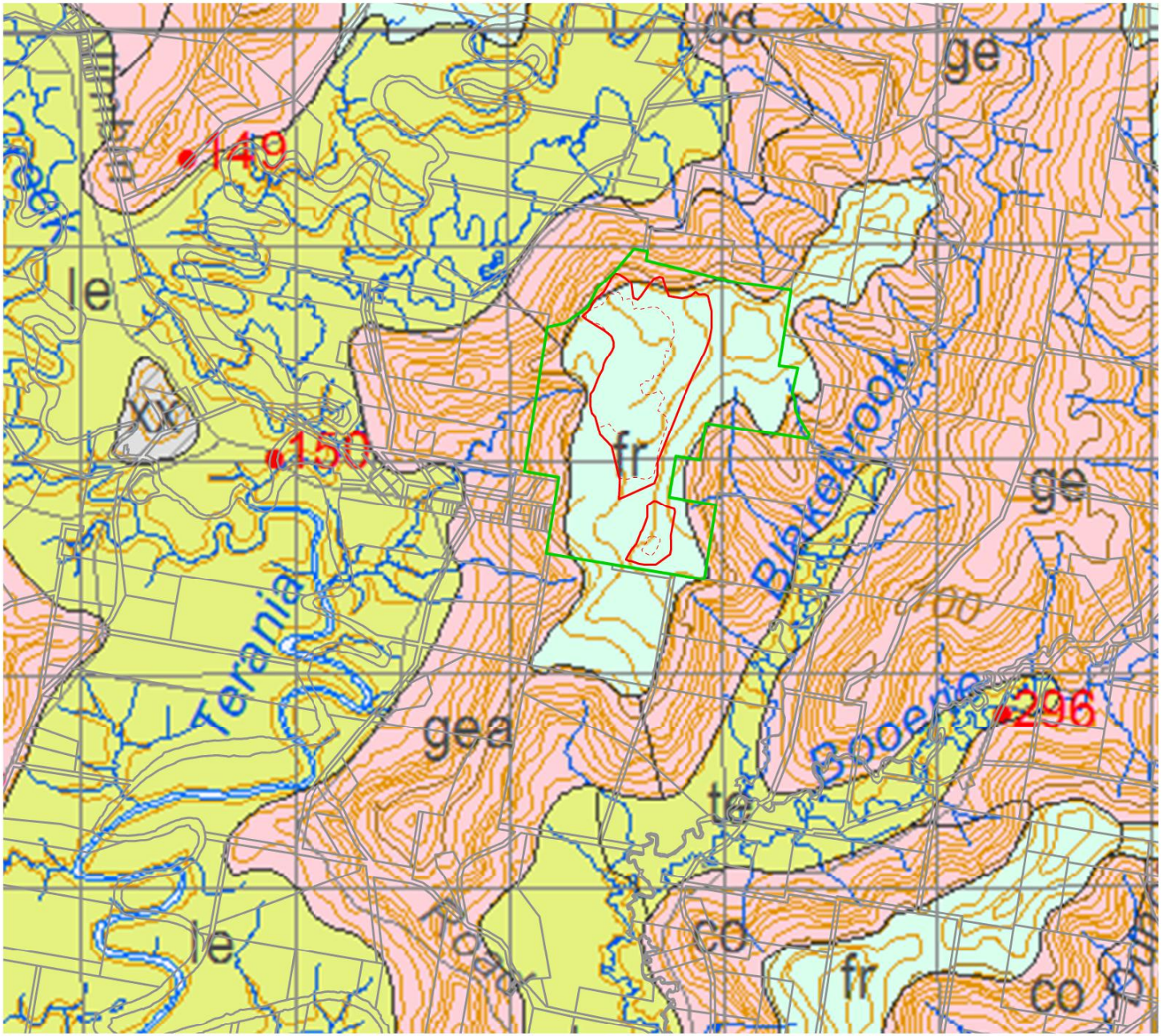
PROJECT
BLAKEBROOK QUARRY

CLIENT
LISMORE CITY COUNCIL

DRAWING
SITE LOCATION

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:16,000@A3	14/12/2018	AJF	CMA	11737	001	A

GILBERT SUTHERLAND



RESIDUAL LANDSCAPES

fr

FREDERICK (13.25km²)

Landscape - low undulating rsises on flat basalt plateau surfaces. Relief 5-30m, elevation 130-180m. Slopes 1-10%. Extensively cleared open-forest.

Soils - shallow (<100cm), poorly drained Prairie Soils (Gn3.42). Localised moderately deep (100-150cm), well-drained Krasnozems (Uf5.2, Gn3.11, Gn4.11) on iron-rich material. Deep (>150cm), poorly drained Black Earths/ Weisenbodens (Ug5.15, Ug5.17) and Dense Clays (Uf6.61) within drainage depressions.

Limitations - shallow, plastic soils with aluminium toxicity potential and sesaonal waterlogging. Localised rock outcrop.

COLLUVIAL LANDSCAPES

co

COOLAMON (65.0km²)

Landscape - very steep slopes on Lismore basalts. Slopes 20-60%, relief 60-100m. Hummocky microrelief and boulder-strewn slopes. Extensively clearedclosed-forest (rainforest).

Soils - shallow (<100cm), moderately well-drained stony Chocolate Soils (Um1.23) and shallow (<100cm), well-drained Krasnozems (Uf5.21,Gn3.11).

Limiations - steep slopes, mass movement hazard, shallow and stony soils, localised waterlogging.

ge

GEORGICA (254.25km²)

Landscape - high rolling and steep waning hills on Lismore Basalts. Relief 90-200m. Slopes 15-30%. Sideslopes, ridge slopes, and narrow, sharp ridges and crests are common. Widespread mass movement has created a hummocky microrelief and terracettes are ommon. Extensively cleared open-and closed-forest.

gea

Landscape variant - gea (74.0km²) - areas of prominent benching, maximal slopes of 40->50%.

geb

Landscape variant - geb (89.25km²) - areas of prominent fluted ridges.

gec

Landscape variant - gec (62.75km²) - hills of lower relief occupying transitional zone from red to black basaltic soils.

Soils - shallow (50-100cm) moderately well-darined Chocolate Soils (Db3.11) and Prairie Soils (Gn3.21, Um5.51) on crests and upper slopes. Shallow to mderately deep (50-150cm), moderately well-drained Chocolate Soils (Db3.11, Db3.12) on upper slopes. Shallow to moderately deep (60-150cm), well-drained Prairie Soils and Chocolate Soil/Prairie Soil intergrades (Gn3.21) on midslopes. Deep (>150cm), poorly to moderately well-drained Black Earths (Ug5.17, Ug5.15) on lwer slopes and footslopes.

Limitations - erodible soils with surface movement potential and localised low wet-bearing strength and water-logging. Steep slopes, widespread mass movement and localised rock outcrop with moderate erosion hazard.

ALLUVIAL LANDSCAPES

le

LEYCESTER (277.0km²)

Landscape - level to gently undulating broad to extensive (500->1500m) alluvial plains of extremely low relief, draining the Mackellar Hills. Extensively cleared closed-and open-forest.

Soils - deep (>200cm), poorly to moderately well-drained alluvial Black Earths (Ug5.15, Ug5.17) and Structured Clays (Uf6.42) occur throughout the floodplains. Wetter areas, such as ox-bow floors, have deep (>200cm), poorly drained Weisenbodens (Ug5.15, Ug5.17). Deep (>200cm), well-drained Earthy Sands (Uc5.21) line channels.

Limitations - moderately erodible, moderately plastic soils with low wet-bearing strength, moderate shrink-swell and localised waterlogging. Flooding, streambank erosion.

te

TERANIA (41.0km²)

Landscape - level to gently undulating alluvial plains of mid to upper reaches of main Richmond River tributaries draining basalt, rhyolite and sandstone areas. Relief <5m, slopes 0-3%. Ox-bows and inset terracing are common features. Extensively cleared closed and open-forest.

Soils - deep (>300cm), well-drained soils of No Suitable Group and dark Alluvial Clays (Uf6, Uf1, Gn2). Near sandstone areas deep (>300cm), well-drained soils of no suitable Group and brown Alluvial Clays (Db3, Db4). Deep (>200cm), poorly drained Weisenbdens and Black Earths (UG5.15, Ug5.17, Uf6) on more recent floodplains. Deep, rapidly drained Earthy Sands (Uc5.21) line channels.

Limitations - Highly erodible, seasonally waerlogged, stony soils of low fertility and low available water-holding capacity. High flood hazard and severe bank erosion.

ORIENTATION

SCALE

200 400 600 800 1000 metres

ROBINA
PO Box 4115 Robina QLD4230 07 5578 9944
Email robina@access.gs **www.access.gs**

LEGEND

Cadastral boundary
Site boundary
Quarry footprint (future)
Quarry footprint (existing)

SOURCES

Map source: Morand (1994) 1:100,000 Soil Landscape Series 9540-9640 (Lismore-Ballina)

PROJECT	CLIENT	DRAWING
BLAKEBROOK QUARRY	LISMORE CITY COUNCIL	SOIL LANDSCAPES EXTRACT FROM LISMORE-BALLINA 1:100 000 SHEET

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:20 000@A3	14/12/2018	AJF	CMA	11737	003	A

GILBERT SUTHERLAND

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

NORTHERN SEDIMENT BASIN
Existing basin area = 0.401 ha
Storage volume in existing basin = 2.517 ML
Required total storage volume = 26.7 ML (incl. ponding across pit floor)
- Settling zone volume = 17.8 ML
- Sediment storage capacity = 8.9 ML
Notes:
1. Storage capacity is to be provided through ponding across floor of quarry once sediment basin fills
2. Following rainfall event, basin to be tested & treated (if necessary) to meet discharge requirements.
3. Treated water is pumped from basin to dam (until dam fills).
4. Excess discharge to be pumped to LPD 2.
5. Basin is to be treated and pumped out to permanent storage level within 5-days of rainfall event and to remain at (or below) permanent storage level at all other times.
6. The permanent storage level to be identified with a marker at approximately 111.5 mAHD.

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
Total volume = 0.322 ML
Settling zone volume = 0.214 ML
Sediment storage capacity = 0.107 ML
Notes:
1. Basin discharge is to be pumped to LPD 1.
2. Collected water is to be tested, treated and released within 5-days of rainfall event.
3. Basin to remain dry at all other times.

SOUTH WESTERN CATCHMENT 1
Area = 0.449 ha
Catchment runoff drains to sediment basin SW1

SEDIMENT BASIN SW2 (UNDER CONSTRUCTION)
Required total volume = 1.297 ML
Settling zone volume = 0.865 ML
Sediment storage capacity = 0.432 ML
Notes:
1. Basin discharge is to be pumped to LPD 1.
2. Collected water is to be tested, treated and released within 5-days of rainfall event.
3. Basin to remain dry at all other times.

SOUTH WESTERN CATCHMENT 2
Area = 1.818 ha
Catchment runoff drains to sediment basin SW2

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 natural catchment discharge point.

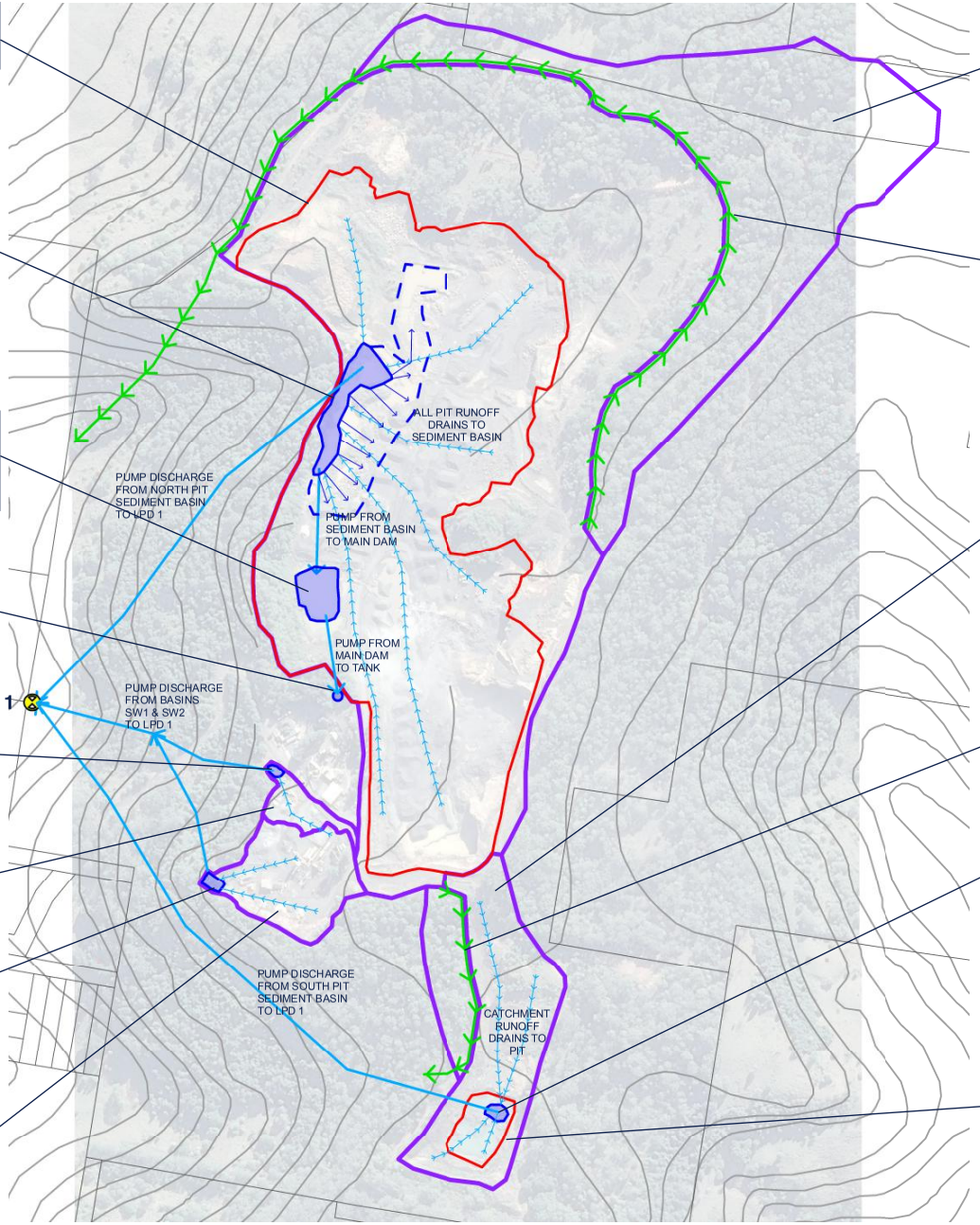
CLEAN WATER DIVERSION DRAIN

SOUTHERN CATCHMENT
Total area = 4.8ha
Area draining to pit = 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.

CLEAN WATER DIVERSION DRAIN

SOUTHERN SEDIMENT BASIN (UTILISES SOUTH PIT)
Required total storage volume = 2.67 ML
Settling zone volume = 1.78 ML
Sediment storage capacity = 0.89 ML
Notes:
1. Storage capacity is to be provided through ponding across floor of quarry.
2. Following rainfall event, basin to be tested & treated (if necessary) to meet discharge requirements.
3. Treated water is pumped from pit to LPD3.
4. Pit is to be pumped out within 5-days of rainfall event and to remain dry at all other times.

SOUTH PIT
Area = 0.5ha



ORIENTATION

SCALE
50 100 150 200 250
metres

ROBINA
PO Box 4115 Robina QLD4230 07 5578 9944
Email robina@access.gs www.access.gs

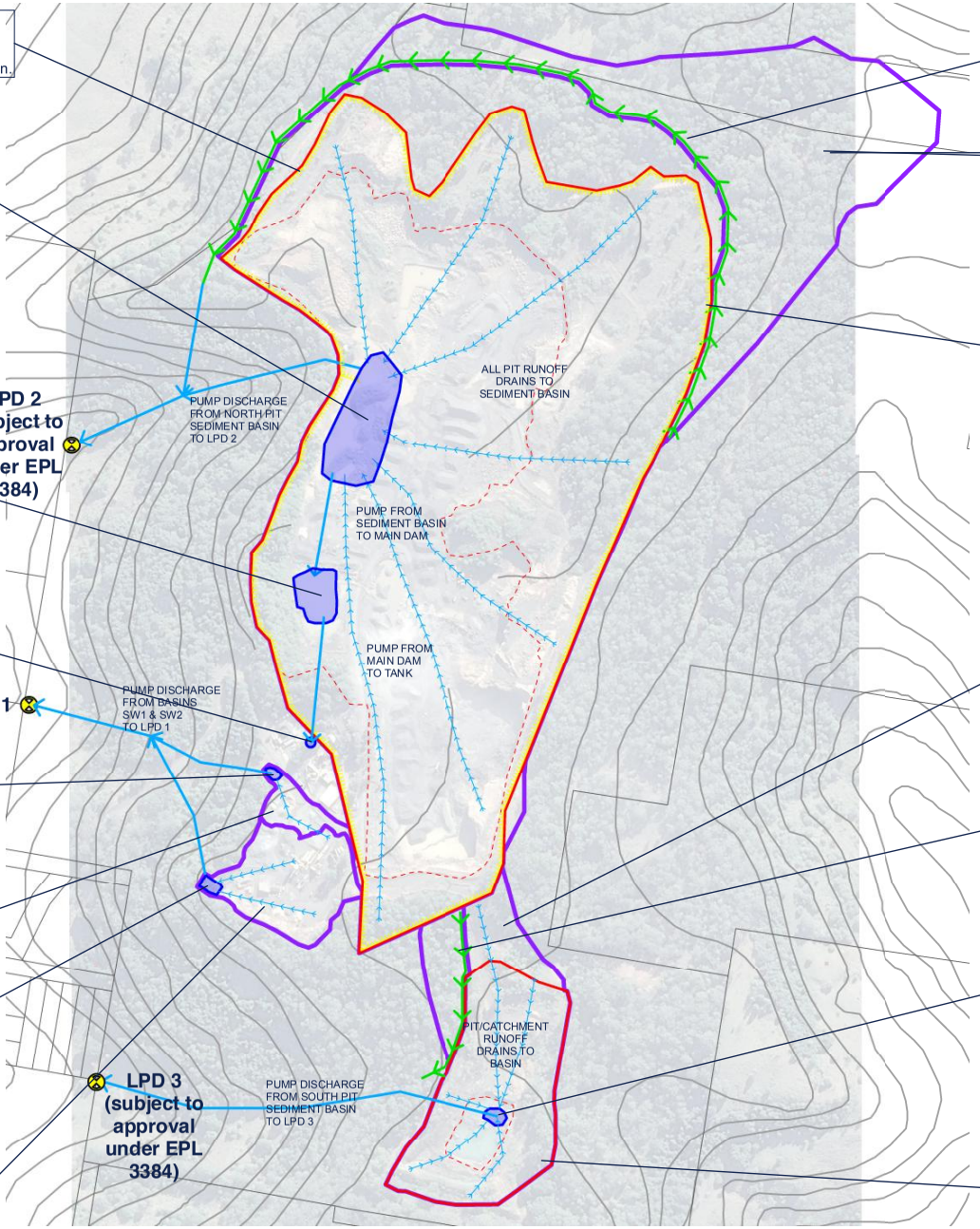
LEGEND
- Catchment boundary
- Quarry pit (existing)
- Discharge point
- Sediment basins / water storage
- Clean water diversion drain

SOURCES
Image source: Google Earth Pro
Image dates: 6 June 2016

PROJECT	CLIENT	DRAWING
BLAKEBROOK QUARRY	LISMORE CITY COUNCIL	EXISTING QUARRY FOOTPRINT WATER MANAGEMENT

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:6,250@A3	14/12/2018	AJF	CMA	11737	004	A

GILBERT SUTHERLAND



NORTH PIT
Area = 36.7 ha
Notes:
1. All pit runoff directed to sediment basin.

NORTHERN SEDIMENT BASIN
Area = 0.980 ha
Required storage volume = 29.4 ML
- Settling zone volume = 19.6 ML
- Sediment storage capacity = 9.8 ML
Notes:
1. Following rainfall event, basin to be tested & treated (if necessary) to meet discharge requirements.
2. Treated water is pumped from basin to dam (until dam fills).
3. Excess discharge to be pumped to LPD 2.
4. Basin is to be treated and pumped out within 5-days of rainfall event and to remain at (or below) nominated permanent storage level at all other times.
5. The permanent storage level to be identified with a marker.

LPD 2 (subject to approval under EPL 3384)

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
To be relocated outside quarry expansion
Usage:
- Asphalt plant
- Haul road sprinklers (dust supression)
- Product water (4% by weight)

LPD 1

SEDIMENT BASIN SW1
Area = 232 m²
Total volume = 0.322 ML
- Settling zone volume = 0.214 ML
- Sediment storage capacity = 0.107 ML
Notes:
1. Basin discharge is to be pumped to LPD 1.
2. Collected water is to be tested, treated and released within 5-days of rainfall event.
3. Basin to remain dry at all other times.

SOUTH WESTERN CATCHMENT 1
Area = 0.442 ha
Catchment runoff drains to sediment basin SW1

SEDIMENT BASIN SW2
Total volume = 1.297 ML
- Settling zone volume = 0.865 ML
- Sediment storage capacity = 0.432 ML
Notes:
1. Basin discharge is to be pumped to LPD 1.
2. Collected water is to be tested, treated and released within 5-days of rainfall event.
3. Basin to remain dry at all other times.

LPD 3 (subject to approval under EPL 3384)

SOUTH WESTERN CATCHMENT 2
Area = 1.817 ha
Catchment runoff drains to sediment basin SW2

CLEAN WATER DIVERSION DRAIN

NORTHERN CATCHMENT
Total area = 50.7 ha
Area draining to pit = 41.2 ha
Undisturbed area diverted around pit = 9.5 ha
Note:
1. All runoff from undisturbed area to be collected in clean water diversion drain and diverted around pit to LPD2.

GROUNDWATER
Inflows collected in perimeter drain and conveyed to sediment basin
Estimated inflow = 190 kL/day

SOUTHERN CATCHMENT
Total area = 5.7ha
Area draining to pit = 4.9 ha
Undisturbed area diverted around pit = 0.8 ha
Note:
1. All runoff from undisturbed area to be collected in clean water diversion drain and diverted west to existing ephemeral gully.

CLEAN WATER DIVERSION DRAIN

SOUTHERN SEDIMENT BASIN (NEW BASIN INSIDE PIT)
Required total storage volume = 3.49 ML
- Settling zone volume = 2.33 ML
- Sediment storage capacity = 1.16 ML
Notes:
1. Following rainfall event, basin to be tested & treated (if necessary) to meet discharge requirements.
2. Treated water is pumped from pit to LPD3.
3. Pit is to be pumped out within 5-days of rainfall event and to remain dry at all other times.

SOUTH PIT
Area = 4.1ha
Notes:
1. All pit runoff directed to sediment basin.

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 (future)
- Quarry pit (existing)
- Discharge point
- Clean water diversion drain
- Sediment basins / water storage
- Perimeter drain (groundwater inflows)

SOURCES
Image source: Google Earth Pro
Image dates: 6 June 2016

NOTES
1. LPD1 is currently the only licenced discharge point for the site.
2. An application has been lodged for approval of LPD2 and LPD3 as additional licensed discharge points under EPL 3384.
3. Until LPD2 and LPD3 are approved under EPL 3384, all site discharge is to be directed to LPD1.

PROJECT BLAKEBROOK QUARRY
CLIENT LISMORE CITY COUNCIL
DRAWING FUTURE QUARRY FOOTPRINT WATER MANAGEMENT

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:6,250@A3	13/02/2019	AJF	CMA	11737	005	B

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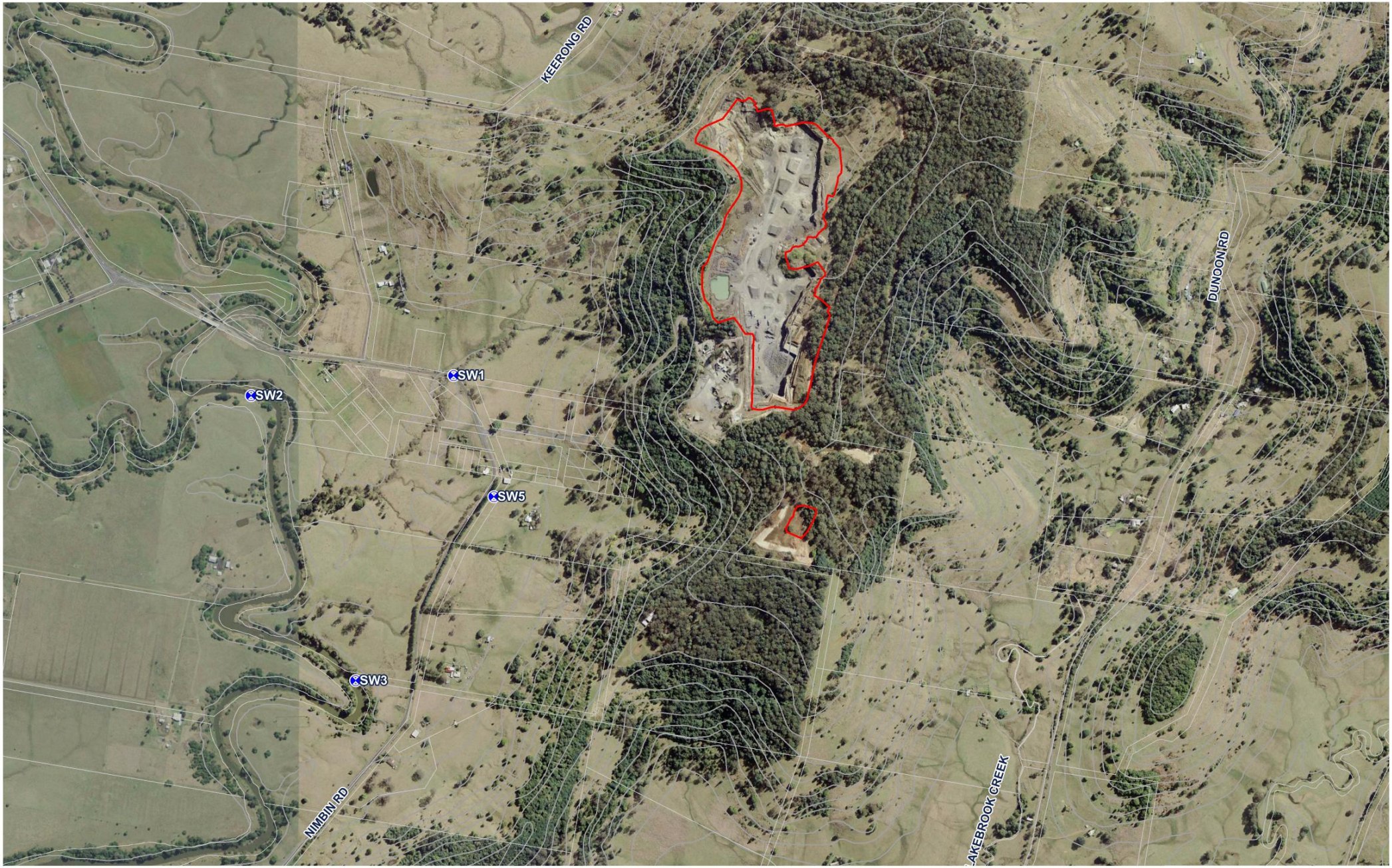

ORIENTATION

SCALE
100 200 300 400 500
metres

ROBINA
PO Box 4115 Robina QLD4230
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07 5578 9944
www.access.gs

LEGEND

- Quarry pit (existing)
- Cadastral boundaries
- Contours (10m interval)
- Surface water monitoring locations

SOURCES

Image source: Google Earth - NSW Globe
Image date: 4 September 2012

PROJECT
BLAKEBROOK QUARRY

CLIENT
LISMORE CITY COUNCIL

DRAWING
SURFACE WATER MONITORING LOCATIONS

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:10,000@A3	14/12/2018	AJF	CMA	11737	008	-

GILBERT SUTHERLAND

6 Attachment 2 – Sediment basin sizing

Sediment retention basins are required to intercept runoff from all undisturbed site areas, and retain most sediment and other materials, thereby protecting downstream waterways from pollution.

In accordance with the requirements of the Licence, design of the sediment basins has been undertaken in accordance with *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.

6.1 Design objectives

6.1.1 Soil texture group

The soil materials on the site have been classified as Type F. Type F soils are fine grained soils with 33 percent or more of the particles being finer than 0.02mm. and less than 10 percent of the soil is dispersible.

These soils require long 'residence' times to settle in a sediment retention basin and the treatment process is described as slow settling in wet basins.

6.1.2 Design event

The design rainfall event for the site is the 90th percentile 5-day rainfall depth.

For Lismore, the applicable rainfall depth (from Table 6.3a of the Blue Book) is 60.2mm over any consecutive 5-day period.

6.2 Sediment basin capacity

Type F sediment basins are normally sized by:

$$V = V_{sz} + V_{ss}$$

where: V = Sediment basin volume (m³)

V_{sz} = Settling zone capacity (m³)

V_{ss} = Sediment storage zone capacity (m³)

6.2.1 Settling zone capacity

The settling zone capacity designed to capture Type F soils can be determined, based on the design rainfall depth, by:

$$V_{sz} = 10 C_v \mathrm{AR}_{(y\ \%ile,5-day)}$$

where: V_{sz} = Settling zone capacity (m³)

C_v = Volumetric runoff coefficient

A = Catchment area draining to basin (ha)

$R_{(y\ \%ile,\ 5\text{-day})}$ = 5-day total rainfall depth that is not exceeded in y percent of rainfall events.

The design 5-day rainfall depth is 60.2mm.

The volumetric runoff coefficient is defined as the proportion of rainfall that runs off as stormwater. Values are defined in Table F2 of Appendix F of the Blue Book, and based on the soil type and the design rainfall depth, the applicable value for the runoff coefficient is 0.79.

6.2.2 Sediment storage capacity

The sediment storage zone capacity can be taken as 50 percent of the settling zone capacity.

6.3 Individual basin sizing

It is proposed to provide sediment basins within each of the two quarry pits for all runoff that can be captured within the pits. Additional sediment basins will be provided external to the pits for disturbed catchment areas that cannot be directed into the pits.

Sediment basin locations and contributing catchment areas for existing and anticipated future site conditions are shown on Drawings 11737-004 and 11737-005, respectively, included in Attachment 1. It must be noted that LPD2 and LPD3 depicted on drawing 11737-005 '*Future Quarry Water Management*', will not come into effect until approved under EPL 3384.

Basin sizing calculations are provided in Attachment 3.

It is intended that both the drawings and calculations will be updated and replaced over

time to reflect the current operational status of the quarry.

6.4 Management of sediment basins

To ensure ongoing availability of the basins for their intended purpose, stormwater in the settling zone will be drained or pumped out within the time period adopted in the design of the basin (i.e. within 5 days following rainfall). This discharge is subject to being able to meet the nominated water quality targets.

Flocculation will be employed where extended settling is unlikely to achieve the objectives within the nominated time period. The basins will be kept dry, or maintained at or below the pre-defined standing water level, at all other times.

Only clear (<50 mg/L suspended solids) supernatant waters will be discharged from the settling zones within the basins. Where possible, floating pump inlets will be used to reduce the opportunity for entrainment of settled sediment during basin pump out.

For the basins not located within the pits, collected sediment will be periodically removed from the basins to maintain their capacity. This removed sediment is to be placed upgradient of a sediment basin, so that water within in the sediment can drain back into the basin.

The sediment is to be located such that it will not be re-entrained by stormwater flows discharging into the basin. Once the sediment is drained it can be incorporated into products or mixed with topsoil (if necessary) and used onsite for rehabilitation.

7 Attachment 3 – Sediment basin sizing calculations

7.1 Existing quarry footprint

Sediment basin sizing - Type F

Job No.	11737
Project:	Blakebrook Quarry
Client:	Lismore City Council
Date:	12/06/2018
Catchment:	North Pit - Existing

Settling Zone Capacity

$$V_{sz} = 10 \cdot C_v \cdot A \cdot R_{(y\ \%ile,\ 5\ day)}$$

Where:

V_{sz}	=	volume of settling zone (m³)
C_v	=	volumetric runoff coefficient (proportion of rainfall that runs off as stormwater
A	=	catchment area (ha)
$R_{(y\ \%ile,\ 5\ day)}$	=	5-day total rainfall depth (mm) that is not exceeded in y percent rainfall events

C_v =	0.79		(refer to Appendix F in Blue Book, Landcom 2004)
A =	37.402	ha	(assume 1.6m³/ha/year for developed catchments)
$R_{(y\ \%ilt,\ 5\ day)}$ =	60.2	mm	(95th %ile, refer to tables in Landcom Soils and Construction)
V_{sz} =	17788	m³	

Sediment storage capacity - 50% of Settling Zone

$$V_{ss} = 0.5 \cdot V_{sz}$$

Where:

V_{ss}	=	volume of sediment storage required (m³)
V_{sz}	=	volume of settling zone (m³)

V_{sz} =	17788	m³
V_{ss} =	8894	m³

Sediment basin volume

$$V = V_{sz} + V_{ss}$$

Where:

V_{sz}	=	total volume of sediment basin (m³)
V_{sz}	=	volume of settling zone (m³)
V_{ss}	=	volume of sediment storage required (m³)

V_{sz} =	17788	m³
V_{ss} =	8894	m³
V =	26681	m³

Sediment basin sizing - Type F

Job No.	11737
Project:	Blakebrook Quarry
Client:	Lismore City Council
Date:	12/06/2018
Catchment:	South Pit

Settling Zone Capacity

$$V_{sz} = 10 \cdot C_v \cdot A \cdot R_{(y\ \%ile,\ 5\ day)}$$

Where:

V_{sz}	=	volume of settling zone (m³)
C_v	=	volumetric runoff coefficient (proportion of rainfall that runs off as stormwater
A	=	catchment area (ha)
$R_{(y\ \%ile,\ 5\ day)}$	=	5-day total rainfall depth (mm) that is not exceeded in y percent rainfall events

C_v =	0.79		(refer to Appendix F in blue Book, Landcom 2004)
A =	3.746	ha	(assume 1.6m³/ha/year for developed catchments)
$R_{(y\ \%ilt,\ 5\ day)}$ =	60.2	mm	(95th %ile, refer to tables in Landcom Soils and Construction)
V_{sz} =	1782	m³	

Sediment storage capacity - 50% of Settling Zone

$$V_{ss} = 0.5 \cdot V_{sz}$$

Where:

V_{ss}	=	volume of sediment storage required (m³)
V_{sz}	=	volume of settling zone (m³)

V_{sz} =	1782	m³
V_{ss} =	891	m³

Sediment basin volume

$$V = V_{sz} + V_{ss}$$

Where:

V_{sz}	=	total volume of sediment basin (m³)
V_{sz}	=	volume of settling zone (m³)
V_{ss}	=	volume of sediment storage required (m³)

V_{sz} =	1782	m³
V_{ss} =	891	m³
V =	2672	m³

Sediment basin sizing - Type F

Job No.	11737
Project:	Blakebrook Quarry
Client:	Lismore City Council
Date:	12/06/2018
Catchment:	South-western Catchment 1

Settling Zone Capacity

$$V_{sz} = 10 \cdot C_v \cdot A \cdot R_{(y\ \%ile,\ 5\ day)}$$

Where:

V_{sz}	=	volume of settling zone (m³)
C_v	=	volumetric runoff coefficient (proportion of rainfall that runs off as stormwater
A	=	catchment area (ha)
$R_{(y\ \%ile,\ 5\ day)}$	=	5-day total rainfall depth (mm) that is not exceeded in y percent rainfall events

C_v =	0.79		(refer to Appendix F in blue Book, Landcom 2004)
A =	0.449	ha	
$R_{(y\ \%ilt,\ 5\ day)}$ =	60.2	mm	(95th %ile, refer to tables in Landcom Soils and Construction)
V_{sz} =	214	m³	

Sediment storage capacity - 50% of Settling Zone

$$V_{ss} = 0.5 \cdot V_{sz}$$

Where:

V_{ss}	=	volume of sediment storage required (m³)
V_{sz}	=	volume of settling zone (m³)

V_{sz} =	214	m³
V_{ss} =	107	m³

Sediment basin volume

$$V = V_{sz} + V_{ss}$$

Where:

V_{sz}	=	total volume of sediment basin (m³)
V_{sz}	=	volume of settling zone (m³)
V_{ss}	=	volume of sediment storage required (m³)

V_{sz} =	214	m³
V_{ss} =	107	m³
V =	320	m³

Sediment basin sizing - Type F

Job No.	11737
Project:	Blakebrook Quarry
Client:	Lismore City Council
Date:	12/06/2018
Catchment:	South-western Catchment 2

Settling Zone Capacity

$$V_{sz} = 10 \cdot C_v \cdot A \cdot R_{(y\ \%ile,\ 5\ day)}$$

Where:

V_{sz}	=	volume of settling zone (m³)
C_v	=	volumetric runoff coefficient (proportion of rainfall that runs off as stormwater
A	=	catchment area (ha)
$R_{(y\ \%ile,\ 5\ day)}$	=	5-day total rainfall depth (mm) that is not exceeded in y percent rainfall events

C_v =	0.79		(refer to Appendix F in blue Book, Landcom 2004)
A =	1.818	ha	
$R_{(y\ \%ilt,\ 5\ day)}$ =	60.2	mm	(95th %ile, refer to tables in Landcom Soils and Construction)
V_{sz} =	865	m³	

Sediment storage capacity - 50% of Settling Zone

$$V_{ss} = 0.5 \cdot V_{sz}$$

Where:

V_{ss}	=	volume of sediment storage required (m³)
V_{sz}	=	volume of settling zone (m³)

V_{sz} =	865	m³
V_{ss} =	432	m³

Sediment basin volume

$$V = V_{sz} + V_{ss}$$

Where:

V_{sz}	=	total volume of sediment basin (m³)
V_{sz}	=	volume of settling zone (m³)
V_{ss}	=	volume of sediment storage required (m³)

V_{sz} =	865	m³
V_{ss} =	432	m³
V =	1297	m³

7.2 Future quarry footprint

Sediment basin sizing - Type F

Job No.	11737
Project:	Blakebrook Quarry
Client:	Lismore City Council
Date:	12/06/2018
Catchment:	North Pit - Future

Settling Zone Capacity

$$V_{sz} = 10 \cdot C_v \cdot A \cdot R_{(y\ \%ile,\ 5\ day)}$$

Where:

V_{sz}	=	volume of settling zone (m³)
C_v	=	volumetric runoff coefficient (proportion of rainfall that runs off as stormwater
A	=	catchment area (ha)
$R_{(y\ \%ile,\ 5\ day)}$	=	5-day total rainfall depth (mm) that is not exceeded in y percent rainfall events

C_v =	0.79		(refer to Appendix F in Blue Book, Landcom 2004)
A =	41.218	ha	(assume 1.6m³/ha/year for developed catchments)
$R_{(y\ \%ilt,\ 5\ day)}$ =	60.2	mm	(95th %ile, refer to tables in Landcom Soils and Construction)
V_{sz} =	19602	m³	

Sediment storage capacity - 50% of Settling Zone

$$V_{ss} = 0.5 \cdot V_{sz}$$

Where:

V_{ss}	=	volume of sediment storage required (m³)
V_{sz}	=	volume of settling zone (m³)

V_{sz} =	19602	m³
V_{ss} =	9801	m³

Sediment basin volume

$$V = V_{sz} + V_{ss}$$

Where:

V_{sz}	=	total volume of sediment basin (m³)
V_{sz}	=	volume of settling zone (m³)
V_{ss}	=	volume of sediment storage required (m³)

V_{sz} =	19602	m³
V_{ss} =	9801	m³
V =	29404	m³

Sediment basin sizing - Type F

Job No.	11737
Project:	Blakebrook Quarry
Client:	Lismore City Council
Date:	12/06/2018
Catchment:	South Pit - Future

Settling Zone Capacity

$$V_{sz} = 10 \cdot C_v \cdot A \cdot R_{(y\ \%ile,\ 5\ day)}$$

Where:

V_{sz}	=	volume of settling zone (m³)
C_v	=	volumetric runoff coefficient (proportion of rainfall that runs off as stormwater
A	=	catchment area (ha)
$R_{(y\ \%ile,\ 5\ day)}$	=	5-day total rainfall depth (mm) that is not exceeded in y percent rainfall events

C_v =	0.79		(refer to Appendix F in blue Book, Landcom 2004)
A =	4.893	ha	(assume 1.6m³/ha/year for developed catchments)
$R_{(y\ \%ilt,\ 5\ day)}$ =	60.2	mm	(95th %ile, refer to tables in Landcom Soils and Construction)
V_{sz} =	2327	m³	

Sediment storage capacity - 50% of Settling Zone

$$V_{ss} = 0.5 \cdot V_{sz}$$

Where:

V_{ss}	=	volume of sediment storage required (m³)
V_{sz}	=	volume of settling zone (m³)

V_{sz} =	2327	m³
V_{ss} =	1164	m³

Sediment basin volume

$$V = V_{sz} + V_{ss}$$

Where:

V_{sz}	=	total volume of sediment basin (m³)
V_{sz}	=	volume of settling zone (m³)
V_{ss}	=	volume of sediment storage required (m³)

V_{sz} =	2327	m³
V_{ss} =	1164	m³
V =	3491	m³

Sediment basin sizing - Type F

Job No.	11737
Project:	Blakebrook Quarry
Client:	Lismore City Council
Date:	12/06/2018
Catchment:	South-western Catchment 1 - Future

Settling Zone Capacity

$$V_{sz} = 10 \cdot C_v \cdot A \cdot R_{(y\ \%ile,\ 5\ day)}$$

Where:

V_{sz}	=	volume of settling zone (m³)
C_v	=	volumetric runoff coefficient (proportion of rainfall that runs off as stormwater
A	=	catchment area (ha)
$R_{(y\ \%ile,\ 5\ day)}$	=	5-day total rainfall depth (mm) that is not exceeded in y percent rainfall events

C_v =	0.79		(refer to Appendix F in blue Book, Landcom 2004)
A =	0.442	ha	(assume 1.6m³/ha/year for developed catchments)
$R_{(y\ \%ilt,\ 5\ day)}$ =	60.2	mm	(95th %ile, refer to tables in Landcom Soils and Construction)
V_{sz} =	210	m³	

Sediment storage capacity - 50% of Settling Zone

$$V_{ss} = 0.5 \cdot V_{sz}$$

Where:

V_{ss}	=	volume of sediment storage required (m³)
V_{sz}	=	volume of settling zone (m³)

V_{sz} =	210	m³
V_{ss} =	105	m³

Sediment basin volume

$$V = V_{sz} + V_{ss}$$

Where:

V_{sz}	=	total volume of sediment basin (m³)
V_{sz}	=	volume of settling zone (m³)
V_{ss}	=	volume of sediment storage required (m³)

V_{sz} =	210	m³
V_{ss} =	105	m³
V =	315	m³

Sediment basin sizing - Type F

Job No.	11737
Project:	Blakebrook Quarry
Client:	Lismore City Council
Date:	18/12/2017
Catchment:	South-western Catchment 2 - Future

Settling Zone Capacity

$$V_{sz} = 10 \cdot C_v \cdot A \cdot R_{(y\ \%ile,\ 5\ day)}$$

Where:

V_{sz}	=	volume of settling zone (m³)
C_v	=	volumetric runoff coefficient (proportion of rainfall that runs off as stormwater
A	=	catchment area (ha)
$R_{(y\ \%ile,\ 5\ day)}$	=	5-day total rainfall depth (mm) that is not exceeded in y percent rainfall events

C_v =	0.79		(refer to Appendix F in blue Book, Landcom 2004)
A =	1.817	ha	(assume 1.6m³/ha/year for developed catchments)
$R_{(y\ \%ilt,\ 5\ day)}$ =	60.2	mm	(95th %ile, refer to tables in Landcom Soils and Construction)
V_{sz} =	864	m³	

Sediment storage capacity - 50% of Settling Zone

$$V_{ss} = 0.5 \cdot V_{sz}$$

Where:

V_{ss}	=	volume of sediment storage required (m³)
V_{sz}	=	volume of settling zone (m³)

V_{sz} =	864	m³
V_{ss} =	432	m³

Sediment basin volume

$$V = V_{sz} + V_{ss}$$

Where:

V_{sz}	=	total volume of sediment basin (m³)
V_{sz}	=	volume of settling zone (m³)
V_{ss}	=	volume of sediment storage required (m³)

V_{sz} =	864	m³
V_{ss} =	432	m³
V =	1296	m³

8 Attachment 4 – Site water balance

PROJECT

SITE WATER BALANCE
BLAKEBROOK QUARRY
BLAKEBROOK
NEW SOUTH WALES

PREPARED FOR

LISMORE CITY COUNCIL

DATE

FEBRUARY 2019

GILBERT SUTHERLAND

DOCUMENT CONTROL

DOCUMENT 11737_WB_RAF4F.docx
TITLE Site Water Balance, Blakebrook Quarry, Blakebrook, New South Wales
PROJECT MANAGER C. Anderson
AUTHOR(S) A. Fullagar
CLIENT Lismore City Council
CLIENT CONTACT Eleisha Went
CLIENT REFERENCE –

SYNOPSIS This report details water balance modelling for the current and future quarry operations at Blakebrook Quarry, Blakebrook, New South Wales.

REVISION HISTORY

REVISION #	DATE	EDITION BY	APPROVED BY
1	01/18	A. Fullagar	C. Anderson / L. Varcoe
2	12/18	A. Fullagar	C. Anderson / L. Varcoe
3	12/02/19	A. Fullagar	C. Anderson / L. Varcoe
4	13/02/19	A. Fullagar	C. Anderson / L. Varcoe

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SUMMARY

Lismore City Council commissioned Gilbert & Sutherland to prepare a water balance assessment for Blakebrook Quarry under existing and proposed future site conditions for inclusion in the Soil and Water Management Plan (SWMP) for the site.

This water balance report uses estimates of quarry pit areas, catchment areas, water storage volumes and water usage that are applicable at the time of writing (February 2019). Models were developed to represent current and proposed future operational procedures at the site (to the degree that these practices could be quantified).

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1 Introduction

This water balance report uses estimates of quarry pit areas, catchment areas, water storage volumes and water usage that are applicable at the time of writing (February 2019). The model was developed to represent current operational procedures at the site (to the degree that these practices could be quantified). It is intended that this report be a 'living document' that is periodically updated to reflect changes to operational procedures over time (including improvements in quantifying water usage associated with current operations).

1.1 Version 3 and 4 – February 2019

There have been no further refinements to the modelling undertaken since the Version 2 report was issued in December 2018.

1.2 Version 2 – December 2018

Refinements to the modelling undertaken since the Version 1 report was issued in January 2018 include:

- Revision of the estimated product export volumes based on the 2017 annual return volumes (as reported in Gilbert & Sutherland's *'Annual Surface Water Balance 2017, Blakebrook Quarry, Blakebrook, New South Wales'* dated February 2018).
- Revision of the model for the 'current quarry footprint' to represent existing site conditions with a single licensed site discharge point, in place of the proposed three (3) discharge points that are currently under application. The model for the 'future quarry footprint' still includes three (3) discharge points in anticipation of approval of a license variation application to include the additional locations.
- Refinement of the southwestern catchment split between the pre-existing sediment basin SW1 and the under-construction sediment basin in SW2.
- Stage-area-storage relationships for the existing sediment basins in the North Pit and sub-catchment SW1 (based on detailed ground survey).
- Estimates of the post-construction stage-area-storage relationship for the sedimentation basin in SW2.
- Revised estimates of seepage out of water bodies based on the results of the groundwater assessment.
- An allowance for future groundwater interaction within the pits (based on the results of a groundwater assessment undertaken since the previous report was issued). This applies to the 'future quarry footprint' model only.

2 Model description and overview

2.1 Introduction

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 at one (1) identified site discharge point, LPD1, as shown on Drawing No. 11737-004 (in Attachment 1). LPD1 is currently the only licensed discharge point from the quarry and therefore the only discharge point addressed in the model for the 'current quarry footprint'.

For the proposed 'future quarry footprint', a further two discharge points, LPD2 and LPD3, have also been addressed by the modelling. These are natural discharge points that are proposed to also be included as licensed discharge points for future quarry operations, as identified in G&S' *'Soil and Water Management Plan, Blakebrook Quarry, Blakebrook, New South Wales'* prepared for LCC and dated February 2019 (the SWMP). Lismore City Council (LCC) is currently in the process of applying for a licence variation to permit discharge at LPD2 and LPD3 in addition to LPD1, and as such they are shown on Drawing No. 11737-005 (in Attachment 1) which depicts proposed future quarry operations.

2.2 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 primarily addresses surface water flows within the site and has been updated to include consideration of surface water to groundwater interactions based on the outcomes of G&S's *'Hydrogeological Review: Groundwater Monitoring & Management Blakebrook Quarry Nimbin Road, Lismore, New South Wales'* dated February 2019.

The model excludes all potable water usage and wastewater discharge from the site.

The model is comprised of four (4) separate 'modules' which, in general, operate independently with respect to water management within the site, however, at present, discharge out of each of the four site catchments is directed to a single licenced discharge point (LPD1). These four 'modules' are based on the four defined catchment areas and corresponding sedimentation basins shown on the drawings numbered 11737-004 and 11737-005 (in Attachment 1). These catchment areas are:

- North Pit
- South Pit
- South-western catchment 1 (SW1)
- South-western catchment 2 (SW2)

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

2.2.1 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 an existing ephemeral gully to which it would naturally drain, had the catchment not been disturbed for the quarry. 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, runoff that exceeds the basin capacity will temporarily pond over the floor of the pit until it is treated and discharged. The sediment basin currently operates as a wet basin due to seepage into the basin from the surrounding rock. Level markers are to be installed within the basin to identify the permanent ponding level that must be restored after each rainfall event.

Following rainfall, water collected in the sediment basin is tested and treated (to meet the required water quality targets) before being discharged within 5 days. Discharge from the basin is pumped to the main dam for reuse within the site. When the dam reaches capacity, excess treated water is pumped out of the sediment basin and directed to LPD1. Subject to future approval of the additional site discharge points, it is intended that in the future excess treated water be pumped directly out to LPD2, a natural discharge point for the pre-quarry landform that is more suitable in proximity to the main dam within the North Pit than the currently licensed discharge point.

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.

2.2.2 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.

For the current extent of excavation, the South Pit is designed to operate as a sedimentation basin for treatment of runoff from the pit and contributing catchment area shown on Drawing No. 11737-004. Earthworks have been undertaken to direct all runoff from the disturbed upstream catchment (including the access road) to the pit.

The South Pit is intended to operate as a dry basin. Following rainfall, water collected in the South Pit will be tested and treated (to meet the required water quality targets) before being pumped out to LPD1 within five days of a rainfall event. Subject to future approval of the additional site discharge points, it is intended that in the future excess treated water be pumped directly out to LPD3, a natural discharge point for the pre-quarry landform that is more suitable in proximity to the South Pit than the currently licensed discharge point. The pit is to remain dry at all other times.

For future expansion of the South Pit excavation, a separate sediment basin will be constructed within the floor of the pit to treat surface runoff in a contained area during treatment, to minimise disturbance of quarry operations for the period following a rainfall event. The sediment basin will be operated in the same way as the pit is currently operated and any overflow from the basin (during events exceeding its design capacity) will be contained within the pit until the water is treated and discharged.

2.2.3 South-western catchments (SW1 and SW2)

The southwestern catchments (SW1 and SW2) are located outside of the quarry pit catchment areas and (similar to the South Pit) do not contribute to the site's water supply requirements. Both catchments discharge to LPD1. The management of surface water runoff in these catchments is focused on treatment and discharge to meet the site's water quality targets.

All catchment runoff is directed as surface flow to the respective basins. The sedimentation basins have been sized based on the design rainfall event for the site (60.2 mm in 5 days). Runoff up to the design event will be treated and pumped out of the basins within 5 days of a rainfall event. As these basins are not contained within the pits, catchment runoff during rainfall exceeding the design event will overflow from the basins and discharge directly to LPD1. Both sedimentation basins will remain dry at all other times.

2.2.4 Water balance flow chart

Figures 1 to 3 (in Attachment 2) provide a schematic of surface water flows within the site that have been included in the water balance model.

3 Model inputs and assumptions

3.1 Model inputs

The water balance model was run for the two scenarios – current and future quarry footprints – as depicted on the drawings numbered 11737-004 and 11737-005 in Attachment 1. The adopted assumptions for each of these scenarios 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).

An analysis of the annual rainfall totals for 1889 to 2016 was undertaken to select a representative period to adopt for the water balance modelling. Based on this analysis, the 20-year period from 1 January 1981 to 31 December 2000 was adopted for the modelling. In selecting this period, consideration was also given to the availability of suitable daily time-step evaporation data, which was only available from 1970 onwards.

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

	Annual rainfall totals (mm)	
Statistic	Entire dataset (1889 to 2017)	Model period (1981 to 2000)
Mean	1,491	1,478
Minimum	585	869
Maximum	2,478	2,308
Percentile bands		
5th percentile	913	1,014
10th percentile	1,051	1,086
20th percentile	1,141	1,121
Median (50th percentile)	1,426	1,438
80th percentile	1,845	1,790
90th percentile	2,119	2,155
95th percentile	2,226	2,236

Based on the above analysis, the adopted modelling period has a similar average annual rainfall to the long-term dataset and includes annual totals ranging from below the 5th percentile to above the 95th percentile of the long- term dataset. The adopted period is therefore considered to be representative of long-term climatic conditions for the site.

Daily rainfall and pan evaporation drill data were adopted as inputs for the model. The average monthly rainfall and pan evaporation totals over the modeling period are provided in Table 3.1.1.2 (on the following page).

Table 3.1.1.2 Average monthly rainfall and pan evaporation

Month	Rainfall (mm)	Pan evaporation (mm)
January	147	165
February	192	134
March	184	128
April	183	97
May	151	70
June	98	63
July	80	72
August	49	95
September	41	126
October	74	150
November	111	154
December	170	171
Annual total	**1478**	**1425**

3.1.2 Catchment areas

Catchment areas included in the modelling for each of the four modules are described in Table 2.1.2.1.

Table 3.1.2.1 Contributing catchment areas

	Current footprint (December 2018)				Future quarry footprint			
Description	North Pit (ha)	South Pit (ha)	SW1	SW2	North Pit (ha)	South Pit (ha)	SW1	SW2
Areas included in model								
Catchment	37.107	3.746	0.449	1.818	40.924	4.893	0.442	1.817
Dam	0.292	-	-	-	0.292	-	-	-
Total	**37.399**	**3.746**	**0.449**	**1.818**	**41.216**	**4.893**	**0.442**	**1.817**
External catchment area (excluded from model)								
Undisturbed catchment	11.309	1.102	-	-	9.500	0.767	-	-

3.1.3 Storage volumes – existing quarry footprint

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

Table 3.1.3.1 Storage volumes

Water storage	Volume (ML)
Main Dam	30
Tank	1.0

The sedimentation basins were modelled using stage-area-storage relationships to represent the settling zone capacity within each basin. For the sediment basins in the North Pit and South-western Catchment 1, 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 by assuming the quarry floor grades towards the basin at an average of 1 percent.

The modelled storage characteristics for the north pit sedimentation basin are given in Table 3.1.3.2.

Table 3.1.3.2 North Pit sedimentation basin – modelled storage details (settling zone)

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	0.720	3.077
103.0	1.120	3.997
103.1	1.600	5.357
103.2	2.160	7.237
103.3	2.800	9.717
103.4	3.520	12.877
103.5	4.320	16.797
103.6	5.200	21.557
103.7	6.160	27.237
103.8	7.200	33.917
103.9	8.320	41.677
104.0	9.520	50.597
104.1	10.800	60.757
104.2	12.160	72.237
104.3	13.600	85.117
104.4	15.120	99.477

Under current site conditions, the south pit is utilised as a sediment basin for its contributing catchment. For modelling purposes, and based on the existing pit landform, it has been assumed to have vertical walls. The required sediment basin storage volume of 2.67 ML (settling zone capacity of 1.78ML plus sediment storage

capacity of 0.89ML) is exceeded by the storage capacity of the pit and where necessary (in large rainfall events) the pit will fill above the required storage level, with discharge limited by the outlet pump capacity. The modelled conditions for the South Pit sedimentation basin are given in Table 3.1.3.3.

Table 3.1.3.3 South Pit as sedimentation basin – modelled storage details (settling zone)

Depth (m)	Area (ha)	Volume (ML)
0	0.490	0.00
0.365	0.490	1.78
1.000	0.490	4.90
2.000	0.490	9.80

The sediment basin in catchment SW1 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 settling zone storage characteristics for the sedimentation basin in sub-catchment SW1 are given in Table 3.1.3.4.

Table 3.1.3.4 SW1 sedimentation basin – modelled storage details (settling zone)

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

The sediment basin in catchment SW2 is currently under construction and once complete will operate as a dry basin. We have been advised that based on site conditions, the maximum basin depth that can be achieved in this location is 1.5 metres. Given that the required settling zone capacity is twice the sediment storage capacity, we have assumed the final basin form will have vertical walls and a settling zone depth of 1 metre. The modelled settling zone storage characteristics for the sedimentation basin in sub-catchment SW2 are given in Table 3.1.3.5.

Table 3.1.3.5 SW2 sedimentation basin – modelled storage details (settling zone)

Depth (m)	Area (ha)	Volume (ML)
0	0.0865	0.000
0.5	0.0865	0.433
1.0	0.0865	0.865

3.1.4 Storage volumes – future quarry footprint

Basins SW1 and SW2 (once constructed) will remain in place with no changes to the storage characteristics future quarry operations.

If the storage tank needs to be relocated in the future to allow for the planned quarry expansion, its volumetric capacity must remain the same at 1.0 ML.

As the quarry works progress, the main storage dam will require some works to maintain its capacity as the quarry floor is lowered. Detailed design for such changes to its configuration will be undertaken at such time in the future that these works are required. For modelling purposes, and until such time as re-design and modification works are undertaken, it has been assumed that the dam footprint and storage volume will remain in their current form.

As works progress and the floor is lowered in the North Pit, the sedimentation basin will require revision. Such works will include increasing the capacity of the sedimentation basin to cater for the design storm event without ponding across the quarry floor (noting that temporary ponding across the quarry floor is expected to occur in events exceeding the design event). The total required sedimentation basin capacity is 29.4 ML (settling zone capacity of 19.6 ML plus sediment storage capacity of 9.8 ML). Assuming a total basin depth of 3 metres and vertical walls, a basin area of 9,800 m² is required to be set aside for future works. For modelling purposes (to cater for events exceeding the design event), the basin stage-storage relationship has been extended above the top of the sediment basin to permit ponding across the quarry floor, assuming a 1 percent grade towards the basin. The modelled settling zone storage characteristics of the north pit sedimentation basin are shown in Table 3.1.4.1.

Table 3.1.4.1 North Pit sedimentation basin – modelled storage details (settling zone)

Depth (m)	Area (ha)	Volume (ML)
0	0.980	0.00
0.5	0.980	4.90
1.0	0.980	9.80
1.5	0.980	14.70
2.0	0.980	19.60
2.1	1.512	20.846
2.2	2.124	22.664
2.3	2.816	25.134
2.4	3.588	28.336
2.5	4.440	32.350
2.6	5.372	37.256
2.7	6.384	43.134
2.8	7.476	50.064
2.9	8.648	58.126
3.0	9.900	67.400
3.1	11.232	77.966
3.2	12.644	89.904
3.3	14.136	103.294
3.4	15.708	118.216

The south pit works are currently on hold and the entire pit floor is being used as a sedimentation basin for the South Pit catchment. When works to expand the south pit recommence, it is recommended that a separate sediment basin be installed in the floor of the South Pit, similar to the basin in the North Pit. The total required sedimentation basin capacity is 3.49 ML (settling zone capacity of 2.33 ML plus sediment storage capacity of 1.16 ML). Assuming a total basin depth of 3 metres and vertical walls, a basin area of 1,170 m² is required to be set aside for future works. For modelling purposes (to cater for events exceeding the design event), the basin stage-storage relationship has been extended above the top of the sediment basin to permit ponding across the quarry floor, assuming a 1 percent grade towards the basin. The modelled settling zone storage characteristics of the south pit sedimentation basin are shown in Table 3.1.4.2.

Table 3.1.4.2 South Pit sedimentation basin – modelled storage details (settling zone)

Depth (m)	Area (ha)	Volume (ML)
0	0.117	0.000
0.5	0.117	0.585
1.0	0.117	1.170
1.5	0.117	1.755
2.0	0.117	2.340
2.1	0.295	2.546
2.2	0.553	2.970
2.3	0.891	3.692
2.4	1.309	4.792
2.5	1.807	6.350
2.6	2.385	8.446
2.7	3.043	11.160

3.1.5 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 2.1.4.1 was adopted in the model. The highest water usage (in the warmer months) has been correlated with average monthly pan evaporation values.

Table 2.1.4.1 Water truck usage adopted in the model

Month	Current footprint (December 2017) (ML)	Future quarry footprint (ML)
January	8	16
February	6	12
March	6	12
April	4	8
May	3	6
June	2	4
July	3	6
August	4	8
September	6	12
October	7	14
November	7	14
December	8	16

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.

3.1.6 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 the *'Soil and Water Management Plan, Blakebrook Quarry, Blakebrook, New South Wales'* to which this water balance is attached provides 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 across catchments SW1 and SW2 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 6 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.

For the current quarry footprint, 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 (or product export rates), whilst recognising that the process/product water will 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 for the current quarry footprint 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 – current quarry footprint

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

The corresponding daily water demand is 19.15kL.

The licence permits the quarry to produce up to 500,000 tonnes annually, which has been adopted for the future quarry footprint model. This equates to an average daily product export of 1602.6 tonnes for the 6 days per week that the quarry is operational throughout the year. This increased production results in a daily water demand of 64.10kL. This has been applied to the model, 6 days per week (excluding Sundays) except where the rainfall exceeds pan evaporation, in which case no product moisture has been added in the model.

3.1.7 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 catchments) 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 LPD1. Subject to future approval of additional site discharge points, this will ultimately be pumped out to proposed 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 will 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 200 L/s for 12 hours per day.

South pit

All South Pit runoff will be collected within the pit. Discharge will be primarily directed to LPD1. Subject to future approval of additional site discharge points, this will ultimately be pumped out to proposed LPD3.

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 evenly across five days. Discharge due to large rainfall events (> the 60.2 mm design event) is not required to meet the water quality targets and the basins will be emptied as soon as practicable.

For rainfall exceeding the design event, the maximum daily discharge rate from the South Pit sedimentation basin has been calculated based on pumping at a rate of 50 L/s for 12 hours per day.

Southwestern catchments

For the south-western catchments, SW1 and SW2, all surface runoff will be collected within the respective sedimentation basins located on the outlet of each catchment. These basins have been sized to capture and treat runoff during the five-day rainfall design event of 60.2 mm. 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 (i.e. emptying each of the sedimentation basins 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) will enter the basins and subsequently overflow to the receiving environment, leaving the site at LPD 1. The base pumping rate will still apply during these periods to empty the sedimentation basin capacity below the overflow level.

Summary of discharge rates

A summary of the pumping rates for emptying the sedimentation basins is provided in Table 3.1.7.1 (on the following page).

Table 3.1.7.1 Sedimentation basin discharge pumping rates

Water storage	Current footprint (December 2018)	Future quarry footprint
North Pit sedimentation basin		
Required settling zone volume (ML)	17.79	19.60
Base discharge rate (ML/day)	3.558	3.92
Maximum discharge rate (ML/day)	8.64	8.64
South Pit sedimentation basin		
Required settling zone volume (ML)	1.78	2.33
Base discharge rate (ML/day)	0.356	0.466
Maximum discharge rate (ML/day)	2.16	2.16
South-western catchment 1 sedimentation basin		
Settling zone volume (ML)	0.214	0.214
Discharge rate (ML/day)	0.0428	0.0428
South-western catchment 2 sedimentation basin		
Settling zone volume (ML)	0.865	0.865
Discharge rate (ML/day)	0.173	0.173

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 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 Sections 3.1.3 and 3.1.4. 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 to 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 Sections 3.1.3 and 3.1.4.

For the current operating conditions, seepage losses from all water bodies have been calculated using a constant seepage rate of 10 mm/day.

For future operating conditions, the deeper excavation in the North Pit will result in the water bodies (Main Dam and north pit sediment basin) being located in geology with lower permeability. For these two water bodies, a constant seepage rate of 1 mm/day has been modelled. For the south pit and south-western catchment sediment basins, the rate of 10 mm/day has been applied (equivalent to current site conditions).

3.2.4 Groundwater inflows

As the excavation in the North Pit gets deeper, it will intersect existing aquifers, resulting in groundwater inflows into the pit. It is anticipated the groundwater will be collected in perimeter drains (to be constructed) and be conveyed to the sediment basin. Details of a groundwater assessment undertaken to quantify flows into the pit are given in G&S's 'Hydrogeological Review: Groundwater Monitoring & Management Blakebrook Quarry Nimbin Road, Lismore, New South Wales' dated December. Based on this assessment, it has been assumed that, under future operating conditions, 190 kL/day of groundwater will flow into the pit.

3.2.5 Initial conditions

For modelling purposes, the following assumptions have been made in respect of water storage volumes at the commencement of the 20-year model period:

- Main water storage dam – initial volume = 28.8 ML (average long-term storage volume under current conditions)
- Water storage tank – full (initial volume = 1 ML)
- North Pit sedimentation basin – empty
- South Pit (functioning as sedimentation basin) – empty
- South-western catchments (SW1 and SW2) sedimentation basins – empty

4 Results – Existing quarry conditions

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

Parameter	Average year	Minimum	Maximum
Total number of rainfall days per year	184.5	143	220
Total number of days per year exceeding 5-day design rainfall (60.2 mm) for previous 5 days	31.2	8	62
Number of events per year exceeding 5-day design rainfall (60.2 mm)	6.4	2	10
Duration of longest exceedance event [a]	7.8	5	16

[a] Duration of exceedance event is defined by number consecutive days that 5-day rainfall total exceeds 5-day design rainfall. Duration of exceedance will exclude (up to) the first to fourth 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 – annual volumes

Parameter	Average year	Minimum	Maximum
Rainfall volume – total North Pit catchment area (ML)	552.8	324.9	863.3
Runoff volume – total North Pit catchment area (ML) [a]	309.5	167.0	542.4
Total basin inflow (ML)	312.1	166.7	551.4
Evaporative losses (ML)	2.8	1.2	5.6
Seepage losses (ML)	10.9	4.6	23.4
Discharge – pumped to main dam	43.0	36.7	47.2
Discharge – pumped out to LPD1	255.5	113.7	490.7

[a] Total runoff expected to 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 diverted from this location to LPD1.

On average, it is estimated that total catchment discharge from the North Pit area reduces by approximately 17 percent as a result of the quarry operations. As current licence conditions require that all controlled site discharge be directed to the licenced discharge point at LPD1, runoff to the receiving environment downstream of the natural catchment discharge point west of the sedimentation basin will be reduced substantially (by 309.5 ML/year) with only runoff from the 11.3 hectare undisturbed upstream catchment that is diverted around quarry pit continuing to drain to this location (approximately 93.5 ML/year).

A summary of the estimated sedimentation basin performance is provided in Table 4.2.1.2.

Table 4.2.1.2 Northern catchment sedimentation basin performance

Parameter	Average year	Minimum	Maximum
Total number of discharge days (to Main Dam and/or LPD)	171	142	215
Total number of days discharging to Main Dam	135	117	158
Total number of days discharging to LPD	100	54	159
Total number of days per year when basin contains water [a]	29	11	54
Maximum number of consecutive days where basin contains water	9.1	3	24
Average number of days to empty basin	2.6	1.6	4.8

[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. More frequent wetting and drying during small events is expected and is accounted for by losses and/or immediate discharge.

The model inputs (basin volumes and pumping rates) dictate that the basin will be emptied within five days of the cessation of all rainfall events up to and including the five-day design rainfall event of 60.2 mm. Where rainfall exceeds the design capacity of the system or a rainfall event continues for more than the 5-day design event duration, the basin is expected to contain water for a longer period whilst active discharge is taking place, (as demonstrated by the results above).

4.2.2 Main Dam water balance

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

Table 4.2.2.1 Northern catchment Main Dam – annual volumes

Parameter	Average year	Minimum	Maximum
Dam inflow from direct rainfall (ML)	4.3	2.5	6.7
Dam inflow pumped from sediment basin (ML)	43.0	36.7	47.2
Total dam inflow (ML)	**47.3**	**43.0**	**51.0**
Evaporative losses (ML)	2.9	2.6	3.3
Seepage losses (ML)	10.7	10.6	10.7
Total losses (ML)	**13.6**	**13.2**	**13.9**
Usage – water truck for dust suppression (ML)	22.7	19.6	24.6
Usage – main tank top-up for other site usage (ML)	11.0	10.5	11.4
Total usage (ML)	**33.7**	**30.3**	**35.9**
Daily stored volume (ML) [a]	**28.8**	**16.7**	**30.9**

[a] Stored volumes reported using average, minimum and maximum daily levels for entire modelling period (not based on annual averages).

The modelling results show that under all modelled climatic conditions, the main dam has sufficient water to meet all quarry water demands. The minimum estimated storage volume is 16.7 ML (or 13.3 ML below full capacity) throughout the model period. It is recommended that detailed ground and bathymetric survey be undertaken to confirm the dam's storage volume and stage-area-volume estimates to improve the reliability of future supply estimates. Level loggers will also be installed to monitor variability in water levels to better

quantify water losses from the storage (once reliable estimates of water usage are established). Figure 4 (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. Freeboard of up to 1 ML will be provided within the bunded dam area to accommodate this rainfall without mixing with 'dirty' quarry pit runoff.

Water truck
Based on the inputs described in Section 3.1.4, the modelling estimates that water truck dust suppression uses an average annual volume of 22.7 ML (or 1,297 truck loads). Quarry management's recent introduction of a daily log of water truck movements will help to confirm and improve the accuracy of the water balance model.

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 Main tank – annual volumes

Parameter	Average year	Minimum	Maximum
Dam inflow pumped from main dam (ML)	11.0	10.5	11.4
Usage – haul road sprinklers (ML)	6.3	6.2	6.3
Usage – asphalt plant (ML)	0.1	0.1	0.1
Usage – process/product water (ML)	4.7	4.2	5.1
Average daily stored volume (ML) [a]	**0.89**	**0.62**	**1.0**

[a] Stored volumes reported using average, minimum and maximum daily levels for entire modelling period (not based on annual averages).

The attached Figure 5 shows the estimated daily storage volumes in the tank for the entire model 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 will be 0.62 ML.

On average, the modelling indicates 11.0 ML of water is used to top up the tank each year. Comparatively, this is significantly lower than the estimate from site staff of weekly top-up volume being equivalent to approximately 50 percent of capacity (which equates to 26 ML/year). It is recommended that a flow-meter be installed on the tank outlet to monitor and better quantify water usage from the tank.

4.3 Southern catchment

The southern catchment water balance was undertaken to estimate the impact of the south pit operations on site discharge volumes. 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

As noted, under existing site conditions the Southern Pit provides a sedimentation basin function for treating runoff from the entire southern catchment. A summary of the annual water balance results for the South Pit (sedimentation basin) is presented in Table 4.3.1.1 (following page).

Table 4.3.1.1 Southern catchment quarry pit (sedimentation basin) – annual volumes

Parameter	Average year	Minimum	Maximum
Rainfall volume – total South Pit catchment area (ML)	55.4	32.5	86.5
Runoff volume – total South Pit catchment area (ML) [a]	31.0	16.7	54.3
Total pit inflow (ML)	34.2	18.8	58.5
Evaporative losses (ML)	1.8	1.5	2.3
Seepage losses (ML)	5.3	3.7	7.4
Discharge – pumped out to LPD1	27.1	13.6	49.9

[a] Total runoff that expected to have been generated and discharged from equivalent catchment area if no obstructions (i.e. quarry pit) were present. Estimate provided for comparison to estimated discharge diverted from this location to LPD1.

On average, it is estimated that total catchment discharge from the South Pit catchment area reduces by approximately 13 percent as a result of the quarry operations. As current licence conditions require that all controlled site discharge be directed to the licenced discharge point at LPD1, runoff to the receiving environment downstream of the natural catchment discharge point west of the sedimentation basin will be reduced substantially with only runoff from the undisturbed catchment area downstream of the quarry pit continuing to drain to this location.

A summary of the estimated sedimentation basin performance is provided in Table 4.3.1.2.

Table 4.3.1.2 South Pit/sedimentation basin performance

Parameter	Average year	Minimum	Maximum
Total number of days discharging to LPD	85	61	121
Total number of days per year when pit contains water [a]	15	7	26
Maximum number of consecutive days where pit contains water	3.1	2	6
Average number of days to empty pit	1.5	1.1	1.9

[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. More frequent wetting and drying during small events is expected and is accounted for by losses and/or immediate discharge.

4.4 South-western catchments

The south-western catchment water balance has been undertaken to estimate catchment discharge volumes at LPD1. Collection and storage of water within these catchments is intended to be temporary only to satisfy water quality treatment requirements. As these basins are not confined within the quarry pits, in rainfall events exceeding their design capacity, the basins will overtop and discharge directly to the receiving environment, leaving the site at LPD1. The modelled storage volume for the existing sedimentation basin SW1 is based on detailed ground survey. Sizing for basin SW2 (under construction) was subsequently undertaken to treat the balance of the overall south-western catchment that exceeded the available capacity in basin in SW1. The modelled storage volume for basin SW2 is based on the required volume for the basin that is currently under construction (as described in Section 3.1.3).

4.4.1 South-western catchment 1 – sedimentation basin SW1

A summary of the annual water balance results for the catchment SW1 sedimentation basin is presented in Table 4.4.1.1 (following page).

Table 4.4.1.1 Sedimentation basin SW1 – annual volumes

Parameter	Average year	Minimum	Maximum
Rainfall volume – total SW1 catchment area (ML)	6.6	3.9	10.4
Runoff volume – total SW1 catchment area (ML) [a]	3.7	2.0	6.5
Total basin inflow (ML)	3.7	2.0	6.6
Evaporative losses (ML)	0.02	0.01	0.04
Seepage losses (ML)	0.08	0.03	0.15
Pumped discharge to LPD1 (ML)	3.0	1.9	4.9
Overflow to LPD1 (ML)	0.6	0	2.0
Total discharge to LPD1 (pumped and overflow) (ML)	3.7	2.0	6.5

[a] Total runoff that expected to 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 total catchment discharge from the SW1 catchment area is comparable to the discharge for the same catchment area prior to the quarry operations.

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	Average year	Minimum	Maximum
Total number of days discharging to LPD	196	155	235
Total number of days of overflow	4	0	14
Total number of days per year when pit contains water [a]	44	19	79
Maximum number of consecutive days where pit contains water	9.6	5	18
Average number of days to empty pit	3.7	2.1	6.2

[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. More frequent wetting and drying during small events is expected and is accounted for by losses and/or immediate discharge.

The model inputs (basin volumes and pumping rates) dictate that the sedimentation basin will be emptied within five days of the cessation of all rainfall events up to and including the five-day design rainfall event of 60.2 mm.

Where rainfall exceeds the design capacity of the system, the basin will overflow at the same time as controlled discharge is taking place. Where a rainfall event continues for more than the five-day design event duration, the basin is expected to contain water for a longer period whilst active discharge is taking place, as indicated in the results above.

4.4.2 South-western catchment 2 – sedimentation basin SW2

A summary of the annual water balance results for the catchment SW2 sedimentation basin is presented in Table 4.4.2.1 (following page).

Table 4.4.2.1 Sedimentation basin SW2 – annual volumes

Parameter	Average year	Minimum	Maximum
Rainfall volume – total SW2 catchment area (ML)	26.9	15.8	42.0
Runoff volume – total SW2 catchment area (ML) [a]	15.0	8.1	26.4
Total basin inflow (ML)	15.2	8.2	26.7
Evaporative losses (ML)	0.10	0.05	0.18
Seepage losses (ML)	0.37	0.16	0.69
Pumped discharge to LPD1 (ML)	12.2	7.5	19.6
Overflow to LPD1 (ML)	2.6	0	7.9
Total discharge to LPD1 (pumped and overflow) (ML)	14.7	7.9	26.4

[a] Total runoff that expected to 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 total catchment discharge from the SW2 catchment area to LPD 1 reduces by approximately 2 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 4.4.2.2.

Table 4.4.2.2 Sedimentation basin SW2 performance

Parameter	Average year	Minimum	Maximum
Total number of days discharging to LPD	195	155	234
Total number of days of overflow	4	0	14
Total number of days per year when pit contains water [a]	43	19	79
Maximum number of consecutive days where pit contains water	9.6	5	1
Average number of days to empty pit	3.7	2.1	6.2

[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. More frequent wetting and drying during small events is expected and is accounted for by losses and/or immediate discharge.

The model inputs (basin volumes and pumping rates) dictate that the sedimentation basin will be emptied within five days of the cessation of all rainfall events up to and including the five-day design rainfall event of 60.2 mm.

Where rainfall exceeds the design capacity of the system, the basin will overflow at the same time as controlled discharge is taking place. Where a rainfall event continues for more than the five-day design event duration, the basin is expected to contain water for a longer period whilst active discharge is taking place, as indicated in the results above.

4.5 Water supply and security

The Main Dam in the North Pit is used to provide all water supply requirements for the site and as such, no imported clean (mains) water is relied upon or needed for any operational uses on site. The Main Dam has a capacity of 30 ML. As detailed in Section 4.2.2, throughout the entire 20-year model period, the available

volume of water stored in the dam does not fall below 16.7 ML (or 55.6 percent of capacity). With an average daily water usage across the site of 92.3 kL, this approximates to 181 days (or almost 6 months) of additional water supply available at all times throughout the modelling period.

Figure 4 (in Attachment 2) shows the estimated available storage levels throughout the model period, whilst Table 4.5.1 provides a summary of the frequency of availability of different supply levels (on a daily timestep basis) throughout the model period.

Table 4.5.1 Daily water supply availability – Main Dam

Main Dam storage volume (ML)	Percent of full storage (%)	Proportion of time storage level exceeded (%)
0	0	100.0%
3.0	10	100.0%
6.0	20	100.0%
9.0	30	100.0%
12.0	40	100.0%
15.0	50	100.0%
16.5	55	100.0%
18.0	60	99.9%
19.5	65	99.7%
21.0	70	99.1%
22.5	75	98.4%
24.0	80	97.0%
25.5	85	94.3%
27.0	90	88.2%
28.5	95	74.0%
30.0	100	11.0%
31.5	105	0.0%

5 Results – Future quarry conditions

5.1 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.

5.1.1 Northern catchment sedimentation basin

Table 5.1.1.1 summarises the annual water balance results for the Northern catchment sedimentation basin.

Table 5.1.1.1 Northern catchment sedimentation basin – annual volumes

Parameter	Average year	Minimum	Maximum
Rainfall volume – total North Pit catchment area (ML)	609.2	358.0	951.4
Runoff volume – total North Pit catchment area (ML) [a]	341.1	184.1	597.7
Total basin inflow (ML)	411.4	252.4	674.6
Evaporative losses (ML)	1.9	0.4	5.3
Seepage losses (ML)	0.7	0.1	2.5
Discharge – pumped to main dam	66.7	56.1	73.8
Discharge – pumped out to LPD2	342.0	178.0	616.5

[a] Total runoff that expected to 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 (proposed) LPD2.

On average, it is expected that total catchment discharge from the North Pit area to (proposed) LPD 2 will be comparable to the discharge for the same undisturbed catchment area prior to quarrying works.
The comparative increase in catchment discharge (when compared to the substantial reduction in catchment discharge under existing conditions) is the combined result of:

- Interception of the groundwater table resulting in an additional inflow source to the quarry pit and significant contribution to the water usage demands within the site.
- Change in geotechnical characteristics of the landform with depth such that the permeability is significantly reduced and seepage from the sedimentation basin will also be reduced.
- Proposed (future) construction of a suitably sized sedimentation basin that does not rely on ponding over the quarry floor for all events up to the design event. The smaller wet basin footprint means evaporative losses from the basin are reduced.

A summary of the estimated sedimentation basin performance is provided in Table 5.1.1.2.

Table 5.1.1.2 Northern catchment sedimentation basin performance

Parameter	Average year	Minimum	Maximum
Total number of discharge days (to Main Dam and/or LPD) [a]	365	365	366
Total number of days discharging to Main Dam	289	250	317
Total number of days discharging to LPD	200	164	240
Total number of days per year when basin contains water [b]	35	12	70

Parameter	Average year	Minimum	Maximum
Max. number of consecutive days where basin contains water	12.4	3	36
Average number of days to empty basin	3.1	1.8	5.9

[a] Once the quarry pit intercepts groundwater, the basin will require continuous dewatering of the groundwater inflows to maintain capacity in preparation for rainfall events.

[b] Total number of days containing water has been calculated based on end-of-day volumes after all losses and discharges (including dewatering of groundwater inflows) have been accounted for. More frequent wetting and drying during small events is expected and is accounted for by losses and/or immediate discharge.

The model inputs (basin volumes and pumping rates) dictate that the sedimentation basin will be emptied within five days of the cessation of all rainfall events up to and including the 5-day design rainfall event of 60.2 mm. Where rainfall exceeds the design capacity of the system or a rainfall event continues for more than the 5-day design event duration, the basin is expected to contain water for a longer than five days, whilst active discharge is taking place, as demonstrated by the results above.

5.1.2 Main Dam water balance

A summary of the water balance results for the Main Dam is presented in Table 5.1.2.1.

Table 5.1.2.1 Northern catchment Main Dam – annual volumes

Parameter	Average year	Minimum	Maximum
Dam inflow from direct rainfall (ML)	4.3	2.5	6.7
Dam inflow pumped from sediment basin (ML)	66.7	56.1	73.8
Total dam inflow (ML)	**71.1**	**62.3**	**76.4**
Evaporative losses (ML)	2.9	2.6	3.3
Seepage losses (ML)	1.1	1.1	1.1
Total losses (ML)	**4.0**	**3.6**	**4.3**
Usage – water truck for dust suppression (ML)	45.3	39.2	49.2
Usage – main tank top-up for other site usage (ML)	21.7	20.0	23.1
Total usage (ML)	**67.0**	**59.2**	**72.3**
Daily stored volume (ML) [a]	**29.6**	**26.4**	**31.0**

[a] Stored volumes reported using average, minimum and maximum daily levels for entire modelling period (not based on annual averages).

The modelling results show that for predicted future conditions, the main dam will provide sufficient supply to service all water demands within the quarry throughout the full range of modelled climatic conditions, with a minimum estimated storage volume of 26.4 ML (or 3.6 ML below full capacity) throughout the model period. This indicates that a reduced dam capacity is feasible for future quarry operations without compromising reliability of supply. Further investigations will be required at such a time when quarry works progress to the point that the current dam required decommissioning and replacement to investigate the intermediate conditions (groundwater inflows, seepage etc.) as the modelling described above only reflects the ultimate stage of the quarry operations.

Section 5 of this report provides a series of recommendations to improve the accuracy of the above estimates. If implementation of those recommendations, and corresponding revisions of the water balance modelling, indicate that there is potential for the dam to empty during dry periods, the capacity of the dam will be increased in the future.

The attached Figure 6 shows the estimated future daily storage volumes in the dam for the entire model period (based on the existing dam capacity).

Although controlled dam inflows (i.e. pumped discharge from the sediment basin) have been restricted to only occurring when the dam is below full storage level, direct rainfall onto the dam during large rainfall events results in the dam exceeding full-storage capacity for a short time after such events. Sufficient freeboard (up to 1 ML) will be provided within the bunded dam area to accommodate this rainfall without mixing with dirty runoff from the quarry pit.

Water truck
Based on the inputs described in Section 3.1.4, the modelling estimates that an average annual volume of 45.3 ML is used by the water truck for dust suppression purposes. This equates 2,589 loads in the water truck. It is recommended that a daily log of all water truck movements be established on site to quantify actual site usage and improve the accuracy of future water balance modeling.

5.1.3 Main Tank water balance

A summary of the water balance results for the Main Tank is presented in Table 5.1.3.1 (following page).

Table 5.1.3.1 Northern catchment Main Dam – annual volumes

Parameter	Average year	Minimum	Maximum
Tank inflow pumped from main dam (ML)	21.7	20.0	23.1
Usage – haul road sprinklers (ML)	6.3	6.2	6.3
Usage – asphalt plant (ML)	0.1	0.1	0.1
Usage – process/product water (ML)	15.4	13.3	16.9
Average daily stored volume (ML)	**0.79**	**0.49**	**1.0**

The attached Figure 7 shows the estimated future daily storage volumes in the tank for the entire model period. Based on the water usage assumptions described above, the modelling suggests that, throughout the modelling period the minimum water level in the rain tank prior to weekly top-up will be 0.49 ML. Once the recommendations detailed in the water balance for the existing quarry operations are implemented, the estimates for future operations will be refined and modelling revised accordingly.

5.2 Southern catchment

The southern catchment water balance has been undertaken to estimate catchment discharge volumes at (proposed) LPD3. Collection and storage of water within the catchment is intended to be temporary only to satisfy water quality treatment requirements. If, following future expansion of the southern quarry pit, a more permanent water storage for re-use within the southern pit is required, this will be provided separately and in addition to the temporary sedimentation basin. In that case, the water balance modelling will be updated accordingly.

5.2.1 Southern catchment sedimentation basin

As noted above, under existing site conditions the southern pit provides a sedimentation basin function for treating runoff from the entire southern catchment. It is anticipated that when the southern pit expansion is undertaken as part of the future quarry operation, a sedimentation basin will be constructed within the southern pit, to limit the inundated area following rainfall events and allow quarry operations to return to normal as soon as possible after the event (whilst treatment and discharge of the collected water is taking place. A summary of the annual water balance results for the future South Pit sedimentation basin is presented in Table 5.2.1.1.

Table 5.2.1.1 Southern catchment sedimentation basin – annual volumes

Parameter	Average year	Minimum	Maximum
Rainfall volume – total South Pit catchment area (ML)	72.3	42.5	113.0
Runoff volume – total South Pit catchment area (ML) [a]	40.5	21.8	71.0
Total basin inflow (ML)	40.7	21.9	71.3
Evaporative losses (ML)	0.09	0.03	0.29
Seepage losses (ML)	0.36	0.09	1.08
Discharge – pumped out to LPD3	40.3	21.8	70.7

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

On average, it is estimated that total catchment discharge from the South Pit catchment area will be comparable to the discharge for the same catchment area prior to the quarry operations.

A summary of the estimated sedimentation basin performance is provided in Table 5.2.1.2.

Table 5.2.1.2 Southern catchment sedimentation basin performance

Parameter	Average year	Minimum	Maximum
Total number of days discharging to LPD	188	149	223
Total number of days per year when basin contains water [a]	18	8	31
Maximum number of consecutive days where basin contains water	4.2	3	10
Average number of days to empty basin	1.7	1.4	2.1

[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. More frequent wetting and drying during small events is expected and is accounted for by losses and/or immediate discharge.

5.3 South-western catchments

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

5.3.1 South-western catchment 1 – sedimentation basin SW1

A summary of the annual water balance results for the catchment SW1 sedimentation basin is presented in Table 5.3.1.1.

Table 5.3.1.1 Sedimentation basin SW1 – annual volumes

Parameter	Average year	Minimum	Maximum
Rainfall volume – total SW1 catchment area (ML)	6.6	3.9	10.4
Runoff volume – total SW1 catchment area (ML) [a]	3.7	2.0	6.5
Total basin inflow (ML)	3.7	2.0	6.6
Evaporative losses (ML)	0.02	0.01	0.04
Seepage losses (ML)	0.08	0.03	0.15
Discharge to LPD1 (pumped and overflow)	3.7	2.0	6.5

[a] Total runoff that expected to 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 total catchment discharge from the SW1 catchment area is comparable to the discharge for the same catchment area prior to the quarry operations.

A summary of the estimated sedimentation basin performance is provided in Table 5.3.1.2.

Table 5.3.1.2 Sedimentation basin SW1 performance

Parameter	Average year	Minimum	Maximum
Total number of days discharging to LPD	196	155	235
Total number of days of overflow	4	0	14
Total number of days per year when pit contains water [a]	44	19	79
Maximum number of consecutive days where pit contains water	9.6	5	18
Average number of days to empty pit	3.7	2.1	6.2

[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. More frequent wetting and drying during small events is expected and is accounted for by losses and/or immediate discharge.

The model inputs (basin volumes and pumping rates) dictate that the sedimentation basin will be emptied within 5-days of the cessation of all rainfall events up to and including the 5-day design rainfall event of 60.2mm.

Where rainfall exceeds the design capacity of the system, the basin will overflow at the same time as controlled discharge is taking place. Where a rainfall event continues for more than the 5-day design event duration, the basin is expected to contain water for a longer period whilst active discharge is taking place, as demonstrated by the results above.

5.3.2 South-western catchment 2 – sedimentation basin SW2

A summary of the annual water balance results for the catchment SW1 sedimentation basin is presented in Table 5.3.2.1.

Table 5.3.2.1 Sedimentation basin SW2 – annual volumes

Parameter	Average year	Minimum	Maximum
Rainfall volume – total SW2 catchment area (ML)	26.9	15.8	42.0
Runoff volume – total SW2 catchment area (ML) [a]	15.0	8.1	26.4
Total basin inflow (ML)	15.2	8.2	26.7
Evaporative losses (ML)	0.10	0.05	0.18
Seepage losses (ML)	0.37	0.16	0.69
Discharge to LPD1 (pumped and overflow)	14.7	7.9	26.4

[a] Total runoff that expected to 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 total catchment discharge from the SW2 catchment area to LPD 1 will be reduced by approximately 2 percent as a result of the future quarry operations (when compared to the same undeveloped catchment area). 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 5.3.2.2.

Table 5.3.2.2 Sedimentation basin SW2 performance

Parameter	Average year	Minimum	Maximum
Total number of days discharging to LPD	195	155	234
Total number of days of overflow	4	0	14
Total number of days per year when pit contains water [a]	43	19	79
Maximum number of consecutive days where pit contains water	9.6	5	18
Average number of days to empty pit	3.7	2.1	6.2

[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. More frequent wetting and drying during small events is expected and is accounted for by losses and/or immediate discharge.

The model inputs (basin volumes and pumping rates) dictate that the sedimentation basin will be emptied within 5 days of the cessation of all rainfall events up to and including the 5-day design rainfall event of 60.2 mm.

Where rainfall exceeds the design capacity of the system, the basin will overflow at the same time as controlled discharge is taking place. Where a rainfall event continues for more than the 5-day design event duration, the basin is expected to contain water for a longer period whilst active discharge is taking place, as demonstrated by the results above.

5.4 Water supply and security

Under the modelled 'future quarry footprint' scenario, the Main Dam in the North Pit is used to provide all water supply requirements for the site and as such, no imported clean (mains) water will be relied upon or needed for any future operational uses on site. Though the form of the dam will likely change as excavation within the pit deepens, for modelling purposes, it has been assumed that the Main Dam will maintain capacity of 30 ML at full storage. As detailed in Section 5.1.2, throughout the entire 20-year model period, the available volume of water stored in the dam is estimated not to fall below 26.4 ML (or 88 percent of capacity). With an average daily water usage across the site of 183.6 kL, this approximates to 144 days (greater than 4 months) of additional water supply available at all times throughout the modelling period.

Figure 6 (in Attachment 2) shows the estimated available storage levels throughout the model period, whilst Table 5.4.1 provides a summary of the frequency of availability of different supply levels (on a daily timestep basis) throughout the model period.

Table 5.4.1 Daily water supply availability – Main Dam

Main Dam storage volume (ML)	Percent of full storage (%)	Proportion of time storage level exceeded (%)
0	0	100.0%
3.0	10	100.0%
6.0	20	100.0%
9.0	30	100.0%
12.0	40	100.0%

Main Dam storage volume (ML)	Percent of full storage (%)	Proportion of time storage level exceeded (%)
15.0	50	100.0%
18.0	60	100.0%
21.0	70	100.0%
24.0	80	100.0%
25.5	85	100.0%
27.0	90	99.5%
28.5	95	95.8%
30.0	100	20.8%
31.5	105	0.0%

6 Recommendations

6.1 Existing quarry operations

It is recommended that the following actions be undertaken to better quantify water movements within the site and improve water balance estimates in the future:

- Install an automated weather station to record daily climate observations.
- Keep a daily log of all water truck activity.
- Install a flow meter on the outlet of the main tank to record/quantify water usage (data to be recorded on a daily basis).
- Monitor the installed level markers within each of the sedimentation basins to ensure they have suitable capacity for rain events.
- Keep a daily log (at the same time each day) of observed water levels within the main dam. Alternatively, an automated level logger can be installed.
- Install (or have readily available) pumps of sufficient capacity to discharge from each of the four sedimentation basins. Separate pumps will be available for each of the basins to ensure timely discharge of runoff.
- Pumps will be tested at minimum monthly intervals (during prolonged dry periods when not in use) to ensure they are maintained in working order for future rainfall events. All testing and maintenance activities will be recorded on site.
- Make all collected data available for inclusion in future model revisions.
- Revision of the water balance modelling in 12 months to improve estimates based on site recordings and observations.

6.2 Future quarry operations

It is recommended that the following actions be undertaken at a suitable time in the future to improve water balance estimates in the future:

- Continue with all recording and logging activities as described above.
- When the sedimentation basins within the northern or southern pit change due to progressing extraction, undertake detailed ground survey to establish a stage-area-storage relationship for the basin to ensure adequate treatment capacity. Install level markers within these sedimentation basin/s to mark the top of the sediment storage zone and incremental water levels above this point up to full settling zone capacity.
- Once the northern pit reaches an extraction depth of 87.5mAHD the volumes of the groundwater inflows to the pit is to be monitored, estimated and reported.
- Once the southern pit reaches an extraction depth of 113mAHD the volumes of the groundwater inflows to the pit is to be monitored, estimated and reported.
- Install (or have readily available) pumps of sufficient capacity to discharge from each of the four sedimentation basins. Separate pumps will be available for each of the basins to ensure timely discharge of runoff.
- Revision of the water balance modelling in conjunction with any significant changes to site operations (e.g. modified water storage structures, changes to the contributing catchment areas or drainage regime, excavation recommencing within the South Pit, excavation below 87.5mAHD in the northern pit and 113mAHD in the southern pit etc.).

7 Reporting requirements

7.1 Annual water balance reporting

An annual water balance report is to be prepared as part of the Annual Return for the quarry. The annual report is to include details of:

- Daily climate observations recorded at on-site weather station.
- Daily water truck activity (number of loads filled/used, truck capacity per load)
- Daily usage from water tank.
- Recorded water levels in all sedimentation basins based on installed level markers.
- Recorded water levels for the main dam (daily time step or logger data).
- Details of all water releases from all on-site sedimentation basins following rain events (time to which pumping commences based on water quality results, pump rates, duration of pumping, time until dry).
- Copies of records for testing and maintenance activities for all onsite water pumps.
- Records of material/product exports from the site.
- Once the northern pit reaches an extraction depth of 87.5 mAHD the volumes of the groundwater inflows to the pit is to be monitored, estimated and reported.
- Once the southern pit reaches an extraction depth of 113 mAHD the volumes of the groundwater inflows to the pit is to be monitored, estimated and reported.
- Annual water balance modelling to reflect actual practices during reporting year based on site recordings and observations.

7.2 Revised site water balance

This report, *'Site Water Balance, Blakebrook Quarry, Blakebrook, New South* Wales' is to be reviewed and revised periodically to reflect planned and actual changes to water management practices on the site, including, but not limited to:

- Upon completion of construction, and following as-constructed survey of, the sedimentation basin in catchment SW2 (if constructed basin form differs from the assumptions contained within this report).
- Upon approval of the proposed additional discharge points currently under application under EPL 3384.
- At any time where there are changes (proposed or actual) to the form of any water storage devices on site (e.g. north pit sedimentation basin changes to allow for increase excavation depth, south pit sediment basin construction when works in south pit recommence).
- In support of any application for changes to the current licence for the site (where the proposed licence changes involve any changes to the water management practices, water storages or any activity that influences on-site water use).
- If observed/recorded water usage (eg. water truck movements, volumes of water used from tank) on site within any annual return period differs by greater than 15 percent from the estimates contained within this report (after accounting for rainfall variability).
- If observed/recorded groundwater inflows (once intercepted) in either pit differ by greater than 15 percent from the estimates contained within this report.

8 Attachment 1 – Drawings

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

NORTHERN SEDIMENT BASIN
Existing basin area = 0.401 ha
Storage volume in existing basin = 2.517 ML
Required total storage volume = 26.7 ML (incl. ponding across pit floor)
- Settling zone volume = 17.8 ML
- Sediment storage capacity = 8.9 ML
Notes:
1. Storage capacity is to be provided through ponding across floor of quarry once sediment basin fills
2. Following rainfall event, basin to be tested & treated (if necessary) to meet discharge requirements.
3. Treated water is pumped from basin to dam (until dam fills).
4. Excess discharge to be pumped to LPD 2.
5. Basin is to be treated and pumped out to permanent storage level within 5-days of rainfall event and to remain at (or below) permanent storage level at all other times.
6. The permanent storage level to be identified with a marker at approximately 111.5 mAHD.

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
Total volume = 0.322 ML
Settling zone volume = 0.214 ML
Sediment storage capacity = 0.107 ML
Notes:
1. Basin discharge is to be pumped to LPD 1.
2. Collected water is to be tested, treated and released within 5-days of rainfall event.
3. Basin to remain dry at all other times.

SOUTH WESTERN CATCHMENT 1
Area = 0.449 ha
Catchment runoff drains to sediment basin SW1

SEDIMENT BASIN SW2 (UNDER CONSTRUCTION)
Required total volume = 1.297 ML
Settling zone volume = 0.865 ML
Sediment storage capacity = 0.432 ML
Notes:
1. Basin discharge is to be pumped to LPD 1.
2. Collected water is to be tested, treated and released within 5-days of rainfall event.
3. Basin to remain dry at all other times.

SOUTH WESTERN CATCHMENT 2
Area = 1.818 ha
Catchment runoff drains to sediment basin SW2

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 natural catchment discharge point.

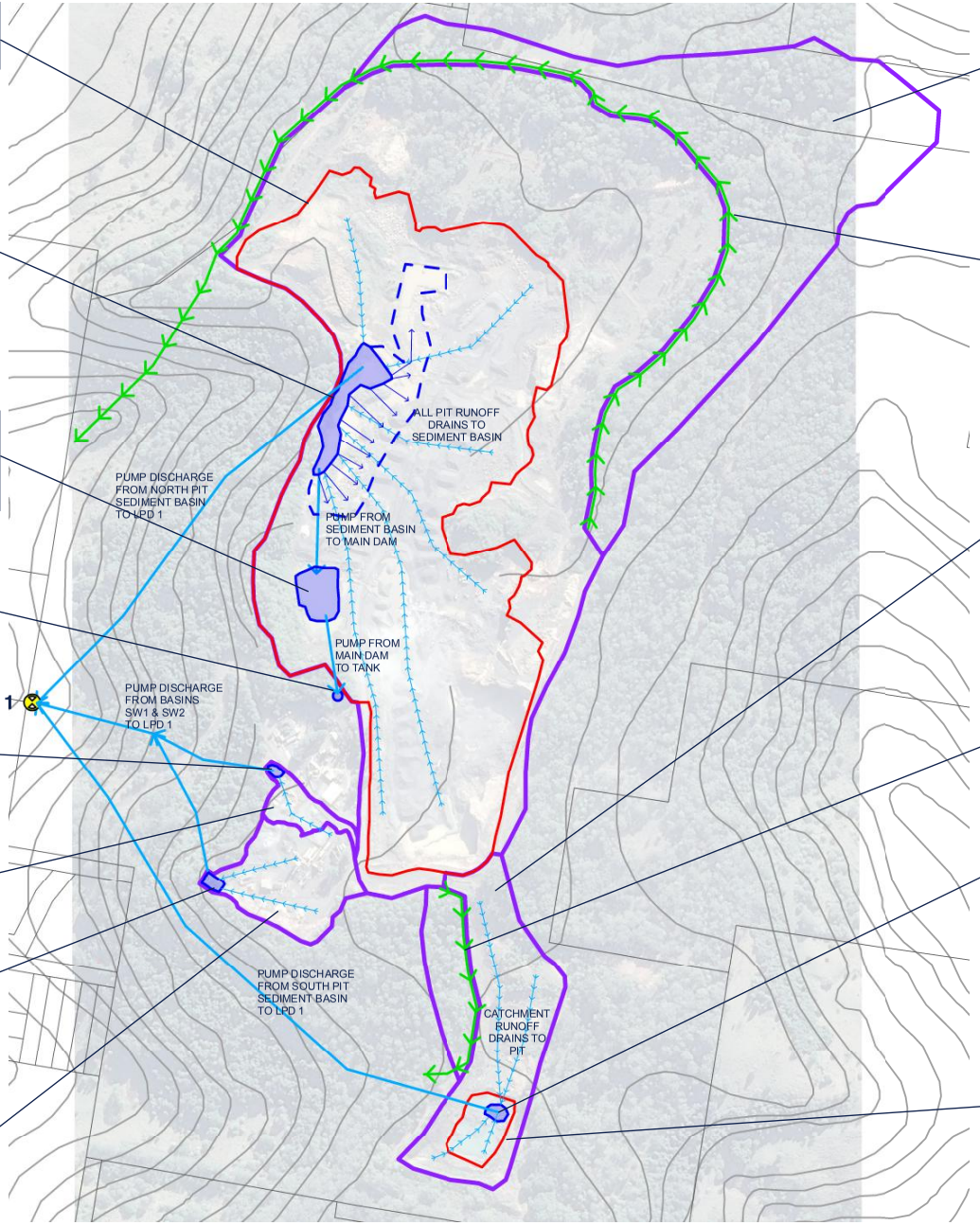
CLEAN WATER DIVERSION DRAIN

SOUTHERN CATCHMENT
Total area = 4.8ha
Area draining to pit = 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.

CLEAN WATER DIVERSION DRAIN

SOUTHERN SEDIMENT BASIN (UTILISES SOUTH PIT)
Required total storage volume = 2.67 ML
Settling zone volume = 1.78 ML
Sediment storage capacity = 0.89 ML
Notes:
1. Storage capacity is to be provided through ponding across floor of quarry.
2. Following rainfall event, basin to be tested & treated (if necessary) to meet discharge requirements.
3. Treated water is pumped from pit to LPD3.
4. Pit is to be pumped out within 5-days of rainfall event and to remain dry at all other times.

SOUTH PIT
Area = 0.5ha



ORIENTATION

SCALE
50 100 150 200 250
metres

ROBINA
PO Box 4115 Robina QLD4230 07 5578 9944
Email robina@access.gs www.access.gs

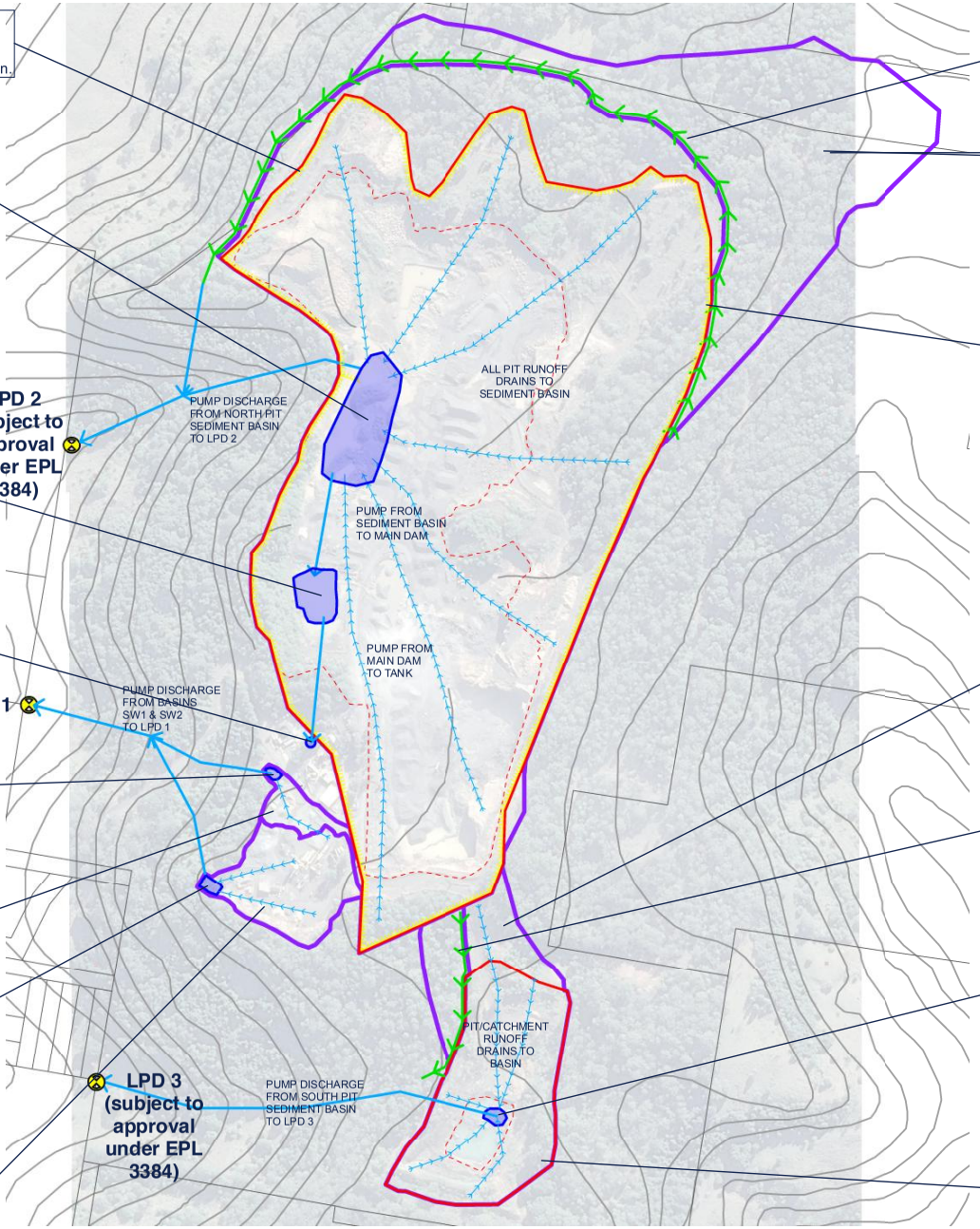
LEGEND
- Catchment boundary
- Quarry pit (existing)
- Discharge point
- Sediment basins / water storage
- Clean water diversion drain

SOURCES
Image source: Google Earth Pro
Image dates: 6 June 2016

PROJECT: BLAKEBROOK QUARRY SOIL AND WATER MANAGEMENT PLAN
CLIENT: LISMORE CITY COUNCIL
DRAWING: EXISTING QUARRY FOOTPRINT WATER MANAGEMENT

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:6,250@A3	12/12/2018	AJF	CMA	11737	004	A

GILBERT SUTHERLAND



NORTH PIT
Area = 36.7 ha
Notes:
1. All pit runoff directed to sediment basin.

NORTHERN SEDIMENT BASIN
Area = 0.980 ha
Required storage volume = 29.4 ML
- Settling zone volume = 19.6 ML
- Sediment storage capacity = 9.8 ML
Notes:
1. Following rainfall event, basin to be tested & treated (if necessary) to meet discharge requirements.
2. Treated water is pumped from basin to dam (until dam fills).
3. Excess discharge to be pumped to LPD 2.
4. Basin is to be treated and pumped out within 5-days of rainfall event and to remain at (or below) nominated permanent storage level at all other times.
5. The permanent storage level to be identified with a marker.

LPD 2 (subject to approval under EPL 3384)

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
To be relocated outside quarry expansion
Usage:
- Asphalt plant
- Haul road sprinklers (dust supression)
- Product water (4% by weight)

LPD 1

SEDIMENT BASIN SW1
Area = 232 m²
Total volume = 0.322 ML
- Settling zone volume = 0.214 ML
- Sediment storage capacity = 0.107 ML
Notes:
1. Basin discharge is to be pumped to LPD 1.
2. Collected water is to be tested, treated and released within 5-days of rainfall event.
3. Basin to remain dry at all other times.

SOUTH WESTERN CATCHMENT 1
Area = 0.442 ha
Catchment runoff drains to sediment basin SW1

SEDIMENT BASIN SW2
Total volume = 1.297 ML
- Settling zone volume = 0.865 ML
- Sediment storage capacity = 0.432 ML
Notes:
1. Basin discharge is to be pumped to LPD 1.
2. Collected water is to be tested, treated and released within 5-days of rainfall event.
3. Basin to remain dry at all other times.

LPD 3 (subject to approval under EPL 3384)

SOUTH WESTERN CATCHMENT 2
Area = 1.817 ha
Catchment runoff drains to sediment basin SW2

CLEAN WATER DIVERSION DRAIN

NORTHERN CATCHMENT
Total area = 50.7 ha
Area draining to pit = 41.2 ha
Undisturbed area diverted around pit = 9.5 ha
Note:
1. All runoff from undisturbed area to be collected in clean water diversion drain and diverted around pit to LPD2.

GROUNDWATER
Inflows collected in perimeter drain and conveyed to sediment basin
Estimated inflow = 190 kL/day

SOUTHERN CATCHMENT
Total area = 5.7ha
Area draining to pit = 4.9 ha
Undisturbed area diverted around pit = 0.8 ha
Note:
1. All runoff from undisturbed area to be collected in clean water diversion drain and diverted west to existing ephemeral gully.

CLEAN WATER DIVERSION DRAIN

SOUTHERN SEDIMENT BASIN (NEW BASIN INSIDE PIT)
Required total storage volume = 3.49 ML
- Settling zone volume = 2.33 ML
- Sediment storage capacity = 1.16 ML
Notes:
1. Following rainfall event, basin to be tested & treated (if necessary) to meet discharge requirements.
2. Treated water is pumped from pit to LPD3.
3. Pit is to be pumped out within 5-days of rainfall event and to remain dry at all other times.

SOUTH PIT
Area = 4.1ha
Notes:
1. All pit runoff directed to sediment basin.

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 (future)
- Quarry pit (existing)
- Discharge point
- Clean water diversion drain
- Sediment basins / water storage
- Perimeter drain (groundwater inflows)

SOURCES
Image source: Google Earth Pro
Image dates: 6 June 2016

NOTES
1. LPD1 is currently the only licenced discharge point for the site.
2. An application has been lodged for approval of LPD2 and LPD3 as additional licensed discharge points under EPL 3384.
3. Until LPD2 and LPD3 are approved under EPL 3384, all site discharge is to be directed to LPD1.

PROJECT BLAKEBROOK QUARRY
CLIENT LISMORE CITY COUNCIL
DRAWING FUTURE QUARRY FOOTPRINT WATER MANAGEMENT

SCALE	DATE	DRAWN	CHECKED	PROJECT	DRAWING	REVISION
1:6,250@A3	13/02/2019	AJF	CMA	11737	005	B

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9 Attachment 2 – Figures

Figure 1 – North Pit catchment water balance

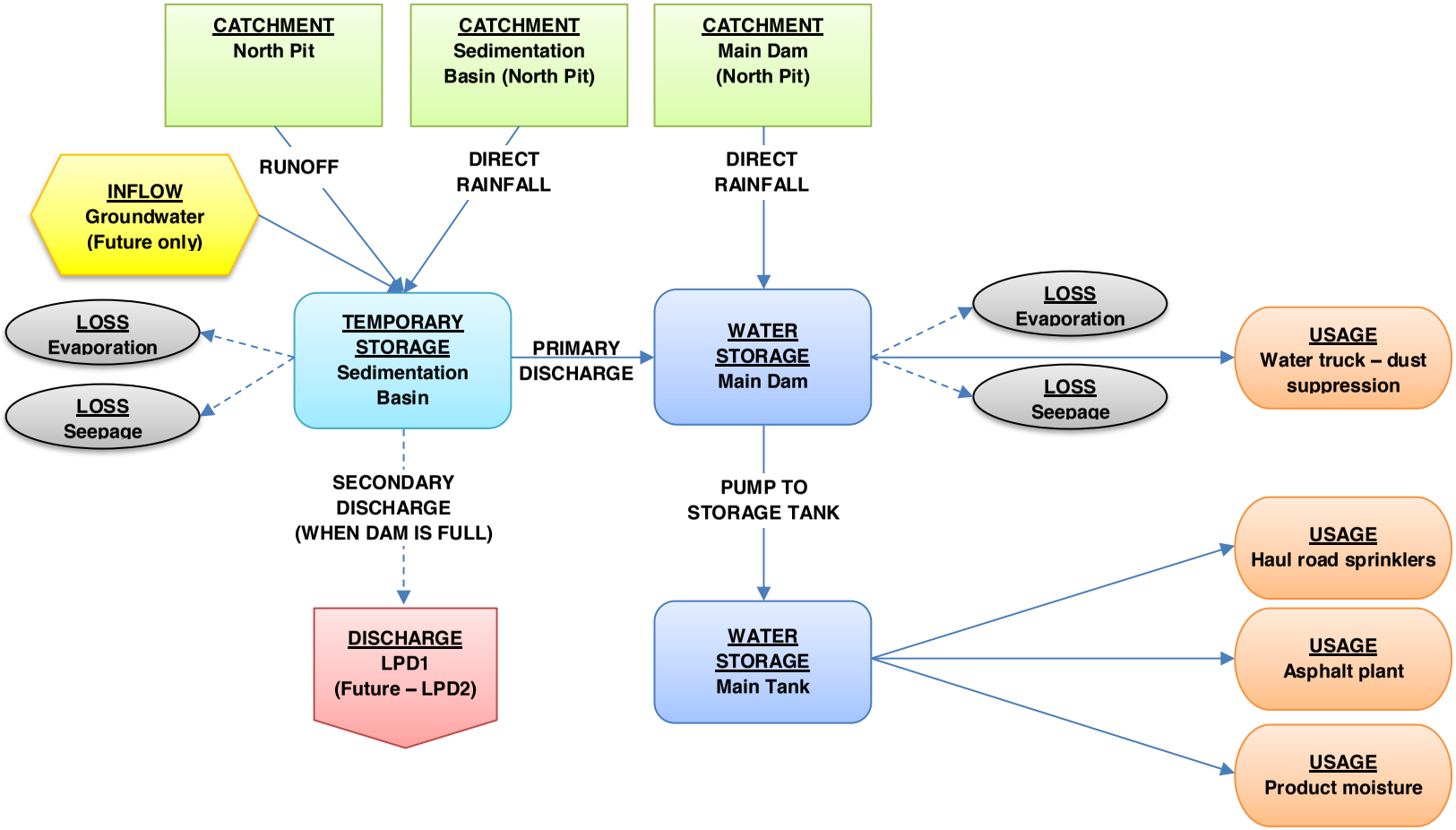


Figure 2 – South Pit catchment water balance

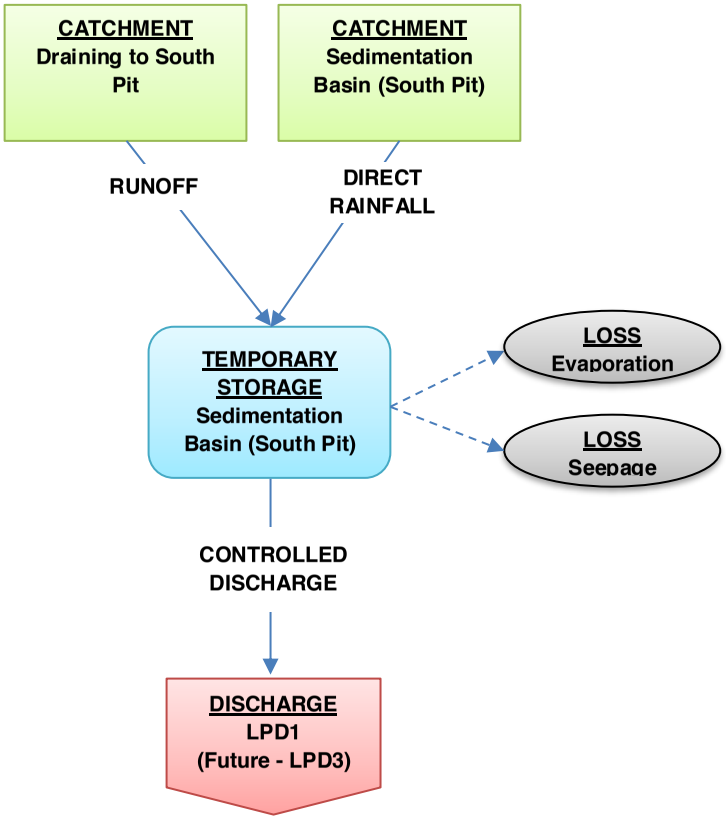


Figure 3 – South Western catchments water balance

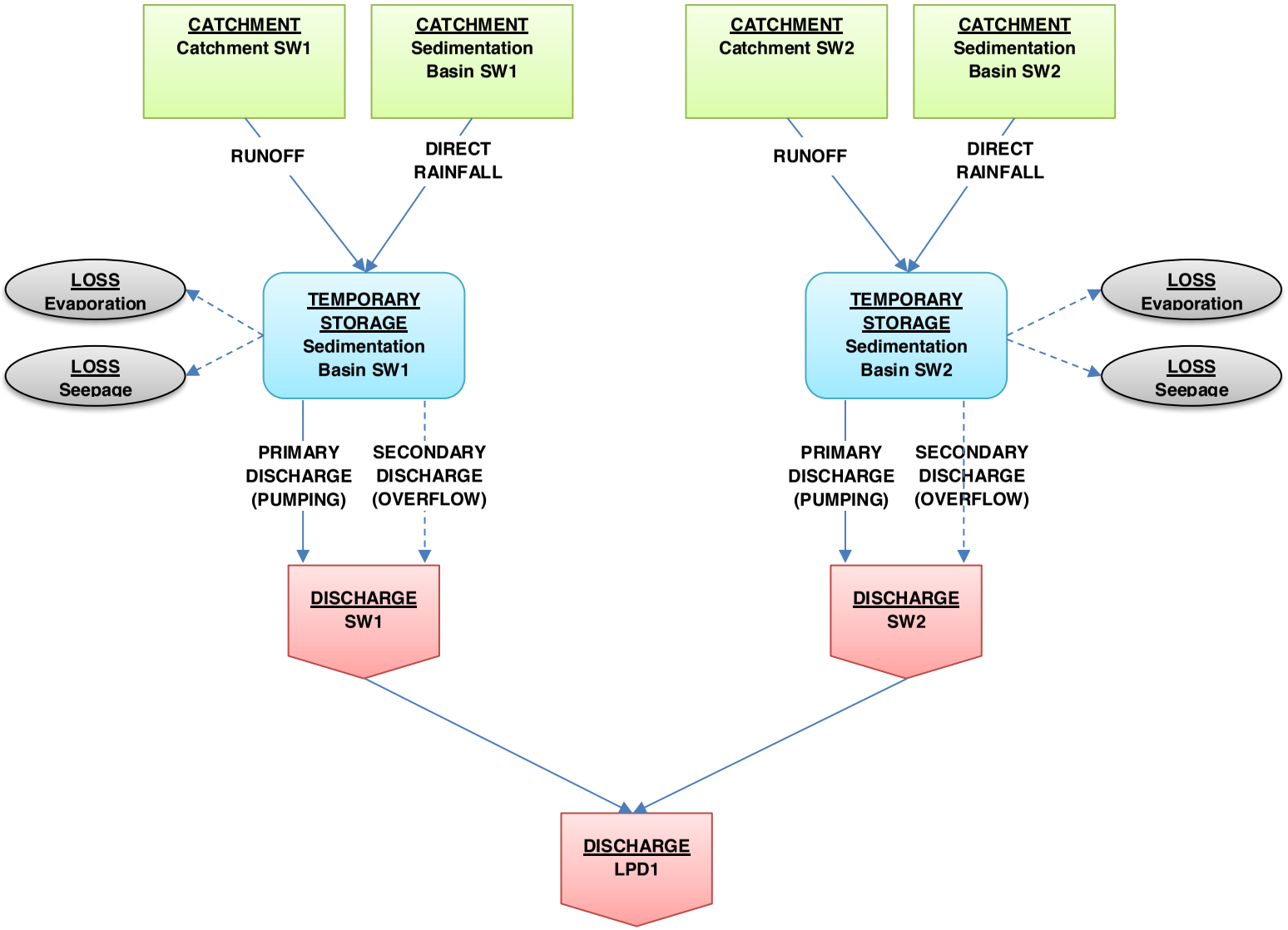


Figure 4 - Main Dam water balance for Existing Quarry Footprint

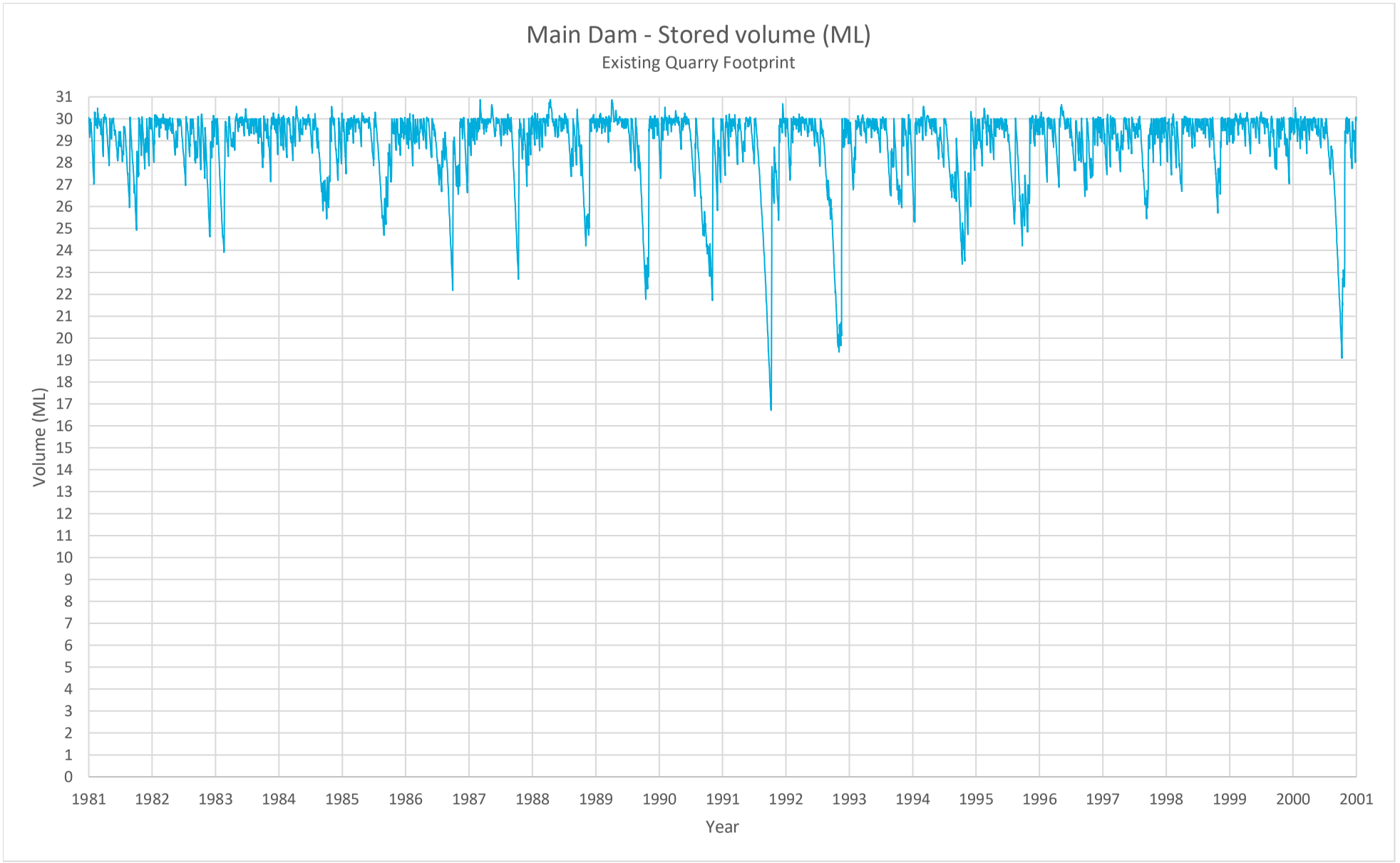


Figure 5 - Main Tank water balance for Existing Quarry Footprint

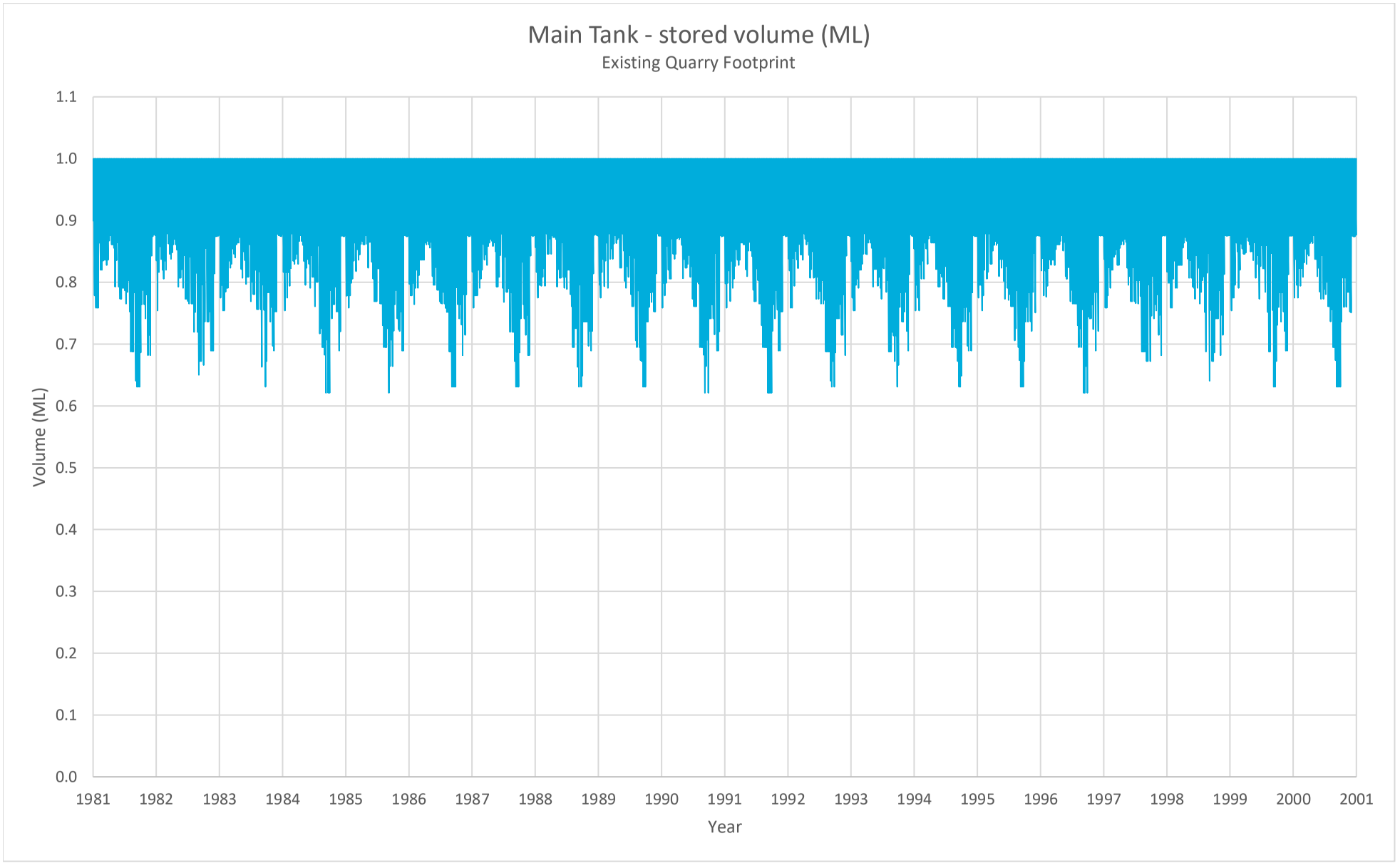


Figure 6 - Main Dam water balance for Future Quarry Footprint

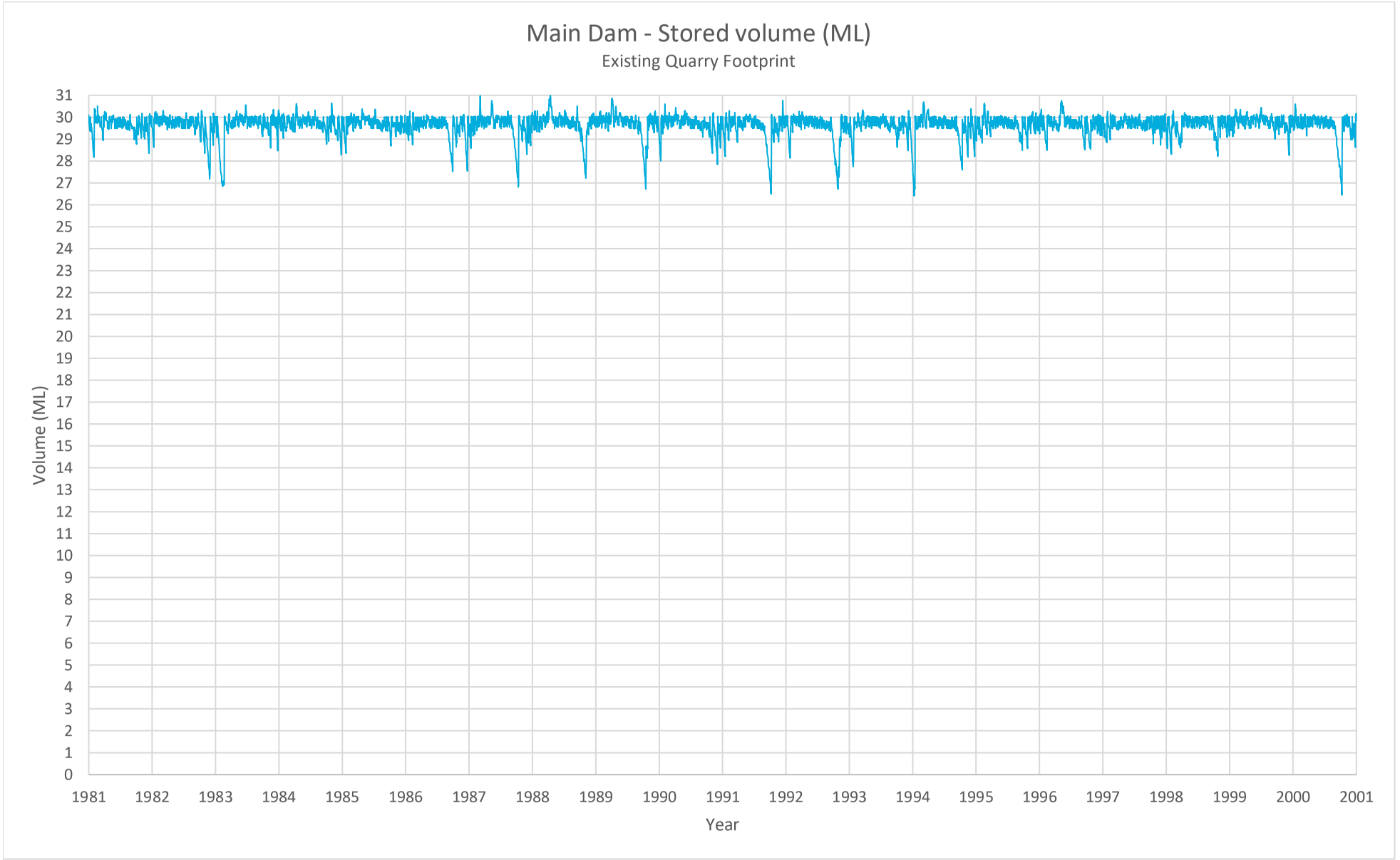
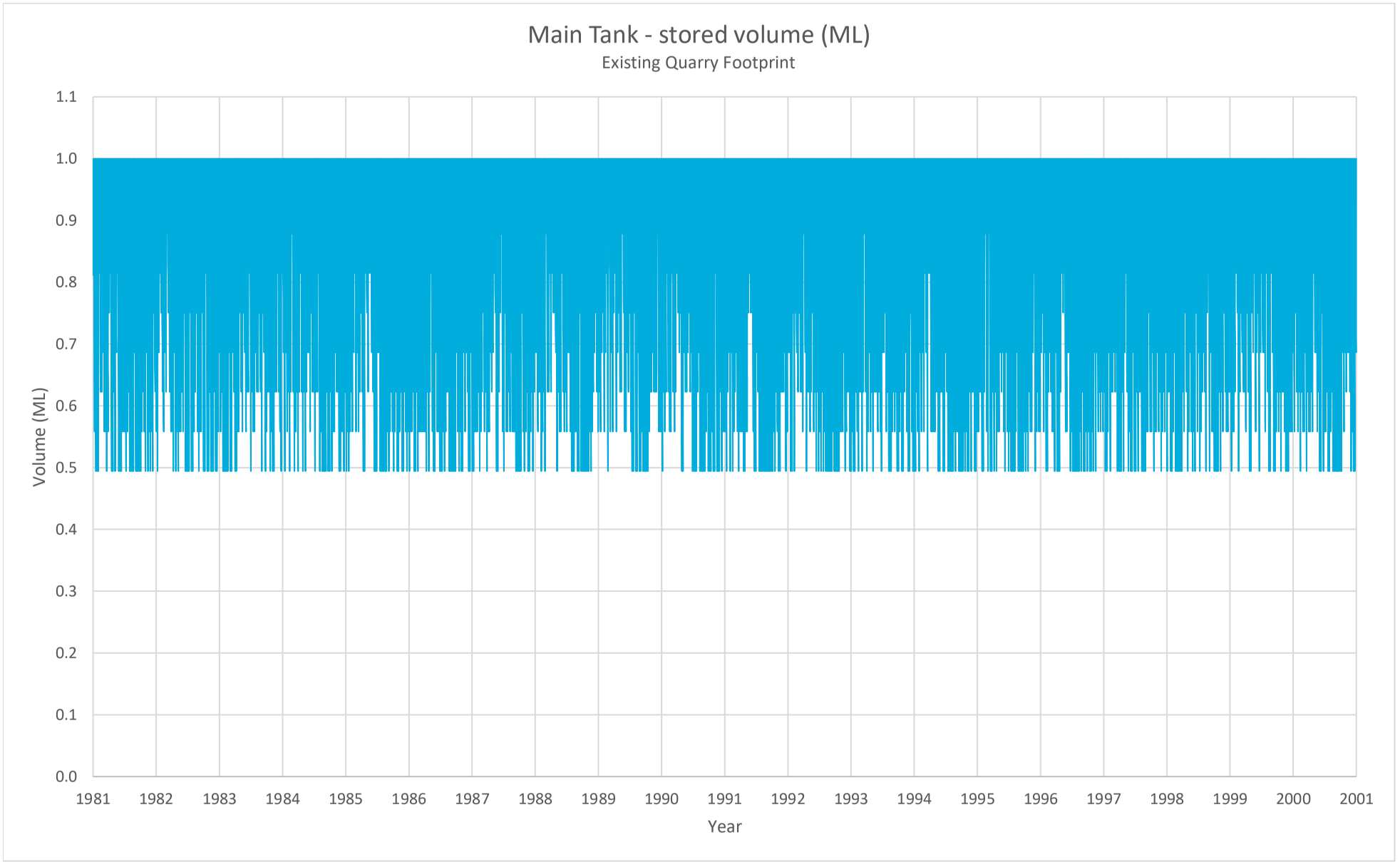


Figure 7 - Main Tank water balance for Future Quarry Footprint



9 Attachment 5 – Summary table, Condition 19 Schedule 3, Notice of Modification

<table>
<tr><th>Soil and Water Management Plan – Condition 19 of Schedule 3</th><th>Addressed in SWMP</th></tr>
<tr><td>e) be prepared by suitably qualified and experienced person/s approved by the Secretary;</td><td>Suitably qualified and experienced persons from Gilbert & Sutherland have prepared the SWMP. Endorsement is attached as Attachment 8.</td></tr>
<tr><td>f) be prepared in consultation with the EPA and DPI Water;</td><td>Draft versions of the reports are to be provided to the agencies for review and comment.</td></tr>
<tr><td>g) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary; and</td><td>Will be submitted to the Secretary for approval within 3 months of the determination of Modification 1.</td></tr>
<tr><td>h) include a:
a. Site Water Balance that includes:
i. details of:
1. sources and security of water supply;
2. water use and management on site;
3. any off-site water transfers; and
4. reporting procedures; and
ii. measures to be implemented to minimise clean water use on site;
b. Surface Water Management Plan, that includes:
i. a program for obtaining detailed baseline data on surface water flows and quality in water bodies that could potentially be affected by the project;
ii. a detailed description of the surface water management system on site including the:
1. clean water diversion system;
2. erosion and sediment controls;
3. dirty water management system; and
4. water storages; and
iii. a program to monitor and report on:
1. any surface water discharges;
2. the effectiveness of the water management system,
3. the quality of water discharged from the site to the environment;
4. surface water flows and quality in local watercourses;
c. Groundwater Management Plan that includes:
i. 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</td><td>A Site Water Balance is included as Attachment 4.
A Surface Water Management Plan (SWMP) has been prepared and includes the following information:
<table>
<tr><th>Component of Condition 19</th><th>Location in SWMP</th></tr>
<tr><td>A program obtaining detailed baseline data on surface water flows and quality in water bodies that could potentially be affected by the project.</td><td>Section 3.5.4 Surface Water Management and Monitoring</td></tr>
<tr><td>A detailed description of the clean water diversion system</td><td>Section 3.5.3 Sediment and Erosion Control</td></tr>
<tr><td>A detailed description of erosion and sediment controls</td><td>Section 3.5.3 Sediment and Erosion Control</td></tr>
<tr><td>A detailed description of dirty water management system</td><td>Sections 3.5.3 Sediment and Erosion Control, 3.5.4 Surface Water Management and Monitoring and Attachment 4 – Site Surface Water Balance</td></tr>
<tr><td>A detailed description of water storages</td><td>Refer to Attachment 4 – Site Surface Water Balance</td></tr>
<tr><td>A program to monitor and report on any surface water discharge</td><td>Section 3.5.3 Sediment and Erosion Control – Implementation Strategy and Section 3.5.4 Surface Water Management and Monitoring</td></tr>
<tr><td>A program to monitor and report on the effectiveness of the water management system</td><td>Section 3.5.4 Surface Water Management and Monitoring</td></tr>
<tr><td>A program to monitor and report on the quality of water discharged from the site to the environment</td><td>Section 3.5.4 Surface Water Management and Monitoring</td></tr>
</table></td></tr>
</table>

ii. *a monitoring program to manage potential impacts, if any, on any alluvium and associated surface water source near the proposed extraction area that includes:* 1. *identification of a methodology for determining threshold water level criteria;* 2. *contingency measures in the event of a breach of thresholds; and* 3. *a program to regularly report on monitoring.*	

A program to monitor and report on surface water flows and quality in local watercourses.	Section 3.5.4 Surface Water Management and Monitoring

A groundwater assessment has been prepared[8] and based on its findings and recommendations a suitable groundwater monitoring strategy developed. The requirements have been included in this SWMP.

Component of Condition 19	Location in SWMP
A provision that requires the Proponent to obtain appropriate water licences(s) to cover the volume of any unforeseen groundwater inflows into the quarry from the quarry face or floor.	Section 3.5.5 Groundwater Management and Monitoring – Implementation Strategy
A monitoring program to manage potential impacts, if any, on any alluvium and associated surface water source near the proposed excavation area that includes identification of a methodology for determining threshold water level criteria	Section 3.5.5 Groundwater Management and Monitoring – Performance Criteria
A monitoring program to manage potential impacts, if any, on any alluvium and associated surface water source near the proposed excavation area that includes contingency measures in the event of a breach of thresholds	Section 3.5.5 Groundwater Management and Monitoring – Identification of incident or failure & corrective action
A monitoring program to manage potential impacts, if any, on any alluvium and associated surface water source near the proposed excavation area that includes a program to regularly report on monitoring.	Section 3.5.5 Groundwater Management and Monitoring - Monitoring

[8] Gilbert & Sutherland (G&S) (2019*). Hydrogeological Review: Groundwater Monitoring & Management Blakebrook Quarry Nimbin Road, Lismore, New South Wales*. Prepared for Lismore City Council January 2018. Which can be downloaded at: https://www.dropbox.com/s/uqkp2l6yyh0ajr7/11737%20GWA%20RER7F.pdf?dl=0

10 Attachment 6 – Site specific surface water quality monitoring requirements and targets

- Water quality monitoring will be undertaken on sediment basins prior to the water from them being actively discharged from the site. The water is to be tested for pH and total suspended solids (TSS). A visual inspection is also to be carried out for oil and grease. Discharge of the sedimentation basins will only occur if:
    - pH is between 6.5 and 8.5;
    - TSS < 50mg/L; and there is
    - No visible oil or grease.
- Over a minimum of 12 monitoring rounds turbidity will also be analysed. A statistical analysis will then be performed to establish a correlation between TSS and turbidity (the correlation will be undertaken on data of varying water quality i.e. near LOR to >50mg/L TSS). Once a correlation is successfully established (identified as an R^2 >0.7) the equivalent turbidity value for a TSS of 50mg/L will be used (rather than measuring TSS) to provide rapid feedback on the suitability or otherwise for discharge of sediment basins.
- Background conditions for the receiving waters will be established by quarterly monitoring at SW1, SW2, SW3 and SW5 as shown on drawing 11737-008. This monitoring will ideally follow a rainfall event defined as (>25mm in 24 hours).[9] It must be ensured that at the time of sampling that no runoff is being derived from discharge from the active quarry area or sediment basins (whether that is active, i.e. pumping or passive, ie. overtopping).
- This background monitoring will include pH, EC, DO, temperature, turbidity, TSS, nutrients and a visual inspection for oil and grease. Once 8 rounds of data are available site specific targets will be established based on the 20th and 80th percentiles in accordance with ANZECC guidelines.
- These targets will then be used to assess whether surface water conditions outside of the excavation are being maintained, or otherwise, and this SWMP will be revised to incorporate this revised information. That revision will also recommend, on the basis of the background monitoring results, an appropriate regime for future surface water monitoring, whether in relation to discharge events and/or routine monitoring to assess the condition of receiving waters relative to measured background conditions.

Location	Easting	Northing	Description
SW1	523693	6818008	Flow under Nimbin Road, downstream of LPD1 and LPD2
SW2	523124	6817955	Upstream of site, discharges in Terania Creek
SW3	523422	6817156	Downstream of site, discharges in Terania Creek
SW5	523807	6817669	Flow under Nimbin Road, downstream of LPD3

[9] The receiving waters are largely ephemeral, with little or no surface flows present between events, precluding monitoring of dry-weather flows.

11 Attachment 7 – Site specific groundwater monitoring requirements and targets

Quarterly monitoring will be undertaken at each of the groundwater bores (BQN1s, BQN1i, BQN1d, BQN2s, BQN2i, BQN2d, BQS1s, BQS1i, BSN1d). In accordance with the Larry Cook 2016 report recommendations (and subsequent approval from DPI NSW), the groundwater will be analysed for:

- pH
- electrical conductivity
- TPH
- BTEX
- total iron,
- total lead

In addition to the above, it is recommended that the samples also be analysed for the following constituents to assist with characterisation of the groundwater:

- dissolved iron,
- dissolved lead
- total oils and grease (this is to be monitored as a surrogate for TPH and BTEX until sufficient data is available)
- major ions and cations

The interim site specific groundwater quality triggers are contained in the following table.

Interim Triggers data set 2016 to June 2018

Parameter	BQS1-S	BQS1-I	BQS1-D	BQN1-S	BQN1-I	BQN1-D	BQN2-S	BQN2-I	BQN2-D
pH	7.12	8.12	8.30	7.18	11.34	9.10	11.07	8.67	8.85
Electrical conductivity (dS/m)	0.512	1.624	1.829	1.171	2.082	1.440	1.138	1.200	1.014
Total oils and grease (mg/L)	10.8	21.0	14.2	4.1	9.0	4.4	3.6	6.9	4.0
Iron (mg/L)	1.829	4.977	6.580	2.162	1.972	97.645	0.579	0.301	3.904
Lead (mg/L)	0.001	0.005	0.009	**0.001** [1]	**0.018** [3]	**0.008** [4]	**0.004** [5]	**0.002** [5]	**0.005** [2]

Notes:
1 – Trigger based on maximum LOR.
2 – Non-parametric maximum – 74.1% coverage at 95% confidence level.
3 – Non-parametric maximum – 79.4% coverage at 95% confidence level.
4 – Non-parametric maximum – 71.7% coverage at 95% confidence level.
5 – Non-parametric maximum – 77.9% coverage at 95% confidence level.

The table is an excerpt from Appendix 13 of the G&S 2018 hydrogeological review of Blakebrook Quarry.[10] The triggers represent the 80th percentile values for each parameter based on the results available for each bore in the dataset, which spans the 2016 to 2018 time period and provides varying sample sizes/per

[10] Site specific groundwater targets were reported in Gilbert & Sutherland (2019). *Hydrogeological Review: Groundwater Monitoring & Management Blakebrook Quarry Nimbin Road, Lismore, New South Wales.* Prepared for Lismore City Council January 2019. Which can be downloaded at: https://www.dropbox.com/s/uqkp2l6yyh0ajr7/11737%20GWA%20RER7F.pdf?dl=0

parameter/per bore. The table footnotes indicate exceptions where an alternative to the 80th percentile is provided to address statistical issues related to the available sample size and/or other variables.

This SWMP notes that a target exceedance has a 20% probability per monitoring round (using this approach). As such, results from multiple monitoring events necessarily need to be reviewed as a group against the interim target to determine compliance or otherwise (i.e. one exceedance of the target is not necessarily an indication of non-compliance).

Once sufficient data is available (ideally 12 data points for each parameter for each bore) the interim targets contained in the above table will be updated. Data loggers will be deployed in each of the groundwater bores (BQN1s, BQN1i, BQN1d, BQN2s, BQN2i, BQN2d, BQS1s, BQS1i, BSN1d). The loggers must record the water level, at a minimum on a daily basis.

12 Attachment 8 – Secretary's endorsement for G&S to prepare SWMP

Appendix J Community Consultation Flyer

Upgrade works for onsite asphalt plant at Blakebrook Quarry

Background

Lismore City Council (LCC) is the owner and operator of Blakebrook Quarry. LCC is proposing to modify the development consent to include an asphalt plant as an ancillary activity to the quarry operations. Presently, the asphalt plant resides in the Blakebrook Quarry footprint area and holds a standard Council DA.

This will enable an increase in asphalt production from 15,000t per year up to 50,000t per year.

No alterations to the quarrying operations are proposed and the current 500,000t limit will remain in place.

Development Overview

LCC wishes to incorporate an existing mobile asphalt plant into the Blakebrook Quarry consent. The asphalt plant is already operative within the quarry site under its own separate DA. No earthworks, removal of vegetation or alterations to the site are proposed.

Existing Environment

Drainage – Surface water is directed in a north east direction. Two sedimentation ponds capture surface water to limit downstream transportation.

Flora and Fauna – The site contains a mixture of tall open forest, closed forest, disturbed grassland and re-growth scrub. As part of the original quarry EIS and approval, a biodiversity offset of 62.6 ha (6:1 offset ratio) was proposed.

Further, a Landscape and Biodiversity Management Plan was developed to re-vegetate degraded areas

Previous site works have identified 84 fauna species onsite. Of the identified species, five (5) are listed under the BC Act.

As a result of this, a Vegetation and Habitat Management Plan as well as a Koala Management Plan were prepared for the quarry.

Traffic and Access – The main road through the locality is Nimbin Road providing connection between Lismore and Nimbin. In the locality of the subject site it allows for a single lane of travel in each direction, with a pavement width varying between 6-8 metres. The posted speed limit is 80 km/hr in this location, with no kerb and guttering or street lighting. An auxiliary right turn treatment is provided for northbound vehicles, to allow for through traffic to pass vehicles turning into the quarry access road.

The existing approval for the site allows for up to 100 laden trucks per day in association with the Quarry.
Laden movements associated with the asphalt plant vary throughout the year, with an average of 14 heavy vehicles per day and in the order of 20 per day during periods of higher demand.
The proposed movements inclusive of both operations entails an increase

for up to 150 laden trucks per day, with an average in the order of 125 trucks per day.

Heritage – An Indigenous Heritage Assessment was undertaken for the site to prepare the EIS. This included a review of databases, consultation with the Ngulingah Local Aboriginal Land Council and a site inspection.

It was determined that the site is unlikely to contain items of Indigenous Heritage.

Noise and Air Quality – The results of the monitoring indicate noise levels of up to 36 dB(A) are expected at nearby sensitive receptors based on existing operations (excluding asphalt plant operation). These comply with the levels set within the EPL.

Environmental Impacts and Mitigation

Drainage – The alteration to asphalt production limits will not alter the drainage from the site.

Flora and Fauna – Previous site works have resulted in the development of several site specific environmental management plans.

As the development is occurring on a heavily modified and disturbed site, it is not expected that any species or communities will be put at risk by the development. There is no vegetation clearing activities proposed as part of the development.

Further, as the asphalt plant is already operative onsite, negative impacts to the area's biodiversity are extremely unlikely.

Noise and Air Quality – Review of the predicted noise levels indicates that compliance with the existing EPL limits is expected to be achieved for all receptors except Receptor 7. For Receptor 7, the results of the noise modelling indicate that an exceedance of up to 1 dB is possible. In practical terms, this level of exceedance is considered to be insignificant with most people unable to discern a difference in noise levels of less than 1 dB. Furthermore, review of the baseline noise monitoring undertaken as part of this assessment indicates that the predicted noise levels are significantly lower than existing background noise levels in the area. As such, based on the results of the noise modelling, the risk of adverse impacts on existing residential uses in the area is considered to be low.

Traffic and Access – There will be an increase in daily flows of up to 66 heavy vehicles (33 laden/33 unladen) during periods of peak demand as a result of this proposal. This increase shall be distributed across the normal 11 hour working day, thereby limiting the impact upon the capacity of the road network which currently operates well based on observations on site. This will give typically around 5-6 extra truck movements per hour (3 inbound and 3 outbound). Given the minor increase in additional movements per hour, it is considered there are no further safety issues generated by the proposed modification to consent for the site operations.

All intersections along the primary transport route are currently operating well within their capacity, with sufficient spare capacity to accommodate the minor increase in peak hour vehicles movements as a result of this proposal.