



Noise & Blast Management Plan

Blakebrook Quarry

MP07_0020

September 2025

Noise & Blast Management Plan

Contents

| | |
|---|-----------|
| DOCUMENT HISTORY | 4 |
| DEFINITIONS | 5 |
| ABBREVIATIONS | 6 |
| 1 INTRODUCTION | 7 |
| 1.1 PURPOSE | 7 |
| 1.2 OBJECTIVES | 7 |
| 1.3 REVIEW SCHEDULE | 8 |
| 2 QUARRY OPERATIONS | 10 |
| 2.1 BACKGROUND | 10 |
| 2.2 OPERATIONAL OVERVIEW | 10 |
| 3 STATUTORY REQUIREMENTS | 11 |
| 3.1 LEGISLATION & POLICIES | 11 |
| 3.2 APPROVAL CONDITIONS | 11 |
| 3.3 GUIDELINES & STANDARDS | 12 |
| 3.4 RELATED MANAGEMENT PLANS | 13 |
| 4 EXISTING ENVIRONMENT | 14 |
| 4.1 BASELINE ASSESSMENT | 14 |
| Blasting Noise and Vibration | 14 |
| Assessment Guidelines | 14 |
| Assessment Methodology | 14 |
| Assessment Results | 14 |
| Construction Noise | 15 |
| Road Traffic Noise | 15 |
| Assessment Criteria | 16 |
| 5 ENVIRONMENTAL IMPACTS & RISK ANALYSIS | 17 |
| 5.1 ENVIRONMENTAL IMPACTS | 17 |
| 5.2 RISK ANALYSIS | 17 |
| 6 PERFORMANCE CRITERIA & INDICATORS | 18 |
| 7 MANAGEMENT & MITIGATION CONTROLS | 19 |
| 7.1 'BEST PRACTICE' MANAGEMENT APPROACH | 19 |
| 7.2 PROPOSED MANAGEMENT CONTROLS | 19 |
| 7.3 PROPOSED MITIGATION MEASURES | 19 |
| 8 MONITORING PROGRAM | 21 |
| 8.1 MONITORING LOCATIONS | 21 |
| 8.2 SCHEDULE | 21 |
| 8.3 METHODOLOGY | 23 |
| 8.4 METEOROLOGICAL PARAMETERS | 23 |
| 8.5 PLANT & EQUIPMENT | 23 |
| 8.6 MONITORING CRITERIA | 24 |
| Accounting For Annoying Noise Characteristics (Low Frequency Noise) | 24 |
| 9 ENVIRONMENTAL & OPERATIONAL PERFORMANCE | 26 |
| 9.1 ROLES & RESPONSIBILITIES | 26 |
| 9.2 STAKEHOLDER CONSULTATION | 28 |
| 9.3 TRAINING & AWARENESS | 28 |
| 9.4 RECORD KEEPING & DOCUMENT CONTROL | 28 |
| 9.5 SITE INSPECTIONS | 29 |

Noise & Blast Management Plan

| | | |
|-----------|---|-----------|
| 9.6 | EXTERNAL COMMUNICATION & NOTIFICATION | 29 |
| 9.7 | COMPLAINT INVESTIGATION & RESPONSE..... | 29 |
| 9.8 | DISPUTE RESOLUTION PROCESS | 30 |
| 10 | REVIEW AND REPORTING..... | 31 |
| 10.1 | CONTINGENCY PLANNING..... | 31 |
| 10.2 | INCIDENT AND NON-COMPLIANCE REPORTING..... | 31 |
| 10.3 | REVIEWS | 32 |
| 10.3.1 | Internal Auditing | 32 |
| 10.4 | EXTERNAL REPORTING..... | 32 |
| 10.5 | NOISE, AIR BLAST OVERPRESSURE & VIBRATION MONITORING REPORT..... | 32 |
| 10.6 | ANNUAL ENVIRONMENTAL monitoring REVIEW | 33 |
| 10.7 | INDEPENDENT ENVIRONMENTAL AUDIT..... | 33 |
| 11 | REFERENCES | 34 |
| | APPENDIX A - DOCUMENT COMPLIANCE..... | 35 |
| | APPENDIX B – Statement of commitments..... | 44 |
| | APPENDIX C – dpe correspondence | 45 |
| | APPENDIX D – ACOUSTIC GLOSSARY | 48 |
| | TABLES | |
| | Table A: Review Schedule..... | 8 |
| | Figure 1: Project Locality and Land Zoning Map..... | 9 |
| | Table B: Legislation & Policies of Relevance | 11 |
| | Table C: Environmental Standards, Policies & Guidelines..... | 12 |
| | Table D: Blakebrook Quarry Management Plans..... | 13 |
| | NSW Road Noise Policy - Table 13: Applicable Road Traffic Noise Criteria..... | 16 |
| | Table E: Noise, Vibration & Blasting Impact Risk Analysis | 17 |
| | Table F: Performance Criteria & Indicators | 18 |
| | Table G: Environmental Impacts and Management Controls | 19 |
| | Figure 2: Noise & Blast Monitoring Locations Map | 22 |
| | Table H: Meteorological Measurement Parameters | 23 |
| | Table I: Meteorological Measurement Parameters | 25 |
| | Table J: Roles & Responsibilities..... | 26 |
| | Figure 3: Roles & Responsibilities | 27 |
| | Table K: NBMP Consultation Requirements | 28 |
| | FIGURES | |
| | Figure 1: Project Locality and Land Zoning Map..... | 9 |
| | Figure 2: Noise & Blast Monitoring Locations Map..... | 22 |
| | Figure 3: Roles & Responsibilities | 27 |

Noise & Blast Management Plan

DOCUMENT HISTORY

| Revision | Date | Prepared By (Name) | Reviewed By (Name) | Change Remarks |
|----------|----------------|--------------------------------------|--|----------------------|
| 1.0 | May 2010 | LCC & ERM Australia | Manager Commercial Services & ERM Australia | Final draft |
| Rev A | June 2010 | LCC & ERM Australia | Manager Commercial Services & ERM Australia | |
| Rev B | April 2011 | LCC & ERM Australia | Manager Commercial Services & ERM Australia | |
| 2.0 | Dec 2017 | LCC & ERM Australia | Manager Business Development & ERM Australia | Update plan |
| 3.0 | March 2018 | LCC & ERM Australia | Manager Business Development & ERM Australia | Update as per CoA |
| 3.1 | August 2018 | LCC & ERM Australia | Compliance Manager & ERM Australia | Update as per CoA |
| 4.0 | June 2022 | Commercial Services Compliance (LCC) | Compliance Manager, Manager Commercial Services, DPE Secretary | Update as per CoA |
| 4.1 | Sept 2022 | Commercial Services Compliance (LCC) | Compliance Manager, Manager Commercial Services, DPE Secretary | Final draft |
| 4.1 | Oct 2023 | Operational Compliance (LCC) | Compliance Manager | Internal Review |
| 4.1 | June 2024 | (LCC) | Compliance Manager | Internal Review |
| 4.1 | September 2025 | LCC | Compliance Coordinator | Review following IEA |
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Noise & Blast Management Plan

DEFINITIONS

| Term | Definition |
|-------------------------------------|---|
| Audit | Systematic, independent and documented process for obtaining evidence and objectively evaluating it to determine the extent to which environmental management system meets the criteria set. |
| Contractor | Contractor engaged by LCC in order to achieve improvements in overall environmental performance |
| Environment | Surroundings in which Contractor operates including air, water, land, natural resources, flora, fauna, humans, heritage and their interrelation. |
| Environmental Aspect | Element of organisational activities or products that can interact with the environment. |
| Environmental Impact | Any changes to the environment, whether adverse or beneficial, wholly or partially resulting from an organisational aspect. |
| Environmental Management | The management system used to develop and implement the environmental system policy and manage environmental aspects. |
| Environmental Objective | Overall environmental goal, consistent with the environmental policy that an organization sets itself to achieve. |
| Environmental Performance | Measurable results of an organisation's management of environmental aspects. |
| Integrated Management System | A single system designed to manage multiple aspects of an organization's operations in line with multiple standards, such as those for quality, environmental and health and safety management. |
| Non-conformance | Non fulfilment of a requirement. |
| NEPM | Legal instruments that specify national standards for a variety of environmental issues. They are binding on all Governments that are members of the NEPC |
| Performance Indicators | Indicators that have been developed as leading or lagging to monitor and assess performance. |
| Procedure | Specified way to carry out an activity or process. |
| Subcontractor | Any company, body or person who is contracted to the Contractor for the purpose of supplying services or goods. |

Noise & Blast Management Plan

ABBREVIATIONS

| Abbreviation | Meaning |
|--------------|---|
| BoM | Bureau of Meteorology |
| CoA | Conditions of Approval |
| DP | Deposited Plan |
| DPHI | Department of Planning Housing and Infrastructure |
| EAR | Environmental Assessment Report |
| EMP | Environmental Management Plan |
| EMS | Environmental Management Strategy |
| EPA | NSW Environment Protection Authority |
| EP&A | Environment Planning and Assessment Act 1979 |
| EPL | Environmental Protection Licence |
| ERM | Environmental Resources Management |
| IMS | Integrated Management System |
| INP | Industrial Noise Policy |
| ISO | International Organisation for Standardisation |
| LCC | Lismore City Council |
| LEP | Local Environmental Plan |
| LGA | Local Government Area |
| NIA | Noise Impact Assessment (Assured Environmental) |
| NPfi | Noise Policy for Industry (2017) |
| NEPC | National Environment Protection Council |
| NBMP | Noise and Blast Management Plan |
| OHWP | Out of Hours Work Protocol relating to Asphalt operations |
| SEE | Statement of Environmental Effects (Mitchel Hanlon) |

Noise & Blast Management Plan

1 INTRODUCTION

This Noise and Blast Management Plan (NBMP) has been prepared by Lismore City Council (LCC) in order to manage noise and blast impacts at Blakebrook Quarry (the Quarry), pursuant to Project Approval 07_0020.

Blakebrook Quarry (the Quarry) is operated by Northern Rivers Quarry (NRQ) which is a commercial entity owned by Lismore City Council. The Quarry is located at 550 Nimbin Road, Blakebrook, approximately seven (7) kilometres northwest of Lismore on Lot 53 DP 1254990 for Extraction Areas and Lot 54 DP 1254990 for Asphalt Plant an ancillary activity.

The site occupies an area of approximately 128 ha (incorporating 45ha rezoned to C2 Environmental Conservation (gazetted on 18 December 2020), providing long term security for the biodiversity offset area. Surrounding land is used for agricultural and rural purposes. The location of the Quarry is as shown in *Figure 1*. Nearby potentially sensitive receptors have also been identified as part of this management plan and are outlined in *Figure 2*

The Quarry is identified as a State Significant Development (SSD) and provides a range of products to northern NSW on behalf of Council including:

- Aggregates
- Drainage rock
- Road base
- Basalt products
- Metal dust
- Fill material
- Bituminous products including hot mix and cold mix – blended according to mix design

1.1 PURPOSE

The purpose of this NBMP is to provide procedures and actions that may need to be implemented to avoid or minimise the noise, vibration and blasting impacts associated with the Quarry operation.

The NBMP will:

- Describe how LCC will manage, and control risks associated with noise, vibration and blasting during the operation of the Quarry.
- Ensure that the relevant stakeholders are involved in the formulation and implementation of this NBMP
- Address the requirements of applicable legislation and any ongoing approvals as they are applicable to the Project.
- Meet the Project Conditions of Approval (CoA).
- Meet the existing EPL requirements for noise at the Quarry.
- Address the requirements of the EAR (ERM 2009) and Statement of Environmental Effects (Mitchel Hanlon 2019) relating to Noise.

1.2 OBJECTIVES

The objectives of the NBMP are:

- Identify environmental obligations and legislative requirements applicable to noise, vibration and blasting monitoring and management at the Quarry.
- Describe the specific environmental management requirements and strategies for environmental elements, define objectives and set targets for environmental performance.
- Provide ongoing monitoring of noise, vibration and blasting levels in the vicinity of the Quarry, to prompt identification of any increased impacts.
- Demonstrate how any potential impacts on surrounding residential receivers will be managed and mitigated.
- Consult with the relevant parties during the preparation and implementation (as required) of this NBMP.
- Define key roles and responsibilities.

Noise & Blast Management Plan

1.3 REVIEW SCHEDULE

In accordance with the CoA Schedule 5, condition 11, this NBMP will be formally reviewed by LCC each year as part of the annual review and reporting process. An official update/revision will be submitted to the NSW DPE at minimum every three (3) years. Noting minor revisions as part of the outcomes of the yearly review and administrative corrections will be undertaken without DPE consultation. A copy will be provided to all parties for record.

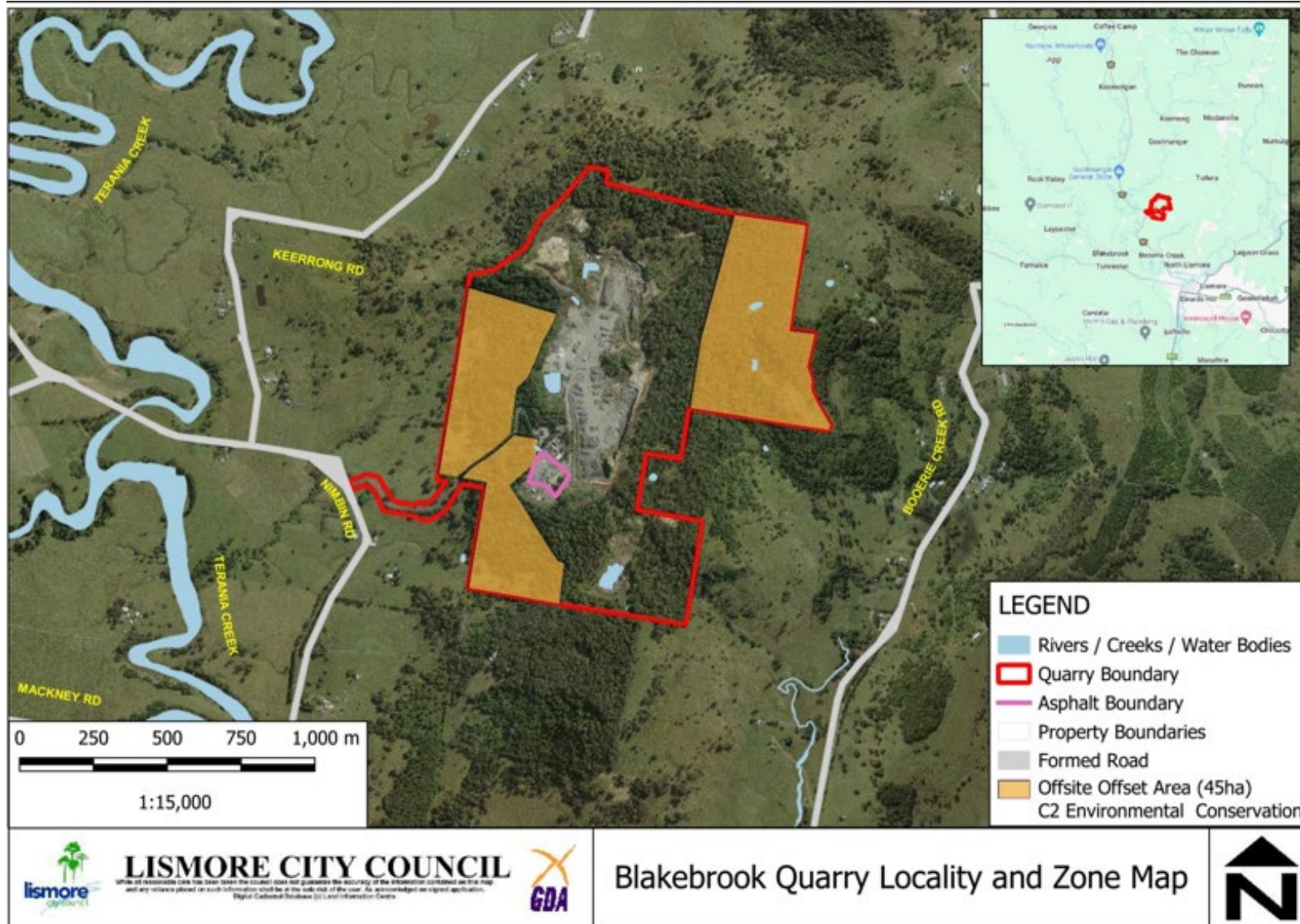
Accordingly, the next reviews are listed in *Table A*. Full requirements for document revisions are listed in Section 9.3.1

Table A: Review Schedule

| No. | Date | Review Type | Reviewer |
|------|-------------------|---------------------------------------|-----------|
| R3 | 23 Mar 2018 | Revision (Submission of amended NBMP) | LCC / DPE |
| R3.1 | 18 Dec 2018 | Internal review | LCC |
| R3.1 | 18 Dec 2019 | Internal review | LCC |
| R3.1 | 18 Dec 2020 | Internal review | LCC |
| R4.1 | 30 Sept 2022 | Revision (extension granted by DPE) | LCC / DPE |
| R4.2 | 30 Sept 2023 | Internal review | LCC |
| R4.2 | 30 June 2024 | Internal review | LCC |
| R4.2 | 30 September 2025 | Internal review following IEA | LCC |

Noise & Blast Management Plan

Figure 1: Project Locality and Land Zoning Map



Noise & Blast Management Plan

2 QUARRY OPERATIONS

2.1 BACKGROUND

The Quarry has an identified resource of approximately 13.6 million tonnes which, based on an extraction rate of 600,000 tonnes per annum, would allow for quarrying for approximately 22 years. The maximum proposed extraction rate was not expected to be achieved in all years of quarrying. Project approval was therefore sought for an area sufficient for 30 years of quarrying with a maximum extraction rate of 600,000 tonnes per annum, continuing in the existing main pit (referred to as the 'North Pit') and a new smaller pit (herein also referred to as the 'South Pit') located to the south of the existing pit.

In accordance with the State Conditions of Approval MP07_0020 (CoA), the Quarry may carry out quarrying and asphalt plant operations on the site until 31 December 2039. Additionally, the Environmental Protection Licence EPL3384, authorises extractive or processed activities annually scaled between >100,000 tonnes – 500,000 tonnes. Quarry extraction depths must not exceed 55 m AHD in the North Pit or 105 m AHD in the South Pit (as prescribed in conditions listed in Appendix A)

In August 2017, LCC submitted a Modification Application to the DPE seeking to mine the first 10 metres of the cap rock in the South Pit at the Quarry. The South Pit was previously unable to be mined until late 2018, at the completion of the detailed groundwater assessment. On 18 September 2017, approval was granted to LCC to undertake these works, in accordance with the revised CoA.

On 11 January 2019, LCC submitted a Modification Application to amalgamate the approvals for the Asphalt Plant and the Quarry. This application was subsequently approved (Modification 3) by the Minister of Planning in July 2021.

2.2 OPERATIONAL OVERVIEW

Quarrying has initially commenced laterally in the existing North pit from 2009. Initial excavation works within the South Pit commenced in late 2014 under a temporary approval to service a specific state government project. These initial works within the South Pit have been completed. No further excavation works for the South Pit are scheduled in the immediate future unless specific rock is needed. Extraction areas within the North Pit are chosen based on the present rock type and quality for supply. Mobile crushing and screening plant equipment is currently utilised for Quarry operations.

Initially, it was expected that over the initial 10 years of the 30 year life of the Quarry that production will average approximately 450,000 tonnes per annum including extraction of high quality product from the southern pit. The production was expected to increase beyond 10 years to the maximum 600,000 tonnes per annum. Production tonnages to date have been substantially less than originally projected as result of changing market demands, cost of production and unprecedented weather events impacting operational performance

Asphalt operations were amalgamated into the Mod 3 CoA as of 20 July 2021. and include asphalt operations to be undertaken for limited campaign works. Asphalt operations are conducted during standard work hours to the fullest extent, however require the additional operating hours to cope with the current demands of the region.

The Asphalt Plant is permitted to transport up to 50,000 tonnes of Asphalt from the Quarry each calendar year. Asphalt operations may be undertaken outside normal operating hours (as per Schedule 3, condition 1) utilising an Out of Hours Work Protocol (OHWP) and ensuring seven (7) day consultation process to nearby residents and EPA. The OHWP is to be uploaded to the Major Projects Portal for approval by DPE prior to works commencing.

The mobile asphalt plant (operated by Downer Group as an ancillary activity) offers a quieter and more efficient operation, with a production capacity of 140 tonnes per hour. The Quarry and Asphalt plant are situated on separate lots within the same deposited plan (DP) and operate within the same site footprint. As such, the Quarry supply aggregate, tested to asphalt specification requirements to the asphalt plant, where it is stockpiled.

Trucks are used to haul asphalt aggregate out of the pit, while most material will be hauled directly off-site.

Noise & Blast Management Plan

3 STATUTORY REQUIREMENTS

3.1 LEGISLATION & POLICIES

The applicable legal and other requirements related to noise, vibration, blasting and environmental management for the Quarry are outlined in *Table B*.

Table B: Legislation & Policies of Relevance

| Legislation and Policies | |
|-----------------------------|--|
| Commonwealth Legislation | <ul style="list-style-type: none">• Environment Protection and Biodiversity Conservation Act 1999 |
| New South Wales Legislation | <ul style="list-style-type: none">• Environment Planning and Assessment Act 1979• Protection of the Environment Operations Act 1997• Protection of the Environment Operations (General) Regulations 2022• Protection of the Environment Operations (Noise Control) 2017• EPA NSW Noise Policy for Industry 2017• Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 |
| Regional Planning Documents | <ul style="list-style-type: none">• North Coast Regional Plan 2036 |
| Local Government Documents | <ul style="list-style-type: none">• Lismore Local Environmental Plan 2012 |

3.2 APPROVAL CONDITIONS

Minister's Conditions of Approval

Pursuant to the Environmental Planning and Assessment Act 1979 (EP&A Act), the Quarry expansion was declared to be a project under Part 3A of the Act and Project Approval has been granted by the Minister for Planning. Project Approval MP07_0020 is identified under a State significant development (SSD) under Division 4.7 of the EP&A Act.

Project Approval Conditions outline the requirements for noise and blast management associated with the Quarry, along with licence conditions pertaining to EPA licence 3384, as provided in Appendix A and Appendix B.

Out of Hours Work Protocol – Asphalt Operations

Asphalt operations may be undertaken outside normal operating hours (as per Schedule 3, condition 1) utilising an Out of Hours Work Protocol (OHWP). Activities permitted under the OHWP are asphalt operations consisting of bituminous products (hot or cold mix) during the hours of 6pm to 7am Monday to Sunday. Out of hours operations are anticipated to occur approximately 10 nights per month.

Management and staff responsible for asphalt plant operations, will notify in writing to LCC, the timing and expected duration of any out of hours construction works, prior to each instance for the inclusion in the OHWP. Works will be forward planned to facilitate adequate seven (7) day consultation timeframe. LCC will notify the EPA (via info@epa.nsw.gov.au) and nearby residents of the OHWP for consultation purposes on behalf of the Asphalt plant operators.

Following consultation and considering any feedback provided, the OHWP is to be uploaded to the Major Projects Portal for approval by DPE prior to works commencing. A Register for all work undertaken will be kept, containing:

- Identify the location, duration and description of works
- Provide a contact number of the Asphalt site manager during the out of hours campaign.

The OHWP provides management strategies for potential noise sources involving asphalt operations and truck movements. The evening and night project-specific noise level criterion is 35 dB(A) L_{Aeq} (15 minute).

Other Conditions

EPL 3384 for the Quarry has in place existing conditions as follows, with mitigation strategies in Table G:

L4.1 Noise from the licenced premises must not exceed an L_{Aeq} (15 minute) noise emission criteria of 36 dB(A) at Location 2 and 7, and 35 dB(A) at all other sensitive receivers, except as expressly provided by in this licence.

Noise & Blast Management Plan

L4.2 Noise from the premises is to be measured at the most affected noise sensitive receiver who has not given written permission for an exceedance of condition L4.1 to determine compliance with this condition.

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

L5.1 The air blast overpressure level from blasting operating in or on the premises must not exceed:

- (a) 115dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period.
- (b) 120dB (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) 5 mm/s for more than 5% of the total number of blasts carried out on the premises during each reporting period.
- (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

Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 stipulates the Operator of a mine site must develop an Explosive Control Plan, as part of the sites Safety Management System. This is enforced and audited by NSW Resource Regulator at regular inspections. The Explosive Control Plan is to be reviewed internally each year, to ensure compliance with legislative updates and identified risks on site.

3.3 GUIDELINES & STANDARDS

Relevant project management standards, policies and guidelines, applicable to this management plan are provided in *Table C*

Table C: Environmental Standards, Policies & Guidelines

| Guidelines and Standards | |
|---|--|
| Australian and New Zealand Environment and Conservation Council - ANZECC (1990) | Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration |
| NSW EPA | Noise Policy for Industry 2017 |
| NSW Department of Environment, Climate Change and Water (DECCW) | NSW Road Noise Policy (RNP), March 2011 |
| AS 2436–2016 | Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites. |
| AS 1055-2018 | Acoustics – Description and measurement of environmental noise |
| AS/NZS IEC 61672.1:2019 | Electroacoustics – Sound Level Meters Specifications |
| AS IEC 60942:2017: | Electro Acoustics – Sound Calibrators |
| AS 2187.2-2006 | Explosives – Storage and Use – Use of Explosives |
| SafeWork NSW | Managing noise and preventing hearing loss at work – Code of Practice December 2022 |

Noise & Blast Management Plan

3.4 RELATED MANAGEMENT PLANS

This NBMP forms part of an overarching Environmental Management Strategy (EMS) for the Quarry. Where relevant, reference should also be made to the other management plans, as listed in *Table D*.

Table D: Blakebrook Quarry Management Plans

| Reference No. | Management Plan |
|---------------|---|
| EMS | Environmental Management Strategy |
| EMS-MP2 | Air Quality Management Plan |
| EMS-MP3 | Soil and Water Management Plan |
| EMS-MP4 | Biodiversity and Rehabilitation Management Plan |
| EMS-MP5 | Aboriginal Heritage Management Plan |
| EMS-MP6 | Operational Traffic Management Plan |

Noise & Blast Management Plan

4 EXISTING ENVIRONMENT

4.1 BASELINE ASSESSMENT

A Statement of Environmental Effects (SEE) was undertaken by Mitchel Hanlon Consulting Pty Ltd on behalf of LCC in 2019, following a detailed Noise Assessment undertaken in 2009 by ERM to identify potential environmental issues in the process of streamlining operating conditions for the Quarry and Asphalt plant, Modification 3 application. Assured Environmental Pty Ltd were appointed to conduct a Noise Impact Assessment (NIA), appendix F, in accordance with NSW NPfl (2017) to assess the potential impacts on nearby sensitive receptors.

Historically six (6) residential properties were identified as being potentially affected by noise associated with the Quarry expansion and were therefore used as noise assessment locations (referred to as noise assessment locations 1 to 6) in the Blakebrook Quarry Noise Assessment (ERM 2009). These locations formed the basis of the noise modelling scenarios. Noise modelling consisted of:

- Potential noise and vibration impact at noise assessment locations from existing and proposed operational noise from the Quarry, including blasting.
- Potential noise impact at noise assessment locations due to increased traffic flows to and from the Quarry expansion.

Blasting Noise and Vibration

As the Quarry was undertaking changes to its blasting regime, historic reports were not felt to be representative of new blasting scenarios. An indicative assessment was therefore undertaken by ERM in 2009. Vibration and overpressure levels for the Quarry were found to be within the accepted guidelines for nearby residences. As blasting will be carried out for the life of the Quarry, each blast will be carefully designed and monitored to ensure that peak particle velocity (PPV) and overpressure criteria continue to be met at residential locations as prescribed by EPL Condition L5 and CoA Schedule 3, condition 6.

Dilapidation surveys were undertaken for seven (7) properties in the vicinity of the Quarry in 2012 by a building surveyor, to satisfy CoA Schedule 4, condition 3 and condition 4, enabling baseline information for each property. In the event of any future request from a landowner, this baseline information will be used to assess any potential damage that may occur as a consequence of the sites operational activities.

Assessment Guidelines

The Noise Assessment was prepared in accordance with EPA Noise Policy for Industry (NPfl (2017) and noise measurements were undertaken in accordance with the requirements of Australian Standard AS 1055-1997 'Acoustics – Description and measurement of environmental noise'. Noting the CoA refers to INP which has been superseded by the NPfl.

Assessment Methodology

Continuous noise monitoring was undertaken using a Rion NL21 environmental noise logger. 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.

Assessment Results

The NIA summarised the 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;
- Night – 10 pm to 7 am.

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.

Noise & Blast Management Plan

Although predicted levels due to the Quarry expansion marginally exceed existing noise levels at noise assessment locations 1 (now superseded under landholder agreement), 2 (now location 1) and 5 (now location 4), it is important to note that the NPfI addresses 'Existing Situation' in Chapter 6 and states:

Many existing industrial sources were designed for higher noise emission levels than the project noise trigger levels outlined in this policy. In other cases, industries may have been in existence before neighbouring noise-sensitive developments and even before noise-control legislation was introduced. The range of mitigation measures available for these sites can be limited or costly.

Applications for extensions to existing premises often provide an opportunity to redress issues that relate to the whole site. Where noise emissions from the site exceed the project noise trigger levels, the regulatory authorities and the noise-source manager will determine achievable noise limits for the site, taking into account matters that must be considered in accordance with the relevant legislation or process, including negotiation with proponents and discussion with stakeholders as required.

There is no 'one-size-fits-all' approach to determine the impact from an existing industry. The following governing principles should be applied when determining the project noise trigger levels and/or assessment requirements for existing industry:

- The project noise trigger levels should not be applied as mandatory noise limits. The project noise trigger level is the level used to assess noise impact and drive the process of assessing all feasible and reasonable control measures.*
- Where an existing industry has been in operation for more than 10 years and existing site operations exceed the project amenity noise level, the project amenity noise level may be adopted as the project noise trigger level to assess existing, and existing plus proposed site operations, as relevant.*
- Where a development proposal involves a discrete process, and premises-wide mitigation has or is to be considered outside of the development proposal, a project noise trigger level for noise from new/modified components (not the whole site) of the operation may be set at 10 dB(A) or more below existing site noise levels or requirements. This approach means that the increase in noise from the whole site is minimised and provides scope for existing components to achieve noise reductions over time.*

The results of the assessment have identified that compliance with the existing EPL limits is expected to be achieved for all receptors except monitoring location 8 (referred to Receptor R7 within the NIA) 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).

Construction Noise

There will be no significant construction activities that are likely to add to received noise levels at residences.

Road Traffic Noise

Based on 2006 daily traffic volumes of 3,200 vehicles per day and a linear growth rate of 2.2%, non-site related traffic on Nimbin Road is forecast at 4,100 vehicles per day for the year 2018. This volume of traffic is equivalent to a noise level of 65dB(A) L_{eq} 15 hour. This complies with former DECCW criteria as site related traffic noise on Nimbin Road will increase existing road traffic noise by 1dB on average over a 15-hour period, which is under the 2dB recommendation. A study conducted by Geocounts (2022) on traffic volumes utilising Nimbin Road to the north and south of the quarry access indicated average weekday (7am-7pm) traffic volume of 2338 vehicles north of the quarry access (Keerong Road) increasing to 2375 vehicles south of the quarry access. Truck volumes (including single unit tippers and buses) account for 13% (average) of the traffic stream and heavy trucks (articulated) accounting for 1.2% (average) in both directions from the quarry access

The NIA noted *"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)."*

Noise & Blast Management Plan

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.

NSW Road Noise Policy - 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: LAeq,15hour 60 dB(A) Night: LAeq,9hour 55 dB(A) (external) |

Noise & Blast Management Plan

5 ENVIRONMENTAL IMPACTS & RISK ANALYSIS

5.1 ENVIRONMENTAL IMPACTS

The Quarry activities that are most likely to have the potential to result in noise and vibration impacts on residential receivers will be quarrying activities including operating machinery, blasting, and transport of materials on and off site for the expansion of the Quarry.

5.2 RISK ANALYSIS

Given that the activities undertaken at the Quarry have the potential to impact on the surrounding environment, the commensurate level of risk associated with these impacts is required to be identified so as to better ensure that it can be mitigated and managed to an acceptable level via means of this management plan.

Accordingly, *Table E* summarises the likely risk level associated with each of the prospective noise, vibration, and blasting impacts, assuming that no mitigation measures or controls are in place to manage impacts. The risk assessment process is in accordance with that described in the EMS for the Quarry.

By implementing the measures outlined in this NBMP, these traffic impacts and associated risks can be managed to an acceptable level, such that the risk would be considered negligible.

Table E: Noise, Vibration & Blasting Impact Risk Analysis

| ID | Aspect | Impact | Risk |
|----|--|---|------|
| N1 | Quarrying activities including excavation and crushing of material | Increase in noise impacts at residential receptors | Low |
| N2 | Blasting to expand Quarry | Increase in vibration and noise impacts on residential receivers | Low |
| N3 | Transport of material on and off site | Increase in traffic movements increasing noise on surrounding roads | Low |

- Note: Risk Rating
- High (serious impacts and potential repercussions)
 - Medium (significant impacts and potential repercussions)
 - Low (minor impacts and potential repercussions)

Additionally, the Quarry has invested significantly towards adaptive management practices, through the development and identification of risk management on site regarding noise and blast management through accreditation of ISO 45001, ISO 14001, ISO 9001 and compliance with *Work Health and Safety (Mines and Petroleum Sites) Regulation 2022* with Principal Hazard Management Plans and site risk registers.

As part of the Quarry IMS compliance schedule, Quality, Safety and Environmental Risk Registers have been developed for task specific activities on site. The risk registers are reviewed six (6) monthly by Quarry operations and Compliance staff, to ensure a proactive approach towards identification and controlling of risks.

Actions relating to any identified exceedances of CoA criteria will be managed as per Section 10.2.

Noise & Blast Management Plan

6 PERFORMANCE CRITERIA & INDICATORS

The intention of the NBMP is to ensure that the Quarry and Asphalt works do not have an adverse impact on the identified sensitive receptors as a result of general operational activities.

In order to achieve this intent, the following Performance Criteria and Indicators have been developed to guide noise management for the Quarry and Asphalt operations based on the following (refer to *Table F*).

Table F: Performance Criteria & Indicators

| Performance Criteria | Performance Indicator | Management/Control |
|---|--|--|
| C1: Comply with all applicable legislation, regulations, standards, codes and licences that relate to the project | I1.1: Comply with operating hours set out in condition 1 in Schedule 3 of Project Approval (MP 07_0020) | Section 2.2 Section 6 Section 7.3 Section 7.4 |
| | I1.2: Noise generated by the Quarry does not exceed the criteria nominated in Condition 3 in Schedule 3 of Project Approval (MP 07_0020) | |
| C2: No significant impacts on sensitive receptors due to blasting activities | I2.1: Ensure blasting activities does not cause an exceedance of the criteria identified in Condition 6 in Schedule 3 of Project Approval (MP 07_0020) | Section 2.2 Section 6 Section 7.4 |
| | I2.2: Carry out a maximum of two (2) blasts per month, unless an additional blast is required following a blast misfire | |

Noise & Blast Management Plan

7 MANAGEMENT & MITIGATION CONTROLS

7.1 'BEST PRACTICE' MANAGEMENT APPROACH

In managing the Quarry, LCC is seeking to ensure that a 'Best Practice' management approach is used across all areas of potential impact management. This approach involves incorporating a suite of site-specific mitigation measures and management controls (like those provided in the sections below) in accordance with the most relevant guidelines and standards to minimise, mitigate and manage noise and blasting impacts associated with Quarry and Asphalt operations, as referenced in Table C.

7.2 PROPOSED MANAGEMENT CONTROLS

The list of the work practices that will be used to control environment impacts during the Quarry and Asphalt operations are provided in *Table G*.

Table G: Environmental Impacts and Management Controls

| Environmental Impact | Management Control |
|--|---|
| Expansion of Quarry increases traffic movement. | Ensure all vehicles leaving site are maintained and noise levels are within equipment specifications. |
| Increase in noise impacts at residential receptors from quarrying activities. | Mitigation measures as outlined in Section 7.3 are implemented. Monitoring of compliance with criteria as per Section 8.8. Non-compliance to result in consideration of further mitigation measures. |
| Increase in vibration and noise impacts on residential receivers from blasting activities. | Blasting impacts will be assessed in accordance with the recommended ANZECC criteria (Where appropriate – noting Guideline has been archived by NEPC). These criteria are used to assess human annoyance, discomfort and potential property impacts from blasting activities. Assessments will identify quarrying areas that may require additional management of blasting practices to reduce potential blast and vibration impacts. Vibration monitoring to confirm conformance with criteria in EPL. |
| Asphalt plant Out of Hours Work notification | <p>A register will be maintained for Out of Hours Work (as described in section 3.2) containing:</p> <ul style="list-style-type: none"> • Identify the location, duration and description of works • Provide a contact number of the Asphalt site manager during the out of hours campaign. <p>Works will be forward planned and advised in writing to LCC, EPA and local residents at least 7 working days prior to being undertaken.</p> |

7.3 PROPOSED MITIGATION MEASURES

Several noise and blast mitigation measures are currently in place at the Quarry and will continue to be employed throughout the proposed expansion. These measures are summarised as follows:

- Ensure that works on site are limited to the approved Quarry and Asphalt operating hours (between 7am and 6pm Monday to Friday, and 7am and 3pm Saturday) in an endeavour to undertake as much work as possible during standard work hours, unless work is approved in accordance with the approved OHWP.
- Ensure that all significant noise generating plant and equipment are procured, maintained and managed to reduce noise and that mitigation is applied where feasible, reasonable and necessary.
- Avoid concentrations of equipment in sensitive work areas e.g. on top of the dump or bund.
- Road traffic noise created by the haul trucks accessing the site is ameliorated by imposing a speed limit of 40 km/h in the site and compression braking is limited whilst on site.
- Avoid trucks congregating along internal haul roads.
- Instruct drivers to travel directly to site and avoid any extended periods of engine idling at or near residential areas.
- Ensure all machines used on the site are in good condition, with particular emphasis on exhaust silencers, covers on engines and transmissions and squeaking or rattling components. Excessively noisy machines will be repaired or removed from the site.

Noise & Blast Management Plan

- All mechanical plant and equipment will be silenced by the best practical means using current technology. Mechanical plant, including noise-suppression devices, will be maintained to the manufacturer's specifications.
- All mechanical plant, equipment and vehicle movements are optimised in a forward direction to avoid triggering reversing motion alarms that are typically required when these items are used in reverse. Consideration for low frequency reversing alarms is to be prioritised.
- The location of activities, plant and equipment will optimise attenuation effects through measures such as topography, natural and purpose-built barriers.
- Limiting contact of loader buckets with metal surfaces.
- Combine predictive meteorological forecasting and noise monitoring data to guide the daily planning of quarrying operations during noise-enhancing meteorological conditions.
- A site specific induction will be provided to all site personnel, drivers and contractors with an emphasis on understanding and managing noise impacts from the work activities being undertaken.
- Plant equipment inspections will be undertaken through Operator Daily Prestarts and serviced (to manufacturers specifications) via LCC Fleet Services maintenance program. If any validated noise complaints are received, operator attended noise measurements will be undertaken to measure and compare the site noise level contributions (LAeq, 15 minute) to the criteria outlined in the CoA.
- Carry out noise compliance monitoring in accordance with CoA Appendix 5 to ensure the Quarry expansion works are complying with the relevant conditions of this approval. Details of the compliance monitoring plan are outlined in Section 8.
- Blasting will be undertaken in accordance with EPL and CoA conditioning.
- Best Practice' management must be implemented during blasting operations and blasting design to ensure that the suitable charge masses (or maximum instantaneous charge, MIC) is achieved presented in Table 7.1 of the Noise Assessment (ERM 2009) are adhered to.
- The Quarry Explosive Control Plan is legislated and audited by the Resources Regulator and includes measures to control flyrock, as per industry best practice methods. These are implemented in consultation with the blasting contractor on site and audited against quality control checklists imbedded within the Quarry IMS and Safety Management System. These include prescribed distance exclusion zones and relocation of Quarry infrastructure where practicable to reduce the risk of fly rock impacts.

Noise experienced at sensitive receivers is expected to be progressively reduced as the Quarry expansion proceeds, as plant will be relocated to greater pit depths throughout the life of the Quarry, in turn progressively reducing noise at nearby receivers.

As per CoA Schedule 4, condition 3 and condition 4, in the event of any future request from a landowner, baseline information will be used to assess any potential damage that may occur as a consequence of the site's operational activities.

Implementation of the above-mentioned mitigation measures will assist in controlling noise levels and blasting effects emanating from the Quarry.

Noise & Blast Management Plan

8 MONITORING PROGRAM

During operation of the Quarry, noise and blast activities will be monitored in the vicinity of the Quarry, in accordance with the monitoring program to ensure compliance with the relevant Conditions of Approval.

The noise measurement procedures employed throughout the monitoring program shall be guided by the requirements of AS 1055:2018 – Acoustics – Description and Measurement of Environmental Noise, and the NSW EPA Noise Policy for Industry (EPA 2017).

Noise, vibration and blasting monitoring will:

- Ensure the Quarry is operating as anticipated with respect to impacts of noise, vibration and blasting on residential receptors.
- Gauge the impact (if any) of the extraction activities on the noise and vibration level across the site.
- Identify any unforeseen noise or vibration impacts from the Quarry operations on residential receptors.
- Implement measures to prevent any as yet unforeseen impacts from the proposed expansion of the Quarry.
- Verify that the Quarry is achieving its environmental objectives.

8.1 MONITORING LOCATIONS

The original Noise Assessment (ERM 2009) and updated NIA (Mitchel Hanlon, SEE 2019) included six (6) noise monitoring locations that were used throughout the assessment, based on proximity to nearby potentially sensitive receptors. Given the proximity between monitoring locations and the location of anticipated noise-generating plant and equipment, the monitoring locations have been revised and separated into primary and supplementary acoustic monitoring locations for the purposes of the NBMP.

Primary and supplementary acoustic locations are identified in *Figure 2*. Primary acoustic monitoring locations consist of locations **2**, **4** and **8** with the remainder of locations being supplementary acoustic monitoring locations.

An agreement was reached with the landowner located along Nimbin Road (previously identified as location 8, ERM 2009) in April 2016, wherein the landowner has agreed to the exceedances in noise levels from Quarry operations. As such the location has been removed as a primary acoustic monitoring location, and a new monitoring location selected being (current) location 8.

Primary monitoring locations will be utilised during noise compliance monitoring and are considered representative in determining compliance with the relevant Conditions of Approval.

In the event that additional monitoring is required then additional monitoring may be undertaken at the most practical supplementary acoustic monitoring locations, as well as at the primary acoustic monitoring locations.

8.2 SCHEDULE

Noise monitoring shall be conducted to represent winter and summer monitoring (as agreed by DPE through approval of this management plan) and will consist of operator attending noise monitoring and spot checks of equipment during the below assessment time periods.

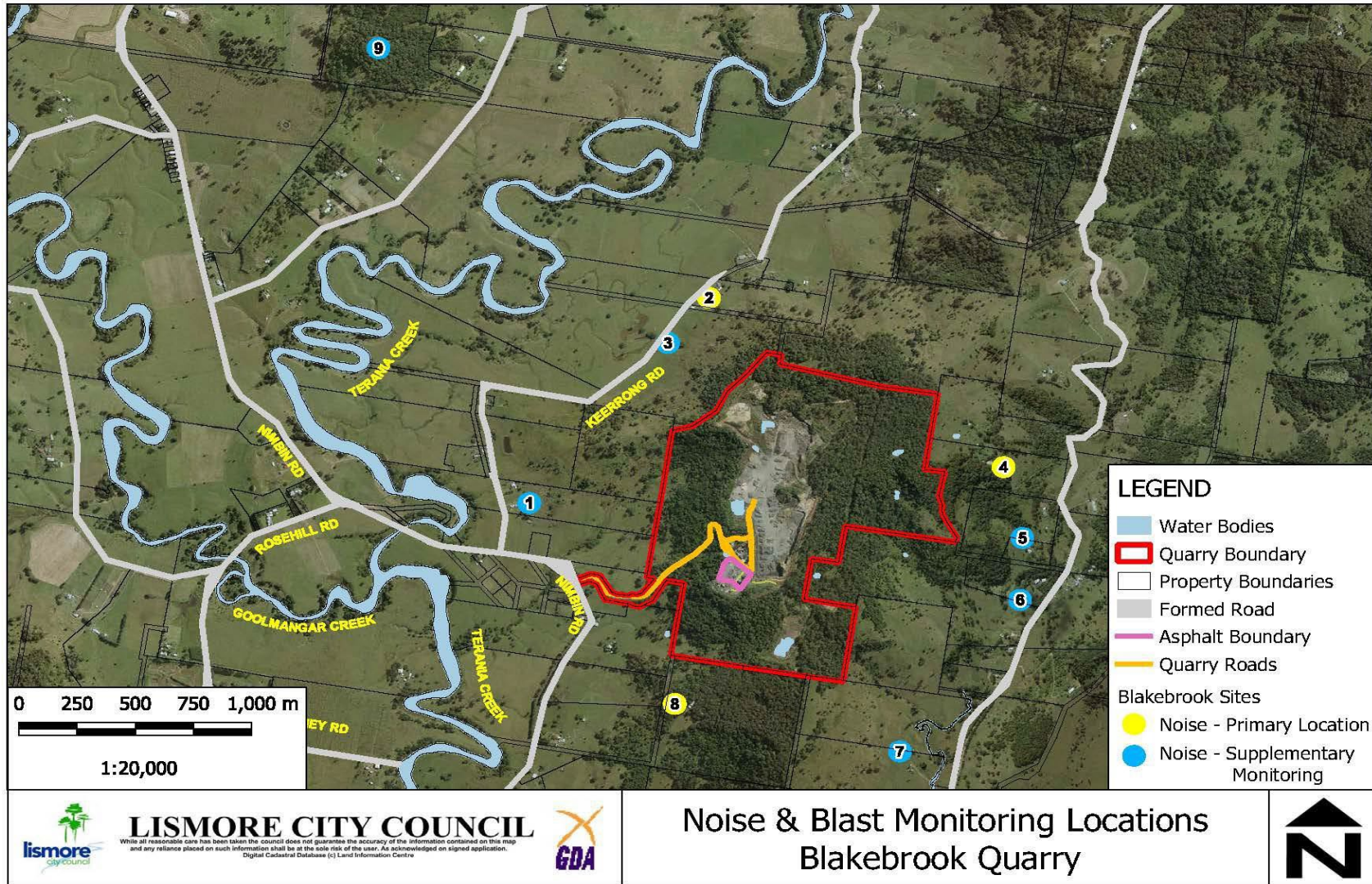
Daytime noise monitoring shall be undertaken in accordance with the CoA, and reported against criteria in Schedule 3, condition 3 (Table 2): Evening and Night noise monitoring shall be undertaken during campaign works as approved under the OHWP.

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

Air blast overpressure and ground vibration monitoring will be undertaken during each blast event. The primary acoustic monitoring locations identified above are considered representative of nearby sensitive receivers however supplementary locations may be considered in the event that an additional range of monitoring is required.

Noise & Blast Management Plan

Figure 2: Noise & Blast Monitoring Locations Map



Noise & Blast Management Plan

8.3 METHODOLOGY

Noise

Operator attended noise measurements shall be conducted at all primary acoustic measurement locations (Locations 2, 4 and 8 – refer *Figure 2*) to quantify and characterise the maximum (L_{Amax}), the energy equivalent (L_{Aeq}), and the background (L_{A90}) noise levels from ambient noise sources and quarrying operations over a 15 minute measurement period.

The operator shall quantify noise emissions and estimate the L_{Aeq} (Period) noise contribution during Quarry activities, as well as the overall level of ambient noise. During attended monitoring, digital recordings will be conducted to allow for additional post analysis of the Quarry noise levels and source identification.

All acoustic instrumentation employed throughout the monitoring program shall meet with the requirements of AS/NZS IEC 61672.1 Sound level meters Specifications & AS/NZS IEC 61672.2 Sound level meters Pattern Evaluation.

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

Blasting

To measure blasting events, blast monitoring shall be conducted that records air blast and vibration levels once triggered by an electronic trigger connected to a shot firing switch. That is, when the shot is fired, the monitor will be triggered by means of a hardwire switch and will start recording and capture the blast event. This will ensure that the event captured is the blast, significantly reducing the influence of other extraneous sources that could affect the measurement. Instrumentation used to measure the air blast overpressure and ground vibration levels must meet the requirements of AS 2187.2 (latest version).

8.4 METEOROLOGICAL PARAMETERS

Adverse meteorological conditions have the potential to increase noise levels, for example wind speeds up to 3 m/s or temperature inversions, however wind speeds above 5 m/s (and rainfall) have the potential to generate extraneous and erroneous noise events, which reduce the accuracy and confidence in measured data.

As such, meteorological parameters will be evaluated prior to undertaking works on site, to gain an understanding of the weather conditions and the potential for variations in noise levels.

All noise measurements shall be accompanied by both qualitative description (including cloud cover, approximate wind direction and speed) and quantitative measurements of prevailing local weather conditions throughout the survey period. Rainfall data and meteorological parameters will be collected from the weather station located on-site, as shown in *Table H*.

Table H: Meteorological Measurement Parameters

| Measured Parameter | Unit | Sample Interval |
|----------------------|---------|-----------------|
| Mean Wind Speed | m/s | 15 minutes |
| Mean Wind Direction | Degrees | 15 minutes |
| Aggregate Rainfall | mm | 15 minutes |
| Mean Air Temperature | C° | 15 minutes |

8.5 PLANT & EQUIPMENT

During the attended noise measurements, the operator shall record any significant Quarry generated noise sources (i.e. haul trucks, dozers etc.).

Noise & Blast Management Plan

8.6 MONITORING CRITERIA

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

The assessment criteria for noise, vibration and blasting for the expanded operations will initially remain the same as stipulated in the EPL. The need for calculating site specific trigger levels may be reviewed after two (2) years of operations once a data set is available.

Accounting For Annoying Noise Characteristics (Low Frequency Noise)

The *Noise Policy for Industry* (NPfI 2017) states that a noise source may exhibit a range of particular characteristics that increase annoyance, such as tones, impulses, low frequency noise and intermittent noise.

Where this is the case, an adjustment ('modifying factor corrections') is applied to the source noise level received at an assessment point before it is compared with criteria to account for the additional annoyance caused by the particular characteristic.

Application of these modifying factors is described in *Fact Sheet C: Corrections for annoying noise characteristics* and outlines correction factors to be applied to the source noise level at the receiver before comparison with the project noise trigger levels to account for the additional annoyance caused by those modifying factors.

The modifying factor corrections should be applied having regard to:

- the contribution noise level from the premises when assessed/measured at a receiver location, and
- the nature of the noise source and its characteristics (as set out in this fact sheet).

The NPfI provides the following definitions to support the modifying factor corrections

- Tonal Noise – Containing a prominent frequency and characterised by a definite pitch.
- Low Frequency Noise – Containing major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.
- Impulsive Noise – Having a high peak of short duration or a sequence of such peaks.
- Intermittent Noise – The level suddenly drops to that of the background noise several times during the assessment period, with a noticeable change in noise level of at least 5 dB.

The modifying factor corrections (and how they are applied) are present in *Table C1* of the NPfI and vary depending on the noise characteristic being assessed. All noise levels generated by the Quarry, which may generate tonal or low frequency content, will be assessed as part of the NBMP monitoring with due regard to these modifying factor penalties, and in accordance with the requirements presented in the NPfI.

Impulsive and intermittent noise, as defined by the NPfI, are not typical characteristics of the Quarry, hence tonal and low frequency noise (LFN) are most relevant to the Quarry and those modifying corrections are reproduced in *Table I*.

Noise & Blast Management Plan

Table 1: Meteorological Measurement Parameters

| | | | | |
|---------------------|---|--|------------------------|---|
| Tonal Noise | One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (ISO1996.2-2007 – Annex D) | Level of one-third octave band exceeds the level of the adjacent bands on both sides by: 5 dB or more if the centre frequency of the band containing the tone is in the range 500–10,000 Hz 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz. | 5 dB ^{2,3} | Third octave measurements should be undertaken using unweighted or Z-weighted measurements. Note: Narrow-band analysis using the reference method in ISO1996-2:2007, Annex C may be required by the consent/regulatory authority where it appears that a tone is not being adequately identified, e.g. where it appears that the tonal energy is at or close to the third octave band limits of contiguous bands. |
| Low Frequency Noise | Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10–160 Hz | Measure/assess source contribution C- and A-weighted Leq,T levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period. where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2-dB(A) positive adjustment applies for the daytime period. | 2 or 5 dB ² | A difference of 15 dB or more between C- and A-weighted measurements identifies the potential for an unbalance spectrum and potential increased annoyance. The values in Table C2 are derived from Moorhouse (2011) for DEFRA fluctuating low-frequency noise criteria with corrections to reflect external assessment locations. |

Notes:

1. Corrections to be added to the measured or predicted levels, except in the case of duration where the adjustment is to be made to the criterion.
2. Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low- frequency range, that is, at or below 160 Hz.
3. Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.

Noise & Blast Management Plan

9 ENVIRONMENTAL & OPERATIONAL PERFORMANCE

9.1 ROLES & RESPONSIBILITIES

The Quarry Operations Coordinator will be responsible for the implementation of this NBMP under the direction of the Head of Roads and Quarry.

All Quarry personnel and contractors are accountable through conditions of employment or contracts with each individual responsible for ensuring that their work complies with the procedures outlined in this NBMP. Further details of the responsibilities of personnel are provided in *Table J*. A diagram outlining the organisational structure for implementing this NBMP is provided at *Figure 3*.

Table J: Roles & Responsibilities

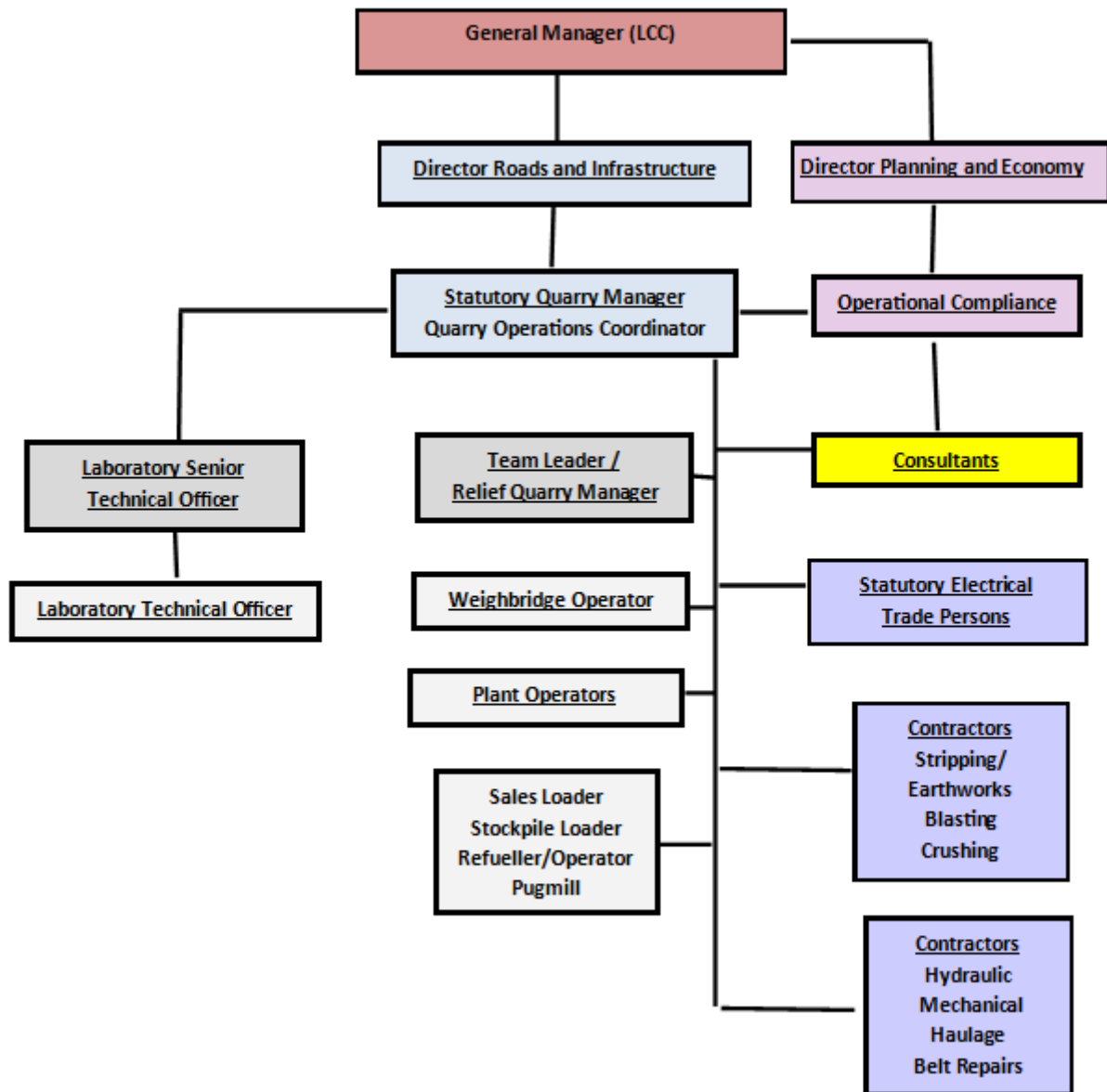
| Head of Roads and Quarry | | |
|--------------------------|--|---------------------------------------|
| Action No. | Action | Timing |
| NVBM.MCS.01 | Ensure that CoA, Project Commitments and any other approval conditions are adhered to when working in designated quarry expansion areas. | At all times |
| NVBM.MCS.02 | Provide LCC, EPA and DPE (and other relevant stakeholders) with the opportunity to contribute to the development of the NBMP. | Prior to commencement of construction |
| NVBM.MCS.03 | Ensuring all staff and contractors are provided with induction regarding the significance of noise, vibration and blasting impacts as part of general environmental management site induction and ensuring that they know of agreed management and mitigation. | Prior to commencement of construction |
| NVBM.MCS.04 | Ensuring all monitoring commitments made as part of the NBMP are executed. | As detailed in NBMP |
| NVBM.MCS.05 | Ensuring monitoring is completed in response to any complaints regarding noise and/or vibration. | When required |

| Quarry Operations Coordinator | | |
|-------------------------------|---|--------------------------------|
| Action No. | Management Procedure | Timing |
| NVBM.OC.01 | Ensuring that CoA, Project Commitments and any other approval conditions are adhered to when conducting quarrying operations. | At all times |
| NVBM.OC.02 | Notifying the Head of Roads and Quarry before undertaking any blasting works. | Prior to commencement of works |
| NVBM.OC.03 | Ensuring all residential receptors are informed of all planned blasting works prior to commencement of works. | Prior to commencement of works |
| NVBM.OC.04 | If complaints are received regarding noise or vibration, stop works that have the potential to impact further and contact the Head of Roads and Quarry immediately. | When and if required |

| Quarry Personnel and Contractors | | |
|----------------------------------|--|--------------------------------|
| Action No. | Management Procedure | Timing |
| NVBM.QP.01 | Ensure approval has been given by the Quarry Operations Coordinator prior to undertaking any blasting works. | Prior to commencement of works |

Noise & Blast Management Plan

Figure 3: Roles & Responsibilities



Noise & Blast Management Plan

9.2 STAKEHOLDER CONSULTATION

The CoA prescribes the regulatory authorities to be consulted in the preparation of the NBMP. These requirements are summarised in *Table K*.

Table K: NBMP Consultation Requirements

| Regulatory Authority | Interest |
|--|--|
| Department of Planning and Environment (DPE) | DPE is the lead agency in ensuring compliance with the requirements of the CoA and will review and approve amendments to the NBMP. |
| Environment Protection Authority (EPA) | The EPA is to be involved in the preparation and revision of the NBMP to ensure that it complies with the requirements of the CoA and other NSW legislation, policy, and technical requirements. |

Draft copies of the NBMP will be provided to the EPA and DPE for consultation and feedback considerations with a final version prepared taking into comments received. The final draft copy of the NBMP is provided to the Head of Roads and Quarry for consultation and feedback considerations prior to the DPE submission.

9.3 TRAINING & AWARENESS

LCC will provide training to its employees with respect to the operations for the site. The objective of the training will be to provide a base level understanding of their individual role in complying with the NBMP. Training will also be provided for specific tasks to ensure employees are competent to perform their required duties.

Verification of Competencies (VOC) is undertaken for all plant operators as per the LCC Corporate & IMS Training & Competency Procedure. Training records are maintained through the Quarry IMS Training Register and LCC corporate records.

As part of the general site induction process, all Quarry personnel will be made aware of potential noise and vibration activities, including blasting, that could impact on residential receptors. Those personnel specifically involved in clearing, grubbing and ground disturbance works including topsoil removal and excavation in close proximity to residents will be made aware of their location and an assessment of the need for mitigation measures completed prior to works commencing.

In accordance with the EMS, LCC will also undertake the following with respect to training and awareness:

- Induct all employees, contractors, subcontractors and visitors (as relevant to their roles) prior to commencing works (and conduct annual refresher inductions)
- Ensure that the Drivers induction is completed by all heavy vehicle drivers, prior to undertaking work at the quarry.
- Hold daily pre-start/toolbox talks.
- Hold WHS/staff meetings as required.
- Issue Project Environmental Alerts (if required).

9.4 RECORD KEEPING & DOCUMENT CONTROL

Records are to be maintained for all noise, vibration and blasting management measures and monitoring. All records shall be kept for a minimum of seven (7) years, with record keeping and document control managed in accordance with the requirements set forth in the EMS.

To ensure that the correct procedures and plans are used on site, issue of the EMS, CoA and/or any other relevant document, and any associated amendments that may be required, will be controlled using a document register and stored in LCC's record management system (TRIM).

Noise & Blast Management Plan

9.5 SITE INSPECTIONS

Weekly inspections will be conducted by the Quarry Operations Coordinator to monitor work practices and identify non-conforming areas and activities or work practices which could lead to potential environmental harm.

It is noted that weekly inspections of work sites also provide an opportunity for the Quarry Manager to address issues raised by Staff, Contractors or Consultants and assist in the implementation of environmental controls to manage noise impacts. Often this continued support leads to better ownership of environmental management and becomes a coaching exercise for field staff to improve their skills in this specialised and complex discipline.

A 'Site Daily and Weekly Checklist' will be used to record and report any improvements required. The purpose of the inspections is to:

- Provide a surveillance tool to ensure that safeguards are being implemented.
- Identify where problems might be occurring (or have the potential to occur).
- Identify where sound environmental practices are not being implemented.
- Facilitate the identification and early resolution of problems.

Any non-conformance with the Site Daily and Weekly checklist will be recorded in the Quarry Non-conformance and Improvement Register.

9.6 EXTERNAL COMMUNICATION & NOTIFICATION

In accordance with EPL L5.3 all sensitive receivers will be given at least 24 hours' notice by phone when blasting is to be undertaken, unless otherwise stipulated by the EPL.

Any Asphalt Out of Hours campaign work will be notified in writing to LCC, EPA and local residents at least 7 working days prior to works being undertaken.

General information regarding the environmental performance of the Quarry and contact details regarding complaints/feedback will be available at all times through LCC website <https://www.lismore.nsw.gov.au/Council/Northern-Rivers-Quarry>

Community meetings will be held at least once per annum, where information regarding the activities being undertaken at the site as well as environmental performance information will be detailed.

Authorities will be kept informed regarding the operation and environmental performance of the Quarry through the Annual Reporting requirements of the CoA and EPL.

9.7 COMPLAINT INVESTIGATION & RESPONSE

Complaints regarding the Quarry or Asphalt operations (including limited campaign asphalt operations relating to the OHWP) will be managed via LCC's existing complaint management system. Quarry and Asphalt complaints must be received via telephone to LCC's Contact Centre 02 6625 0500

Details that are to be logged by Council staff include:

- Complainant's name.
- Telephone number / email address / postal address.
- Date of contact.
- Nature of complaint.

The details of the complaint will be passed on to the Quarry Compliance division. Management will be committed to rectifying any activity that has caused a complaint as soon as possible, with a response being provided, to the complainant within five (5) business days of receipt of the complaint. The Quarry will undertake actions to identify and initiate appropriate action in response to the complaint to resolve (where practicable).

Noise & Blast Management Plan

Records of all complaints received are to be kept within LCC Complaints Management System, the Quarry Complaints Register and added to the Quarry's Non-conformance and Improvements Register.

All Quarry staff are responsible for reporting any complaints to the Quarry Manager. Complaints must be made through the correct channel to the LCC Customer Contact Centre in order to ensure correct record keeping and response.

9.8 DISPUTE RESOLUTION PROCESS

In the case that a dispute between the complainant and LCC arises with respect to the management and/or outcomes of the Complaint Investigation and Response (*Section 9.7*), the complainant may refer the matter to the DPE for an independent review

If a matter is referred to the DPE, and the DPE are satisfied that the dispute is genuine, the DPE can request LCC to follow procedures set out in Schedule 4, condition 2 (refer Appendix A)

Noise & Blast Management Plan

10 REVIEW AND REPORTING

Annual review and reporting are required to assess the outcomes of the NBMP, review its effectiveness, and consider works undertaken against annual budgets and targets.

Any issues noted regarding the success of management works will be relayed to the site manager on an ongoing basis so that relevant improvements can be made.

10.1 CONTINGENCY PLANNING

Should at any time management results of the NBMP be determined to be negatively impacting on surrounding sensitive receptors for the Quarry and Asphalt expansion, then the NBMP management controls and monitoring program may need to be intensified to allow better identification and understanding of the impacts and facilitate design of appropriate mitigation measures.

Before any significant changes are made to the NBMP, LCC will consult with DPE and the EPA, to obtain their feedback. Once feedback from DPE has been incorporated into the NBMP, it will be uploaded to the Major Projects Portal for approval by the Secretary.

10.2 INCIDENT AND NON-COMPLIANCE REPORTING

All incidents and non-compliance will be reported in accordance with the requirements of the CoA that relate to incident and non-compliance reporting (Schedule 5, conditions 8 and 9 – refer Appendix A) and EPL (condition R2).

- *Incident: An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance*

Where an incident has occurred, relevant agencies are to be notified immediately of the incident becoming known to the licensee. The notification must be in writing via the DPE Major Projects Portal and (where relevant) via telephone to the EPA Hotline 131 555. A written report is to be within 7 days, stating the relevant license condition that has been exceeded, the reason for the incident and mitigating actions to address the incident.

- *Non-compliance – An occurrence, set of circumstances or development that is a breach of this consent.*

Where a non-compliance against the limits/performance criteria in the CoA or EPL has occurred and an investigation determines the exceedance is of Quarry influence, the relevant agencies will be notified in writing within 7 days of the non-compliance becoming known to the licensee. EPA is to be notified via telephone to the Hotline 131 555 to generate a reference number. The licensee will provide details on the non-compliance and mitigating actions to address the non-compliance, which will be submitted to DPE via the Major Projects Portal and to the EPA via info@epa.nsw.gov.au.

LCC will undertake an investigation into the cause of the incident or non-compliance according to the IMS *Incident Reporting Investigation and Notification Procedure*, with strategies to prevent reoccurrence being implemented. All investigations relating to incidents and non-compliances, shall be reported in the Annual Environmental Monitoring Report. All procedures and documents are maintained within LCC's electronic records management system (TRIM).

In addition, in the event of an exceedance that has affected nearby landowners, the Quarry will follow conditions as set out in the CoA, Schedule 4, condition 1 – Notification of Landowners where applicable. As soon as practicable and no longer than 7 days LCC will 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.

Noise & Blast Management Plan

10.3 REVIEWS

10.3.1 Internal Auditing

An internal review of this NBMP will be undertaken by LCC on an annual basis or within 3 months of the below triggers. The purpose of the review is to determine the appropriateness of the NBMP in achieving environmental objectives and performance goals throughout the Quarry and Asphalt expansion and ensure that the system is meeting the requirements of relevant legislation, standards, policies, licences, permits, approvals and objectives. A report will be provided to the Compliance Manager with any recommendations for improvement. The Compliance Manager will review and approve changes to the system (as required).

LCC will notify DPE when a review triggered by the below has been undertaken:

- an incident report
- annual environmental monitoring review
- independent environmental audit
- any modification to the CoA

Following the outcome of a review, if a document revision is substantiated, it will be submitted via the Major Projects Portal for approval of the Secretary within six (6) weeks.

To ensure any additional measures to improve the environmental performance of the project is kept up to date, LCC may submit (at any time) revised strategies, plans or programs for approval of the Secretary, as noted in Schedule 5, condition 5 (refer Appendix A).

10.4 EXTERNAL REPORTING

All external reporting required by the CoA or other obligation for the Quarry will be approved by Quarry Management. This includes management and monitoring documentation associated with this NBMP.

Noise Monitoring reports are reviewed and made available on the LCC website <https://www.lismore.nsw.gov.au/Council/Northern-Rivers-Quarry>. Noise monitoring reports and adherence to this management plan are internally audited and reviewed as part of the Annual Environmental Monitoring Report and overall compliance audited every 3 years as part of the Independent Environmental Audit (IEA).

Currently the EPL for the site requires reporting of the results of the air blast over pressure and ground vibration levels as part of the Annual Return.

10.5 NOISE, AIR BLAST OVERPRESSURE & VIBRATION MONITORING REPORT

Recording of Results

Upon receipt of each round of monitoring results a suitably qualified person (the Quarry Operations Coordinator or nominated representative) will review results and report any identified exceedances where required. If an exceedance is identified an investigation will be undertaken with reports sent to the EPA or DPE within seven (7) days (as appropriate). All records are stored in TRIM.

Monitoring reports will consist of the following information (where applicable):

Noise Monitoring Report

- Reference to:
 - *EPL conditions – specifically Noise Limits, Hours of Operation, Other Monitoring and Recording Conditions*
 - *CoA requirements – specifically Schedule 3 – Noise, Appendix 5 – Noise Compliance Assessment*
 - *This Noise & Blast Management Plan (where applicable)*
 - *Best Practice methods and relevant Australian Standards for compliance (namely AS2659.1)*

Noise & Blast Management Plan

- Summary of attended noise monitoring results
- Measured/calculated and/or operator estimated Quarry L_{Aeq} (Period) contributed noise levels for each monitoring location.
- Summarised conclusion determining compliance against licence parameters.

Blast Monitoring Report

- Reports identifying vibration and air blast overpressure results from identified monitoring locations
- Calibration of equipment consistent to regulatory requirements and latest version of Australian Standards (namely AS2187.2)
- Best Practice methods and relevant Australian Standards for compliance
- Summarised conclusion determining compliance against licence parameters
- LCC will make reference to:
 - EPL conditions – specifically *Blasting (M7), Hours of Operation*,
 - CoA requirements – specifically *Schedule 3 – Noise, Appendix 5 – Noise Compliance Assessment*
 - NRQ Explosive Control Plan for content and Checklists

10.6 ANNUAL ENVIRONMENTAL MONITORING REVIEW

In accordance with the Minister's CoA, an annual environmental monitoring review (AEMR) is to be prepared to the satisfaction of the DPE, in accordance with CoA Schedule 5, Condition 11 (refer Appendix A).

The annual review will provide a comprehensive review of all monitoring results over the previous calendar year, including evaluation on the effectiveness of the noise and blast operations and compliance with the performance measures, criteria and operating conditions in the CoA.

The Head of Roads and Quarry will review and approve the outcome and recommendations in the report, which will be submitted via the Major Project Portal by the end of March annually. The AEMR will be submitted to LCC for awareness (via the Head of Roads and Quarry) and must be made available to the Community Consultative Committee or any interested person.

LCC will make available on the website via <https://www.lismore.nsw.gov.au/Council/Northern-Rivers-Quarry> any records that are relevant to enable assessment of the environmental performance of the site, relating to the CoA and EPL.

10.7 INDEPENDENT ENVIRONMENTAL AUDIT

Within three (3) years of quarrying operations, and every three (3) years thereafter, an independent environmental audit (IEA) of the Project will be undertaken by a suitably qualified, experienced and independent team of experts who has been endorsed by the Secretary, to assess what, if any, noise and blast impacts have occurred as a result of the expanded operations at the Quarry. Consultation with Agencies and the CCC is included in the assessment of the report. The Head of Roads and Quarry will review the outcome and recommendations in the report. Recommendations will be reviewed against the approved CoA and this management plan, with a response to audit recommendations and an implementation timetable (if required), will be submitted to the Secretary via Major Project Portal within 12 weeks of commencing the audit. The report will be submitted to LCC for awareness (via the Head of Roads and Quarry).

Upon acceptance of the report by the Secretary, LCC will make it available on the website via <https://www.lismore.nsw.gov.au/Council/Northern-Rivers-Quarry>.

Noise & Blast Management Plan

11 REFERENCES

Department of Infrastructure, Planning and Natural Resources, 2004, Guidelines for the Preparation of Environmental Management Plans.

Environmental Resources Management Australia Pty Ltd (ERM), 2009, Blakebrook Quarry Expansion Environmental Assessment Report.

Lismore City Council Statement of Environmental Effects (SEE), Mitchel Hanlon 2019, Blakebrook Quarry Asphalt Plant: Noise Impact Assessment

Northern Rivers Quarry – Blakebrook Quarry Out of Hours Work Protocol (Ardill Payne 2021)

Noise & Blast Management Plan

APPENDIX A - DOCUMENT COMPLIANCE

| CoA Condition | | Compliance reference | | | | | | | | | | | |
|---|--|---|-------------------|---|-------------------------------|-----------------------|--|----------|---|--|-------------|---|-------------------------|
| Schedule 2, condition 2 Terms of Approval | The Proponent must carry out the project: (a) generally in accordance with the EA, EA (Mod 1) and MR (Mod 3); and | Section 3.1 Section 3.2 Section 4.1 Section 5.1 Section 8.1 | | | | | | | | | | | |
| | (b) in accordance with the conditions of this approval, Project Layout Plan and the Statement of Commitments. <i>Notes:</i> • <i>The Project Layout Plan is shown in Appendix 1;</i> • <i>The Statement of Commitments is reproduced in Appendix 2.</i> | Section 3.1 Section 9.5 Section 9.6 | | | | | | | | | | | |
| Schedule 2, condition 15 Compliance | 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. | Table N Figure 3 Section 10.1 Section 10.3 | | | | | | | | | | | |
| Schedule 3, condition 1 Hours of Operation | <p>NOISE</p> <p>Hours of Operation</p> <p>1. The Proponent must comply with the operating hours set out in Table 1.</p> <p><i>Table 1: Operating hours</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #d3d3d3;">Activity</th> <th style="background-color: #d3d3d3;">Permissible Hours</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Quarrying operations, Asphalt plant operations and loading and dispatch of laden trucks</td> <td>7 am to 6 pm Monday to Friday</td> </tr> <tr> <td>7 am to 3 pm Saturday</td> </tr> <tr> <td>At no time on Sundays or public holidays</td> </tr> <tr> <td rowspan="2">Blasting</td> <td>10 am to 3 pm Monday to Friday (except public holidays)</td> </tr> <tr> <td>At no time on Sundays or public holidays</td> </tr> <tr> <td>Maintenance</td> <td>May be conducted at any time, provided that these activities are not audible at any privately-owned residence</td> </tr> </tbody> </table> | Activity | Permissible Hours | Quarrying operations, Asphalt plant operations and 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 | Section 10.5 Table F |
| Activity | Permissible Hours | | | | | | | | | | | | |
| Quarrying operations, Asphalt plant operations and 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 | | | | | | | | | | | | |
| Schedule 3, condition 2A Hours of Operation | With the prior written agreement of the Secretary, the Proponent may undertake limited campaign asphalt plant operations (within the limits imposed under condition 8 of Schedule 2) outside of the operating hours prescribed in condition 1 of this Schedule, as requested by public authorities. In such circumstances, the applicant must prepare an Out of Work Hours Work Protocol. This protocol must: (a) be prepared in consultation with the EPA and any residents who may be affected by the noise generated by these works; and (b) be approved by the Secretary prior to the commencement of any out of hours Asphalt plant operations. | Section 2.2 Section 3.2 Section 7.3 Section 8.2 Section 9.7 | | | | | | | | | | | |

Noise & Blast Management Plan

| <p>Schedule 3, condition 3</p> | <p>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.</p> <p><i>Table 2: Noise criteria dB(A)</i></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Receiver^a</th> <th style="text-align: center;">Day L_{Aeq} (15 minute)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Location 2 and Location 7</td> <td style="text-align: center;">36</td> </tr> <tr> <td style="text-align: center;">All other locations</td> <td style="text-align: center;">35</td> </tr> </tbody> </table> <p><i>* Receiver locations are shown in Appendix 3</i></p> <p>Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW <i>Industrial Noise Policy</i>. Appendix 5 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.</p> <p>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.</p> | Receiver ^a | Day L _{Aeq} (15 minute) | Location 2 and Location 7 | 36 | All other locations | 35 | <p>Table F</p> |
|---|---|---|-------------------------------------|---------------------------|----|---------------------|----|----------------|
| Receiver ^a | Day L _{Aeq} (15 minute) | | | | | | | |
| Location 2 and Location 7 | 36 | | | | | | | |
| All other locations | 35 | | | | | | | |
| <p>Schedule 3, condition 4 Operating Conditions</p> | <p>The Proponent must:</p> <p>(a) implement best practice management to minimise the construction, operational and road transportation noise of the project;</p> <p>(b) minimise the noise impacts of the project during meteorological conditions when the noise criteria in this approval do not apply (see Appendix 5);</p> <p>(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</p> <p>(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.</p> <p><i>Note: Required frequency of noise monitoring may be reduced if approved by the Secretary.</i></p> | <p>Section 4.1</p> | | | | | | |
| <p>Schedule 3, condition 5 Noise Management Plan</p> | <p>The Proponent must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:</p> <p>(a) be prepared in consultation with the EPA;</p> <p>(b) be submitted to the Secretary within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary;</p> <p>(c) describe the measures to be implemented to ensure:</p> <ul style="list-style-type: none"> • 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); <p>(d) describe the proposed noise management system; and</p> <p>(e) include a monitoring program to be implemented to measure noise from the project against the noise criteria in Table 2.</p> <p>The Proponent must implement the Noise Management Plan as approved from time to time by the Secretary.</p> | <p>Section 7.1 Section 8</p> | | | | | | |
| <p>Schedule 3, condition 6 Blasting</p> | <p>The Proponent must ensure that blasting on site does not cause any exceedance of the criteria in Table 3.</p> | <p>Section 3.2 Section 4.1 Section 10.2 Table F</p> | | | | | | |

Noise & Blast Management Plan

| | <p>Table 3: Blasting Criteria</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Receiver</th> <th style="text-align: center;">Airblast overpressure (dB(Lin Peak))</th> <th style="text-align: center;">Ground vibration (mm/s)</th> <th style="text-align: center;">Allowable exceedance</th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;">120</td> <td style="text-align: center;">10</td> <td style="text-align: center;">0%</td> </tr> <tr> <td style="text-align: center;"><i>Any residence on privately-owned land</i></td> <td style="text-align: center;">115</td> <td style="text-align: center;">5</td> <td style="text-align: center;"><i>5% of the total number of blasts over a period of 12 months</i></td> </tr> </tbody> </table> <p>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.</p> | Receiver | Airblast overpressure (dB(Lin Peak)) | Ground vibration (mm/s) | Allowable exceedance | | 120 | 10 | 0% | <i>Any residence on privately-owned land</i> | 115 | 5 | <i>5% of the total number of blasts over a period of 12 months</i> | |
|--|---|--|--|----------------------------|-------------------------|--|-----|----|----|--|-----|---|--|--|
| Receiver | Airblast overpressure (dB(Lin Peak)) | Ground vibration (mm/s) | Allowable exceedance | | | | | | | | | | | |
| | 120 | 10 | 0% | | | | | | | | | | | |
| <i>Any residence on privately-owned land</i> | 115 | 5 | <i>5% of the total number of blasts over a period of 12 months</i> | | | | | | | | | | | |
| <p>Schedule 3, condition 9 Blast Management Plan</p> | <p>The Proponent must prepare a Blast Management Plan for the project to the satisfaction of the Secretary. This plan must:</p> <p>(a) be submitted to the Secretary for approval within 3 months of the determination of Modification 1, unless otherwise agreed by the Secretary;</p> <p>(b) describe the measures to be implemented to ensure compliance with the blast criteria and operating conditions of this approval;</p> <p>(c) include measures to manage flyrock to ensure the safety of people and livestock and to protect property;</p> <p>(d) include a monitoring program for evaluating and reporting on compliance with the blasting criteria in this approval;</p> <p>(e) include local community notification procedures for the blasting schedule, in particular to nearby residences;</p> <p>(f) include a protocol for investigating and responding to complaints related to blasting operations.</p> <p>The Proponent must implement the Blast Management Plan as approved from time to time by the Secretary.</p> | <p>Section 10.2 Section 3 Section 7.3 Section 8.3 Section 8.6 Section 10.5 Figure 2 Section 10.2 Section 9.7 Table J</p> | | | | | | | | | | | | |
| <p>Schedule 3, condition 13 Meteorological Monitoring</p> | <p>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 <i>Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales guideline</i>.</p> | <p>Figure 2 Section 8.4</p> | | | | | | | | | | | | |
| <p>Schedule 4, condition 1 Notification of Landowners</p> | <p>As soon as practicable, and no longer than 7 days, after obtaining monitoring results showing:</p> <p>(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</p> | <p>Section 10.2</p> | | | | | | | | | | | | |
| <p>Schedule 4, condition 2 Independent Review</p> | <p>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:</p> <p>(a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to:</p> | <p>Section 9.8</p> | | | | | | | | | | | | |

Noise & Blast Management Plan

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| | <ul style="list-style-type: none"> 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 | Section 9.8 |
| | (c) comply with any written requests made by the Secretary to implement any findings of the review. | Section 9.8 |
| Schedule 5, condition 2 Evidence of Consultation | Where consultation with any State or local agency is required by the conditions of this approval, the Proponent must: | Appendix C |
| | (a) consult with the relevant agency prior to submitting the required document to the Secretary for approval; | Appendix C |
| | (b) submit evidence of this consultation as part of the relevant document; | Table O Section 9.2 |
| | (c) describe how matters raised by the agency have been addressed and any matters not resolved; and | Appendix C |
| | (d) include details of any outstanding issues raised by the agency and an explanation of disagreement between any agency and the Proponent. | |
| Schedule 5, condition 3 Management Plan Requirements | The Proponent must ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include: | Section 4.1 |
| | (a) detailed baseline data | |
| | (b) a description of: <ul style="list-style-type: none"> 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; | Section 6 Section 7.2 Section 8 Table L |
| | (c) a description of the measures that to be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria; | Section 7.2 Section 8 Section 8.5.3 Section 8.6.3 |
| | (d) a program to monitor and report on the: <ul style="list-style-type: none"> impacts and environmental performance of the project; and effectiveness of any management measures (see (c) above); | Section 5.2 Section 7.2 Section 8 Section 10.4 Section 10.4.2 Section 10.4.3 |
| | (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; | Section 10.1 |
| | (f) a program to investigate and implement ways to improve the environmental performance of the project over time | Section 10.3 |
| | (g) a protocol for managing and reporting any: <ul style="list-style-type: none"> incidents | Section 9.7 Section 10.2 Section 10.4.1 |
| | • complaints; | Section 9.7 |
| | • non-compliances with statutory requirements; and | Section 10.2 |
| • exceedances of the impact assessment criteria and/or performance criteria; and | Section 10.2 | |

Noise & Blast Management Plan

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| | (h) a protocol for periodic review of the plan. | Section 1.3 Section 10.3.1 |
| <p>Schedule 5, condition 4a Revision of Strategies, Plans & Programs</p> <p><i>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.</i></p> | Within 3 months of the submission of an: (a) incident report under condition 9 below | Section 1.3 Table A Section 10.3.1 |
| | (b) Annual Review under condition 11 below; | Section 1.3 Table A Section 10.3.1 |
| | (c) audit report under condition 12 below; and | Section 1.3 Table A Section 10.3.1 |
| | (d) any modifications to this approval <i>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.</i> | Section 1.3 Table A Section 10.3.1 |
| <p>Schedule 5, condition 5 Updating and Staging of Strategies, Plans or Programs</p> | <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> | Section 8 Section 10.3.1 |
| <p>Schedule 5, condition 6 Adaptive Management</p> | <p>The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and performance measures in this consent. Any exceedance of these criteria or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.</p> <p>Where any exceedance of these criteria or performance measures has occurred, the Applicant must, at the earliest opportunity:</p> <p>(a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;</p> | Section 5.2 Table F Section 7.2 |

Noise & Blast Management Plan

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| | (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and | Section 9.8 |
| | (c) implement reasonable remediation measures as directed by the Planning Secretary. | Section 9.8 |
| Schedule 5, condition 8 Incident Notification | The Proponent must immediately notify the Department and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing via the Major Projects Website and identify the development (including the development application number and name) and set out the location and nature of the incident. | Section 10.2 |
| Schedule 5 Condition 9 Non-Compliance Notification | Within seven days of becoming aware of a non-compliance, the Applicant must notify the Department of the non-compliance. The notification must be in writing via the Major Projects Website and identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. | Section 10.2 |
| Schedule 5, condition 10 Regular Reporting | 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. | Section 8.5.3 Section 10.4 Section 10.4.1 |
| Schedule 5, condition 11 Annual Review <i>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.</i> | 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: | Section 10.4.2 |
| | (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: <ul style="list-style-type: none"> • 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; | Section 10.4.2 |
| | (c) evaluate and report on: <ul style="list-style-type: none"> • the effectiveness of the air quality and noise management systems; and • compliance with the performance measures, criteria and operating conditions in this approval. | Section 10.4.2 |
| | (d) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance; | Section 10.4.2 |
| | (e) identify any trends in the monitoring data over the life of the project; | Section 10.4.2 |
| | (f) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; | Section 10.4.2 |
| (g) describe what measures will be implemented over the current calendar year to improve the environmental performance of the project. | Section 10.4.2 | |
| Schedule 5 Condition 12 Independent Environmental Audit | 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: <ul style="list-style-type: none"> (a) be led and conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary; | Section 10.4.3 |

Noise & Blast Management Plan

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| | (b) include consultation with the relevant agencies and the CCC; | Section 10.4.3 |
| | (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); | Section 10.4.3 |
| | (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; | Section 10.4.3 |
| | (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 | Section 10.4.3 |
| | (f) be conducted and reported to the satisfaction of the Secretary. | Section 10.4.3 |
| Schedule 5, condition 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. | Section 10.4.3 |
| Schedule 5, condition 14 Access to Information | 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: <ul style="list-style-type: none"> • 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 | Section 9.6 Section 9.7 |
| | (b) keep this information up-to-date, to the satisfaction of the Secretary. | Section 9.6 Section 9.7 |
| EPL 3384 – L4.1 Noise Limits | Noise from the licenced premise must not exceed an LAeq (15 minute) noise emission criterion of 36db(A) at Location 2 and 7 and 35db(A) at all other sensitive receivers, except as expressly provided by this licence. | Section 4.1 |
| EPL 3384 – L4.2 Noise Limits | Noise from the premises is to be measured at the most affected noise sensitive receiver who has not given written permission for an exceedance of condition L5.1 to determine compliance with this condition. Note: Noise sensitive locations means buildings used as a residence, hospital, school, childcare centre, places of public worship and nursing homes. A noise sensitive location includes the land within 30m of the building. | Section 4.1 |
| EPL 3384 – L4.3 | The noise limits set out in the Noise Limits table apply under all meteorological conditions except for the | Section 4.1 |

Noise & Blast Management Plan

| Noise Limits | <p>following:</p> <p>a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or</p> <p>b) Temperature inversion conditions up to 3°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or</p> <p>c) Temperature inversion conditions greater than 3°C/100m.</p> | Section 8.4 | | | | | | | | |
|---|--|---|-------------------|---|---|----------|--|-------------|--|-------------------------|
| EPL 3384 – L5.1 Blasting | <p>The airblast overpressure level from blasting operations in or on the premises must not exceed:</p> <p>a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and</p> <p>b) 120 dB (Lin Peak) at any time.</p> <p>as measured at the nearest sensitive receiver</p> | Section 3.2 Section 8.2 Section 8.3 Section 10.5 | | | | | | | | |
| EPL 3384 – L5.2 Blasting | <p>The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed:</p> <p>a) 5mm/s for more than 5% of the total number of blasts carried out on the premises during each reporting period; and</p> <p>b) 10 mm/s at any time.</p> <p>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 .</p> | Section 3.2 | | | | | | | | |
| EPL 3384 – L5.3 Blasting | All sensitive receivers are to be given at least 24 hours notice when blasting is to be undertaken. | Section 9.6 | | | | | | | | |
| EPL 3384 – L5.4 Blasting | The licensee must report any exceedance of the licence blasting limits to the EPA within 24 hours of the exceedance becoming known to the licensee or to one of the licensee's employees or agents. | Section 10.5 | | | | | | | | |
| EPL 3384 – L6.1 Hours of Operation | <p>Activities covered by this licence must be in accordance with the operating hours set out in the table below</p> <table border="1" data-bbox="504 866 1637 1150"> <thead> <tr> <th>Activity</th> <th>Permissible Hours</th> </tr> </thead> <tbody> <tr> <td>Quarrying activities, asphalt plant operations and loading and dispatch of laden trucks</td> <td>07:00 to 18:00 Monday to Friday; 07:00 to 15:00 on Saturday and at no time on Sundays and Public Holidays</td> </tr> <tr> <td>Blasting</td> <td>10:00 to 15:00 Monday to Friday and at no time on Saturday, Sunday and Public Holidays</td> </tr> <tr> <td>Maintenance</td> <td>May be conducted at any time provided that these activities are not audible at any privately-owned residence</td> </tr> </tbody> </table> | Activity | Permissible Hours | Quarrying activities, asphalt plant operations and loading and dispatch of laden 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 | Maintenance | May be conducted at any time provided that these activities are not audible at any privately-owned residence | Section 10.5 Table F |
| Activity | Permissible Hours | | | | | | | | | |
| Quarrying activities, asphalt plant operations and loading and dispatch of laden 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 | | | | | | | | | |
| Maintenance | May be conducted at any time provided that these activities are not audible at any privately-owned residence | | | | | | | | | |
| EPL 3384 – L6.2 Hours of Operation | <p>The following activities may be carried out outside the hours specified in Condition L7.1 above:</p> <ul style="list-style-type: none"> • 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. <p>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.</p> <p>Note: Where a blast failure has occurred or there are compelling safety reasons, the EPA may permit a blast to occur outside the above hours. The licensee must provide prior notice of any such blast to the EPA by contacting 131 555.</p> | Section 2.2 Section 3.2 Section 7.3 Section 8.2 Section 9.7 | | | | | | | | |

Noise & Blast Management Plan

| | | |
|---|---|--|
| <p>EPL 3384 – L6.3 Out of hours work implemented in accordance with conditions of approval</p> | <p>The licensee may also undertake limited campaign asphalt plant operations (within the limits imposed under Application No: 07_0020, Mod 3,condition 8, Schedule 2), outside of the operating hours prescribed in condition L6.1, as requested by public authorities. In such circumstances, the licensee must prepare an Out of Hours Work Protocol. This protocol must: 1. be prepared in consultation with the EPA and any residents who may be affected by the noise generated by these works; and 2. be approved by the NSW Department of Planning and Environment Secretary prior to the commencement of any out of hours asphalt plant operations.</p> | <p>Section 2.2 Section 3.2 Section 7.3 Section 8.2 Section 9.7</p> |
| <p>EPL 3384 – L6.4 Out of Hours Work reporting</p> | <p>Any works undertaken through these provisions are to be reported to the EPA in accordance with condition R1.9.</p> | <p>Section 9.6</p> |
| <p>EPL 3384 – M7.1 Blasting</p> | <p>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.</p> | <p>Section 10.5</p> |
| <p>EPL 3384 – M8.1 Other monitoring and recording conditions</p> | <p>Noise monitoring must be carried out in accordance with Australian Standard AS 2659.1 – 1998: Guide to the use of sound measuring equipment – Portable sound level meters, and the compliance monitoring guidance provided in the NSW Industrial Noise Policy.</p> | <p>Section 10.5</p> |

Noise & Blast Management Plan

APPENDIX B – STATEMENT OF COMMITMENTS

| 5 | Noise | Responsibility | Timing | Comment |
|------|---|----------------------|--|-----------------------------|
| 5.1 | The quarry will operate in accordance with the Conditions of Approval (Condition 1 of Schedule 3). | Lismore City Council | Ongoing | Section 1.1 |
| 5.2 | Speed limits within the quarry site will be restricted to 40km/h and compression braking limited. | Lismore City Council | Ongoing | Section 3.4 |
| 5.3 | 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) 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 | Section 3.2 Section 7.2 |
| 5.4 | Attended noise monitoring and plant equipment audits will be undertaken. | Lismore City Council | Annually | Section 10.5 |
| 5.5 | Plant will be relocated to greater pit depths as the floor of the quarry gets deeper. | Lismore City Council | Ongoing | Section 7.3 |
| 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; Lismore City Council Prior to the operation of the expanded quarry. NSW Government 28 Department of Planning, Industry and Environment • blasting noise; and • road traffic noise. | Lismore City Council | Prior to the operation of the expanded quarry | Section 8.1 Section 10.5 |
| 5.7 | A noise compliance assessment (including airblast overpressure and ground vibration from blasting) shall be submitted to the EPA 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 | Section 10.5 |
| 5.8 | Noise from the premises must not exceed the limits presented in condition 3 of Schedule 3. | Lismore City Council | Ongoing | Section 4.1 |
| 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 | Section 8.1 |
| 5.10 | Where it can be demonstrated that direct measurement of noise from the Blakebrook Quarry is impractical, the EPA 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 | Section 10.5 |
| 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 | Section 8.4 |

Noise & Blast Management Plan

APPENDIX C – DPE CORRESPONDENCE



Department of Planning and Environment

Ms Eleisha Went
Compliance Manager, Commercial Services
Lismore City Council

Ref. ED22/6741

60 BRUNSWICK STREET
LISMORE NSW 2480

Via email: Eleisha.went@lismore.nsw.gov.au

Dear Ms Went

Blakebrook Quarry - Flood Emergency Request (MP07_0020) Extension of Time Request

Thank you for your correspondence to the Department of Planning and Environment (the "Department") dated 3 & 12 March 2022 seeking an extension of time for the submission of reports required under the conditions of consent and additionally, seeking increased limits on hours of operation, production, and vehicle movements for the Blakebrook Quarry (MP07_0020) to enable Council to repair necessary infrastructure.

The Department acknowledges that the Lismore region and its residents have been significantly impacted by the recent unprecedented flooding and associated impacts to infrastructure. The Department wishes to assist in any way possible to support Council and the community that have been impacted by this tragic event.

Reports and Environmental Management Plans

The Department has considered your request for the extension of time for the submission of the following reports and management plans;

- Annual Environmental Management Review (AEMR); and
- Modification 3 Management Plan revisions (including Site Water Balance)

Accordingly, the Planning Secretary has approved your request for an extension of time until 30 June 2022 for the submission of the Annual Environmental Management Review, and until 30 September 2022 for the submission of revised Management Plans required under Modification 3 (including the Site Water Balance).

Increased production limits, hours of operation and vehicle movements

In relation to your request seeking increased hours of operation, production limits, and vehicle movements, the Department provides assurance that it will not take enforcement action for

Noise & Blast Management Plan



Department of Planning and Environment

these exceedances for an initial period of 3 months and will review the Council's circumstances at that time in determining whether this period should be extended.

The Department notes that the Council has committed to the following measures:

- Continue to monitor and record tonnages of quarry products and asphalt leaving the site;
- Continue to monitor and record the number of laden truck movements exiting the site;
- Limit hours of operation wherever possible;
- Record and respond to any complaints; and
- Continue to meet the requirements of management plans and programs.

Additionally, the Department considers that blasting activities at the site should be undertaken within the approved hours unless considered critical for production or for safety reasons (such as a misfire). The Department further requests that the Council conducts engagement with sensitive receivers prior to increasing production, truck movements or conducting operations outside of the approved hours.

Finally, the Department requests that a short monthly summary report be provided during the period of works, outlining the works conducted outside of the limits of consent, whether complaints have been received and the Council's response to such complaints.

Should you wish to discuss the matter further, please contact Mr Phillip Rose, Compliance Officer at the Department on 6670 8657 or phillip.rose@planning.nsw.gov.au

Yours sincerely

A handwritten signature in black ink, appearing to read 'Ben Harrison', with a long horizontal line extending to the right.

Ben Harrison
Director Compliance
As nominee of the Planning Secretary

16.8.2022

Noise & Blast Management Plan

RE: REQUEST: EPA Consultation - Blakebrook Quarry EPL3384 - Revised Noise and Blast Management Plan



James Hunt <james.hunt@epa.nsw.gov.au>

To ● Eleisha Went

Cc ○ Luke Davison

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Good afternoon Eleisha,

The EPA have reviewed the Revised Noise and Blast Management Plan (NBMP) for Blakebrook Quarry (EPL 3384).

After reviewing the NBMP, the EPA have no issues or concerns with the revisions made.

Kind regards,

James Hunt
Operations Officer
Regulatory Operations Regional
NSW Environment Protection Authority
M 0499 010 566

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Noise & Blast Management Plan

APPENDIX D – ACOUSTIC GLOSSARY

A.1 GLOSSARY – ACOUSTICAL CONCEPTS & TERMINOLOGY

What Is Noise and Vibration?

- Noise - Noise is often defined as a sound, especially one that is loud or unpleasant or that causes disturbance¹ or simply as unwanted sound, but technically, noise is the perception of a series of compressions and rarefactions above and below normal atmospheric pressure.
- Vibration - Vibration refers to the oscillating movement of any object. In a sense noise is the movement of air particles and is essentially vibration, though in regard to an environmental assessment vibration is typically taken to refer to the oscillation of a solid object(s). The impact of noise on objects can lead to vibration of the object, or vibration can be experienced by direct transmission through the ground, this is known as ground-borne vibration.

Essentially, noise can be described as what a person hears, and vibration as what they feel.

What Factors Contribute to Environmental Noise?

The noise from an activity, like construction work, at any location can be affected by a number of factors, the most significant being:

- How loud the activity is?
- How far away the activity is from the receiver?
- What type of ground is between the activity and the receiver location e.g. concrete, grass, water or sand?
- How the ground topography varies between the activity and the receiver? For example, is it flat, hilly, mountainous? Blocking the line of sight to a noise source will generally reduce the level of noise.
- Any other obstacles that block the line of sight between the source to receiver e.g. buildings or purpose built noise walls.

How to Measure and Describe Noise

Noise is measured using a specially designed 'sound level' meter which must meet internationally recognised performance standards. Audible sound pressure levels vary across a range of 10^7 Pascals (Pa), from the threshold of hearing at $20\mu\text{Pa}$ to the threshold of pain at 200Pa. Scientists have defined a statistically described logarithmic scale called Decibels (dB) to more manageably describe noise.

To demonstrate how this scale works, the following points give an indication of how the noise levels and differences are perceived by an average person:

- 0 dB – Represents the threshold of human hearing (for a young person with ears in good condition).
- 50 dB – Represents average conversation.
- 70 dB – Represents average street noise, local traffic etc.
- 90 dB – Represents the noise inside an industrial premises or factory.
- 140 dB – Represents the threshold of pain – the point at which permanent hearing damage may occur.

Human Response to Changes in Noise Levels

The following concepts offer qualitative guidance in respect of the average response to changes in noise levels:

- Differences in noise levels of less than approximately 2 dB are generally imperceptible in practice, an increase of 2 dB is hardly perceivable.
- Differences in noise levels of around 5 dB are considered to be significant.
- Differences in noise levels of around 10 dB are generally perceived to be a doubling (or halving) of the perceived loudness of the noise. An increase of 10 dB is perceived as twice as loud. Therefore an increase of 20 dB is four (4) times as loud and an increase of 30 dB is eight (8) times as loud etc.
- The addition of two (2) identical noise levels will increase the dB level by about 3 dBA. For

Noise & Blast Management Plan

example, if one car is idling at 40 dB and then another identical car starts idling next to it, the total dB level will be about 43 dB.

- The addition of a second noise level of similar character which is at least 8 dB lower than the existing noise level will not add significantly to the overall dB level.
- A doubling of the distance between a noise source and a receiver result approximately in a 3 dB decrease for a line source (e.g. vehicles travelling on a road) and a 6 dB decrease for a point source (e.g. the idling car discussed above).
- A doubling of traffic volume for a line source results approximately in a 3 dB increase in noise, halving the traffic volume for a line source results approximately in a 3 dB decrease in noise.

Terms to Describe the Perception of Noise

The following terms offer quantitative and qualitative guidance in respect of the audibility of a noise source:

- Inaudible/Not Audible – The noise source and/or event could not be heard by the operator, masked by extraneous noise sources not associated with the source. If a noise is 'inaudible' its noise level may be quantified as being less than the measured L_{A90} background noise level, potentially by 10 dB or greater.
- Barely Audible – The noise source and/or event are difficult to define by the operator, typically masked by extraneous noise sources not associated with the source.
- Just Audible – The noise source and/or event may be defined by the operator. However there are a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on the instantaneous noise level contributions, noted by the operator.
- Audible – The noise source and/or event may be easily defined by the operator. There may be a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.
- Dominant – The noise source and/or event are noted by the operator to be significantly 'louder' than all other noise sources. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.

The following terms offer qualitative guidance in respect of acoustic terms used to describe the frequency of occurrence of a noise source during an operator attended environmental noise measurements:

- Constant – This indicates that the operator has noted the noise source(s) and/or event to be constantly audible for the duration of the noise measurement e.g. an air conditioner that runs constantly during the measurement.
- Intermittent – This indicates that the operator has noted the noise source(s) and/or event to be audible, stopping and starting intervals for the duration of the noise measurement e.g. cars passing by.
- Infrequent – This indicates that the operator has noted the noise sources(s) and/or event to be constantly audible, however, not occurring regularly or at intervals for the duration of the noise measurement e.g. small number of aircraft are noted during the measurement.

How to Calculate or Model Noise Levels

There are two (2) recognised methods which are commonly adopted to determine the noise at a particular location from a proposed activity. The first is to undertake noise measurements whilst the activity is in progress and measure the noise, the second is to calculate the noise based on known noise emission data for the activity in question.

The second option is preferred as the first option is largely impractical in terms of cost and time constraints, notwithstanding the meteorological factors that may also influence its quantification. Furthermore, it is also generally considered unacceptable to create an environmental impact simply to measure it. In addition, the most effective mitigation measures are determined and implemented during the design phase and often cannot be readily applied during or after the implementation phase of a project.

Because a number of factors can affect how 'loud' a noise is at a certain location, the calculations can be very complex. The influence of other ambient sources and the contribution from a particular source in question can be difficult to ascertain. To avoid these issues, and to quantify the direct noise contribution from a source/site in question, the noise level is calculated using noise modelling software packages. The noise emission data used may be obtained from the manufacturer or from

Noise & Blast Management Plan

ERM's database of measured noise emissions.

Acoustic Terminology & Statistical Noise Descriptors

Environmental noise level such as noise generated by industry, construction and road traffic are commonly expressed in dBA. The A-weighting scale follows the average human hearing response and enables comparison of the intensity of noise with different frequency characteristics. Time varying noise sources are often described in terms of statistical noise descriptors. The following descriptors are commonly used when assessing noise and are referred to throughout this acoustic assessment:

- **Decibel (dB)** – This unit is used to describe sound levels and noise exposure. It is the equivalent of ten (10) times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.
- **dBA** – This unit is used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound level measurement to approximate the response of the human ear.
- **dBC** – This unit is used to measure 'C-weighted' sound pressure levels. C-weighting is an adjustment made to sound level measurements which takes account of low frequency components of noise within the audibility range of humans.
- **dBZ or dBL** – This unit is used to measure 'Z-weighted' sound pressure levels with no weighting applied, linear.
- **Hertz (Hz)** – The measure of frequency of sound wave oscillations per second. One (1) oscillation per second equals one (1) hertz.
- **Octave** – A division of the frequency range into bands, the upper frequency limit.
- **1/3 Octave** – Single octave bands divided into three (3) parts.
- **L_{eq}** – This level represents the equivalent or average noise energy during a measurement period. The L_{eq}, 15 minute noise descriptor simply refers to the L_{eq} noise level calculated over a 15 minute period. Indeed, any of the below noise descriptors may be defined in this way, with an accompanying time period e.g. L₁₀ 15 minute, as required.
- **L_{max}** – The absolute maximum noise level in a noise sample.
- **L_N** – The percentile sound pressure level exceedance for N% of the measurement period calculated by statistical analysis.
- **L₁₀** – The noise level exceeded for 10% of the time and is approximately the average of the maximum noise levels.
- **L₉₀** – The noise level exceeded for 90% of the time and is approximately the average of the minimum noise levels. The L₉₀ level is often referred to as the 'background' noise level and is commonly used as a basis for determining noise criteria for assessment purposes.
- **Sound Power Level (L_w)** – This is a measure of the total power radiated by a source. The Sound Power of a source is a fundamental property of the source and is independent of the surrounding environment.
- **Sound Pressure Level (L_p)** – The level of sound pressure, as measured at a distance by a standard sound level meter with a microphone. This differs from L_w in that this is the received sound as opposed to the sound 'intensity' at the source.
- **Background Noise** – The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} descriptor.
- **Ambient Noise** – The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far. This is described using the L_{Aeq} descriptor.
- **Cognitive Noise** – Noise in which the source is recognised as being annoying.
- **Masking** – The phenomenon of one sound interfering with the perception of another sound e.g. the interference of noise traffic with use of a public telephone on a busy street.

Noise Policy for Industry Terminology

The following terminology is from the NSW EPA –Noise Policy for Industry 2017 and relevant application notes:

- **Assessment Background Level (ABL)** –The single figure background level representing each assessment period: day, evening and night (that is, three assessment background levels are determined for each 24-hour period of the monitoring period). Its determination is by the methods described in Fact Sheet B.

Noise & Blast Management Plan

- **Rating Background Level (RBL)** – The overall single figure background level representing each assessment period (day, evening and night) over the whole monitoring period (as opposed to over each 24 hour period used for the assessment background level). This is the level used for assessment purposes. See Fact Sheets A & B
- **Extraneous Noise** – Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
- **Most Affected Location(s)** – Locations that experience (or will experience) the greatest noise impact from the noise source under consideration. In determining these locations, one needs to consider existing background levels, exact noise source location(s), distance from source (or proposed source) to receiver, and any shielding between source and receiver.
- **Noise Criteria** – The general set of non-mandatory noise level targets for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity e.g. noise levels for various land uses.
- **Noise Limits** – Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels which the proponent has predicted can be met during the environmental assessment.
- **Project Noise Trigger Levels** – Target noise levels for a particular noise generating facility. They are based on the most stringent of the project intrusiveness noise level or the project amenity noise level.
- **Compliance** – The process of checking that source noise levels meet with the noise limits in a statutory context.
- **Non-compliance** – In this policy this means not required by legislation. The policy specifies project noise trigger levels to be strived for, but the legislation does not make these levels compulsory. However the policy will be used as a guide to setting statutory (legally enforceable) limits for licences and consents.
- **Feasible and Reasonable Measures** – As defined in Fact Sheet F
- **Meteorological Conditions** – Wind and temperature inversion conditions.
- **Temperature Inversion** – An atmospheric condition in which temperature increases with height above the ground.
- **Adverse Weather** – Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

Operator Attended Noise Measurements

Table M below presents typical abbreviations that are used to describe common noise sources that may be noted during environmental noise measurements.

Table M: General Field Noise Abbreviations

| Noise Source | Abbreviation |
|------------------------|--------------|
| Wind-blown Vegetation | WBV |
| Car Pass-by | CP |
| Operator Noise | OP |
| Animal Noise | AN |
| Distant Traffic | DT |
| Near Traffic | NT |
| Aircraft Noise | AN |
| Metal on Metal Contact | MMC |

During operator attended noise measurements, the sound level meter will present the instantaneous level and record acoustical and statistical parameters. In certain acoustical environments, where a range of noise sources are audible and detectable, the sound level meter cannot measure a direct source noise level and it is often necessary to account for the contribution and duration of the sources.

Noise & Blast Management Plan

Noted Percentile Contribution – Table N presents noise level deductions that are typically applied based on the percentage contribution of a noise source(s)

Table N: Noise Level Deductions - Noted Percentile Contribution

| Percentage Contribution | Noise Level Adjustment dBA |
|-------------------------|----------------------------|
| 5% | -13.0 |
| 10% | -10.0 |
| 15% | -8.2 |
| 20% | -7.0 |
| 25% | -6.0 |
| 30% | -5.2 |
| 35% | -4.6 |
| 40% | -4.0 |
| 45% | -3.5 |
| 50% | -3.0 |
| 55% | -2.6 |
| 60% | -2.2 |
| 65% | -1.9 |
| 70% | -1.5 |
| 75% | -1.2 |
| 80% | -1.0 |

| Percentage Contribution | Noise Level Adjustment dBA |
|-------------------------|----------------------------|
| 85% | -0.7 |
| 90% | -0.5 |
| 95% | -0.2 |
| 100% | 0.0 |

Example: The measured L_{Aeq} 15 minute noise level is 49 dB, and the site contribution was observed to be 10% of this level (extraneous noise sources were noted to dominate the measurement), therefore the L_{Aeq} 15 minute noise level deduction is 10 dB, with a resultant noise level contribution of approximately 39 dB.

Noise & Blast Management Plan

Noted Time Contribution – Table O presents noise level deductions that may be applied based on the percentage of time that a noise source(s) is audible during a 15-minute measurement.

Table O: Noise Level Deductions - Noted Time Contribution

| Event Duration (Minutes) | Noise Level Adjustment dBA |
|--------------------------|----------------------------|
| 1 | -11.8 |
| 2 | -8.8 |
| 3 | -7.0 |
| 4 | -5.7 |
| 5 | -4.8 |
| 6 | -4.0 |
| 7 | -3.3 |
| 8 | -2.7 |
| 9 | -2.2 |
| 10 | -1.8 |
| 11 | -1.3 |
| 12 | -1.0 |
| 13 | -0.6 |
| 14 | -0.3 |
| 15 | 0.0 |

Example: The measured L_{Aeq} 15 minute noise level contribution of an excavator was noted to be 56 dB, however it was only audible for 6 minutes during the 15 minute measurement period, therefore the L_{Aeq} 15 minute noise level deduction is 4 dB, with a resultant noise level contribution of approximately 52 dB.

Where the noise emission from a source is clearly detectable and the contribution can be measured, these deductions are not necessary.

A.2 VIBRATION – GLOSSARY OF TERMS, DEFINITIONS & METHODOLOGY

How to Measure and Control Vibration

Vibration refers to the oscillating movement of any object. In relation to construction projects, ground borne vibration is the most likely outcome of works and potentially has three (3) effects on vibration sensitive receivers. These are:

- Ground borne vibration that may cause annoyance.
- Ground borne vibration that may have an adverse effect on a structure e.g. a building.
- Regenerated noise due to ground borne vibration.

Each of these potential effects can be assessed in accordance with the relevant standard. Perceptible levels of vibration often create concern for the surrounding community at levels well below structural damage guideline values, this issue needs to be managed as part of the vibration monitoring program.

Vibration is typically measured using specific devices that record the velocity or acceleration at a designated receiver location, usually being the closest premises to works. Modern vibration monitoring devices will typically capture amplitude data for the three (3) orthogonal axes, being the transverse, longitudinal and vertical, and also the frequency at which the measured vibration event occurs.

Noise & Blast Management Plan

Monitoring of this level of detail enables analysis of significant vibration events to determine compliance with relevant guidelines, such as the NSW Department of Environment and Conservation – NSW Environmental Noise Management – Assessing Vibration: A Technical Guide (The NSW Vibration Guideline) (February 2006), and the German Institute for Standardisation –) DIN 4150-3:2016-12) – Structural Vibration – Effects of Vibration on Structures.

Vibration propagates in a different manner to noise and can be difficult to control depending on the frequency of the source in question, although identifying the strategy best suited to controlling vibration follows a similar approach to that of noise. This includes elimination, control at the source, control along the propagation path and control at the receiver and/or a combination of these, such as no work/respice periods.

Vibration Descriptors

The following terms are often used to describe measured vibration levels:

- Parameter – An attribute with a value e.g. weighting.
- Particle Velocity – The instantaneous value of the distance travelled by a particle per unit time in a medium that is displaced from its equilibrium state by the passage of a sound or vibration wave.
- Peak Component Particle Velocity (PCPV) – Is the highest (maximum or peak) particle velocity which is recorded during a particular vibration event over the three (3) axes. PCPV is measured in the unit mm/s.
- Phase – The relative position of a sound wave to some reference point, the phase of a wave is given in radians, degrees, or fractions of a wavelength.
- Acceleration – The change in velocity over time. Acceleration is dependent on the velocity and the frequency of the vibration event (velocity is a vector), as such acceleration changes in two (2) ways, magnitude and/or direction. Acceleration is measured in the unit m/s².
- Perceptible – Vibration levels that a receiver of building occupant may 'feel'. 0.2 mm/s is typically considered to be the human threshold for perception of vibration.
- Geophone or Accelerometer – The transducer/device typically used to measure vibration.
- Damage – Is defined in DIN 4150-3 to include minor non-structural effects such as cosmetic damage or superficial cracking in paint or cement render, the enlargement of cracks already present, and the separation of partitions or intermediate walls from load bearing walls.
- Vibration Dose Value (VDV) – A concept outlined in the NSW Vibration Guideline, which is a calculative approach to assessing the impact of intermittent vibration or extended periods of impulsive vibration. VDV require the measurement of the overall weighted RMS (Root Mean Square) acceleration levels over the frequency range 1 Hz to 80 Hz. To calculate VDV the following formula (refer to *Section 2.4.1* of the guideline) is used:

$$VDV = \left[\int_0^T a^4(t) dt \right]^{0.25}$$

Where VDV is the vibration dose value in m/s^{1.75} $a(t)$ is the frequency weighted RMS of acceleration in m/s² and T is the total period of the day (in seconds) during which vibration may occur.

- MIC – Maximum Instantaneous Charge or explosive charge mass (kg) detonated per delay (any 8ms interval).
- SD (m) – The scaled distance for air-blast and ground vibration from the charge to the receiver.