

Environmental Noise Impact Assessment A.P. Delaney & Co. Pty. Ltd.

'Rockwood 1 & 3' Quarries - Winchester Lane,
Table Top. NSW. 2640

Prepared for: -

A.P. Delaney & Co. Pty. Ltd.
PO Box 730,
Albury. NSW. 2640

Attention: Mr. Russell Delaney

Reference: 1703006E-R - **REV B FINAL (Including 'Rockwood 1' Quarry)**

CONFIDENTIAL

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In association with: -

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Ray Walsh Acoustics, Noise and Sound in association with Harwood Acoustics, was requested by Mr. Matt Johnson of Habitat Planning, on behalf of Mr. Russell Delaney, the Managing Director of A. P. Delaney & Co. Pty. Ltd., the Operator of Rockwood Quarry, to carry out a noise impact assessment of its existing Quarry at Winchester Lane, Table Top NSW 2640.

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1. INTRODUCTION AND SUMMARY

1.1 INTRODUCTION AND PREVIOUS ASSESSMENT 2017

Ray Walsh Acoustics, Noise and Sound in association with Harwood Acoustics prepared an Environmental Noise Impact Assessment for A. P. Delaney & Co. Pty. Ltd. in October 2017, reference 1703006E-R Rev A, dated 20/10/2017 (the 2017 NIA).

The 2017 NIA addressed the noise impact from a hard rock extraction quarry known as 'Rockwood 3', located at 208 Winchester Lane, Table Top, NSW, on surrounding residential receptors. The 2017 NIA was prepared to support an application to Albury City Council and the NSW Environment Protection Authority, seeking approval for the continuation to an existing extractive industry for a period of 30 years, as well as an increase in the annual production of crushed rock from 75,000 m³ to 100,000 m³ per annum as well as other associated activities such as the crushing of recycled concrete and the disposal of biosolid waste.

A. P. Delaney & Co. Pty. Ltd. operate the Quarry under Environment Protection Licence (EPL) 10069 issued by the NSW Environment Protection Authority as well as Development Consent from Albury City Council (reference 10.2008.28631).

The 2017 NIA therefore established acceptable noise limits at each receptor location in accordance with the noise limits set out in EPL 10069.

The 2017 NIA concluded that the level of noise emission from the current and proposed ongoing operation of the 'Rockwood 3' quarry was within the limits set by EPL 10069 at all receptor locations.

Since submission of the 2017 NIA, the assessment has been reviewed by Albury City Council and the NSW EPA. Following those reviews, and subsequent discussions, Mr Craig Bretherton, Manager Regional Operations South West of the EPA has requested that the noise assessment be revised in accordance with the following requirements: -

- That the $L_{eq, 15 \text{ minute}}$ noise descriptor be used in place of the $L_{10, 15 \text{ minute}}$ noise descriptor;
- The assessment is carried out in accordance with the EPA's Industrial Noise Policy 2000 (as distinct from the current Noise policy for Industry 2017);
- That the EPA's Road Noise Policy 2011 is addressed where applicable; and
- That consideration is given to the noise emission from the 'Rockwood 1' quarry as well as the 'Rockwood 3' quarry and the cumulative impact of both as well as other associated activities being conducted on site such as the crushing of recycled concrete and the disposal of biosolid waste.

This revised assessment addresses those requirements.

It should be noted that the Industrial Noise Policy 2000 was replaced by the Noise Policy for Industry 2017 in October 2017.

It is understood however, that the Secretary's Environmental Assessment Requirements (SEARS) for this application were prepared prior to October 2017 and consequently stipulate the use of the 2000 Policy, hence Mr Bretherton's request.

For completeness and to address any future potential amendments that may be applied to A. P. Delaney & Co. Pty. Ltd.'s Environment Protection Licence this assessment considers the noise limits established in accordance with both the 2000 and 2017 noise policies.

1.2 SUMMARY AND FINDINGS

A. P. Delaney & Co. Pty. Ltd. currently operates hard rock extraction quarries known as 'Rockwood 3' at 208 Winchester Lane and "Rockwood 1' at Gerogery Road, both at Table Top, NSW (the Quarries).

The Quarries are located on the southern side of Winchester Lane in a rural area approximately 3 kilometres west of the Hume Highway.

'Rockwood 3' is the larger of the two quarries and is located toward the western side of the site. 'Rockwood 1' is the smaller of the two quarries and is located near to Gerogery Road approximately 800 metres to the west of 'Rockwood 3', as shown in Figure 1.

There are rural residences located toward the north, west and north east, the nearest of which are at distances of approximately 500 and 700 metres from 'Rockwood 1' and 'Rockwood 3' respectively.

Toward the south is a new industrial estate ('Nexus') currently under construction, and there is also a larger extraction quarry located toward the south west on Hulme Lane that is owned and operated by Burgess Earthmoving and is not related to the subject site. The Quarries, surrounding area and nearest residences are shown in Figure 1.

The proposed development seeks approval for the continuation and expansion of an existing extractive industry for a period of 30 years, as well as an increase in the annual production of crushed rock from 75,000 m³ to 100,000 m³ per annum. There will be no other changes to current work practices.

A. P. Delaney & Co. Pty. Ltd. operate the Quarry under Environment Protection Licence 10069 issued by the NSW Environment Protection Authority as well as Development Consent from Albury City Council (reference 10.2008.28631).

However, as noted in Section 1.1 above, this assessment is carried out in accordance with the NSW Industrial Noise Policy 2000 as required by the Secretary's Environmental Assessment Requirements (SEARS - reference 1075 and Council's Development Consent No. 10.2008.28631.1) supplied by the NSW Department of Planning and Environment and the NSW Environment Protection Authority. The SEARS requires an assessment of the potential noise impacts during the construction and operational phase of the extension and from on-road traffic as well as noise and vibration from blasting. There will be no construction phase in this instance. Consideration is also given to the Noise Policy for Industry 2017 for completeness as discussed in Section 1.1 above.

Acceptable noise limits derived from the NSW Industrial Noise Policy 2000 and Noise Policy for Industry 2017 are 35 dBA ($L_{eq, 15 \text{ minute}}$) and 40 dBA ($L_{eq, 15 \text{ minute}}$) respectively, at any effected residence during the 'day' period between the hours of 7 am and 6 pm Monday to Saturday.

In addition, the Licence sets limits for ground vibration peak particle velocity from blasting operations of 5 mm/s or 2 mm/s for more than 5% of the total blasts and 10 mm/s at any time. The Air blast overpressure level from blasting operations must not exceed 115 dB (Lin Peak) for more than 5% of blasts and 120 dB (Lin peak) at any time.

Acceptable noise limits for on road truck movements are derived from the NSW Road Noise Policy 2011. The Policy recognises that in certain instances extractive industries must be served by local roads and states that where authorities recognise these principal haulage routes, that noise criteria for the routes should reflect those for arterial or sub arterial roads.

Consideration is therefore given to the noise assessment criteria for existing residences affected by additional traffic generated by land use developments of 60 dBA ($L_{eq, 15 \text{ hour}}$) as well as a relative increase criteria of existing traffic noise level of + 12 dB.

The acceptable noise limits derived from the Road Noise Policy are met at the nearest residences to the route for existing trucks.

Attended noise and vibration surveys have been carried out at the Site in May and June 2017 and again in June 2018 (for 'Rockwood 3') and May 2018 (for 'Rockwood 1'). A blast was undertaken at 'Rockwood 3' on 11 May 2017 and ground borne vibration and air blast overpressure measurements were taken at the nearest residential receptors to the site at the time.

The measured vibration and air blast overpressure levels were found to be well within the acceptable limits set by the EPL and are therefore acceptable.

It is not practicable to directly measure the level of noise emission from the operational activities undertaken at either quarry pit at any of the nearby receptor locations in terms of an energy average sound pressure over a minimum period of 15 minutes ($L_{eq, 15 \text{ minute}}$). This is due to the significantly lower level of quarry noise received at these locations compared to levels of ambient and extraneous noise.

During the noise surveys the measured short-term energy average sound pressure levels ($L_{eq, \text{short-term}}$) during lulls of extraneous noise were found to be well below 35 dBA at the receptors closest to each of the Quarries, whilst the quarries were in full operation. These measured short-term noise levels that were well below 35 dBA are also affected by extraneous and ambient noise and the contribution from the quarry activities is lower still.

Notwithstanding this, noise measurements have also been taken of all processes, plant and equipment used at each of the quarries during typical operations. Measured noise levels have been used to undertake noise modelling to each of the potentially affected receptor locations.

Measured short-term noise levels and predicted 15-minute noise levels through noise modeling were found to be well below the Intrusiveness Criterion set by the Industrial Noise Policy 2000 and Project Noise Trigger Level set by the Noise Policy for Industry 2017 at all receptor locations.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 SITE DESCRIPTION

The quarries are located on the southern side of Winchester Lane in a rural area approximately 3 kilometres west of the Hume Highway.

‘Rockwood 3’ is the larger of the two quarries and is located toward the western side of the site. ‘Rockwood 1’ is the smaller of the two quarries and is located near to Gerogery Road approximately 800 metres to the west of ‘Rockwood 3’, as shown in Figure 1.

There are rural residences located toward the north, west and north east, the nearest of which are at distances of approximately 500 and 700 metres from Rockwood 1 and Rockwood 3 respectively.

Toward the south is a new industrial estate (‘Nexus’) currently under construction, and there is also a larger extraction quarry located toward the south west on Hulme Lane that is owned and operated by Burgess Earthmoving and is not related to the subject Site. The Quarries, surrounding area and nearest residences are shown in Figure 1.

Receptor R4 is the Albury Wodonga Clay Target shooting club which is considered a commercial receptor and assessed as such, for completeness.

The nearest residential receptors to the site are shown in Table 1 and Figure 1 below.

Table 1 Receptor Locations

Receptor	Approximate distance in metres	
	Rockwood 1	Rockwood 3
R1 – 394 Gerogery Road	470	1200
R2 – 96 Winchester Lane	780	670
R3 – 48 Bridle Lane	1630	710
R4 – 154 Winchester Lane – (commercial)	1200	810
R5 – 22 Mountainpeak Lane	1000	800

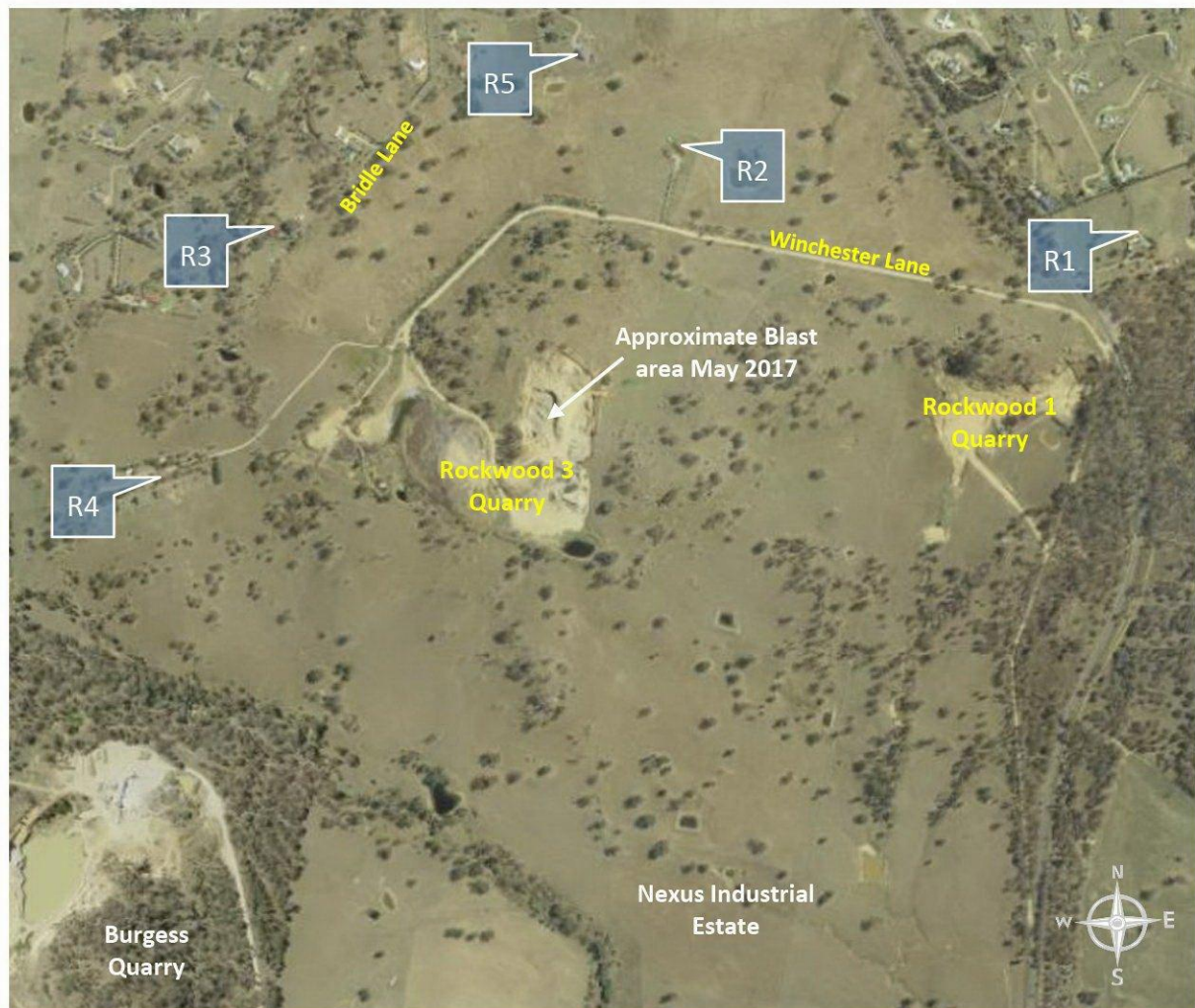


Figure 1. Location Plan – Rockwood 1 & 3 Quarries, Table Top, NSW

(source: NSW Government Spatial Information Exchange © 2017)

All distances are approximate and based on the closest crusher in either 'Rockwood 1' (screener only) or 'Rockwood 3' pits to an assessment location at 30 metres from the nearest façade of each house as a reference only. Various noise producing aspects of each quarry are at varying distances from each residence and this is taken into account in calculations and predictions in Section 5 of this report.

Compliance with the acceptable noise limits at these receptor locations will ensure compliance at all other residences in the vicinity of the Quarries. The receptor at location R5 was assessed during the blast and measurements of vibration and air blast overpressure were taken near to the southern boundary of this property. This was due to the proximity of the blast site and the fact that the resident at location R2 is project related, it was deemed appropriate to measure at a location beyond the closest receptor.

2.2 DESCRIPTION OF QUARRY ACTIVITIES

Activities at 'Rockwood 3' include the extraction of hard rock, typically granite, crushing, screening, grinding or separating and the despatch of raw materials via truck.

Activities at 'Rockwood 1' involve processing previously extracted material using a buckshot screener and dispatching the product to Albury via truck where it is mixed with river gravel or other material as required.

The Quarries supply raw materials for use almost exclusively in A. P. Delaney & Co. Pty. Ltd.'s projects, for example, fill and road base and does not supply material to the public or other contractors.

A condition of approval limits the extraction and processing of raw material to a maximum 75,000 m³ per annum and it is proposed to seek approval for an increase of this limit to 100,000 m³ per annum.

Noise producing plant and equipment at the 'Rockwood 3' site comprises the following: -

- Three stage crusher (primary and secondary jaw crushers and a tertiary gyratory crusher);
- Screening plant;
- Front end loaders;
- Buckshot screen;
- 30 tonne Excavator with rock breaking attachment;
- Truck and trailer / tipper trucks.

It is reported that there an average of approximately two trucks in and out of the site on any given day, with an estimated peak of five (5) trucks (10 movements) on a busy day. It should be reiterated that the Quarry supplies raw material for its own use in A.P.D. earthwork projects and is not open to the pubic or other contractors.

As a result of the proposed increase in the extraction rate of raw material to 100,000 m³ per annum, there is potential for an estimated sixteen (16) trucks (32 movements) on a typical busy day.

Noise producing plant and equipment at the 'Rockwood 1' site comprises the following: -

- Mobile buckshot screener in a fixed location;
- Front end loader;
- Excavator (occasionally); and
- Truck and trailer / tipper trucks.

It should be noted that 'Rockwood 1' only carries out screening operations from two to four days per annum.

3. NOISE CRITERIA

This section outlines the noise guidelines applicable to this proposal and establishes the project specific noise goals.

3.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEARS)

The NSW Department of Planning and Environment and EPA have provided SEARS for the preparation of an Environmental Impact Assessment for this proposal including requirements from the NSW EPA.

SEAR Number 1075, 'Key Issues', states: -

"Noise and blasting - including.

- an assessment of the likely construction and operational noise and vibration impacts of the development in accordance with the NSW Industrial Noise Policy and the Interim Construction Noise Guideline, having regard to EPA requirements (Attachment 2);*
- an assessment of the likely road noise impacts (traffic and haulage) of the development under the NSW Road Noise Policy; and*
- an assessment of the likely blasting and vibration impacts of the development, having regard to the relevant ANZEC guidelines and paying particular attention to impacts on people, livestock, heritage items and infrastructure."*

Given that the Quarry is existing and there are no proposed changes to the current operations, with the exception of an increase in the annual extraction rate from 75,000 m³ to 100,000 m³, there is no need to assess noise from a 'construction phase'.

3.2 ENVIRONMENT PROTECTION LICENCE 10069

AP Delaney & Co Pty Ltd operates the Rockwood Quarry under Environment Protection Licence 10069.

Section L3, Noise Limits, states: -

"L3.1 To determine compliance with condition(s) L6.1 noise must be measured at, or computed for, any affected noise sensitive locations (such as a residence, school or hospital). A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000).

L3.2 Noise from the premises must not exceed an $L_{A10(15 \text{ minute})}$ noise emission criterion of 40 dB(A) (7am to 6pm) Monday to Saturday.

Definition

L_{A10} (15 minute) is the sound pressure level that is exceeded for 10% of the time when measured over a 15 minute period.

Note: Noise measurement

For the purpose of noise measurements required for this condition, the L_{A10} noise level must be measured or computed at the nearest affected residence not owned by the licensee, or at another suitable location as agreed to by EPA, over a period of 15 minutes using "FAST" response on the sound level meter.

For the purpose of the noise criteria for this condition, 5dBA must be added to the measured level.

Measurement locations shall be:

- a) at the residential boundary;*
- b) 30 metres from the residence (rural situations) where the boundary is more than 30 metres from the residence."*

Section L4, Blasting, states: -

L4 Blasting

"L4.1 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed:

- a) 5mm/s or 2 mm/s for more than 5% of the total number of blasts carried out on the premises during each reporting period; and*
- b) 10 mm/s at any time.*

At any residence or noise sensitive location that is not owned by the licensee.

L4.2 The air blast overpressure level from blasting operations in or on the premises must not exceed:

- a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and*
- b) 120 dB (Lin Peak) at any time.*

At any residence or noise sensitive location that is not owned by the licensee.

3.3 NSW EPA'S INDUSTRIAL NOISE POLICY 2000

The NSW Environment Protection Authority (EPA) published the NSW Industrial Noise Policy (INP) in January 2000. The policy is specifically aimed at assessing noise from industrial noise sources scheduled under the Protection of the Environment Operations Act 1997. However, local government may find the policy helpful in the carrying-out of its land-use planning responsibilities (for example, the setting of targets in local and regional environmental plans).

The Policy sets two separate noise criteria to meet environmental noise objectives and these are: -

- **Intrusiveness** - to account for and control intrusive noise impacts at residential receptors in the short-term; and
- **Amenity** - to protect and maintain noise level amenity for residences and other particular land uses.

3.3.1 Controlling Intrusive Noise Impacts

When assessing intrusiveness, the background noise needs to be measured.

Section 2.1 of the Policy states that: -

“The intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the L_{Aeq} descriptor) measured over a 15-minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB.”

Where the noise source contains characteristics such as prominent tonal components, impulsiveness, intermittency, irregularity or dominant low-frequency content adjustments to the measured level may be applied to allow for the increase in annoyance.

3.3.2 Protecting Noise Amenity

The amenity assessment is based on noise criteria specific to land use and associated activities.

Section 2.2 of the Policy states: -

“To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.1.” and

“Where the existing noise level from industrial noise sources is close to the acceptable noise level, the noise level from any new source(s) must be controlled to preserve the amenity of an area. If the total noise level from industrial sources already exceeds the acceptable noise level for the area in question, the L_{Aeq} noise level from any new source should not be greater than:

- *10 dB below the acceptable noise level if there is a reasonable expectation that existing levels may be reduced in the future; or*
- *10 dB below the existing level if there is no such reasonable expectation that existing levels will fall (for example, in cases where surrounding areas are fully developed) and no significant changes to land use are expected.*

Table 2.2 sets out the implications of this requirement for noise from industrial sources.”

The relevant parts of tables 2.1 and 2.2 are replicated in Tables 2 and 3 below.

Table 2 **Amenity Criteria (INP - Table 2.1)**

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{eq} Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
Residence	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
Residence	Urban	Day	60	65
		Evening	50	55
		Night	45	50
Residence	Urban/Industrial Interface – for existing situations only	Day	65	70
		Evening	55	60
		Night	50	55
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Table 3 **Modification to acceptable noise level (ANL)* to account for existing level of industrial noise (INP - Table 2.2)**

Total existing L_{eq} noise level from industrial sources dBA	Maximum L_{eq} noise level for noise sources from new sources alone dBA
$\geq$ Acceptable noise level plus 2	If existing noise level is <i>likely to decrease</i> in future: acceptable noise level minus 10 If existing noise level is <i>unlikely to decrease</i> in future: existing level minus 10
Acceptable noise level plus 1	Acceptable noise level minus 8
Acceptable noise level	Acceptable noise level minus 8
Acceptable noise level minus 1	Acceptable noise level minus 6
Acceptable noise level minus 2	Acceptable noise level minus 4
Acceptable noise level minus 3	Acceptable noise level minus 3
Acceptable noise level minus 4	Acceptable noise level minus 2
Acceptable noise level minus 5	Acceptable noise level minus 2
Acceptable noise level minus 6	Acceptable noise level minus 1
$<$ Acceptable noise level minus 6	Acceptable noise level

* ANL = recommended acceptable L_{Aeq} noise level for the specific receiver, area and time of day from Table 2.1.

Relevant notes to support the noise level tables are shown below:

1. The recommended acceptable noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.
2. In assessing noise levels at residences, the noise level is to be assessed at the most affected point on or within the residential property boundary or, if this is more than 30 m from the residence, at the most-affected point within 30 m of the residence.
3. In assessing noise levels at commercial or industrial premises, the noise level is to be assessed at the most-affected point on or within the property boundary.

6. *Types of receivers are defined as follows: -*

Commercial *an area defined as a business zone, except neighbourhood business zone, on an LEP.*

Industrial *an area defined as an industrial zone on an LEP.*

For isolated residences within an industrial zone, the industrial amenity criteria would usually apply.

In application notes to the INP, the EPA further states: -

Where there is doubt or debate over which receiver category is appropriate, the proponent needs to seek the views of the relevant land use manager (for example, Council or Department of Planning and Infrastructure). Once the land use manager has identified the land use (e.g. zone, allowable density of development and land use patterns), the appropriate amenity criteria can be assigned.

The INP does not require that intrusive noise be assessed at industrial or commercial premises. For industrial/commercial receivers, only the amenity criteria apply. Amenity noise levels should be assessed at the most affected point on or within the property boundary. This approach also applies to other non-residential receivers, such as educational facilities, hospitals and places of worship.

3.4 MEASURED BACKGROUND NOISE LEVELS

In order to establish the Intrusiveness Criteria, it is necessary to determine the background noise levels in the vicinity of all potentially affected residential receptors.

The background noise level is defined by the EPA as ‘the underlying level of noise present in ambient noise when all unusual extraneous noise is removed’ and is considered to be represented by the $L_{A90, 15 \text{ minute}}$ descriptor. This is a statistical measure of the sound pressure level that is exceeded for 90 % of the time.

The Rating Background Level is the single-figure background noise level derived from monitoring $L_{A90, 15 \text{ minutes}}$ over a representative period of time. The Rating Background Level is established for the day, evening and night time periods and is used for assessment purposes.

When measuring background noise levels, it is important to undertake sufficient monitoring of background noise to allow intrusive noise to be assessed adequately.

This typically requires long-term background noise monitoring.

Section 3.1.2 of the Policy states: -

“Where the rating background level is found to be less than 30 dB(A), then it is set to 30 dB(A).”

In this instance, short-term background noise measurements were taken at receptor location R1 during the site visit of 11 May 2017. Several measured 15 minute periods ($L_{90, 15 \text{ minute}}$) during day time hours were at or below 30 dBA. Therefore, the rating background noise level (RBL) during the day time period is considered to be 30 dBA.

3.5 NOISE POLICY FOR INDUSTRY 2017

The Noise Policy for Industry 2017 (NPI 2017) replaced the Industrial Noise Policy 2000 (INP 2000) October 2017. However, as mentioned previously the SEARS for this proposal stipulate use of the INP 2000 and as such it is utilised in this assessment.

It is likely that AP Delaney's Environment Protection Licence will be updated in the future and the Noise Limits within the Licence will reflect the current Policy at that time. This assessment therefore addresses the NPI 2017 criteria for completeness.

Full details of the Noise Policy for Industry 2017 criteria are provided in Appendix D of this Report.

One significant difference in the 2017 Policy as compared to the 2000 Policy is the increase to the minimum rating background noise level during the day time period.

Minimum assumed RBLs are applied in the NPI 2017 and these result in minimum Project Intrusiveness Noise levels. These are shown in Table 2.1 in the NPI 2017 and are replicated in Table 3 below.

Table 3 Minimum assumed RBLs and project intrusiveness noise levels
(Derived from EPA NPI 2017 Table 2.1)

Time of Day	Minimum Assumed Rating Background Level dBA	Minimum Project Intrusive Noise Level (L_{eq} , 15 minute, dBA)
Day (7 am to 6 pm)	35	40
Evening (6 pm to 10 pm)	30	35
Night (10 pm to 7 am)	30	35

The minimum rating background noise level under the INP 2000 was 30 dBA and the resultant Intrusiveness Criteria was 35 dBA (L_{eq} , 15 minute).

Given that the Quarries operate during day time hours only the project specific noise goals for this development differ under the 2000 and 2017 policies by 5 dB. Again, consideration is given to both criteria in this assessment.

3.6 ON ROAD TRAFFIC NOISE CRITERIA – ROAD NOISE POLICY

The NSW EPA published the NSW Road Noise Policy in March 2011 and the Policy replaced the Environmental Criteria for Road Traffic Noise in July 2011.

The Policy contains strategies to address the issue of road traffic noise from, among other things, traffic generating developments.

3.6.1 Determining Road Categories

Section 2.2 of the Policy provides definitions of, and advice for determining, road categories for different road types.

Section 2.2.2 of the Policy ‘Principal haulage routes along public roads’, states: -

“Some industries such as mines and extractive industries are, by necessity, in locations that are often not served by arterial roads. Heavy vehicles must be able to access these often more remote sites and this may mean travelling on local public roads. Good planning practice acknowledges this type of road use and develops ways of managing any associated adverse noise impacts. Principal haulage routes are distinct from private haul roads – further guidance on private haul roads is provided in Appendix C4.

Where local authorities identify a ‘principal haulage route’, the noise criteria for the route should match those for arterial/sub-arterial roads, recognising that they carry a different level and mix of traffic to local roads.”

Winchester Lane is considered to be an existing haulage route and is therefore considered to be a sub-arterial road for the purpose of noise assessment, in accordance with the Road Noise Policy. The criteria for local roads is shown below as well for completeness.

3.6.2 Noise Assessment Criteria – Residential Land Uses

Section 2.3.1 of the Policy ‘Noise assessment criteria – residential land uses’ sets out the assessment criteria for residences to be applied to particular types of project, road category and land use.

The relevant parts of the EPA’s Table 4 are replicated in Table 5 below.

Table 5 Road Traffic Noise Assessment Criteria

Road Category	Type of Project / Land Use	Assessment Criteria, dBA	
		Day (7 am – 10 pm)	Night (10 pm – 7 am)
Freeway / arterial / sub arterial	3. Existing residences affected by additional traffic on existing freeway / arterial / sub-arterial roads generated by land use developments	L _{Aeq} (15 hour) 60 (external)	L _{Aeq} (9 hour) 55 (external)
Local Roads	6. Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq} (1 hour) 55 (external)	L _{Aeq} (1 hour) 50 (external)

3.6.3 Relative Increase Criteria

Section 2.4 of the policy states: -

“In addition to the assessment criteria outlined in Table 3 [Table 5 above], any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development must be considered. Residences experiencing increases in total traffic noise level above the relative increase criteria in Table 6 should also be considered for mitigation as described in Section 3.4. For other existing sensitive land uses as outlined in Table 4, the relative increase criteria should be applied to the respective L_{Aeq} , (period) for that land use type, except for open space. For road projects where the main subject road is a local road, the relative increase criterion does not apply.”

Table 6 of the EPA Policy is replicated in Table 6 below.

Table 6 Relative Increase Criteria

Road Category	Type of Project / Land Use	Assessment Criteria, dBA	
		Day (7 am – 10 pm)	Night (10 pm – 7 am)
Freeway / arterial / sub arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road	Existing Traffic L_{Aeq} (15 hour) + 12 dB (external)	Existing Traffic L_{Aeq} (9 hour) + 12 dB (external)

The Policy further states: -

“In Table 6 (EPA) above, the ‘existing’ traffic noise level refers to the level from all road categories which would occur for the relevant ‘no build’ option as described in Section 2.5.3. Where the existing L_{Aeq} , (period) road traffic noise level is found to be less than 30 dB(A), it is deemed to be 30 dB(A). A relative increase of 12 dB represents slightly more than an approximate doubling of perceived loudness (AS2659.1–1988) and is likely to trigger community reaction, particularly in environments where there is a low existing level of traffic noise. The relative increase criteria are primarily intended to protect existing quiet areas from excessive changes in amenity due to noise from a road project.

A similar approach is adopted in both the United States Federal Highway Administration’s Noise Abatement Criteria (United States Department of Transportation 1982) and the VicRoads Traffic Noise Reduction Policy (VicRoads 2005).”

In this instance, the existing truck movements to and from the Quarry are considered to form part of the existing traffic noise levels on the Winchester Lane haulage route.

3.7 PROJECT SPECIFIC NOISE GOALS

The most relevant criteria are as follows: -

All residential receptors (R1, R2, R3 and R5)

- **35 dBA** $L_{eq, 15 \text{ minute}}$ during the day time period. (NPI 2000)
- **40 dBA** $L_{eq, 15 \text{ minute}}$ during the day time period. (PNI 2017)
- **60 dBA** ($L_{eq, 15 \text{ hour}}$) from on road traffic noise during the day.

Commercial Receptor R4

- **65 dBA** $L_{eq, \text{period}}$ when in use (see Table 2 in this Report).

The criteria are to be assessed at the most affected point at or within the receptor's boundary, or for residential receptors, if that is more than 30 metres from the dwelling, then at 30 metres from the dwelling facade. In this instance, all residential receptors are rural properties, or on large residential blocks, and the assessment location is considered to be at 30 metres from the nearest facade of each house facing the respective Quarries.

4. MODIFYING FACTOR ADJUSTMENTS

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level.

Section 4 of the NSW Industrial Noise Policy provides modifying factor corrections to account for the additional annoyance where applicable. The modifying factor corrections are to be applied to the measured or predicted source noise level, at the receiver location, prior to comparison with the project specific noise criterion detailed above.

Table 4.1 of the INP is replicated in the attached Appendix C and the equivalent updated version associated with the Noise Policy for Industry 2017 is shown in Appendix E.

5. QUARRY NOISE EMISSION

5.1 MECHANICAL PLANT AND EQUIPMENT SOURCE NOISE LEVELS

Noise surveys were undertaken on 11 May, 1 and 2 June 2017, 18 May and 13 June 2018 by Mr. Ray Walsh and Mr. Matthew Harwood (May 2017 only).

The 2017 noise surveys assessed noise emission from the operation of Rockwood 3 only and also included measurements undertaken during blasting.

The 2018 noise surveys assessed noise emission from Rockwood 1 as well as additional measurements undertaken at Rockwood 3 for confirmation that the 2017 processes and measurement results remain valid, which they do.

Attempts were made to undertake noise measurements at the closest receptors to each of the respective Quarries during the noise surveys.

At no time was it possible to directly measure the level of quarry noise emission in terms of an energy average sound pressure level over a period of 15 minutes ($L_{eq, 15 \text{ minute}}$) at either receptor location. This was due to the low level of quarry noise and the higher levels of ambient and extraneous noise at each location, particularly vehicular traffic traversing Gerogery Road.

Subjectively noise emission from the Quarries was most often not, and only on occasion just audible at either receptor location during the noise surveys. Short term L_{eq} noise level measurements and instantaneous sound pressure levels observed during lulls of ambient and extraneous noise were well below 35 dBA at each of the closest receptors during each of the noise surveys.

Notwithstanding the above, a noise model has been established to predict the level of noise emission at all receptor locations from the operation of both quarries.

Measured sound pressure levels taken in close proximity to all items of plant and equipment have been used to establish the 'A' frequency weighted sound power levels, in decibels re: 1 pW, of plant and equipment shown in Table 7 below.

The three-stage crusher plant at Rockwood 3 was crushing rock for road base which is reported to be a worst-case scenario with regard to noise emission.

Instrumentation used during the surveys is shown in the attached Appendix A.

Table 7 **Leq, 15 minute Sound Power Levels – Mechanical Plant & Equipment**

Description	Individual Sound Power Level Leq, 15 minute (dBA)
<i>Rockwood 1</i>	
Buckshot Screener – Rockwood 1	109
Front End Loader SC5 – Rockwood 1	106
<i>Rockwood 3</i>	
Three Stage Crushing Plant (with main screens)	116
Additional screening Plant – Rockwood 3	96
Rock Breaker	112
Excavator (loading rock / rubble)	110
Front End Loader (loading / moving rock – Rockwood 3)	110
Tipper Truck / Truck and Trailer	107

5.2 NOISE LEVEL PREDICTIONS

5.2.1 Modelling Equations

For all outdoor noise sources, the external noise level at each receptor has been calculated from the formula: -

$$L_{eq} = L_w + Dc - A$$

Where:

- L_w is the sound power level of the noise source;
- Dc is directivity correction; and
- A is the attenuation that occurs during the propagation from source to receiver.

The term A in the equation includes attenuation from geometric divergence (distance loss), atmospheric absorption, ground absorption, barrier effects and miscellaneous other effects.

This model derives from the International Standard ISO 9613-2 (1996(E)) 'Acoustic – Attenuation of sound during propagation outdoors Part 2 General method of calculation'.

The method described in the Standard is general in the sense that it may be applied to a wide variety of noise sources, and covers the major mechanism of sound attenuation. The method allows for propagation conditions with the wind blowing from the source to the receiver.

5.2.2 Predicted Noise Levels

Predicted noise levels are shown in Table 8 below.

Table 8 Predicted L_{eq} Noise Levels – All residential receptors

Description	Predicted Noise Level $L_{eq, 15 \text{ minute}}$ (dBA) at Receptor Location				
	R1	R2	R3	R4	R5
Acceptable Noise Limit – Day (INP 2000)	35	35	35	35	35
Rockwood 3	<25	28	29	30	26
Rockwood 1	28	<25	< 20	< 20	< 20
Combined	29 – 30	28 – 29	29 – 30	30	26 – 27
Complies	Yes	Yes	Yes	Yes	Yes
Acceptable Noise Limit – Day (NPI 2017)	40	40	40	40	40
Complies	Yes	Yes	Yes	Yes	Yes

The predictions in Table 8 consider the following: -

- Distance loss to each receptor from various components of each of the quarries: -
 - Crushing and screening plant at Rockwood 3 and 1 at fixed locations;
 - Front end loader, excavator and truck at northern end of Rockwood 3 as a worst-case scenario;
- Attenuation due to the shielding of the pit walls and topography of the land and / or ground absorption;
- All plant and equipment operating typically for a minimum 15 minutes with the exception of a truck which is assumed to operate on-site at full sound power for 7.5 minutes in 15; and
- Both quarry pits operating simultaneously.

Given the distances to each receptor and the attenuation from the quarry pit walls and topography of the land the mobile plant reversing alarms are not considered to be tonal at any residential premises.

No consideration is given to low frequency or impulsive noise sources at any receptor location either. Consequently, there are no modifying factor corrections applicable to noise sources associated with the operation of the Quarry at any receptor location.

Historically, over the last ten years, blasting has occurred once approximately every two years. There is potential in the lead up to a blast for the front-end loader to be used to clear overburden at a higher level in the Quarry than the level at which the loader usually operates. It is reported that this is unlikely to be required for at least another five blasts (e.g. approximately 10 years' time).

If the loader operates at the northern end of the Rockwood 3 Quarry with direct line of Site to the residential receptor at R2, the predicted level of noise emission is 43 dBA $L_{eq, 15 \text{ minute}}$.

This level is above the INP 2000 Intrusiveness Criterion of 35 dBA and the NPI 2017 Project Noise Trigger Level of 40 dBA during the day.

However, it may not occur in practice and in the event that it does, it will be of short duration, once in approximately two years only and is therefore considered acceptable.

To minimise the impact, in the event that it does occur, all affected residences should be notified prior to commencement of the clearing of overburden and supplied with specific details of when the works will occur and at what time they will cease.

6. BLASTING

6.1 MEASURED LEVELS

Two blasts were conducted by Hamilton's Blasting Services on Thursday 11 May 2017 at the Quarry.

A blast report is shown in the attached Appendix B with a summary of the blast design parameters as follows: -

Explosive 17.15 tonnes	Burden 2.3 metres
Average Bench Height 10.9 metres	Average Stem Height 2.0 metres
Average Hole Depth 11.9 metres	No. of holes 231
Powder Factor 1.09	Total BCM 15806.18

The blast was set up in two different sections of the rock face and two separate shots were fired approximately 3 minutes apart.

Ground vibration and air blast overpressure measurements were taken during the blasts at the following locations: -

- Attended measurements conducted by Matthew Harwood and Ray Walsh – at receptor R1 on concrete verandah of dwelling;
- Vibration monitor with overpressure microphone located in the ground on the front lawn adjacent to veranda at receptor R1

- Unattended measurement using vibration logger with overpressure microphone – at the southern property boundary of receptor R4, with geophone mounted in the ground.

The results of the survey are shown in Table 9 below and details of the instrumentation used during the survey is shown in the attached Appendix A.

Table 9 Measured Vibration and Overpressure Levels (May 2017)

	Vibration (Peak Particle Velocity)	Air Blast (Lin Peak)
	ANZECC Guide	ANZECC Guide
Criteria	2 to 5 mm/s & up to 10 mm/s	115 dB – 120 dB
<i>Measured Levels – Blast 1</i>		
Receptor R1 – House	0.54 mm/s	106
Receptor R1 – Yard	0.61 mm/s	117*
Receptor R2 – southern boundary	<0.5 mm/s (did not trigger)	Did not trigger
Complies	Yes	Yes
<i>Measured Levels – Blast 1</i>		
Receptor R1 – House	2.15 mm/s	115
Receptor R1 – Yard	3.61 mm/s	111
Receptor R2 – southern boundary	2.33 mm/s	112
Complies	Yes	Yes

* Although below the 120 dB max allowable level, the measured level on the vibration monitor is considered to be extraneous noise.

Discussion

The Australian and New Zealand Environment Conservation Council (ANZECC) provide guidelines in the document *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* 1990.

The guidelines recommended maximum level for ground vibration is 5 mm/s (peak particle velocity - ppv).

The ppv level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10mm/s at any time.

It can be seen from Table 9 that the level of peak particle velocity was below 5 mm/s during all measurements at all receptor locations.

The measured ppv level during the second blast was in excess of 2 mm/s at both locations whilst being below 5 mm/s.

It is unclear where the limit of “5 mm/s or **2 mm/s**” contained in the EPL derives from (see Section 3.2).

None the less, the levels were below the maximum allowable level for any given blast of 10 mm/s and given the Quarry is likely to blast once only every two years, this is acceptable.

7. ON ROAD TRAFFIC NOISE

It is reported that there are up to approximately five (5) trucks in and out of the Site (10 movements) on a typical busy day and this may increase to sixteen (16) trucks (32 movements) as a result of the proposed increase to the extraction rate.

All trucks will pass the same receptor at location R2 on Winchester Lane on both approach and exit.

This residence is located at a distance of approximately 150 metres from the closest point of Winchester Lane and is considered to be the closest receptor to trucks passing along the route to and from the quarry.

Formulae are given in the Calculation of Road Traffic Noise (CoRTN) from the UK Department of Transport and Welsh Office (1988) for the calculation of on-road vehicle noise. However, the calculation procedure given in CoRTN is untested for small traffic flows (under 200) and typically yields lower levels than occur in practice.

Therefore, a calculation based on the sound exposure level for various vehicles has been carried out. The sound exposure level (L_{Ae}) is a summation of the sound energy produced during a single event (i.e. a motor vehicle pass by, train pass by, etc).

The author has measured the level of noise emission from numerous heavy vehicles, including tipper trucks, truck and trailer, semi-trailers and truck and dog combinations.

The average maximum measured sound exposure levels of a range of trucks, normalised to a distance of 10 metres is as follows: -

- Truck – 86 dBA;

Once established, a sound exposure level (L_{Ae}) can be used to calculate an energy average, sound pressure level ($L_{eq, time}$) using the following formula: -

$$L_{eq, 1 \text{ hour}} = L_{Ae} - 10 \log_{10} (T) + 10 \log_{10} (N)$$

Where T is time in seconds (15 hours in this instance – in accordance with the assessment criteria, see Section 3.5) and N is the number of vehicle trips (32 in this instance as a worst-case scenario).

The predicted noise level from existing on road vehicle movements (circa 10) during typical busy flows at the nearest residence is: -

- **23 dBA** ($L_{eq, 15 \text{ hour}}$)

The predicted noise level from future on road vehicle movements (circa 32) during typical busy flows at the nearest residence is: -

- **28 dBA** ($L_{eq, 15 \text{ hour}}$)

It can be seen that the predicted on road traffic noise level is below the limit of 60 dBA ($L_{eq, 15 \text{ hour}}$).

It should be noted that the predicted 1 hour noise level for an assumed 6 truck movements as a worst-case scenario is 32 dBA ($L_{eq, 1 \text{ hour}}$).

This level is well below the level of 55 dBA ($L_{eq, 1 \text{ hour}}$) during the day should the Council deem Winchester Lane to be a local road rather than a haulage route as discussed in Section 3.5 of this report.

Additionally, it can be seen that the Relative Increase criteria (see Section 3.5.3 of this Report) is also easily met for the future potential expansion.

8. CONCLUSION

An assessment of the existing level of noise emission arising from 'Rockwood 3' Quarry, 208 Winchester Lane, Table Top, NSW has been undertaken along with a compliance assessment of ground vibration and air blast overpressure from blasting on site.

An assessment of the existing level of noise emission arising from 'Rockwood 1' Quarry has also been undertaken and included within this report.

Measurements and calculations show that the level of noise emission from the operation of the Quarry is well within noise limit set by Environment Protection Licence 10069 at all potentially affected residential receptor locations.

The level of potential noise emission from on road vehicle movements is well below the noise limits set by the NSW EPA's *Road Noise Policy 2011*.

Measured levels of both ground vibration and air blast overpressure were well below the limits set by the Australian and New Zealand Environment Conservation Council (ANZECC) *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration 1990*.

Measured levels of ground vibration at the closest receptor during one blast were above the level 2 mm/s (peak particle velocity) contained in the Environment Protection Licence 10069 yet below the level of 5 mm/s also contained in the licence and were therefore acceptable.



Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments: -

Appendix A – Noise Survey Instrumentation

Appendix B – Blast Report

Appendix C – Modifying Factor Corrections (EPA INP 2000)

Appendix D – Noise Policy for Industry 2017

Appendix E – Modifying Factor Corrections (EPA 2017)

Important Note

All products and materials suggested by Jamboral Pty. Ltd. T/as Ray Walsh Acoustics Noise & Sound and Harwood Acoustics are selected for their acoustical properties only.

*Recommendations made in this report are intended to resolve acoustical problems only, therefore all other properties such as aesthetics, air flows, chemical, corrosion, combustion, construction details, decomposition, expansion, fire rating, fumes, grout or tile cracking, loading, shrinkage, smoke, ventilation etc. are outside Ray Walsh Acoustics Noise & Sound's and Harwood Acoustic's fields of expertise and **must** be checked with the supplier or suitably qualified specialist before purchase.*

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Noise Survey Instrumentation	Appendix A
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The instrumentation used during the noise surveys consisted of the following: -

Description	Model No.	Serial No.
Brüel & Kjaer Sound Level Meter	2250	3009198
Brüel & Kjaer Calibrator	4231	2053044
ARL Ngara Noise Logger	Ngara V2	878150
Im4 Noise Logger	104	104
Rion Acoustic Calibrator	NC-73	11245019
Instantel Vibration Monitor	Minimate Plus	BE16439
Triaxial Geophone	714A9701	BG19291
Svantek Sound Level Meter	971	39170
Bruel & Kjaer Sound Level Meter	2260	244 3406
Svantek Acoustical Calibrator	SV 31	39580
Texel Vibration Monitor		4321
Texel Vibration Monitor		4343

The Svantek sound level meter conforms to Australian Standards AS IEC 61672.1-2004: 'Electroacoustics - Sound level meters – Specifications' and AS 1259 as Class 1 precision sound level meters.

The Brüel & Kjaer 2250 sound level meter conforms to Australian Standard AS IEC 61672.1-2004: 'Electroacoustics - Sound level meters – Specifications' as Class 1 precision sound level meters.

The ARL Ngara logger conforms to Australian Standard AS1259.1:1990, and AS1259.2:1990 "Acoustics - Sound Level Meters", as a Type 1 sound level meter. The Ngara logger also conforms to IEC 61672.3:2006 Standard as a Class 1 sound level meter and has an accuracy suitable for field and laboratory use.

The Texel Vibration monitors were provided by Hamilton Blasting complete with calibration certificates.

The Im4 noise logger conforms to Australian Standard AS1259.1:1990, and AS1259.2:1990 "Acoustics - Sound Level Meters", as a Type 2 sound level meter.

The calibration of the sound level meters and loggers was checked before and after the measurement periods. No significant system drift occurred over the measurement periods.

The sound level meters, loggers and calibrators have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates as required by the regulations.



Blast Details

CLIENTS COPY

17/05/2017

Client Name	AP Delany & Co		
Site	Rockwood Quarry		
Location on Site	Production Pit		
Shot Number	AP DELANY 001 /17		
ShotFirer	David Hamilton		
Burden [m]	2.30	Bench Height [m]	10.90
Spacing [m]	2.50	Exp Total Drill [m]	2748.90
Hole Depth [m]	11.90	Sub-Drill	1.00
Stemming [m]	2.00	Hole Diameter [mm]	89.00
Hole Angle	10.00	Rock Density	2.60
Number of Holes	231	Total Tonnage	41096.06
Number of Face Holes	41	Total BCM	15806.18
Powder Factor	1.09	MIC	
Expected Explosives [kg]	17151.75	Boretrak Date	TBA, ,
Profile Date	22.3.2017, ,	Blast Date	



Modifying Factor Corrections (EPA INP 2000)	Appendix C
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Modifying factor corrections from Section 4.3 of the NSW Industrial Noise Policy 2000.

Table C1 Modifying Factor Corrections (from Table 4.1 of the NSW INP)

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (above 400 Hz)	+ 5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted Level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+ 5 dB	C-weighted is designed to be more responsive to low frequency noise
Impulsive Noise	Time weighting fast and impulse	If the difference in the A weighted maximum levels between 'fast' and 'impulse' are greater than 2 dB	Apply the difference in measured levels as the correction up to a maximum of 5 dB	Impulse time weighting is characterised by a short rise time (35msec) compared to 125msec for 'fast'.
Intermittent Noise	Subjectively Assessed	Level varies by more than 5 dB	+ 5 dB	Adjustment to be applied for night time only
Duration	Single-event noise duration may range from 1.5 m to 2.5 h	One event in any 24-hour period	0 to -20dBA	The acceptable noise level may be increased by an adjustment depending on duration of noise (see Table 4.2)
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10 dBA ² (excluding duration correction)	

Notes

1. Corrections to be added to the measured or predicted levels
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.

D.1 NSW EPA'S NOISE POLICY FOR INDUSTRY 2017

D.1.1 Introduction

The NSW Environment Protection Authority (EPA) published the NSW Noise Policy for Industry in October 2017 (the Policy). This Policy has now replaced the Industrial Noise Policy (INP) 2000.

This policy sets out the NSW Environment Protection Authority's (EPA's) requirements for the assessment and management of noise from industry in NSW. It aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

The Noise Policy for Industry is designed to assist industry and authorities to ensure that potential noise impacts associated with industrial projects are managed effectively.

The purpose of the policy is to ensure noise impacts associated with particular industrial developments are evaluated and managed in a consistent and transparent manner. It provides noise levels for assessing the potential impact of noise from industry and includes a framework for considering feasible and reasonable noise mitigation measures.

The objectives of the policy are to:

- provide the noise levels that are used to assess both change in noise level and long-term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified;
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, taking into account the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy is designed for large industrial and agricultural sources and specifies substantial monitoring and assessment procedures that may not always be applicable to the types of sources councils need to address.

However, local government may find the policy helpful in assessing noise from premises it regulates and in the carrying-out of its land-use planning responsibilities.

D.1.2 Project Noise Trigger Level

Section 2 of the Noise Policy for Industry 2017 sets out the procedure to determine the **project noise trigger levels** relevant to a particular industrial development.

The project noise trigger level provides a benchmark or objective for assessing a proposal or site. It is not intended for use as a mandatory requirement.

The project noise trigger level is a level that, if exceeded, would indicate a potential noise impact on the community, and so ‘trigger’ a management response; for example, further investigation of mitigation measures.

The project noise trigger level, feasible and reasonable mitigation, and consideration of residual noise impacts are used together to assess noise impact and manage the noise from a proposal or site. It is the combination of these elements that is designed to ensure that acceptable noise outcomes are determined by decision makers.

The **project noise trigger level** is the lower (that is, the more stringent) value of the project **intrusiveness noise level** and project **amenity noise level**.

D.1.3 Project Intrusiveness Noise Level

The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the **L_{Aeq} descriptor**), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment.

The intrusiveness noise level is determined as follows:

$$L_{Aeq, 15 \text{ minute}} = \text{rating background noise level (RBL)} + 5 \text{ dB}$$

Where:

<i>L_{Aeq, 15 minute}</i>	<i>Represents the equivalent continuous energy average A-weighted sound pressure level of the source over 15 minutes.</i>
-----------------------------------	---

And:

<i>Rating background assessment noise level</i>	<i>Represents the background level to be used for purposes, as determined by the method outlined in Fact Sheets A and B.</i>
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Intrusiveness noise levels are not used directly as regulatory limits. They are used in combination with the amenity noise level to assess the potential impact of noise, assess reasonable and feasible mitigation options and subsequently determine achievable noise requirements.

Minimum assumed RBLs are applied in the Policy and these result in minimum intrusiveness noise levels. These are shown in Table 2.1 in the Policy and are replicated in Table D1 below.

Table D1 Minimum assumed RBLs and project intrusiveness noise levels
(Derived from EPA Table 2.1)

Time of Day	Minimum Assumed Rating Background Level dBA	Minimum Project Intrusive Noise Level (Leq, 15 minute, dBA)
Day (7 am to 6 pm)	35	40
Evening (6 pm to 10 pm)	30	35
Night (10 pm to 7 am)	30	35

D.1.4 Amenity Noise Levels and Project Amenity Noise Levels

To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise levels within an area from **all** industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. (EPA Table 2.2 is replicated in Table D2 below).

The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance.

The recommended amenity noise levels represent the objective for **total** industrial noise at a receiver location, whereas the **project amenity noise level** represents the objective for noise from a **single** industrial development at a receiver location.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a **project amenity noise level** applies for each new source of industrial noise as follows:

Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB

Amenity noise levels are not used directly as regulatory limits. They are used in combination with the project intrusiveness noise level to assess the potential impact of noise, assess reasonable and feasible mitigation options, and subsequently determine achievable noise requirements.

Table D2 **Amenity Noise Levels (EPA Table 2.2)**

Receiver	Noise Amenity Area	Time of Day	L _{Aeq} , dBA
(see Table 2.3 to determine which residential receiver category applies)			Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks *	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom – internal	All	Noisiest 1-hour period when in use	35 (see notes for table)
Hospital ward internal external	All	Noisiest 1-hour	35
		Noisiest 1-hour	50
Place of worship – internal	All	When in use	40
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50
Active recreation area (e.g. school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	All	Add 5 dB(A) to recommended noise amenity area

Notes: The recommended amenity noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as follows:

- rural residential
- suburban residential
- urban residential
- industrial interface – an area that is in close proximity to existing industrial premises and that extends out to a point where the existing industrial noise from the source has fallen by 5 dB or an area defined in a planning instrument. Beyond this region the amenity noise level for the applicable category applies. This category may be used only for existing situations.

- commercial – commercial activities being undertaken in a planning zone that allows commercial land uses
- industrial – an area defined as an industrial zone on a local environment plan; for isolated residences within an industrial zone the industrial amenity level would usually apply.

Time of day is defined as follows:

- day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
- evening – the period from 6 pm to 10 pm
- night – the remaining periods.

D.1.5 Assessment Locations

For a **residence**, the project noise trigger levels are to be assessed at the reasonably most-affected point on or within the residential property boundary or, if that is more than 30 metres from the residence, at the reasonably most-affected point within 30 metres of the residence, but not closer than 3 metres to a reflective surface and at a height of between 1.2–1.5 metres above ground level. This should not be read to infer that the project noise trigger level (or a limit in a statutory document) applies only at the reasonably most-affected location.

Table E1 Modifying Factor Corrections (from Table C.1 of the NSW Noise Policy for Industry 2017)

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (<i>ISO1996-2:2007 – Annex D</i>).	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	Third octave measurements should be undertaken using unweighted or Z-weighted measurements. Note: Narrow-band analysis using the reference method in <i>ISO1996-2:2007, Annex C</i> 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	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.

Table E1 Modifying Factor Corrections (from Table C.1 of the NSW Noise Policy for Industry 2017) *Cont...*

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Intermittent Noise	Subjectively Assessed but should be assisted with measurement to gauge the extent of change in noise level.	The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible.	5 dB	Adjustment to be applied for night-time only .
Duration	Single-event noise duration may range from 1.5 m to 2.5 h	One event in any 24-hour period	0 to -20dBA	The acceptable noise trigger level may be increased by an adjustment depending on duration of noise (see Table C.3)
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10 dBA ² (excluding duration correction)	

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.