

17 April 2018

10-1477R0

Hanson Construction Materials Pty Ltd
Level 5, 75 George Street
Parramatta NSW 2150

Attention: Ms Belinda Pignone

Dear Belinda

**Annual Noise Compliance Monitoring 2018
Central Coast Sands Quarry
Lot 2 Reservoir Road, Somersby**

1 Introduction

VMS Australia Pty Ltd has been appointed by Hanson Construction Materials Pty Ltd to conduct the annual noise compliance monitoring for the Central Coast Sands Quarry located at Lot 2 Reservoir Road, Somersby (the Project), in order to assess noise emission levels from the quarry's operation. This report presents the findings of the morning shoulder period and daytime measurements conducted at the nearest residential receivers during site activities on 5 April 2018

2 Assessment Criteria

The Project was granted Project Approval (MP 08_0173) on 1 August 2014 by the Minister for Planning.

Operational noise criteria for the Project are nominated in Schedule 3, Condition 10 of MP 08_0173 and are replicated in **Table 1**.

Table 1 Project Operational Noise Criteria

Location	Day	Evening	Morning Shoulder	
	LAeq(15minute)	LAeq(15minute)	LAeq(15minute)	LA1(1minute)
B	37	35	37	47
C	37		38	
D	38		40	
G	38		38	
R	36		38	
All other privately-owned land	35		35	

Excerpt from Project Approval 1 August 2014

3 Equipment List

The below list details the equipment that was in operation for the duration of the monitoring period at all five monitoring locations.

Quarry Operations Without Ripper

- Komatsu PC450-8 (Excavator)
- Volvo A40G (Dump Truck)
- Komatsu WA500-6 (Front End Loader)
- WA480-5H (Front End Loader)
- CAT 735C (Water Cart)

4 Noise Monitoring Locations

Noise monitoring was conducted at the nearest residential receivers at locations at B, C, D, G and R during the morning shoulder and day-time periods.

Figure 1 presents the monitoring locations.

Figure 1 Noise Monitoring Locations

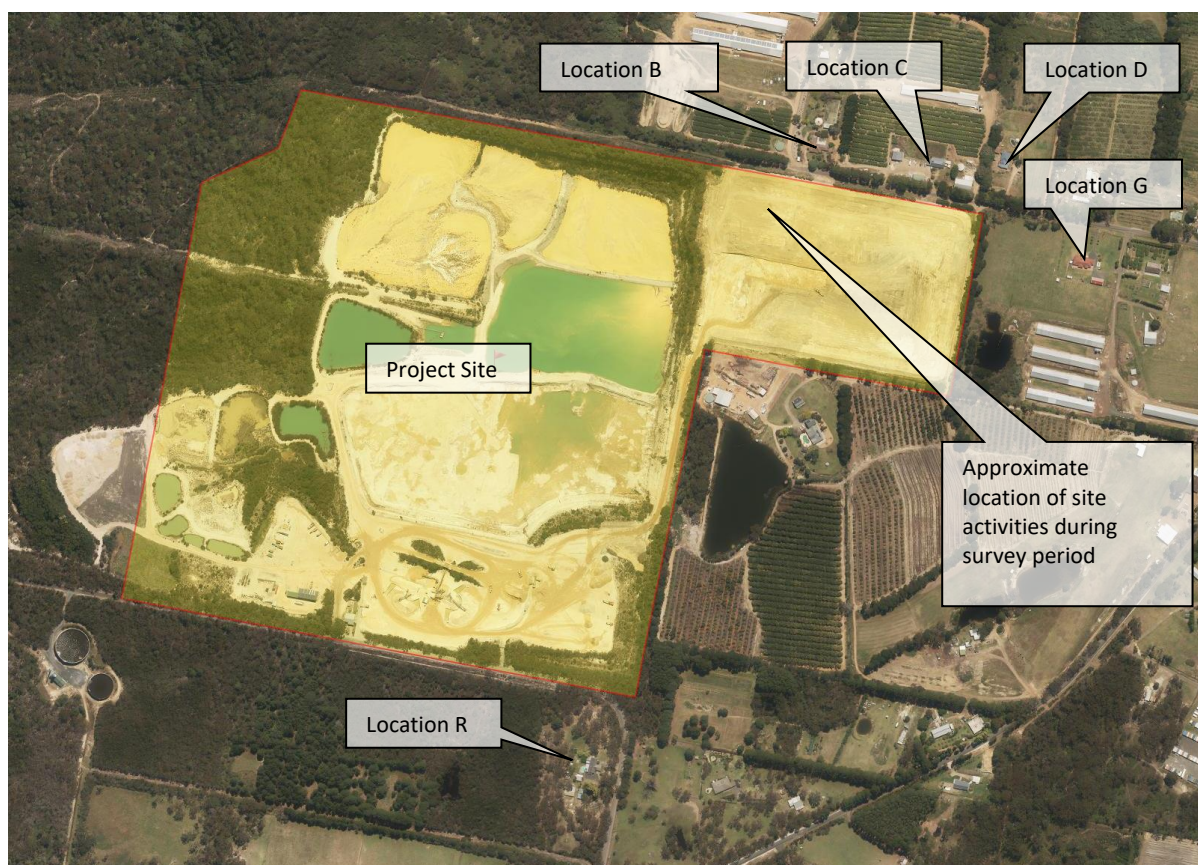


Image courtesy of Six Maps

4.1 Instrumentation and Measurement Procedure

Noise monitoring was conducted in accordance with the procedures specified in the *Central Coast Sands Quarry Project Noise Management Plan* dated 3 January 2018.

The acoustic instrumentation employed during the monitoring programme complied with the requirements of AS 1259.1-1990 “Acoustics - Sound Level Meter - Non-Integrating” and IEC 61672.1-2004 “Electroacoustics - Sound Level Meters - Specifications” and carried current NATA or manufacturer calibration certificates. The schedule of noise monitoring equipment deployed during the programme is presented in **Table 2**.

Table 2 Noise Monitoring Equipment

Instrumentation	Type	Serial Number
B&K 2250 SLM	Type 1	3008618
B&K 2250 SLM	Type 1	2575724
B&K 4231 Acoustic Calibrator	Type 1	2574227

In order to determine compliance with the noise limits nominated in **Table 1**, operator-attended 15-minute noise surveys were conducted on Thursday 5 April 2018 at the nominated residential receivers.

The measurements were conducted in accordance with Australian Standard AS 1055-1997 "Acoustics - Description and measurement of environmental noise".

A level calibration check was undertaken using an acoustic calibrator which emitted a 94 dBA calibration tone at 1 KHz. The calibration check was conducted prior and after the survey with no shift noted during the calibration process.

5 Operational Noise Compliance Monitoring Results

The measured noise emission levels from quarry operations are presented in **Table 3** and **Table 4**, during the morning shoulder period and daytime period respectively.

Table 3 Operational Noise Compliance Monitoring Results - Morning Shoulder Period

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)		Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq (15minute)	Estimated Project LA1 (1minute)	Assessment
		LAeq	LA1				
B – 126A Keighley Avenue	5/4/18 6.45am Wind: Calm Temp:20 °C	52	80	Birds:54-68 Insects:15-38 Local Mech plant:35	30	41	Complies
C – 110 Keighley Avenue	5/4/18 6.43am Wind: Calm Temp:20 °C	40	67	Birds:40-48 Dog:45-57 Insects:32-55 Excavator:35-45	31	41	Complies
D – 100 Keighley Avenue	5/4/18 6.28am Wind: Calm Temp:20 °C	52	48	Birds:54-68 Insects:30-38 Excavator:40-48 Passing vehicle:80 Dog:46-52	30	41	Complies
G – 81 Keighley Avenue	5/4/18 6.25am Wind: Calm Temp:20 °C	52	80	Insects:24-38 Birds:41-48 Dog Bark:58 Site Operation:35 Passing vehicle:80	30	45	Complies
R – 21 Reservoir Road	5/4/18 6.02am Wind: Calm Temp:20 °C	54	77	Passing Trucks:73 Birds:58 Site: 38-42 Truck entering site: 49	34	45	Complies

Table 4 Operational Noise Compliance Monitoring Results - Daytime Period

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels L _{Amax} (dB)	Estimated Project LAeq (15minute)	Assessment
		LAeq(15minute)			
B – 126A Keighley Avenue	5/4/18 7.07am Wind: Calm Temp:20 °C	53	Birds: 45-69 Insects: 24-37 Local Mech Plant: 35-47 Site Operation: 41-47	41	4dB above criterion
C – 110 Keighley Avenue	5/4/18 7.01am Wind: Calm Temp:20 °C	52	Garbage Truck: 80 Birds: 42-51 Airplane: 42-49 Site Operations: 33-41	30	Complies
D – 100 Keighley Avenue	5/4/18 7.23am Wind: Calm Temp:20 °C	43	Vehicle Passby: 60 Birds: 31-46 Airplane: 39-40 Insects: 26-37 Site Operations: 26-41	30	Complies
G – 81 Keighley Avenue	5/4/18 7.20am Wind: Calm Temp:20 °C	43	Birds: 40-59 Airplane: 42-48 Insects: 38-55 Site Operations:31-35	30	Complies
R – 21 Reservoir Road	5/4/18 7.58am Wind: Calm Temp:20 °C	45	Birds: 42-58 Local pump: 42-45 Lawn Mower: 41-46 Site Operations: 43	33	Complies

6 Assessment and Findings

Noise monitoring conducted during the morning shoulder period for the Central Coast Sands Quarry operations on Thursday 5 April 2018 found that the noise emissions from the Project site complied with both the LAeq(15minute) and LA1(1minute) Noise Criteria nominated in Schedule 3, Condition 10 of the Project Approval at the nearest residences as described within **Table 1**.

Noise monitoring conducted during the daytime period, found that the noise emissions from the Project site complied with the LAeq(15minute) Noise Criteria at the nearest residences as described within **Table 1** with the exception of one resident at 126A Keighley Avenue (Location B).

During daytime measurement at Location B, it was noted that the excavator within the extension area was found to be producing excessive noise during its operation. The high L_{Aeq} noise emission was controlled by the excavator exhaust and fan noise was mainly due to the high elevation of the excavator which negated the effectiveness of the acoustic bunding shielding the residences. Intermittent noise was from the bucket and or ripper slackness was also audible but did not contribute greatly to the L_{Aeq} noise emissions. Accordingly, it is recommended that a dozer is used to rip and push rock in a supporting role to the excavator to allow the excavator to operate at a lower RL. This will shift the acoustic centre of noise sources (both excavator and dozer) to an elevation which is at least 3m lower than the current source height (excavator only) and would result in an approximate 5dBA reduction in the noise level received at Location B, bringing the Project back into compliance with the noise criteria.

Noise contributions from the quarry were found to be barely perceptible at residential locations located further away from the quarry mainly Location D and G. It was also noted during measurements that the controlling background noise sources were from birds, insects and surrounding wildlife.

Yours sincerely



Zul Khasmuri
Technical Director - Acoustics & Vibration

Terminology Relating to Noise and Vibration

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Power	Sound Power is the rate at which sound energy is emitted, reflected, transmitted, or received, per unit time. Unlike sound pressure, sound power is neither room-dependent nor distance-dependent.
Sound Pressure Level (SPL)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa (20x10 ⁻⁶ Pascals) on a decibel scale.
Sound Power Level (SWL)	The Sound Power Level is the sound power relative to a standard reference pressure of 1pW (20x10 ⁻¹² Watts) on a decibel scale. The SWL of a simple point source may be used to calculate the SPL at a given distance (r) using the following formula: $SPL = SWL - 10 \times \text{Log}_{10}(4 \times \pi \times r^2)$ Note that the above formula is only valid for sound propagation in the free-field (see below).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log ₁₀ (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting, dBA	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
Leq,T	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
Lmax,T	A noise level index defined as the maximum noise level during the period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L90,T	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L10,T	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit.
DnT,w	The single number quantity that characterises airborne sound insulation between rooms over a range of frequencies.
Rw	Single number quantity that characterises the airborne sound insulating properties of a material or building element over a range of frequencies.
Reverberation	The persistence of sound in a space after a sound source has been stopped.
PPV	The particles of a medium are displaced from their random motion in the presence of a vibration wave. The greatest instantaneous velocity of a particle during this displacement is called the Peak Particle Velocity (PPV) and is typically measured in the units of mm/s.
Hertz, Hz	The unit of Frequency (or Pitch) of a sound or vibration. One hertz equals one cycle per second. 1 kHz = 1000 Hz, 2 kHz = 2000 Hz, etc.
Acceleration	Acceleration is defined as the rate of change of Velocity of a particle over a period of time and is typically measured in the units of m/sec ² .
Vibration Dose, VDV	When assessing intermittent vibration, it is necessary to use the vibration dose value (VDV), a cumulative measurement of the vibration level received over an 8-hour or 16-hour period. The VDV formulae uses the RMS Acceleration raised to the fourth power and is known as the Root-mean-quad method. This technique ensures the VDV is more sensitive to the peaks in the acceleration levels. VDV's are typically measured in the units of m/s ^{1.75} .