19 December 2018

10-1615R0

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

**Attention:** **Ms Belinda Pignone**

Dear Belinda

**Q4 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 Wednesday 19 December 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 reproduced in **Table 1**.

### Table 1 Project Operational Noise Criteria[1]

| 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 | |

Note 1: 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 three monitoring locations.

Pit Operations:

- Komatsu PC450-8 (Excavator, Ex)
- Volvo A40G (Dump Truck, DT)

Sales Yard:

- Komatsu WA500-6 (Front End Loader, FEL)
- WA480-5H (Front End Loader, FEL)

Processing Plant (PP):

- No plant in operation during time of measurement

The approximate location of the above plant and equipment during this monitoring period is shown on **Figure 1**.

# 4 Noise Monitoring Locations

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

**Figure 1** presents the monitoring locations.

## Figure 1 Noise Monitoring and Operating Plant Locations

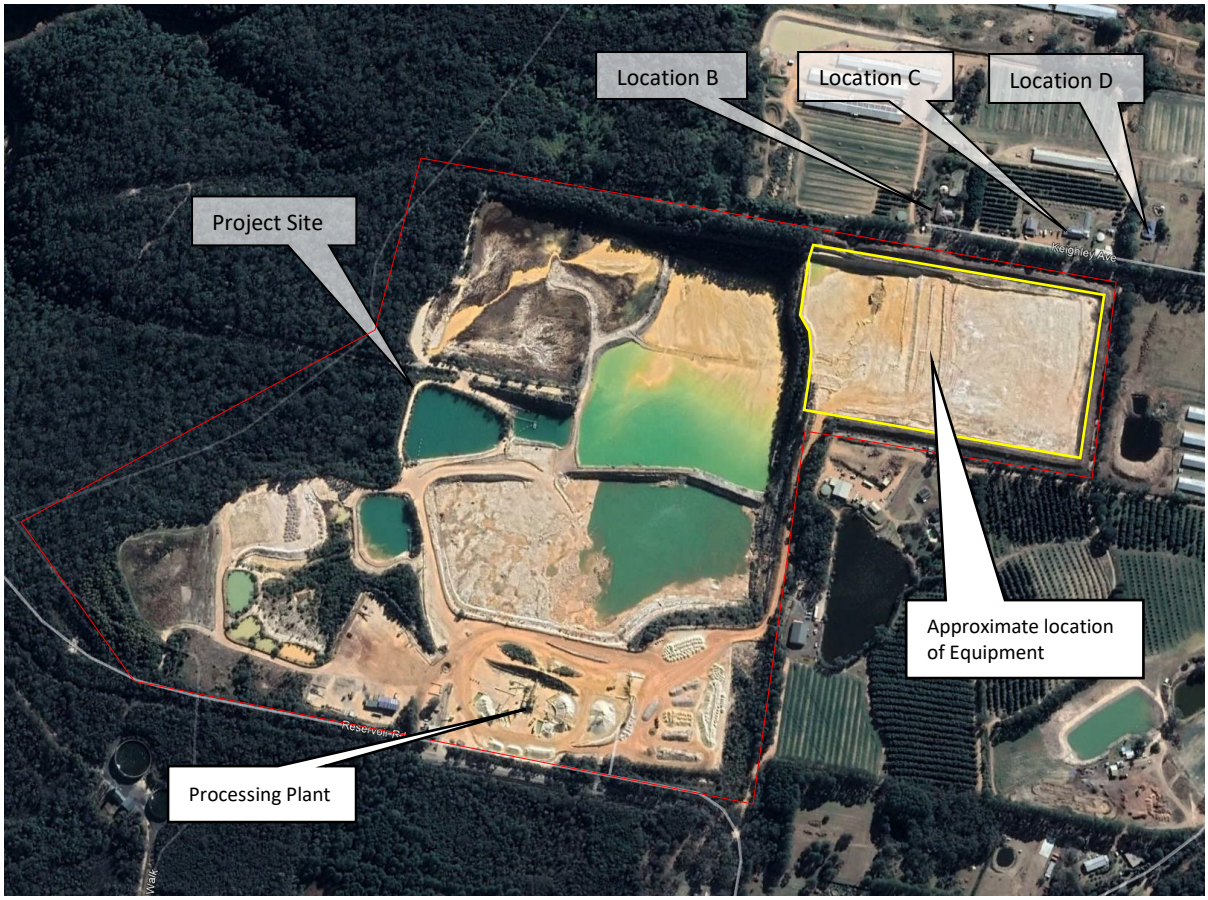


Image courtesy of Google Maps

### 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 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 Wednesday 19 December 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 | Ambient Noise Level | | Description of Noise Emission, Typical Maximum Levels $L_{Amax}$ | Estimated Project $L_{Aeq}$ (15minute) | Estimated Project $L_{A1}$ (1minute) | Assessment |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq}$ | $L_{A1}$ | | | | |
| D – 100 Keighley Avenue | 19/12/18<br>6.03am<br>Wind: Calm<br>Temp: 18 °C | 41 | 53 | Birds:40-54<br>Car Passby:60<br>Distant trucks:40 | 30 | 40 | Complies |
| C – 110 Keighley Avenue | 19/12/18<br>6.28am<br>Wind: Calm<br>Temp: 18 °C | 41 | 50 | Birds:44-54<br>Horn:57<br>Insects:48-52<br>Excavator:38-39<br>Reverse Siren: 39-41 | 33 | 41 | Complies |
| B – 126A Keighley Avenue | 19/12/18<br>6.45am<br>Wind: Calm<br>Temp: 18 °C | 37 | 47 | Birds:44-57<br>Excavator:39-42<br>Local Mech plant:35-36<br>Reverse Siren: 37 | 30 | 41 | Complies |

## Table 4 Operational Noise Compliance Monitoring Results - Daytime Period

| Location | Date/Start Time/Weather | Ambient Noise Level | Description of Noise Emission, Typical Maximum Levels $L_{Amax}$ | Estimated Project $L_{Aeq}$ (15minute) | Assessment |
|---|---|---|---|---|---|
| | | $L_{Aeq}$(15minute) | | | |
| D – 100 Keighley Avenue | 19/12/18<br>7.45am<br>Wind: 0.5m/s<br>Temp:4 °C | 41 | Vehicle Passby: 62<br>Birds: 47-50<br>Distant Traffic: 40-42<br>Excavator: 39-41 | 32 | Complies |
| C – 110 Keighley Avenue | 19/12/18<br>7.20am<br>Wind: 0.5m/s<br>Temp:4 °C | 47 | Birds: 44-62<br>Car Passby: 59-61<br>Excavator: 50-53<br>Plane:52 | 37 | Complies |

| Location | Date/Start Time/Weather | Ambient Noise Level $L_{Aeq(15minute)}$ | Description of Noise Emission, Typical Maximum Levels $L_{Amax}$ | Estimated Project $L_{Aeq}$ (15minute) | Assessment |
|---|---|---|---|---|---|
| B – 126A Keighley Avenue | 19/12/18 7.00am Wind: Calm Temp:18 °C | 44 | Birds: 42-65 Reverse Siren: 43-45 Excavator: 44-54 Aircraft: 42-44 | 35 | Complies |

# 6 Assessment and Findings

Noise monitoring conducted during the morning shoulder period for the Central Coast Sands Quarry operations on Wednesday 19 December 2018 found that the noise emissions from the Project site complied with both the $L_{Aeq(15minute)}$ and $L_{A1(1minute)}$ Noise Criteria nominated in Schedule 3, Condition 10 of the Project Approval at the nearest residences as described in **Table 1**.

Noise monitoring conducted during the daytime period, found that the noise emissions from the Project site complied with the $L_{Aeq(15minute)}$ Noise Criteria at the nearest residences as described in **Table 1**.

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:<br>$SPL = SWL - 10 \times Log_{10}(4 \times \pi \times r^2)$<br>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 log10 (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.<br>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. VDVs are typically measured in the units of $m/s^{1.75}$. |