

12 October 2022

10-1805 Annual (Q3) 20221011.docx

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

**Attention: Ms Belinda Pignone**

Dear Belinda

**Annual Noise Compliance Monitoring 2022  
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 between Tuesday 4 October and Thursday 6 October 2022.

## 2 Hours of Operations

The Project operating hours have been limited in the Project Approval (MP 08\_0173) and shown in **Table 1**.

**Table 1 Hours of Operation**

Activity	Operating Hours
Transportation of quarry products from the site	6:00am to 4:00pm, Monday to Friday, and 6:00am to 2:00pm, Saturday. No transportation of quarry product from the site on Sundays or Public Holidays.
Other Quarrying Operations	6:00am to 6:00pm, Monday to Friday, and 6:00am to 4:00pm, Saturday. No quarrying operations on Sundays or Public Holidays.

Activity	Operating Hours
Construction Activities	7.00 am to 4.00 pm, Monday to Friday; and 7.00 a m to 12.00 pm, Saturday, Unless noise from these activities does not exceed 38dB(A) LAeq(15min) at any privately-owned residence
Maintenance Activities	24 hours a day, 7 days per week, providing maintenance activities are inaudible at any privately-owned residence

Source: Project Approval (MP 08\_0173) dated 2014.

### 3 Quarry Activity

With an annual extraction limit of 310,000 tonnes per annum, the quarry operates primarily as sand extraction that processed on-site and transported off-site to regional and local customers by road. The quarry comprises of fixed plant sand washing and processing, office and amenities.

A summary of the quarry activities and equipment list during the monitoring periods are presented in **Table 2**.

**Table 2 Quarry Activities – 4 October to 6 October 2022**

Activity	Tuesday 4 October 2022	Wednesday 5 October 2022	Thursday 10 October 2022
	Morning Shoulder (06:00 - 07:00) and Day (06:00 - 18:00)	Morning Shoulder (06:00 - 07:00) and Day (06:00 - 18:00)	Morning Shoulder (06:00 - 07:00) and Day (06:00 - 18:00)
Pit Operations	No pit operation during time of measurement.	Dump Truck (HM400) Front End Loader (Komatsu WA500-6) 2:00pm-6:00pm	Dump Truck (HM400) Front End Loader (Komatsu WA500-6)
Stock Yard	Front End Loader (VolvoL180H) Front End Loader (Komatsu WA500-6)	Front End Loader (VolvoL180H) Front End Loader (Komatsu WA500-6) 10.00am-2.00pm	Front End Loader (Komatsu WA500-6) 6:00am till 7:00am Front End Loader (VolvoL180H)
Processing Plant	Plant in operation during time of measurement. Feeding plant from surge pile with FEL	Plant shutdown for maintenance (6:00am – 10.00am) Plant running as normal from 10.00am till 6.00pm	Plant in operation during time of measurement.

### 4 Noise Criteria

The Project Approval (MP 08\_0173) was granted 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 3**.

**Table 3 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	

Note 1: Excerpt from Project Approval dated 1 August 2014.

## 5 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 period (6.00am to 7.00am) and daytime periods (7.00 am to 6.00 pm). Day-time attended measurements were conducted for 1.5 hours at each location as per Condition M7 of the Environmental Protection Licence (EPL 3751) dated 11 November 2016. The noise monitoring locations are presented in **Figure 1**.

**Figure 1 Noise Monitoring Locations**

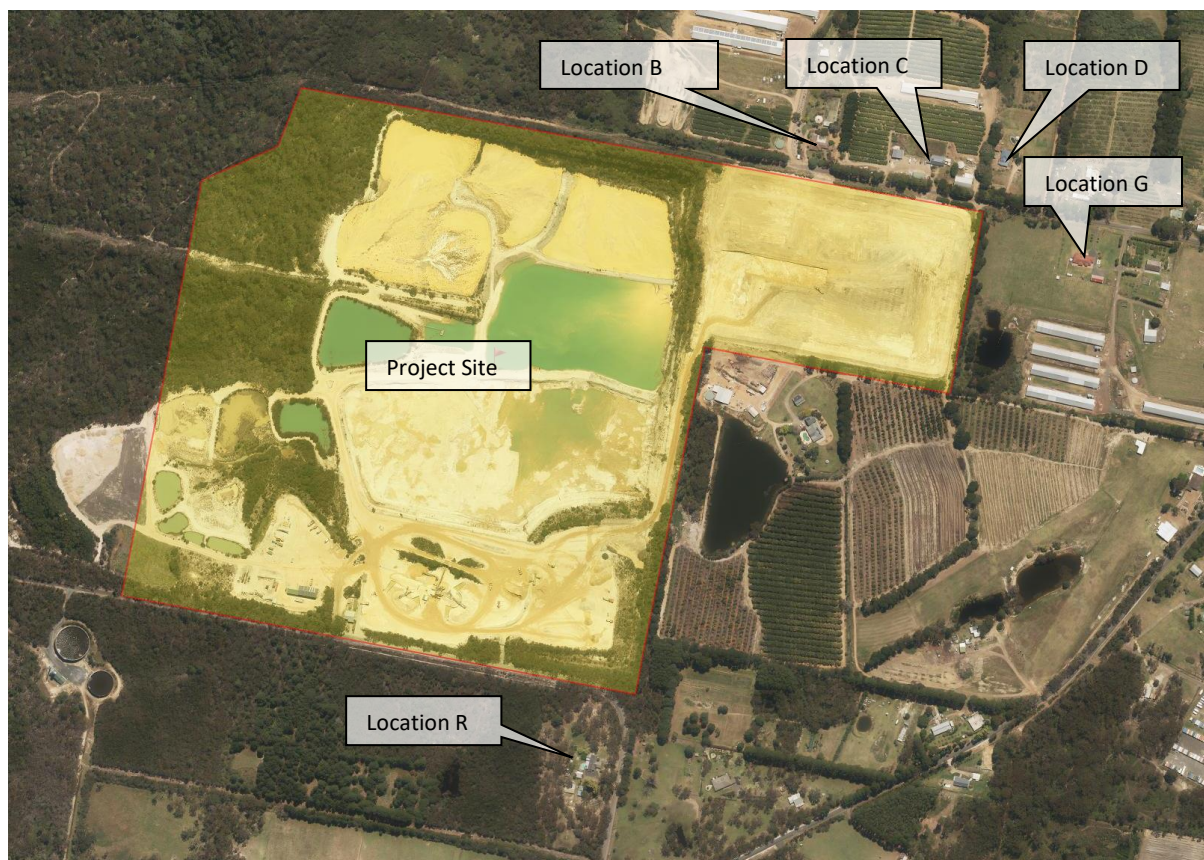


Image courtesy of Six Maps

## 5.1 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 61672.1-2019 "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 4**.

**Table 4 Noise Monitoring Equipment**

Instrumentation	Type	Serial Number
B&K 2250 SLM	Type 1	3024564
B&K 2250 SLM	Type 1	3023945
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 between Tuesday 4 October and Thursday 6 October 2022 at the nominated residential receivers.

The measurements were conducted in accordance with Australian Standard AS 1055-2018 "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.

## 6 Operational Noise Compliance Monitoring Results

The measured noise emission levels from quarry operations are presented in **Table 5** to **Table 10**, during the morning shoulder period and daytime periods.

**Table 5 Operational Noise Compliance Monitoring Results - Morning Shoulder Period  
4 October 2022**

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)		Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Estimated Project LA1(1min)	Assessment
		LAeq(15min)	LA1(1min)				
B – 126A Keighley Avenue	04/10/2022 6:01 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 4 okta	45	53	Birds: 44-60 Rooster: 36-41 Truck at residence (engine): 36-39 Road traffic: 42-54  <b>Quarry not discernible</b>	<29	<43	Complies



Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)		Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Estimated Project LA1(1min)	Assessment
		LAeq(15min)	LA1(1min)				
C – 110 Keighley Avenue	04/10/2022 6:44 am Wind: Calm Temp: 15 °C Humidity: 96% Cloud: 4 okta	42	55	Bird: 41-63; Dog barking: 37-39 Rooster: 30-31 Road traffic: 32-39  <b>Front-end-loader (quacker): 29-30</b>	<30	<45	Complies
D – 100 Keighley Avenue	04/10/2022 6:45 am Wind: Calm Temp: 15 °C Humidity: 96% Cloud: 4 okta	39	45	Bird: 40-60 Dogs Barking: 37-38 Road traffic: 36-38 Car: 44  <b>Front-end-loader: 28-30</b>	< 26	<35	Complies
G – 87 Keighley Avenue	04/10/2022 6:24 am Wind: Calm Temp: 15 °C Humidity: 96% Cloud: 4 okta	39	45	Bird: 40-53 Rooster: 33 Road traffic: 35-37  <b>Front-end-loader (quacker): 30-31</b>	< 27	<35	Complies
R – 21 Reservoir Road	04/10/2022 6:25 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 4 okta	46	51	Birds: 46-55; Car door (from residence): 44-45; Car engine (from residence): 48-51; Road traffic: 42-48;  <b>Front-end-loader (quacker): 47-48; Sand pump: 33-34</b>	37	47	Complies

**Table 6 Operational Noise Compliance Monitoring Results - Morning Shoulder Period 5 October 2022**

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)		Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Estimated Project LA1(1min)	Assessment
		LAeq(15min)	LA1(1min)				
B – 126A Keighley Avenue	05/10/2022 6:39 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	46	56	Bird: 42-69 Road traffic: 38-41  <b>Quarry not discernible</b>	<30	<46	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)		Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Estimated Project LA1(1min)	Assessment
		LAeq(15min)	LA1(1min)				
C – 110 Keighley Avenue	05/10/2022 6:23 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	45	67	Bird: 42-61 Road traffic: 37-48  <b>Quarry not discernible</b>	<30	<47	Complies
D – 100 Keighley Avenue	05/10/2022 6:40 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	43	48	Bird: 40-54 Road traffic: 38-40 Domestic activities: 38-40  <b>Quarry not discernible</b>	<31	<38	Complies
G – 87 Keighley Avenue	05/10/2022 6:22 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	44	50	Bird: 40-55 Road traffic: 38-40 Truck at residence (idle): 42-44 Truck at residence (door): 51  <b>Quarry not discernible</b>	<31	<40	Complies
R – 21 Reservoir Road	05/10/2022 6:01 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	49	59	Bird: 40-64 Road traffic: 38-40 Car passby: 70  <b>Quarry not discernible</b>	<30	<44	Complies

**Table 7 Operational Noise Compliance Monitoring Results - Morning Shoulder Period  
6 October 2022**

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)		Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Estimated Project LA1(1min)	Assessment
		LAeq(15min)	LA1(1min)				
B – 126A Keighley Avenue	06/10/2022 6:28 am Wind: 0-1 m/s (E) Temp: 13 °C Humidity: 98% Cloud: 8 okta	42	51	Birds: 44-58; Dog barking: 37-38; Wind in trees: 42-43 Road traffic: 36-39  <b>Quarry not discernible</b>	<30	<46	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)		Description of Noise Emission, Typical Maximum Levels L <sub>Amax</sub> (dB)	Estimated Project L <sub>Aeq</sub> (15min)	Estimated Project L <sub>A1</sub> (1min)	Assessment
		L <sub>Aeq</sub> (15min)	L <sub>A1</sub> (1min)				
C – 110 Keighley Avenue	06/10/2022 6:44 am Wind: 0-1 m/s (E) Temp: 13 °C Humidity: 98% Cloud: 8 okta	43	53	Birds: 41-58; Plane: 41-43; Wind in trees: 41-44 Road traffic: 36-39  <b>Quarry not discernible</b>	<30	<43	Complies
D – 100 Keighley Avenue	06/10/2022 6:45 am Wind: 0-1 m/s (E) Temp: 13 °C Humidity: 98% Cloud: 8 okta	42	48	Bird: 40-56 Plane: 47 Wind in trees: 38-42 Road traffic: 37-39  <b>Quarry not discernible</b>	<29	<38	Complies
G – 87 Keighley Avenue	06/10/2022 6:29 am Wind: 0-1 m/s (E) Temp: 13 °C Humidity: 98% Cloud: 8 okta	40	45	Bird: 40-56 Wind in trees: 40-45 Road traffic: 37-39  <b>Quarry not discernible</b>	<28	<35	Complies
R – 21 Reservoir Road	06/10/2022 6:02 am Wind: 0-1 m/s (E) Temp: 13 °C Humidity: 98% Cloud: 8 okta	46	57	Bird: 40-62 Wind in trees: 37-40 Road traffic: 36-38  <b>Front-end-loader: 35-37</b> <b>Front-end-loader (quacker): 36-47</b>	37	46	Complies

**Table 8 Operational Noise Compliance Monitoring Results - Daytime Period  
4 October 2022**

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Assessment
		LAeq(15min)			
B – 126A Keighley Avenue	04/10/2022 7:00 am Wind: Calm Temp: 16 °C Humidity: 95% Cloud: 3 okta	47	Birds: 42-70 Plane: 41-47 Road traffic: 32-38  Quarry not discernible	<30	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels L <sub>A</sub> max (dB)	Estimated Project L <sub>A</sub> eq(15min)	Assessment
		L <sub>A</sub> eq(15min)			
	04/10/2022 7:15 am Wind: Calm Temp: 16 °C Humidity: 95% Cloud: 3 okta	51	Bird: 48-69 Plane: 41-44 Road traffic: 33-39  <b>Quarry not discernible</b>	<30	Complies
	04/10/2022 7:30 am Wind: Calm Temp: 17 °C Humidity: 93% Cloud: 2 okta	48	Bird: 41-67 Plane: 36-39 Quad bike: 39-43 Road traffic: 31-34  <b>Front-end-loader: 31-32 Front-end-loader (quacker): 33-35</b>	33	Complies
	04/10/2022 7:45 am Wind: Calm Temp: 17 °C Humidity: 93% Cloud: 1 okta	50	Birds: 43-70 Road traffic: 30-36  <b>Front-end-loader: 32-33 Front-end-loader (quacker): 33-35</b>	34	Complies
	04/10/2022 8:00 am Wind: Calm Temp: 17 °C Humidity: 93% Cloud: 1 okta	39	Birds: 42-59 Road traffic: 33-40  <b>Front-end-loader: 31-33 Front-end-loader (quacker): 33-35</b>	33	Complies
	04/10/2022 8:15 am Wind: Calm Temp: 17 °C Humidity: 93% Cloud: 1 okta	44	Birds: 39-64 Plane: 42-52 Road traffic: 33-39  <b>Front-end-loader: 31-34 Front-end-loader (quacker): 34-38</b>	37	Complies
C – 110 Keighley Avenue	04/10/2022 8:34 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	41	Birds: 39-61 Quad bike: 37-41 Road traffic: 29-32  <b>Front-end-loader: 30-31 Front-end-loader (quacker): 33-36</b>	35	Complies
	04/10/2022 8:49 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	39	Birds: 43-60 Plane: 40-42 Road traffic: 29-32  <b>Front-end-loader: 30-31 Front-end-loader (quacker): 33-36</b>	35	Complies



Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels L <sub>A</sub> max (dB)	Estimated Project L <sub>A</sub> eq(15min)	Assessment
		L <sub>A</sub> eq(15min)			
	04/10/2022 9:04 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	38	Birds: 44-55 Road traffic: 30-32  <b>Front-end-loader: 30-31</b> <b>Front-end-loader (quacker): 33-36</b>	35	Complies
	04/10/2022 9:19 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	40	Birds: 41-60 Road traffic: 31-32  <b>Front-end-loader: 30-32</b> <b>Front-end-loader (quacker): 33-35</b>	34	Complies
	04/10/2022 9:34 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	44	Birds: 39-60 Plane: 40-46 Road traffic: 32-35  <b>Front-end-loader: 31-32</b> <b>Front-end-loader (quacker): 33-35</b>	34	Complies
	04/10/2022 9:49 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	39	Birds: 38-60 Plane: 38-41 Road traffic: 30-32  <b>Front-end-loader: 30-32</b> <b>Front-end-loader (quacker): 33-34</b>	33	Complies
D – 100 Keighley Avenue	04/10/2022 07:05 am Wind: Calm Temp: 16 °C Humidity: 95% Cloud: 3 okta	41	Birds: 44-58 Plane: 35-37 Road traffic: 35-37  <b>Quarry not discernible</b>	<30	Complies
	04/10/2022 07:20 am Wind: Calm Temp: 16 °C Humidity: 95% Cloud: 3 okta	44	Birds: 40-73 Road traffic: 35-37  <b>Front-end-loader: 28-30</b> <b>Front-end-loader (quacker): 26-30</b>	<30	Complies
	04/10/2022 07:35 am Wind: Calm Temp: 17 °C Humidity: 93% Cloud: 2 okta	41	Birds: 39-65 Road traffic: 35-40  <b>Front-end-loader: 27-29</b> <b>Front-end-loader (quacker): 26-30</b>	<30	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels L <sub>Amax</sub> (dB)	Estimated Project L <sub>Aeq</sub> (15min)	Assessment
		L <sub>Aeq</sub> (15min)			
	04/10/2022 07:50 am Wind: Calm Temp: 17 °C Humidity: 93% Cloud: 1 okta	41	Birds: 43-67 Plane: 38-45 Road traffic: 35-37  <b>Front-end-loader: 26-28</b> <b>Front-end-loader (quaker): 26-32</b>	<30	Complies
	04/10/2022 08:05 am Wind: Calm Temp: 17 °C Humidity: 93% Cloud: 1 okta	39	Birds: 42-58 Domestic activity bangs: 40 Road traffic: 32-34  <b>Front-end-loader: 24-26</b> <b>Front-end-loader (quaker): 26-30</b>	<30	Complies
	04/10/2022 08:20 am Wind: Calm Temp: 17 °C Humidity: 93% Cloud: 1 okta	37	Birds: 42-49 Plane: 35-37 Road traffic: 32-34  <b>Front-end-loader: 25-26</b> <b>Front-end-loader (quaker): 26-36</b>	<30	Complies
G – 87 Keighley Avenue	04/10/2022 8:40 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	46	Birds: 44-71 Road traffic: 30-34 Domestic activity: 30-40  <b>Front-end-loader: 25-36</b> <b>Front-end-loader (quaker): 26-30</b>	<30	Complies
	04/10/2022 8:55 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	38	Birds: 41-59 Road traffic: 30-34 Domestic activities: 44-48  <b>Quarry not discernible</b>	<30	Complies
	04/10/2022 9:10 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	46	Birds: 43-60 Road traffic: 32-36 Timber yard: 33-34  <b>Front-end-loader: 20-26</b>	<30	Complies
	04/10/2022 9:25 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	56	Birds: 42-52 Dog barking: 48-85 Timber yard: 35-41 Road traffic: 30-34  <b>Front-end-loader: 22-26</b> <b>Front-end-loader (quacker): 26-28</b>	<30	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Assessment
		LAeq(15min)			
	04/10/2022 9:40 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	37	Birds: 40-53 Plane: 40-42 Road traffic: 30-32  <b>Front-end-loader: 20-24</b> <b>Front-end-loader (quacker): 25-28</b>	<30	Complies
	04/10/2022 10:03 am Wind: Calm Temp: 17 °C Humidity: 92% Cloud: 0 okta	39	Birds: 41-59 Plane: 30 Road traffic: 30-32 Truck at residence: 39-40  <b>Front-end-loader: 22-26</b> <b>Front-end-loader (quacker): 25-28</b>	<30	Complies
R – 21 Reservoir Road	04/10/2022 10:10 am Wind: Calm Temp: 18 °C Humidity: 92% Cloud: 0 okta	43	Birds: 42-53 Forklift (neighbouring timber yard): 39-44 Timber saw (neighbouring timber yard): 53-59 Road traffic: 42-46  <b>Sand pump: 31-32</b>	32	Complies
	04/10/2022 10:25 am Wind: Calm Temp: 18 °C Humidity: 92% Cloud: 0 okta	41	Birds: 39-61 Forklift (neighbouring timber yard): 42-50 Road traffic: 33-41  <b>Sand pump: 31-32</b>	32	Complies
	04/10/2022 10:25 am Wind: Calm Temp: 18 °C Humidity: 92% Cloud: 0 okta	46	Birds: 46-67 Plane: 41-44 Forklift (neighbouring timber yard): 41-43 Timber saw (neighbouring timber yard): 48-58 Road traffic: 32-40  <b>Sand pump: 31-32</b> <b>Front-end-loader: 36-42</b> <b>Horn: 35-36</b> <b>Front-end-loader (quacker): 40-48</b>	37	1 dB above daytime noise criteria <sup>1</sup>

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Assessment
		LAeq(15min)			
	04/10/2022 10:40 am Wind: Calm Temp: 18 °C Humidity: 92% Cloud: 0 okta	44	Birds: 39-66 Forklift (neighbouring timber yard): 42-46 Timber saw (neighbouring timber yard): 52-55 Road traffic: 44-48  <b>Sand pump: 31-32</b> <b>Front-end-loader: 35-44</b> <b>Horn: 35-36</b> <b>Front-end-loader (quacker): 41-51</b>	38	2 dB above daytime noise criteria <sup>1</sup>
	04/10/2022 10:55 am Wind: Calm Temp: 18 °C Humidity: 92% Cloud: 0 okta	46	Birds: 46-68 Plane: 40-44 Forklift (neighbouring timber yard): 42-48 Timber saw (neighbouring timber yard): 53-56 Forklift horn (neighbouring timber yard): 49-50 Road traffic: 46-57  <b>Sand pump: 31-32</b> <b>Front-end-loader: 37-43</b> <b>Front-end-loader (quacker): 41-52</b>	39	3 dB above daytime noise criteria <sup>1</sup>
	04/10/2022 11:10 am Wind: Calm Temp: 18 °C Humidity: 92% Cloud: 0 okta	44	Birds: 43-61 Forklift (neighbouring timber yard): 41-43 Road traffic: 42-47  <b>Sand pump: 31-32</b> <b>Front-end-loader: 36-41</b> <b>Front-end-loader (quacker): 38-48</b>	38	2 dB above daytime noise criteria <sup>1</sup>

Note 1: The quarry-owned front-end-loader (Komatsu WA500-6) is currently in "re-build" process for noise mitigation as required in Section 8 of the Project Environmental Protection Licence (Licence number: 3751 dated 11 November 2016). The noise exceedance at "Location R – 21 Reservoir Road" during daytime period was due to the use of the "hired" front-end-loader (with quacker installed) at the stock yard.

**Table 9 Operational Noise Compliance Monitoring Results - Daytime Period  
5 October 2022**

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Assessment
		LAeq(15min)			
B – 126A Keighley Avenue	05/10/2022 7:00 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	41	Birds: 46-63 Road traffic: 38-41  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 7:15 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	44	Birds: 44-61 Plane: 42-49 Road traffic: 38-40  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 7:30 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	46	Birds: 42-66 Plane: 39-52 Road traffic: 37-41  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 7:45 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	52	Birds: 42-71 People talking: 32-33 Road traffic: 37-44  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 8:00 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	54	Birds: 41-79 Plane: 44-49 Road traffic: 37-44  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 8:15 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	51	Birds: 41-74 Plane: 41-50 Domestic activity: 38-41 Road traffic: 38-44  <b>Quarry not discernible</b>	<30	Complies
C – 110 Keighley Avenue	05/10/2022 8:35 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	43	Birds: 42-58 Road traffic: 38-43  <b>Quarry not discernible</b>	<30	Complies



Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels L <sub>Amax</sub> (dB)	Estimated Project L <sub>Aeq</sub> (15min)	Assessment
		L <sub>Aeq</sub> (15min)			
	05/10/2022 8:50 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	46	Birds: 41-64 Road traffic: 37-45  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 9:05 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	47	Bird: 41-63 Plane: 40-46 Tractor (idling): 39-41 Tractor (moving): 41-43 Tractor (banging): 51-54 Domestic activity: 47-49 road traffic: 38-41  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 9:20 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	41	Birds: 40-55 Road traffic: 38-40  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 9:35 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	51	Birds: 41-49 Helicopter: 48-65 Tractor (banging): 45-46 Road traffic: 37-41  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 9:50 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	46	Birds: 42-60 Domestic activity: 44-46 Road traffic: 37-42  <b>Quarry not discernible</b>	<30	Complies
D – 100 Keighley Avenue	05/10/2022 07:00 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	58	Birds: 43-80 Domestic activities: 38-40 Road traffic: 36-38  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 07:15 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	42	Birds: 41-54 Plane: 42-48 Domestic activities: 38-40 Road traffic: 36-38  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 07:30 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	43	Birds: 40-61 Plane: 41-51 Road traffic: 38-42  <b>Quarry not discernible</b>	<31	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels L <sub>Amax</sub> (dB)	Estimated Project L <sub>Aeq</sub> (15min)	Assessment
		L <sub>Aeq</sub> (15min)			
	05/10/2022 07:45 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	44	Birds: 43-58 Domestic activities: 38-40 Road traffic: 38-40  <b>Quarry not discernible</b>	<33	Complies
	05/10/2022 08:00 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	46	Birds: 42-67 Plane: 44-46 Domestic activities: 45-46 Truck at residence: 46-50 Road traffic: 38-42  <b>Quarry not discernible</b>	<31	Complies
	05/10/2022 08:15 am Wind: Calm Temp: 15 °C Humidity: 97% Cloud: 8 okta	47	Birds: 40-64 Plane: 45-51 Truck door at residence: 50 Road traffic: 38-40  <b>Quarry not discernible</b>	<31	Complies
G – 87 Keighley Avenue	05/10/2022 08:30 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	44	Birds: 41-65 Dogs barking: 47-53 FEL at residence: 45-54 Road traffic: 38-42  <b>Quarry not discernible</b>	<31	Complies
	05/10/2022 08:45 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	43	Birds: 37-60 FEL at residence: 45-55 Road traffic: 38-40  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 09:00 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	43	Birds: 43-55 Plane: 40-44 Dogs barking: 46-48 FEL at residence: 45-55 Road traffic: 37-40  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 09:15 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	43	Birds: 42-46 Dogs barking: 51-56 FEL at residence: 45-52 Road traffic: 38-40  <b>Quarry not discernible</b>	<30	Complies
	05/10/2022 09:30 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	44	Birds: 40-46 Helicopter: 47-65 Dogs barking: 53-57 FEL at residence: 45-53 Road traffic: 38-40  <b>Quarry not discernible</b>	<30	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels L <sub>Amax</sub> (dB)	Estimated Project L <sub>Aeq</sub> (15min)	Assessment
		L <sub>Aeq</sub> (15min)			
	05/10/2022 09:45 am Wind: Calm Temp: 16°C Humidity: 96% Cloud: 8 okta	46	Birds: 44-68 Dogs barking: 45-47 Road traffic: 38-42  <b>Quarry not discernible</b>	<31	Complies
R – 21 Reservoir Road	05/10/2022 10:11 am Wind: Calm Temp: 16°C Humidity: 94% Cloud: 8 okta	38	Birds: 41-51 Forklift (neighbouring timber yard): 39-43 Road traffic: 34-39  <b>Sand pump: 31-32</b>	32	Complies
	05/10/2022 10:26 am Wind: Calm Temp: 16°C Humidity: 94% Cloud: 8 okta	43	Birds: 43-64 Road traffic: 34-39  <b>Sand pump: 31-32 Front-end-loader: 36-38</b>	35	Complies
	05/10/2022 10:41 am Wind: Calm Temp: 16°C Humidity: 94% Cloud: 8 okta	41	Birds: 41-55 Forklift (neighbouring timber yard): 46-47 Road traffic: 36-42  <b>Sand pump: 31-32 Front-end-loader: 36-38</b>	35	Complies
	05/10/2022 10:56 am Wind: Calm Temp: 16°C Humidity: 94% Cloud: 8 okta	42	Birds: 41-49 Saw cutting (neighbouring timber yard): 48-56 Road traffic: 34-38  <b>Sand pump: 31-32 Front-end-loader: 35-38</b>	35	Complies
	05/10/2022 11:11 am Wind: Calm Temp: 16°C Humidity: 94% Cloud: 8 okta	39	Birds: 40-45 Road traffic: 34-37  <b>Sand pump: 31-32</b>	32	Complies
	05/10/2022 11:26 am Wind: Calm Temp: 16°C Humidity: 94% Cloud: 8 okta	43	Birds: 41-59 Car idling (residence): 42-43 Forklift (neighbouring timber yard): 39-44 Road traffic: 37-48  <b>Sand pump: 31-32</b>	32	Complies

**Table 10 Operational Noise Compliance Monitoring Results - Daytime Period  
6 October 2022**

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Assessment
		LAeq(15min)			
B – 126A Keighley Avenue	06/10/2022 8:35 am Wind: 0-2 m/s (NE) Temp: 15 °C Humidity: 96% Cloud: 8 okta	46	Birds: 42-69 Wind in tree: 39-43 Road traffic: 37-39  <b>Front-end-loader: 36-39</b> <b>Front-end-loader (quacker): 39-40</b> <b>Dump truck: 38-40</b>	36	Complies
	06/10/2022 8:50 am Wind: 0-2 m/s (NE) Temp: 15 °C Humidity: 94% Cloud: 8 okta	44	Birds: 41-58 Wind in tree: 38-48 Road traffic: 37-46  <b>Front-end-loader: 36-39</b> <b>Front-end-loader (quacker): 38-41</b> <b>Dump truck: 35-42</b>	37	Complies
	06/10/2022 9:05 am Wind: 0-2 m/s (NE) Temp: 15 °C Humidity: 94% Cloud: 8 okta	44	Birds: 42-62 Plane: 46-54 Wind in tree: 41-44 Road traffic: 37-42  <b>Front-end-loader: 38-40</b> <b>Front-end-loader (quacker): 37-41</b> <b>Dump truck: 36-44</b>	36	Complies
	06/10/2022 9:20 am Wind: 0-2 m/s (NE) Temp: 15 °C Humidity: 94% Cloud: 8 okta	42	Birds: 41-53 Plane: 36-38 Wind in tree: 37-39 Road traffic: 38-42  <b>Front-end-loader: 37-39</b> <b>Front-end-loader (quacker): 39-41</b> <b>Dump truck: 36-42</b>	37	Complies
	06/10/2022 9:35 am Wind: 0-2 m/s (NE) Temp: 15 °C Humidity: 94% Cloud: 8 okta	42	Birds: 40-50 Wind in tree: 38-42 Road traffic: 38-43  <b>Front-end-loader: 37-38</b> <b>Front-end-loader (quacker): 39-41</b> <b>Dump truck: 36-41</b>	37	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Assessment
		LAeq(15min)			
	06/10/2022 9:50 am Wind: 0-2 m/s (NE) Temp: 15 °C Humidity: 94% Cloud: 8 okta	45	Birds: 41-67 Plane: 43-45 Wind in tree: 41-44 Domestic activity: 42-45 Quad bike: 38-41 Road traffic: 37-41  <b>Front-end-loader: 35-37</b> <b>Front-end-loader (quacker): 36-40</b> <b>Dump truck: 38-42</b>	37	Complies
C – 110 Keighley Avenue	06/10/2022 7:00 am Wind: 0-2 m/s (NE) Temp: 15 °C Humidity: 96% Cloud: 8 okta	42	Birds: 43-52 Plane: 38-52 Wind in trees: 37-41 Road traffic: 36-39  <b>Quarry not discernible</b>	<30	Complies
	06/10/2022 7:15 am Wind: 0-2 m/s (NE) Temp: 15 °C Humidity: 96% Cloud: 8 okta	41	Bird: 41-57 Wind in trees: 38-42 Road traffic: 36-40  <b>Front-end-loader: 35-40</b> <b>Front-end-loader (quacker): 36-38</b> <b>Dump truck: 34-39</b>	37	Complies
	06/10/2022 7:30 am Wind: 0-2 m/s (NE) Temp: 15 °C Humidity: 96% Cloud: 8 okta	49	Bird: 42-66 Plane: 38-43 Wind in trees: 41-46 Road traffic: 36-41  <b>Front-end-loader: 34-39</b> <b>Front-end-loader (quacker): 36-37</b> <b>Dump truck: 34-38</b>	37	Complies
	06/10/2022 7:45 am Wind: 0-2 m/s (E) Temp: 15 °C Humidity: 96% Cloud: 8 okta	48	Bird: 41-65 Plane: 42-54 Wind in trees: 39-42 Road traffic: 37-38  <b>Front-end-loader: 34-42</b> <b>Front-end-loader (quacker): 36-39</b> <b>Dump truck: 35-39</b>	37	Complies
	06/10/2022 8:00 am Wind: 0-2 m/s (E) Temp: 15 °C Humidity: 96% Cloud: 8 okta	47	Birds: 41-67 Wind in trees: 37-42 Road traffic: 37-38  <b>Front-end-loader: 39-40</b> <b>Front-end-loader (quacker): 38-47</b> <b>Dump truck: 36-40</b>	36	Complies



Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Assessment
		LAeq(15min)			
	06/10/2022 8:15 am Wind: 0-2 m/s (E) Temp: 15 °C Humidity: 96% Cloud: 8 okta	55	Birds: 42-81 Plane: 42-52 Wind in trees: 37-42 Road traffic: 37-40  <b>Front-end-loader: 35-44</b> <b>Front-end-loader (quacker): 36-39</b>	37	Complies
D – 100 Keighley Avenue	06/10/2022 7:00 am Wind: 0-2 m/s (E) Temp: 15 °C Humidity: 96% Cloud: 8 okta	43	Birds: 40-62 Wind in trees: 42-46 Road traffic: 37-39  <b>Front-end-loader: 34-36</b> <b>Dump truck: 36-39</b>	35	Complies
	06/10/2022 7:15 am Wind: 0-2 m/s (E) Temp: 15 °C Humidity: 96% Cloud: 8 okta	43	Birds: 40-58 Plane: 41-45 Wind in trees: 41-45 Road traffic: 37-39  <b>Front-end-loader: 34-35</b> <b>Front-end-loader (quacker): 36-39</b> <b>Dump truck: 31-40</b>	32	Complies
	06/10/2022 7:30 am Wind: 0-2 m/s (E) Temp: 15 °C Humidity: 96% Cloud: 8 okta	42	Birds: 40-56 Plane: 45-49 Wind in trees: 41-44 Road traffic: 37-39  <b>Front-end-loader: 34-35</b> <b>Front-end-loader (quacker): 36-39</b> <b>Dump truck: 30-43</b>	33	Complies
	06/10/2022 7:45 am Wind: 0-2 m/s (E) Temp: 15 °C Humidity: 96% Cloud: 8 okta	44	Birds: 40-62 Dogs barking: 44 Wind in trees: 42-44 Road traffic: 37-39  <b>Front-end-loader: 34-35</b> <b>Front-end-loader (quacker): 38-42</b> <b>Dump truck: 30-43</b>	35	Complies
	06/10/2022 8:00 am Wind: 0-2 m/s (E) Temp: 15 °C Humidity: 96% Cloud: 8 okta	42	Birds: 40-60 Dogs barking: 38-40 Wind in trees: 40-45 Road traffic: 37-39  <b>Front-end-loader: 35-38</b> <b>Front-end-loader (quacker): 40-42</b> <b>Dump truck: 36-42</b>	37	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels L <sub>Amax</sub> (dB)	Estimated Project L <sub>Aeq</sub> (15min)	Assessment
		L <sub>Aeq</sub> (15min)			
	06/10/2022 8:15 am Wind: 0-2 m/s (E) Temp: 15 °C Humidity: 96% Cloud: 8 okta	45	Birds: 40-67 Wind in trees: 41-44 Road traffic: 37-39  <b>Front-end-loader: 34-36</b> <b>Front-end-loader (quacker): 35-39</b> <b>Dump truck: 32-36</b>	33	Complies
G – 87 Keighley Avenue	06/10/2022 9:45 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	43	Birds: 40-57 Wind in trees: 40-42 Road traffic: 36-38  <b>Front-end-loader: 33-35</b> <b>Front-end-loader (quacker): 35-36</b> <b>Dump truck: 32-35</b>	34	Complies
	06/10/2022 10:00 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	41	Birds: 40-55 Wind in trees: 38-44 Road traffic: 36-38  <b>Front-end-loader: 33-34</b> <b>Front-end-loader (quacker): 35-37</b> <b>Dump truck: 32-34</b>	34	Complies
	06/10/2022 10:15 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	42	Birds: 40-58 Wind in trees: 39-43 Road traffic: 36-38  <b>Front-end-loader: 33-35</b> <b>Front-end-loader (quacker): 35-36</b> <b>Dump truck: 32-35</b>	34	Complies
	06/10/2022 10:30 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	44	Birds: 40-66 Wind in trees: 41-43 Road traffic: 35-37  <b>Front-end-loader: 34-35</b> <b>Front-end-loader (quacker): 35-37</b> <b>Dump truck: 32-37</b>	35	Complies
	06/10/2022 10:45 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	40	Birds: 40-51 Wind in trees: 40-44 Road traffic: 36-38  <b>Front-end-loader: 34-36</b> <b>Front-end-loader (quacker): 35-36</b> <b>Dump truck: 32-36</b>	34	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Assessment
		LAeq(15min)			
	06/10/2022 11:00 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	41	Birds: 40-66 Wind in trees: 39-43 Road traffic: 35-37  <b>Front-end-loader: 33-35</b> <b>Front-end-loader (quacker): 34-35</b> <b>Dump truck: 35-36</b>	33	Complies
R – 21 Reservoir Road	06/10/2022 10:16 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	45	Birds: 42-60 Wind in trees: 40-42 Forklift (neighbouring timber yard): 42-46 Saw cutting (neighbouring timber yard): 52-54 Dropping metal bars (neighbouring timber yard): 52-59 Road traffic: 38-39  <b>Sand pump: 33-34</b> <b>Dump truck: 37-51</b>	36	Complies
	06/10/2022 10:31 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	44	Birds: 43-57 Wind in trees: 40-43 Forklift (neighbouring timber yard): 36-41 Domestic activity: 45-47 Road traffic: 37-44  <b>Sand pump: 33-34</b> <b>Dump truck: 36-51</b>	35	Complies
	06/10/2022 10:46 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	42	Birds: 39-55 Plane: 37-43 Wind in trees: 38-42 Road traffic: 36-38  <b>Sand pump: 33-34</b> <b>Dump truck: 42-53</b>	35	Complies
	06/10/2022 11:01 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	48	Birds: 42-56 Plane: 42-46 Wind in trees: 36-43 Saw cutting (neighbouring timber yard): 52-63 Road traffic: 37-44  <b>Sand pump: 33-34</b> <b>Dump truck: 37-51</b>	36	Complies

Location	Date/Start Time/Weather	Primary Noise Descriptor (dB re 20 µPa)	Description of Noise Emission, Typical Maximum Levels LAmax (dB)	Estimated Project LAeq(15min)	Assessment
		LAeq(15min)			
	06/10/2022 11:16 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	48	Birds: 41-56 Plane: 42-53 Wind in trees: 36-39 Forklift (neighbouring timber yard): 38-39 Saw cutting (neighbouring timber yard): 52-64 Road traffic: 37-44  <b>Sand pump: 33-34</b> <b>Dump truck: 38-47</b>	35	Complies
	06/10/2022 11:31 am Wind: 0-1 m/s (E) Temp: 15 °C Humidity: 92% Cloud: 8 okta	43	Birds: 39-57 Plane: 42-48 Wind in trees: 37-42 Saw cutting (neighbouring timber yard): 45-49 Road traffic: 36-45  <b>Sand pump: 33-34</b> <b>Dump truck: 42-49</b> <b>Front-end-loader (quacker): 38-40</b>	36	Complies

## 7 Assessment and Findings

Based on the measured noise emissions presented in **Section 6**, the estimated Project related noise contributions for each location are summarised in **Table 11** to **Table 13**, together with an assessment against the corresponding Project Approval Noise Criteria.

It is worth noting that the quarry-owned Komatsu WA500-6 front-end-loader (FEL) is currently in “rebuild” process with noise mitigation as required in Section 8 of the Project Environmental Protection Licence (Licence number: 3751 dated 11 November 2016). A “hired” FEL (with quacker installed) was being used at the Project Site during the noise monitoring.

**Table 11 Morning Shoulder and Daytime Period – 4 October 2022**

Period	Location	Estimated Project Noise Level Contribution dBA		Project Noise Assessment	
		LAeq(15min)	LA1(1min)	LAeq(15min)	LA1(1min)
Morning Shoulder	B – 126A Keighley Avenue	<29	<43	Pass	Pass
	C – 110 Keighley Avenue	<30	<45	Pass	Pass
	D – 100 Keighley Avenue	< 26	<35	Pass	Pass
	G – 87 Keighley Avenue	< 27	<35	Pass	Pass
	R – 21 Reservoir Road	37	47	Pass	Pass
Day	B – 126A Keighley Avenue	<30-37	N/A	Pass	N/A
	C – 110 Keighley Avenue	33-35		Pass	
	D – 100 Keighley Avenue	<30		Pass	
	G – 87 Keighley Avenue	<30		Pass	
	R – 21 Reservoir Road	32-39		Up to +3 dB exceedance <sup>1</sup>	

Note 1: The daytime LAeq noise exceedance at location R (21 Reservoir Road) was due to the use of the “hired” Komatsu WA500-6 FEL (with quacker installed). The “hired” FEL will be used for up to four (4) weeks period during the “rebuild” process of the quarry-owned Komatsu WA500-6 FEL.

**Table 12 Morning Shoulder and Daytime Period – 5 October 2022**

Period	Location	Estimated Project Noise Level Contribution dBA		Project Noise Limit	
		LAeq(15min)	LA1(1min)	LAeq(15min)	LA1(1min)
Morning Shoulder	B – 126A Keighley Avenue	<30	<46	Pass	Pass
	C – 110 Keighley Avenue	<30	<47	Pass	Pass
	D – 100 Keighley Avenue	<31	<38	Pass	Pass
	G – 87 Keighley Avenue	<31	<40	Pass	Pass
	R – 21 Reservoir Road	<30	<44	Pass	Pass
Day	B – 126A Keighley Avenue	<30	N/A	Pass	N/A
	C – 110 Keighley Avenue	<30		Pass	
	D – 100 Keighley Avenue	<33		Pass	
	G – 87 Keighley Avenue	<31		Pass	
	R – 21 Reservoir Road	32-35		Pass	



**Table 13 Morning Shoulder and Daytime Period – 6 October 2022**

Period	Location	Estimated Project Noise Level Contribution dBA		Project Noise Limit	
		LAeq(15min)	LA1(1min)	LAeq(15min)	LA1(1min)
Morning Shoulder	B – 126A Keighley Avenue	<30	<46	Pass	Pass
	C – 110 Keighley Avenue	<30	<43	Pass	Pass
	D – 100 Keighley Avenue	<29	<38	Pass	Pass
	G – 87 Keighley Avenue	<28	<35	Pass	Pass
	R – 21 Reservoir Road	37	46	Pass	Pass
Day	B – 126A Keighley Avenue	36-37	N/A	Pass	N/A
	C – 110 Keighley Avenue	<30-37		Pass	
	D – 100 Keighley Avenue	32-37		Pass	
	G – 87 Keighley Avenue	33-35		Pass	
	R – 21 Reservoir Road	35-36		Pass	

Based on the operator-attended noise survey summary presented in **Table 11** to **Table 13**, during the noise monitoring period between Tuesday 4 October and Thursday 6 October 2022, the project contributed LAeq(15min) and LA1(1min) noise levels at locations B,C,D,G and R comply with the project morning shoulder noise criteria. The project contributed LAeq(15min) noise levels at locations B,C,D and G comply with the daytime project noise criteria as nominated in the Project Approval (MP 08\_0173). The project contributed LAeq(15min) noise levels at locations R was measured as up to 3 dB above the nominated daytime noise criteria as presented in **Table 3** due to the use of the “hired” Komatsu WA500-6 FEL with quacker installed.

## 8 Conclusion

VMS has conducted operator-attended noise monitoring for Central Coast Sands Quarry operations over a three-day period between Tuesday 4 October and Thursday 6 October 2022 during the morning shoulder and daytime periods.

A “hired” Komatsu WA500-6 FEL (with quacker installed) was used at the Project Site during the operator-attended noise monitoring period as the quarry-owned FEL is currently in “rebuild” process with noise mitigation.

The estimated Project related noise contribution during the “morning shoulder period” (between 6.00am and 7.00am) did not exceed the project LAeq(15min) or LA1(1min) noise criteria as nominated in the Project Approval (MP 08\_0173) at all nominated monitoring locations. The Project related noise contribution during “daytime period” (between 7.00am and 6.00pm) did not exceed the project LAeq(15min) noise criteria at all nominated monitoring locations except at “Location R – 21 Reservoir Road” on Tuesday 4 October 2022. The noise exceedance is due to the use of “hired” Komatsu WA500-6 FEL (with quacker installed).

VMS conclude that the project is in compliance with the project operational noise criteria as nominated in the Project Approval (MP 08\_0173) except at “Location R – 21 Reservoir Road” with LAeq noise exceedance up to 3 dB during daytime period on Tuesday 4 October 2022.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Liu Yang', with a long, sweeping horizontal stroke extending to the right.

Yang Liu  
Principal - Acoustics and 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 <sup>-6</sup> 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 <sup>-12</sup> 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: $SPL = SWL - 10 \times \log_{10}(4 \times \pi \times r^2)$ 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 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 <sup>2</sup> .
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-squared 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 <sup>1.75</sup> .