



ANNUAL NOISE MONITORING REPORT

ENVIRONMENTAL PROTECTION (FIMISTON GOLD MINE
NOISE EMISSIONS) APPROVAL 2016

APRIL 2023



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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ACRONYM	DEFINITION
KCGM	Kalgoorlie Consolidated Gold Mines Pty Ltd
DWER	Department of Water and Environmental Regulation
NVMMP	Noise and Vibration Monitoring and Management Plan
L _A	A-weighted Statistical Sound Pressure Level
L _{eq}	Equivalent Continuous Level
WIF	Weather Influencing Factor
ENB	Environmental Noise Bund
UWA	University of Western Australia

1. PURPOSE

Kalgoorlie Consolidated Gold Mines Pty Ltd (KCGM) is required to submit an Annual Noise Monitoring Report to the CEO of the Department of Water and Environmental Regulation (DWER) within one month from the end of the reporting year in accordance with Condition 10 of the *Environmental Protection (Fimiston Gold Mine Noise Emissions) Approval 2016* (2016 Fimiston Noise Approval).

The Annual Noise Monitoring Report (this report) is required to include:

- (a) a summary of the noise and airblast levels recorded under clause 8 during the year; and
- (b) a summary of the progress of the implementation of the noise management plan submitted or revised under clause 9.

This report covers the period from 22 March 2022 to 21 March 2023. In accordance with the approved KCGM Noise and Vibration Monitoring and Management Plan (August 2018) (NVMMMP) the data presented in the annual report is for the twelve-month period from 1 April 2022 to 31 March 2023 to align with the quarterly reporting periods.

2. SUMMARY OF KCGM OPERATIONS

KCGM is a wholly owned subsidiary of Northern Star Resources Ltd, and is responsible for operating the Fimiston Open Pit, Mt Charlotte Underground Mine and the Fimiston and Gidji Processing Plants.

The Fimiston Operations and Mt Charlotte Underground Mine are located adjacent to the City of Kalgoorlie-Boulder approximately 600 km east of Perth, Western Australia, whilst the Gidji Processing Plant is located approximately 17 km north of Kalgoorlie-Boulder.

KCGM comprises many facets of mining and mineral processing including:

- Open pit mining (Fimiston);
- Waste rock disposal (Fimiston);
- Underground mining (Mt Charlotte);
- Mineral processing (Fimiston and Gidji);
- Tailings disposal (Fimiston and Gidji);
- Ultra-fine grinding (Fimiston and Gidji);
- Electrowinning and refining (Fimiston); and
- Exploration.

On average, the Fimiston Processing Plant, in conjunction with the Gidji Gold Processing Plant, produces up to 500,000 ounces of gold each year with the Fimiston Open Pit and Mt Charlotte Underground having a combined gold reserve of approximately 11 million ounces.

The current production mine life will see mining and mineral processing continue until 2034.

3. NOISE MONITORING

In accordance with Condition 8 of the 2016 Fimiston Noise Approval, KCGM undertakes the following noise monitoring programmes:

- Continuous Environmental Noise Monitoring;
- Compliance Environmental Noise Monitoring; and
- Airblast Monitoring.

Each of these monitoring programmes are outlined in the NVMMP.

3.1. Continuous Environmental Noise Monitoring

During the reporting period, continuous environmental noise monitoring was undertaken, as far as practicable, at Metal Exploration Premises (MEP) and Boulder Primary School (BPS) in accordance with Condition 8(1) of the 2016 Fimiston Noise Approval.

Results of the continuous environmental noise monitoring programme are provided in the Quarterly Noise and Blast Monitoring Reports submitted to the DWER. The quarterly report also contains the following, with respect to continuous noise monitoring:

- Information on any data loss; and
- Graphs of continuous noise levels recorded at the MEP and BPS monitoring sites.

To avoid duplication of data, this annual report does not include the detailed results as previously submitted in the quarterly reports but provides a summary of the continuous noise levels recorded at MEP and BPS during the period 1 April 2022 to 31 March 2023.

The noise generated from the Fimiston Operations is very constant and stable. The average noise levels are summarised for day (0700 to 1900 hours), evening (1900 to 2200 hours) and night (2200 to 0700 hours) periods in Figure 1 (BPS) and Figure 2 (MEP). Noise data from BPS is recorded as L_{A10} , L_{A50} and L_{A90} , and noise data from MEP is recorded as L_{Aeq} due to different configurations of the sound level meters. Noise levels recorded during this reporting period are consistent with previous years.

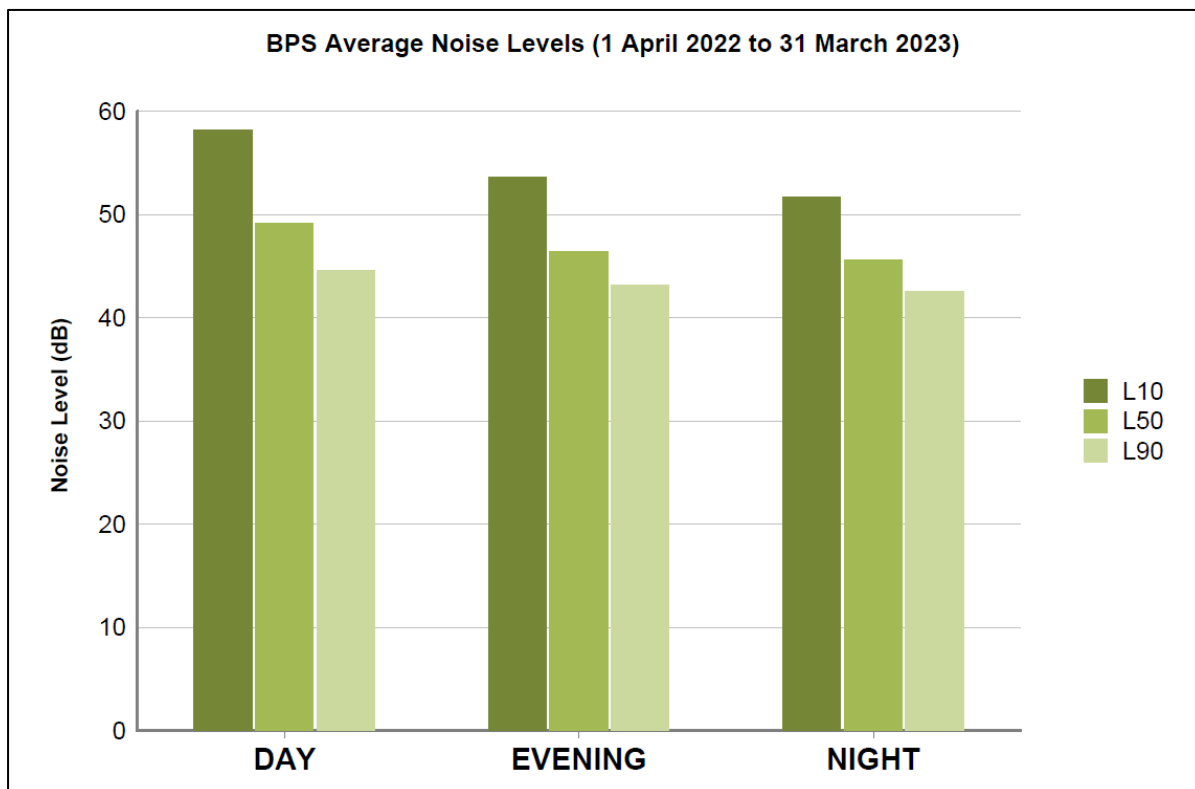


Figure 1: BPS Noise Level Summary

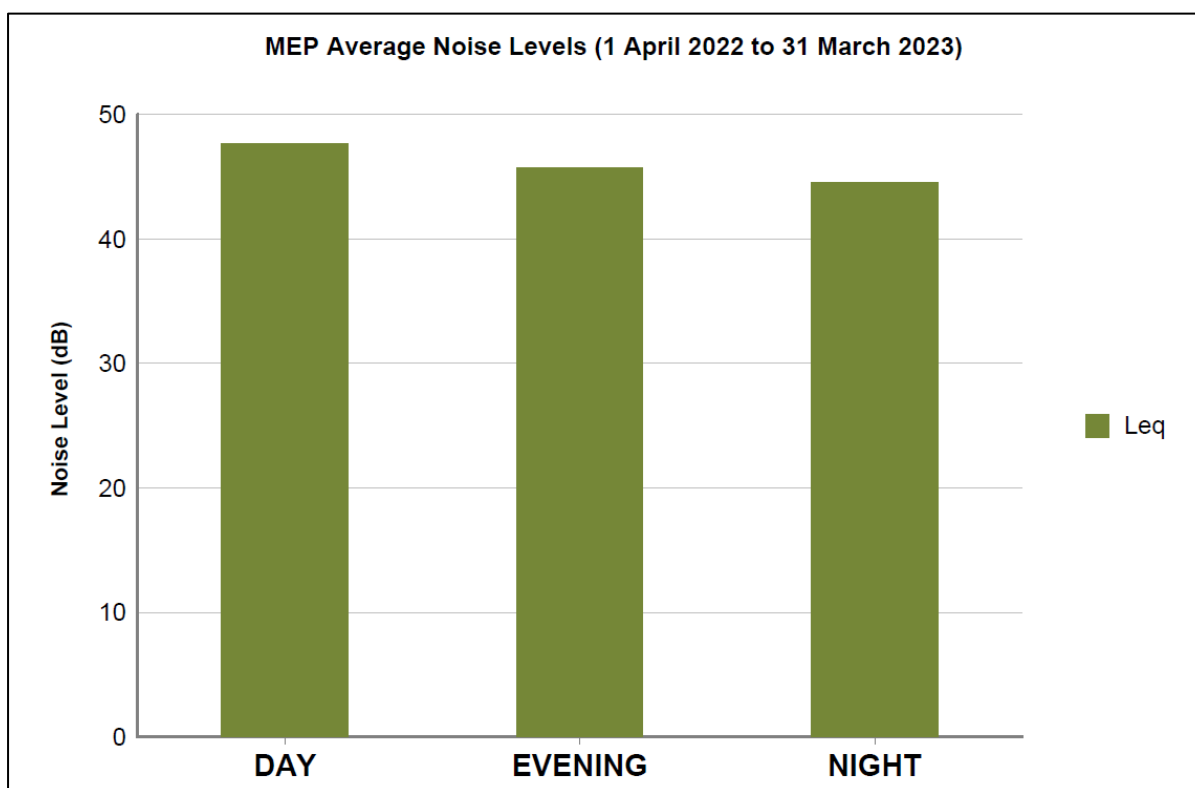


Figure 2: MEP Noise Level Summary

3.2. Quarterly Compliance Environmental Noise Monitoring

Approved noise levels for KCGM's Fimiston Operations are stipulated in Condition 4 of the 2016 Fimiston Noise Approval. During the reporting period, quarterly compliance noise monitoring was undertaken at each of the five reference locations Figure 3 in accordance with Condition 8(2) of the 2016 Fimiston Noise Approval.

The approved noise levels also consider a Weather Influencing Factor (WIF). Data from the weather monitoring equipment at KCGM's weather station MEX Figure 3 is used to determine the WIF based on measured weather conditions prevailing at the time the noise is received.

During the reporting period, the measured levels at all locations complied with the approved noise levels for the nighttime period. KCGM noted that the measured LA10 noise level at OSB in Quarter 4 2022 was equal to the approved LA10 noise level of 53dB. An internal review was conducted which confirmed that KCGM was operating in accordance with the NVMP. A summary of the measured noise levels and the approved noise levels by location are shown in Figure 4, 5, 6 and 7.

Results of the quarterly compliance noise monitoring programme are provided in the Quarterly Noise and Blast Monitoring Reports submitted to the DWER and are provided on KCGM's website (www.superpit.com.au).

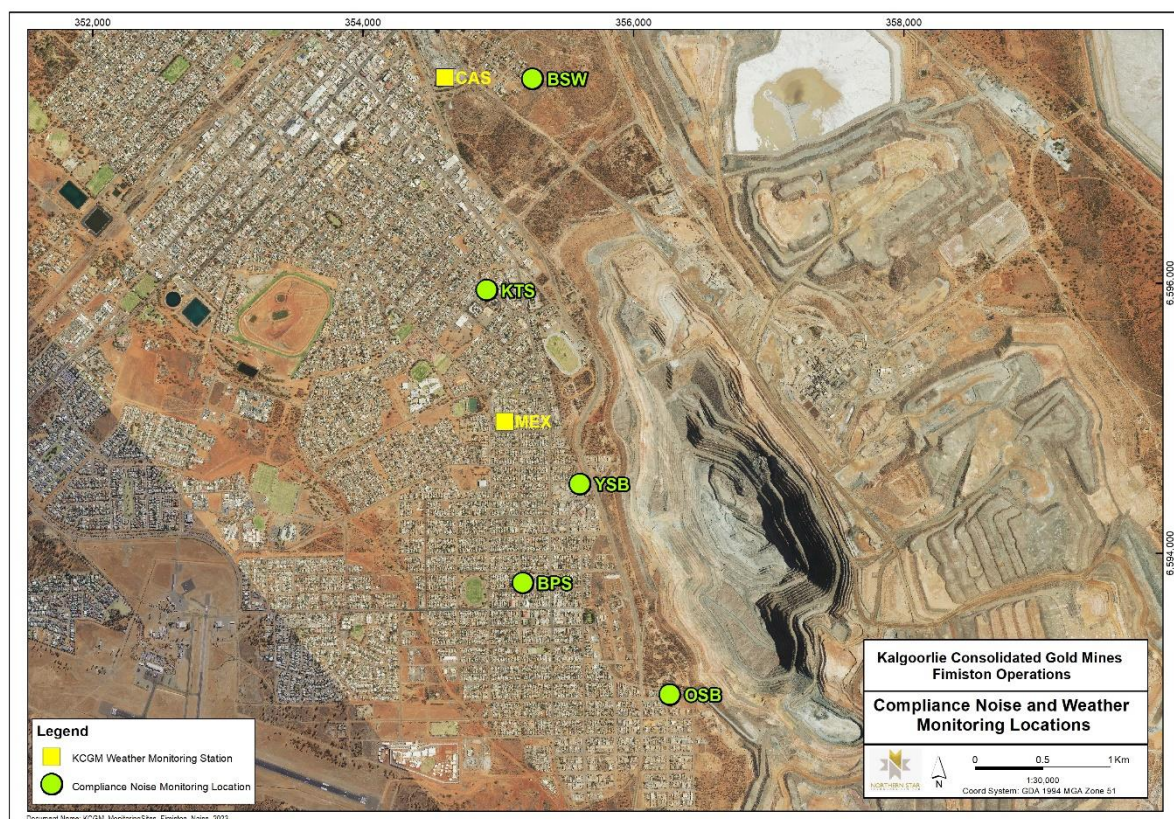


Figure 3: Compliance Noise Monitoring and Weather Station Locations

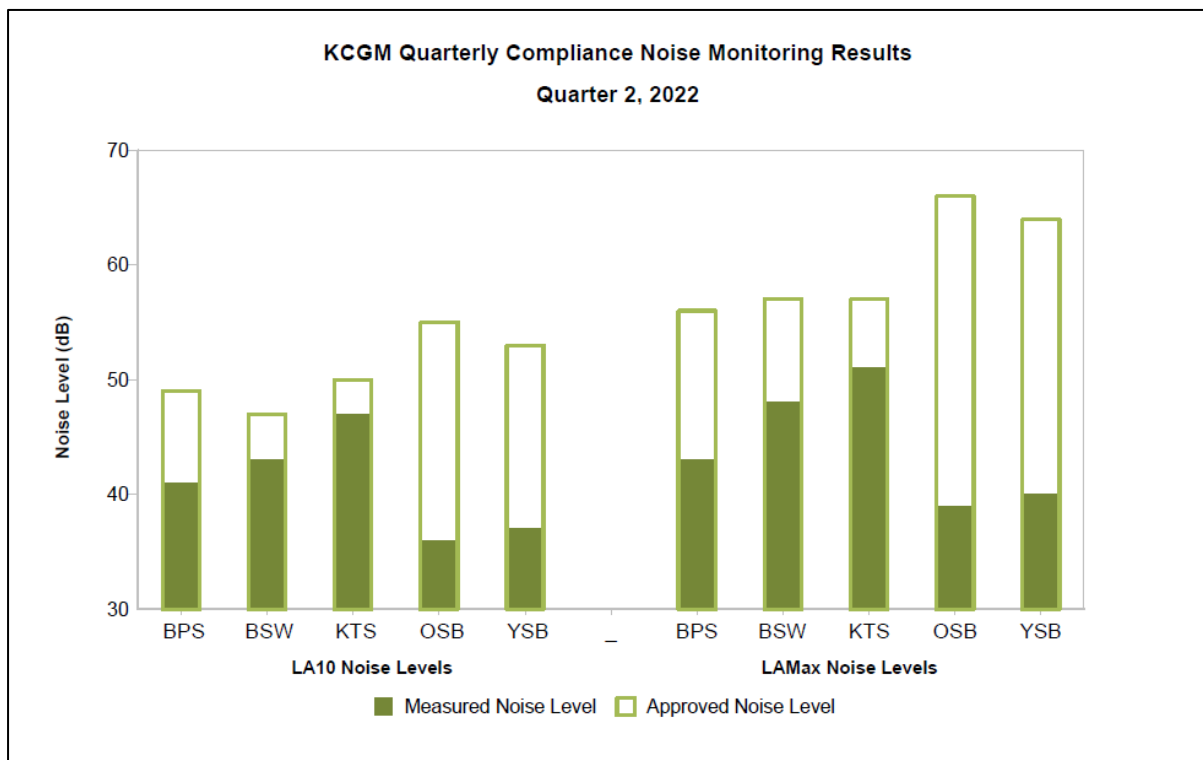


Figure 4: Compliance Noise Monitoring Results, Quarter 2 2022

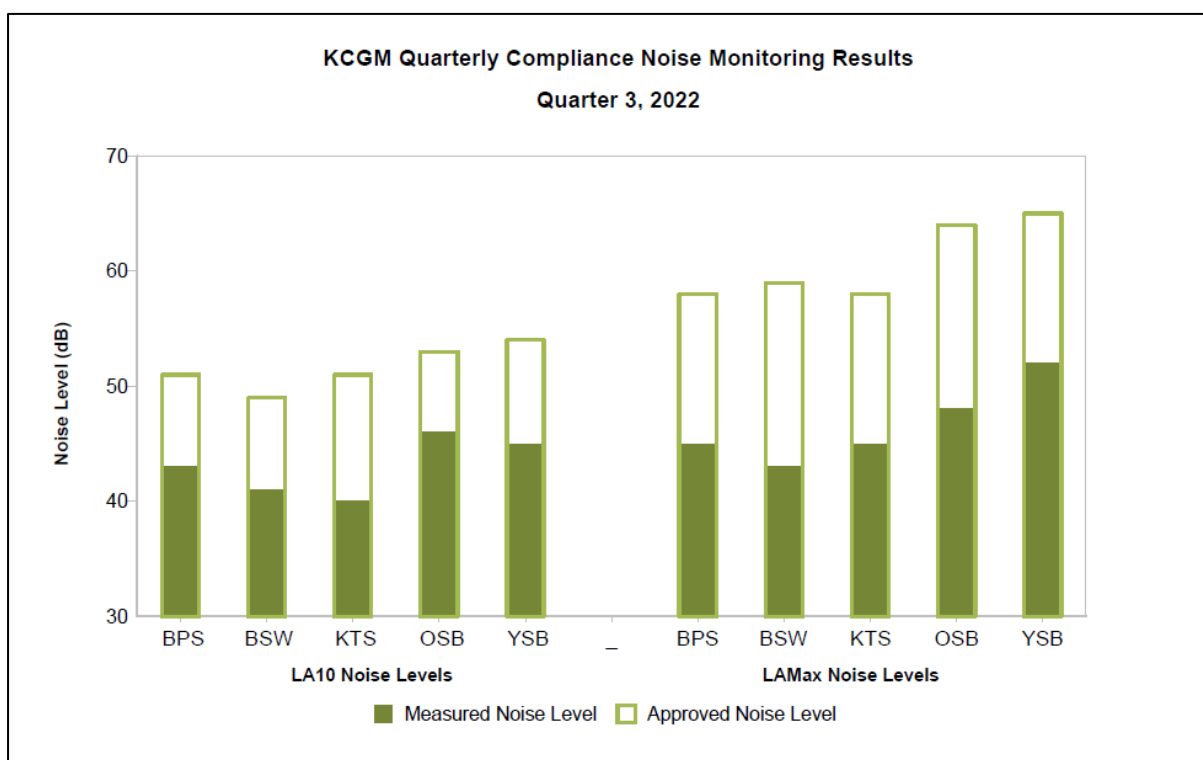


Figure 5: Compliance Noise Monitoring Results, Quarter 3 2022

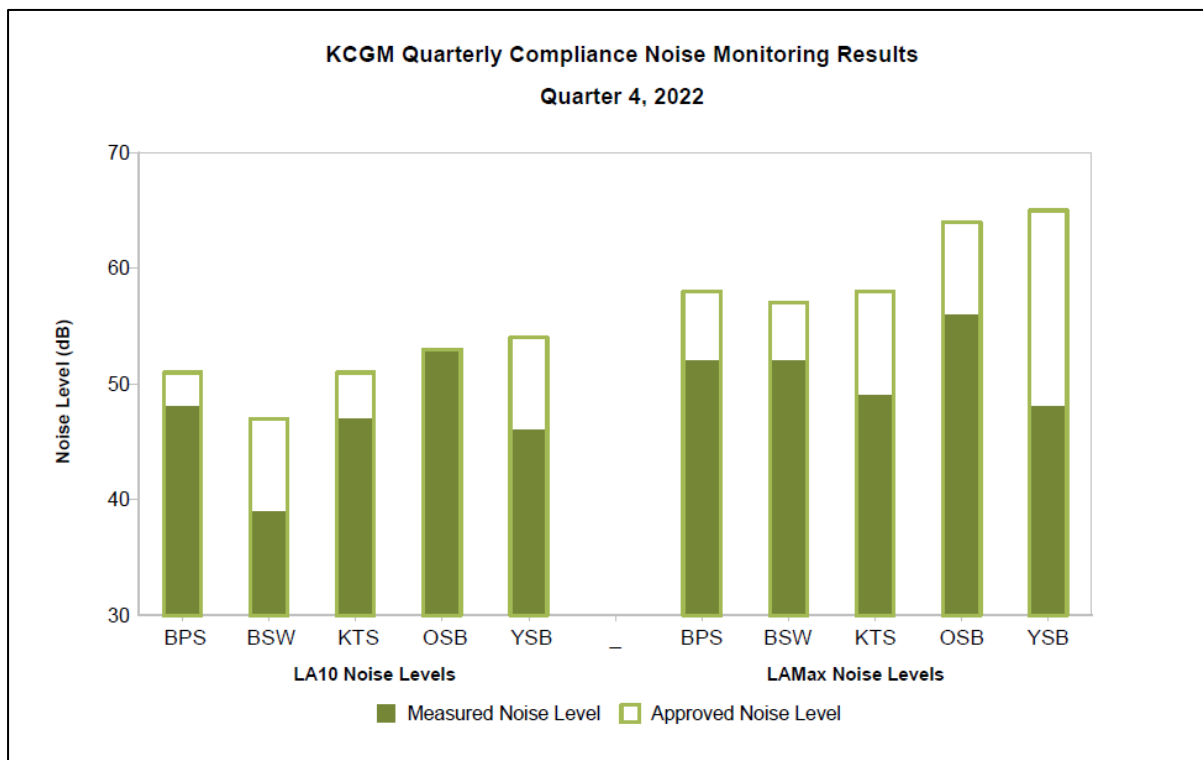


Figure 6: Compliance Noise Monitoring Results, Quarter 4 2022

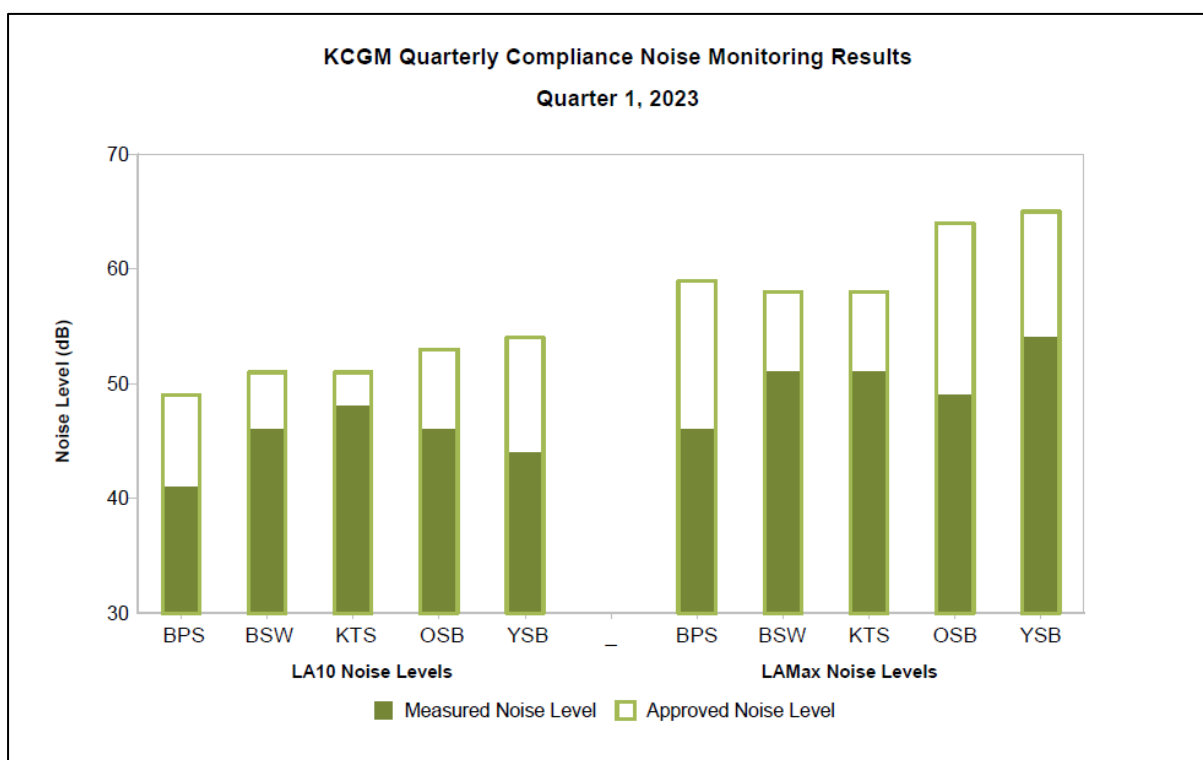


Figure 7: Compliance Noise Monitoring Results, Quarter 1 2023

3.3. Airblast Monitoring

Approved airblast levels for KCGM's Fimiston Operations are stipulated in Condition 4 of the 2016 Fimiston Noise Approval. During the reporting period, airblast levels received at each blast monitoring station Figure 8 were recorded in accordance with Condition 8(3) of the 2016 Fimiston Noise Approval.

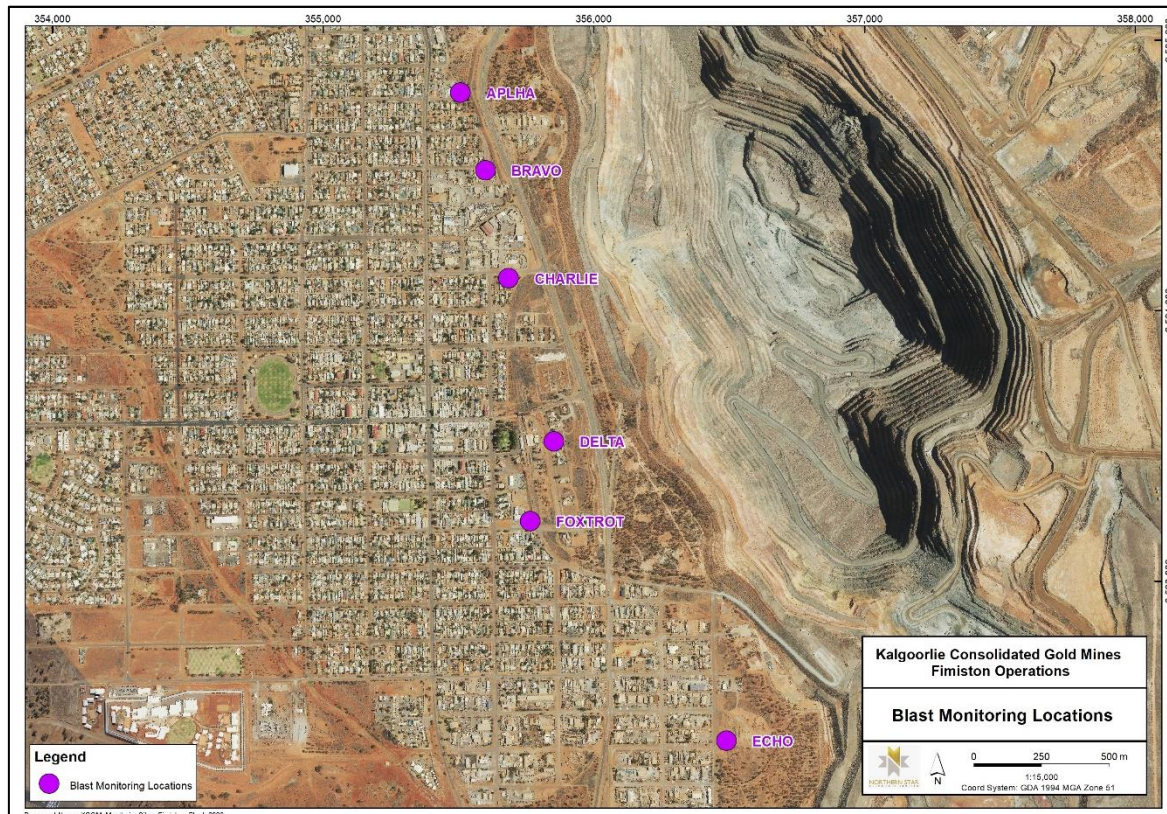


Figure 8: Fimiston Open Pit Blast Monitoring Sites

During the blast monitor calibration process from 31 May 2022 to 1 June 2022 it was identified that the monitor located at the Charlie blast monitoring site required maintenance and it was removed from service. On 17 November 2022 the Charlie blast monitor was replaced with a calibrated back-up monitor. This monitor will remain in the blast monitoring network and is due for calibration in May 2023. KCGM has reviewed its operating processes which has resulted in the implementation of further monthly checks to ensure ongoing commitment to the NVMMMP.

A review of the blasts conducted in Quarter 4 2022 and the blast monitoring results recorded in Quarter 2, Quarter 3 and November/December 2022 indicates that the blast vibration levels are likely to be less than 5mm/s and the airblast levels less than 115dB for the period the blast monitor was offline.

Results of the recorded airblast levels are provided in the Quarterly Noise and Blast Monitoring Reports submitted to the DWER. During the reporting period, the measured airblast levels at all locations complied with the approved noise levels (Table 1). A summary of the measured airblast levels are shown in Figure 9.

Table 1: Noise Emissions from Blasting as per Schedule 3 of the 2016 Fimiston Noise Approval

Time of Day	Approved airblast level (dB L _Z peak)	
	Not to be exceeded anytime	Not to be exceeded for 9 in any 10 consecutive blasts
0700 to 1800 hours Monday to Saturday (excluding public holidays)	125	120
0700 to 1800 hours Sunday and public holidays	120	115

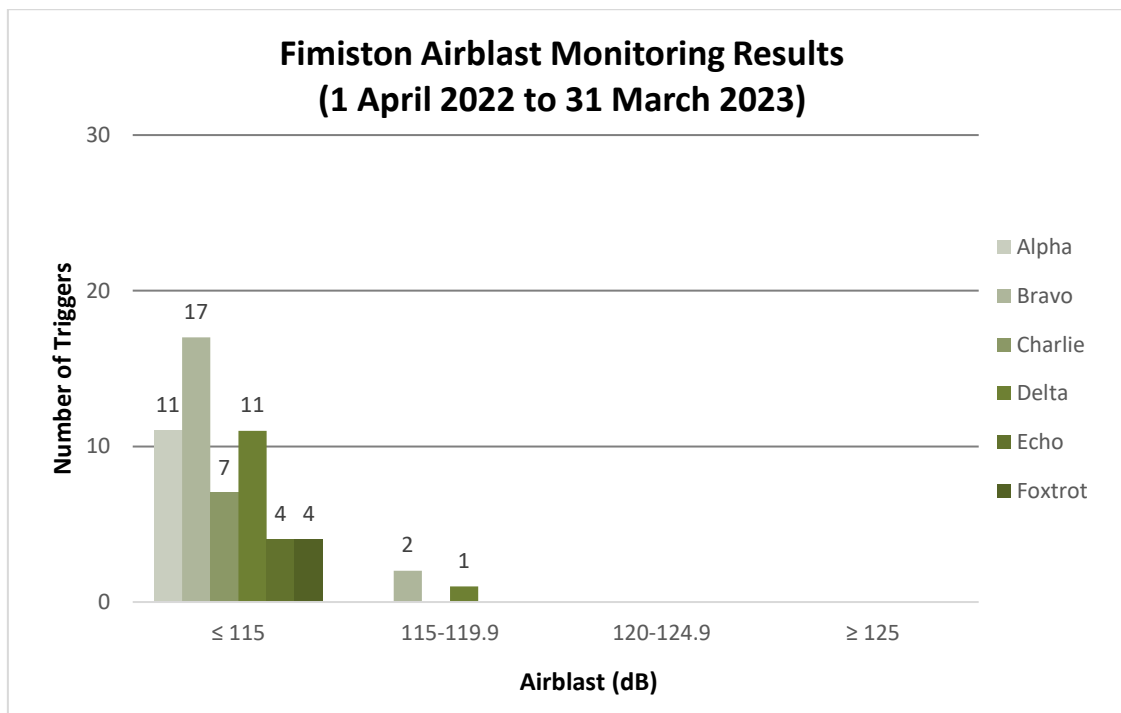


Figure 9: Summary of Fimiston Airblast Monitoring Results

4. NOISE MANAGEMENT PLAN IMPLEMENTATION

KCGM's NVMMP has been developed and implemented by KCGM in accordance with conditions set by the Minister for Environment since the early 1990's. The NVMMP is implemented to fulfil the requirements of Ministerial Statement 782 *Fimiston Gold Mine Operations Extension (Stage 3) and Mine Closure Planning*, and the 2016 Fimiston Noise Approval.

The objective of the NVMMP is to manage noise emissions from the Fimiston Operations to minimise potential impacts to the residents of the City of Kalgoorlie-Boulder. Through implementation of the NVMMP, KCGM commits to undertake all reasonable, practicable and safe measures to meet the relevant noise and vibration standards.

In accordance with Condition 9 of the 2016 Fimiston Noise Approval the NVMMMP was updated following gazettal of the *Environmental Protection (Fimiston Gold Mine Noise Emissions) Approval 2016* in March 2016. The revised NVMMMP (June 2016) was submitted to the DWER on 22 June 2016 and was approved by the DWER (then DER) on 19 September 2016 and the DWER (then OEPA) on 1 November 2016.

The duration of the 2016 Approval is until 22 March 2021 or if KCGM applies for further approval within the first four years, it will continue to operate until another approval is granted or refused.

In December 2019, KCGM submitted an application to the Minister for Environment seeking further approval under Regulation 17 to allow the emission of noise from the existing Fimiston Gold Mine Operations to vary from the standards specified in the Regulations. In a letter dated 21 January 2020, KCGM were advised that the application had been referred to the Chief Executive Officer of the DWER for assessment.

As no further correspondence had been received since January 2020, KCGM contacted the DWER's Noise Service in June 2020 to determine the status of the application. KCGM's query was referred to the DWER's Regulatory Service who acknowledged that they are following up on the application. A letter from the Director General of the DWER, dated 17 August 2020, advised that the DWER is working through reprioritising resources needed to complete the assessment works, and that *"Once this process is completed over the next few weeks, I will ensure that the relevant officer makes contact in regard to your application"*. KCGM is yet to be contacted by the relevant officer.

KCGM has commenced working with the DWER Noise Branch and at a meeting held between the two parties on the 21 July 2022 KCGM discussed the further approval and the scheduling of the assessment. Also discussed with the Noise Branch was that KCGM had submitted a Significant Amendment (Referral) to Ministerial Statement 782 under Section 38 of the EP Act. It is anticipated that the further approval application will be assessed and processed in parallel with the Referral during 2023.

The NVMMMP covers the following aspects:

- Management Plan Summary
- Overview of the Fimiston Operations and History of Fimiston Noise Approvals
- Noise Modelling and Verification
- Management Approach (environmental noise, blast vibration and airblast)
- Environmental Criteria and Monitoring Programmes
- Complaint Management
- Reporting Provisions
- Adaptive Management and Review
- Stakeholder Consultation

KCGM believes the NVMMMP provides best practices and procedures to enable the Fimiston Operations to continue in a reasonable and practicable manner, while providing an acceptable noise environment for the residents of the City of Kalgoorlie-Boulder.

A summary of the progress of the implementation of the NVMMMP is provided in Table 2, which lists out the key activities undertaken with regards to KCGM's Management Approaches as outlined in the NVVMP.

Table 2: Summary of NVMMMP Implementation

MANAGEMENT APPROACH		PROGRESS OF IMPLEMENTATION
Mining Activities	Environmental Noise Bund	<ul style="list-style-type: none"> A key noise management feature at KCGM has been the establishment of the Environmental Noise Bund (ENB). Major changes to the pit design take into consideration the location of the ENB and potential noise impacts on the City of Kalgoorlie-Boulder.
	Surface Activities	<ul style="list-style-type: none"> Certain surface activities (e.g., rock breaking) continue to be restricted to daytime only. Four complaints were received in relation to mining activities during the reporting period (refer to Table 3).
	Mt Charlotte Waste Rock Conveyor	<ul style="list-style-type: none"> KCGM continues to manage noise emissions from the Mt Charlotte Waste Rock Conveyor via routine inspections and maintenance of the conveyor belt, the rollers and related infrastructure. One complaint was received in relation to the Mt Charlotte Waste Rock Conveyor during the reporting period (refer to Table 3).
Haul Truck Noise	UWA Research Project	<ul style="list-style-type: none"> KCGM implemented a Noise Amelioration Programme by means of co-funding a Research Project entitled “<i>Integrated Passive and Active Control of Humming noise from KCGM’s Haul Trucks</i>” put forward by the University of Western Australia (UWA). The project was aimed at achieving total sound power attenuation through development of a prototype engine enclosure as well as examining ways to reduce noise associated with the haul truck muffler. The final report for the ARC Linkage Project (LP140100987) “Integrated Passive and Active Control of Humming Noise from KCGM’s Haul Trucks” was submitted to KCGM in August 2019. In summary, the outcome of this project included three innovative techniques that can effectively reduce the noise from KCGM haul trucks. Of these techniques, the partial acoustic enclosure and retrofitted mufflers are considered the most practicable and cost-effective for use on-site to achieve noticeable noise reduction. Whilst the single-channel Active Noise Control (ANC) is a good method for the control of tonal noise radiation in a specific direction, it is not practical for use on-site. During 2020/21 KCGM replaced its aging CAT 793C haul truck fleet with new CAT 793F haul trucks. KCGM is reviewing the the noise reduction techniques from the UWA study to determine if they are applicable to the new CAT 793F trucks.
	Reversing Alarms	<ul style="list-style-type: none"> Broadband reversing alarms continue to be utilised on select mining equipment permanently located onsite.
Resource Definition Drilling		<ul style="list-style-type: none"> KCGM’s resource definition drilling programmes often occur in close proximity to the City of Kalgoorlie-Boulder. A desktop noise assessment is undertaken for each drilling programme prior to commencement to verify compliance with the <i>Environmental Protection (Noise) Regulations 1997</i>. In 2016, KCGM commenced a resource definition drilling programme on the western side of the ENB which were in close proximity to industrial premises in Boulder. Several

MANAGEMENT APPROACH		PROGRESS OF IMPLEMENTATION
		<p>desktop noise assessments have been undertaken which indicated that the proposed 24/7 drilling operations would comply with the <i>Environmental Protection (Noise) Regulations 1997</i>.</p> <ul style="list-style-type: none"> • During the reporting period, KCGM continued to undertake resource definition drilling to the south of the open pit operations (near the Super Pit Lookout). These activities operate in close proximity to industry premises within the South Boulder area. • Sea containers are utilised to manage noise emissions as required. • Nearby property owners are notified of the planned drilling activities via letter drop prior to commencement. • No issues or complaints were received in relation to KCGM's resource definition drilling activities during the reporting period.
Surface Blasting	Blasting Times	<ul style="list-style-type: none"> • KCGM only detonated explosives on the premises between the hours of 0700 hours and 1800 hours. • All reasonable effort was taken to avoid blasting on Sundays. • Whilst blasts are not scheduled on Sundays, there can be a requirement to conduct unscheduled blasts on a Sunday. Each request for a Sunday blast is subject to an internal, multi-departmental review which considers several criteria including likely impact to near neighbours. No noise complaints were received from blasting on a Sunday during the reporting period. • When a blast is fired on a Sunday, an explanation is provided in the Quarterly Noise and Blast Monitoring Reports submitted to the DWER.
	Blast Design and Modelling	<ul style="list-style-type: none"> • Each blast is carefully designed to meet internal design criteria and considers external factors which may potentially increase the vibration and/or airblast levels. • No complaints were received in relation to airblast as a result of surface blasting activities during the reporting period.

5. PUBLIC COMPLAINTS

KCGM's approach to Complaint Management is outlined in the NVMMP.

A summary of any complaints regarding noise and/or vibration received are provided in the Quarterly Noise and Blast Monitoring Reports submitted to the DWER. Noise complaints have been listed below in Table 3 for the annual reporting period associated with this report.

Table 3: Summary of Complaints in the Reporting Period (22 March 2022 to 21 March 2023)

Complaint Category	Date	Summary of Complaint
Noise	8/04/2022	Local resident contacted the PIL regarding noise and advised the 'Real Time Noise Monitoring Graph' was unavailable on the Superpit website. An internal review identified an issue with the Pi network communications and whilst repairs were being carried out, the report was manually uploaded to the Superpit website. An internal environment review of noise identified that the closest noise monitor to the resident 'MEX didn't record elevated noise, however, the wind direction aligned with Fimiston open pit 'OBH' operations including load and haul activity.
Noise	17/09/2022	Local resident made a complaint through the website query function regarding constant machinery noise at 12:30am near Federal Road and Brookman Street, Boulder. An internal environment review of noise identified that the closest noise monitor at "MEP" recorded marginal elevated night-time noise and wind direction fluctuated with the low speeds. The complaint also claimed real-time noise data was not available, on review however, the data upload was successful and available.
Noise	16/10/2022	Local resident made a complaint through the NSR Facebook page stating noise accelerated from 3am to sunrise. An internal environment review indicated haulage around Southern and Eastern waste rocks dumps. Wind direction aligned with Fimiston haulage operations into town. The resident only indicated that they were a "nearby resident" to Fimiston operations. This limited KCGM's ability to narrow down potential noise sources.
Noise	18/10/2022	Local resident made a complaint through the PIL seeking a resolution to noise emissions from KCGM Operations. A KCGM Social Performance Advisor called the resident the morning of October 19th, upon receiving PIL form from the night shift team to better understand the residents' concerns. After a follow-up call with the resident, it is believed noise is compounding with other personal factors.
Noise	27/01/2023	Williamstown Resident on Cahill Road called PIL to lodge complaint regarding high pitch noise caused by rollers on the MTC conveyor belt. The noise has been heard intermittently for two weeks prior. Once resident called, the crusher team were advised and conducted an inspection. The roller causing the noise was identified and replaced. Resident was appreciative that the issue was resolved quickly.

Figure 10 shows a summary of noise complaints received by KCGM since 2009 (by calendar year) with respect to activities managed under the NVMMMP.

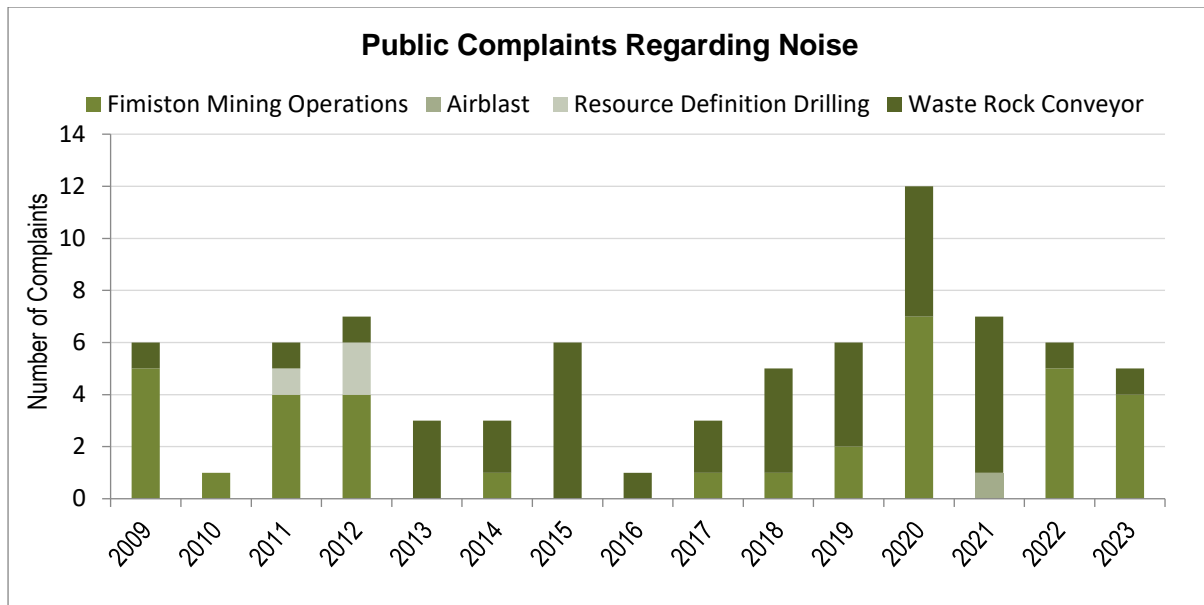


Figure 10: Summary of Noise Complaints by Calendar Year Since 2009