



OceanaGold New Zealand Ltd

Fourth Quarter 2019 - Summary Report

Noise Levels in Waihi



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## 1. Summary

Compliance against the consented noise limit(s) and New Zealand Standards was achieved during the fourth quarter of 2019. Two mean corrected noise levels (MCNL) assessments were made during the period; both had all contributory readings in suitable meteorological conditions as required by the measurement standards and were compliant.

22 single compliance readings were made during the quarter. 12 single corrected measurement levels (SCML) were taken in suitable met conditions and were compliant.

Adverse wind conditions (>3 m/s), as recorded at the meteorological station on Barry Rd, occurred on 36% of the monitoring occasions.

No marginal or non-compliant measurements were made during the period, which contributed to no yellow or red assessments (as per the Noise Management Plan – Noise Mitigation) being determined during the quarter.

Five night-time measurements for the Mill were recorded in the reporting period. The measurements were compliant, with the mill inaudible and levels dominated by crickets and cicadas at 30 to 36 dB.

Three compliance measurements were made of surface-related activities (e.g. stockpiling and ventilation) supporting underground operations during the quarter. All measurements were compliant; levels ranged from 44 to 46 dB and were dominated by residential activities and birds.

## 2. Introduction

This report provides a summary of noise measurements and assessments undertaken by OceanaGold (NZ) Ltd Waihi Operations (OceanaGold) for the Fourth quarter of 2019. The report is prepared to comply with the requirements of five consents:

- Hauraki District Council (HDC) Land Use Consent (LUC) for Project Martha (LUC 202.2018.857.1, condition 26A) OceanaGold is required to submit quarterly summary reports to Council on representative noise levels.
- Under the Noise Conditions of the LUC for the Favona Underground Mine (No. 85.050.326.E, condition 9) a summary report is required at the end of each 3-month period from commencement to completion of work.
- Under the Noise Conditions of the LUC for the Trio Underground Mine (RC-15774, condition 6d) a summary report is required at the end of each 3-month period from commencement to completion of work.
- Under the Noise Conditions of the LUC for the Correnso Underground Mine (RC-202.2012, condition 11d) a summary report is required at the end of each 3-month period from commencement to completion of work.
- Under the Noise Conditions of the LUC for the Martha Drill Drive Project (MDDP) (LUSE-202.2017.664.001, condition 11d) a summary report is required at the end of each 3-month period from commencement to completion of work.

For exploration drilling operations, the conditions set out in section 8.3.1 of the Hauraki District Plan apply. Any monitoring of these activities is also included in this report.

## 3. Methodology

Sound measurements and assessments by OceanaGold comply with the consent conditions and the New Zealand Standards *NZS 6801:2008 Acoustics - Measurement of Environmental Sound and 6802:2008 Acoustics - Environmental Noise*.

Compliance noise is measured for a minimum of 15 minutes as required under the consent conditions. Compliance readings cannot always be made on every site visit or check due to excessive wind conditions (i.e. greater than 5 m/s).

Monitoring checks are made in response to complaints whenever necessary; initially to verify the noise level and subsequently (if necessary) to determine the effectiveness of any mitigating actions and/or the

effect of changing wind conditions (changing wind strength or direction influences noise transmission between the mine and the receiver).

OceanaGold uses noise monitoring procedures to ensure conformance to the above standards and consent conditions, and has also implemented a noise mitigation plan for the Martha Mine. The Martha Mine Noise Mitigation Plan requires daily review of wind conditions that could potentially result in noise levels generating complaints. Monitoring has shown that wind speeds (measured at the OceanaGold meteorological station) over 3 m/s are likely to increase mine noise downwind of the activity to levels that generate complaints. When such wind conditions occur, OceanaGold implements mitigating actions to reduce noise levels where practicable. During periods when high frequency sounds such as birds, cicadas and crickets become the controlling noise, a filter can be applied to noise measurements at four and eight kilo-hertz to enable analysis of the lower frequency noise levels (i.e. those associated with mine operations).

Wind has a significant influence on sound propagation. Sound measurement and assessment must take the effect of wind into account. Sound measurements are taken in conditions ranging from nil wind up to 5 m/s at the receiver (*NZS 6801:2008 Acoustics - Measurement of Environmental Sound*). Wind greater than 5 m/s is generally unacceptable for monitoring due to wind noise effects on the microphone.

Downwind, wind speeds of 3 - 5 m/s are considered marginal due to propagation of sound by wind from source to receiver. Conditions akin to those for which the compliance limits are set generally occur when wind speeds are less than 3 m/s (*Hegley, 2003: Evidence of Nevil Hegley – Favona Underground Project 2003 Final – 11/11/03*).

Wind speeds are recorded at the OceanaGold met stations at Barry Rd and at the Development Site. These wind readings are assumed to represent the general wind conditions across Waihi and at the noise source (e.g. the mine).

Other meteorological factors influencing the overall sound environment include solar radiation, cloud cover, sunrise and sunset times, wind direction and the direction from source to receiver. These factors were also measured to derive a meteorological stability rating at the time of monitoring. Meteorological stability categories of 4 (neutral) or 5 (slightly positive) are considered suitable meteorological influences on sound propagation and are used to determine noise compliance (*NZS 6801:2008 Acoustics - Measurement of Environmental Sound* (HDC LUC 97/98-105, Condition 3.8 (e))).

## 4. Results

### 4.1. General

Monitoring activity for the period is shown in Table 1.

**Table 1:** Noise monitoring activity

	Number of days checked	Number of days measured	Number of checks (compliance & other)	Number of complaint days	Number of complaint checks
October	3	3	8	0	0
November	1	1	4	0	0
December	3	3	10	0	0
<b>QR Total</b>	<b>7</b>	<b>7</b>	<b>22</b>	<b>0</b>	<b>0</b>

### 4.2. Wind

Adverse wind conditions occurred at the Barry Rd met station for 36% of the monitoring occasions (see Table 2). While it is the general prevailing wind condition as measured at the met station that primarily affects noise propagation, measurements may be made under adverse conditions if the wind at the receiver or at street level is generally more favourable for monitoring. Even then, representative noise measurements of mining activities are not always possible due to wind noise. Periods of high wind strengths during monitoring were less frequent than the previous quarter (53% adverse).

**Table 2:** Percentage of monitoring time average wind speeds greater or equal to 3 m/s.

	<b>Receiver</b>	<b>Met Station</b>
October	0%	38%
November	0%	100%
December	0%	10%
<b>QR Total</b>	<b>0%</b>	<b>36%</b>

55% (12/22) of the compliance measurements made in the reporting period were in suitable met conditions (as measured at the met station). Other conditions (wind direction, solar radiation, and cloud cover) also influence suitable met assessments. Monitoring in suitable met conditions occurred on more occasions during this reporting period as the previous quarter.

#### 4.3. Compliance

No mine-dominated SCML exceeded compliance levels in suitable met conditions during the reporting period (see Table 3).

**Table 3:** Summary of Single Corrected Measured Levels (SCML).

	<b>Total SCML calculations</b>	<b>Mine-dominated SCML over (limit + 5 dB)</b>	<b>SCML in suitable met</b>	<b>Mine-dominated SCML over in suitable met</b>
October	8	0	7	0
November	4	0	0	0
December	10	0	5	0
<b>QR Total</b>	<b>22</b>	<b>0</b>	<b>12</b>	<b>0</b>

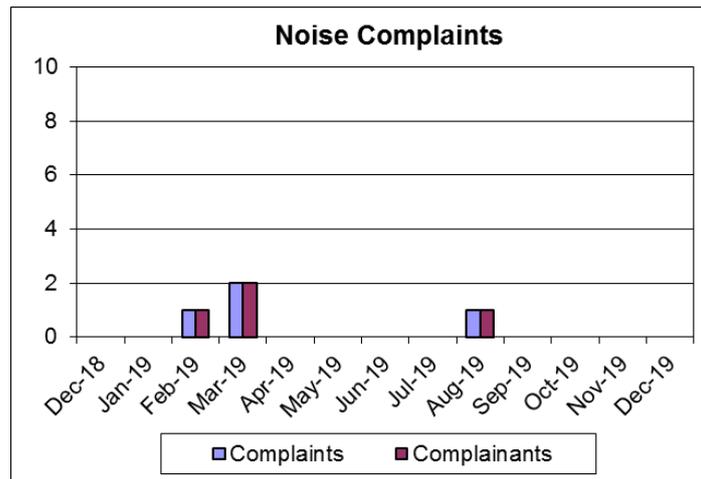
Two MCNL assessment was made where all contributing measurements were in suitable met conditions this quarter (see Table 4); both measurements were compliant with the consented noise limit.

**Table 4:** Summary of Mean Corrected Noise Levels (MCNL).

	<b>Total MCNL calculations</b>	<b>Marginal MCNL</b>	<b>MCNL 5 dB over limit</b>	<b>MCNL in suitable met</b>	<b>MCNL over limit in suitable met</b>
October	1	0	0	1	0
November	0	0	0	0	0
December	1	0	0	1	0
<b>QR Total</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

#### 4.4. Complaints

There were no complaints in relation to mining-related noise during the reporting period (note: blast related issues are documented in the quarterly vibration report).



**Figure 1:** Noise complaint history

## 4.5. Operations Assessment

### 4.5.1. Martha Pit

No significant works were conducted in the pit during the quarter. The pit is essentially in 'lock-down' with only essential maintenance (drainage, weed control, and security) and low-impact geotechnical monitoring being undertaken.

### 4.5.2. Mill

Five night-time measurements for the mill were recorded in the reporting period. The measurements were compliant, with the mill inaudible and levels dominated by wind and traffic at 30 to 36 dB. No measurement was mine-dominant.

### 4.5.3. Underground Operations

Three compliance measurements were made of surface-related activities (e.g. stockpiling and ventilation) supporting underground operations during the quarter. All measurements were compliant; levels ranged from 44 to 46 dB and were dominated by residential activities and birds.

### 4.5.4. Exploration/Drilling

Near-mine exploration and geotechnical drilling during the quarter continued in various locations: underground, in and around the outside of the pit, and over the Rex orebody. Drilling near to private residences has been kept to daytime-only drilling, recognising the activity was unlikely to comply with night-time noise restrictions. Some night-time drilling was achievable at sites more distant from private residences, but this required additional noise mitigation measures and a preparedness to return to daytime-only if issues arise.

Monitoring was undertaken in relation to an exploration drill rig in the south-west corner of the pit, focusing on noise implications at a company rental property (i.e. not a compliance issue). Liaison was undertaken with the tenants following two night-time readings up to 47 dB; they advised that the noise was not affecting them, and they supported the drilling continuing.

The use of proprietary noise blankets installed on security fences around drill rigs was common practice during the period.

## 5. Mitigation

### 5.1. Mine & Exploration

Commitment to the management and mitigation of mine noise was sustained during the reporting period. In accordance with the Noise Management Plan (noise mitigation), no yellow assessments or red assessments were determined during the quarter.