



OceanaGold New Zealand Ltd
Fourth Quarter Summary Report 2019
Vibration Levels in Waihi

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Summary

- Results from the Blasthub vibration monitoring system for the fourth quarter 2019 are reported for Favona, Trio, Correnso and SUPA Underground Mines and Project Martha. Stope blasting was carried out in relation to Correnso/SUPA and the Trio Deeps, with significant development blasting undertaken in the Martha Underground component of Project Martha.
- Compliance for Correnso/SUPA development and production blasting was achieved for both the 95-percentile and average limits defined by the consents. One blast result was above the 95-percentile standard of 5mm/s; this was reported, investigated and the applicable mitigation action implemented.
- Compliance for Trio blasting was achieved during the quarter; 6 production blast events during the period triggered compliance monitors with a maximum PVS of 1.3mm/s. No development blasts triggered compliance monitors.
- Compliance for Project Martha blasting was achieved during the quarter; only two of the 154 blast events during the period triggered any compliance monitors (maximum vibration 0.9mm/s). *Blasting within the Martha Drill Drive Project (MDDP) is now reported under the Project Martha statistics.*
- 36 vibration-related complaints were received during the reporting period, down from the 73 received in the previous quarter (Figures 6 & 7). The number of complainants also decreased; 10 during the quarter cf. 18 in the previous period. These decreases are considered due to good blast management in Correnso with relatively few large resultant vibrations.
- The total number of blasts (630) was up on the previous quarter (521) while the number of blast events (204) was down (cf. 292). Although there was an increase in blasts in Martha Underground with development now available in multiple headings, this was countered by a decrease in both blasts and events in both Trio (moving from development to a stoping phase) and Correnso (reduced development).

1. Introduction

This report documents vibration measurements and assessments to meet the requirements of:

- a) Hauraki District Council (HDC) LUC No. 97/98-105 (Condition 3.11) for the extended Martha Mine Project.
- b) HDC Land Use Consent 85.050.326E (Condition 24) for the Favona Underground Mine.
- c) HDC Land Use Consent RC-15774 (Condition 9) for the Trio Underground Mine Project.
- d) HDC Land Use Consent RC – 202.2012 (Condition 22 (f)) for the Correnso Underground Mine.
- e) HDC Land Use Consent RC – 202.2016 (Condition 14 (f)) for the Slevin Underground Mine (SUPA).
- f) HDC Land Use Consent RC – 202.2017 (Condition 18 (f)) for the Martha Drill Drive Project (MDDP).
- g) HDC Land Use Consent LUC 202.2018.857.1 (Condition 53) for Project Martha.

As agreed between OceanaGold and HDC these reports summarise vibration results and general performance of the monitoring system over calendar quarters rather than the dates set out in the consents.

2. Equipment Performance

“Blasthub”, the vibration monitoring system, has been used for reporting purposes, providing real-time monitoring, recording and review of results on a web-site. Access to the web-site is controlled, with permissions for review provided to HDC staff and OceanaGold users. The system is set with trigger levels between 0.40 and 0.75 mm/s for Martha and Underground operations.

In terms of vibration monitoring, the Project Martha network comprises 13 monitors (some shared with the Correnso network). These all have a trigger limit currently set at 0.75 mm/s. Any blasts fired during the period (highlighted in red) and the monitor locations are shown in Figure 1. (*nb: the ‘Rex’ monitors have not yet been installed, but will be prior to mining in that vicinity*)

The Trio Underground Operations have five compliance monitors situated at Boyd Rd, Moore St, Clarke St, the Coreshed (Barry Rd) and the Scout Hall (Baker St). In addition to these, one other monitor is located near the Trio vent shaft (Trio VS). This monitor acts as an ‘indicator’ for Blasthub, which allows correlation with the other monitors to report the compliance monitoring results directly onto Blasthub. The blasts fired during the period (highlighted in red) and monitor locations are shown in Figure 2.

The Correnso Underground monitoring network comprises 10 permanent vibration monitors. These all have a trigger limit currently set at 0.75 mm/s. The blasts fired during the period (highlighted in red) and monitor locations are shown in Figure 3. SUPA utilises the same compliance monitors as Correnso, with the data incorporated into a shared database.

MDDP officially commenced on 17 August 2017 and shared two monitors from the Correnso network (Secondary W and Secondary SW) along with three monitors (Pensioner Flats, Waihi CBD, Central School) along the drives' paths. MDDP data was initially incorporated into the shared Correnso database, but with the Project Martha consent boundary overlaying the MDDP consent area, the MDDP data subsequent to commencing Project Martha has now been allocated to the Project Martha database for reporting purposes.

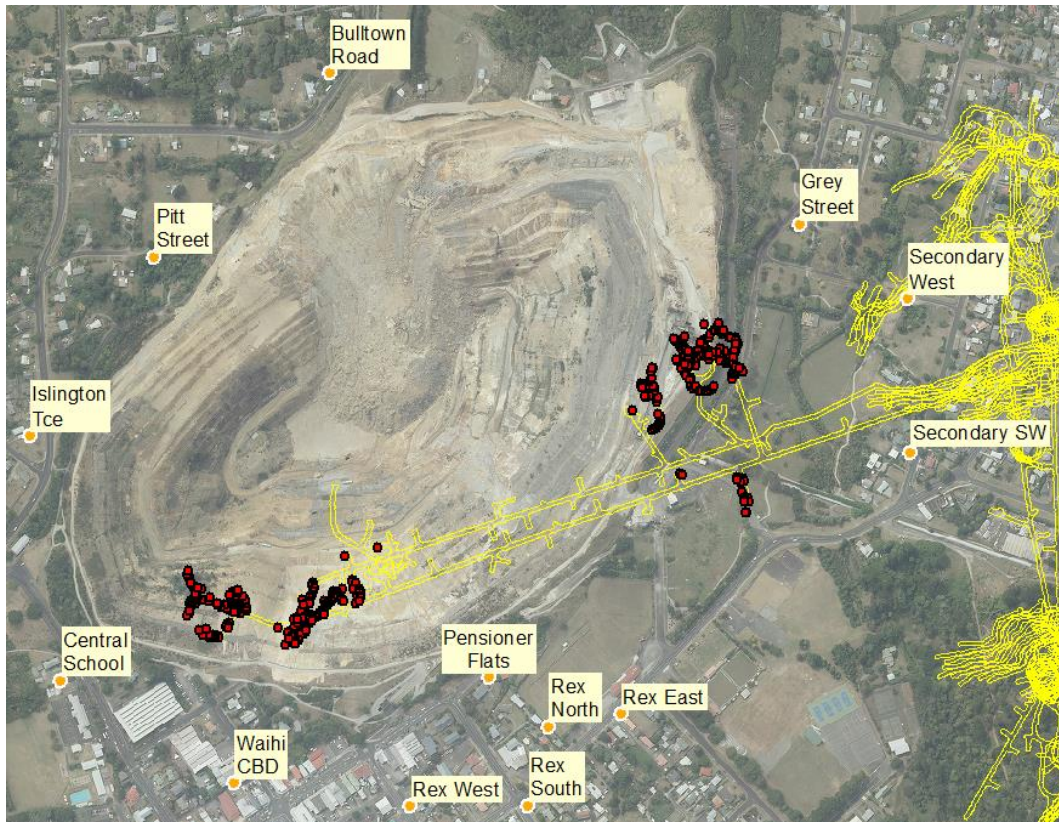


Figure 1 VMS Monitor & Blast Locations – Project Martha

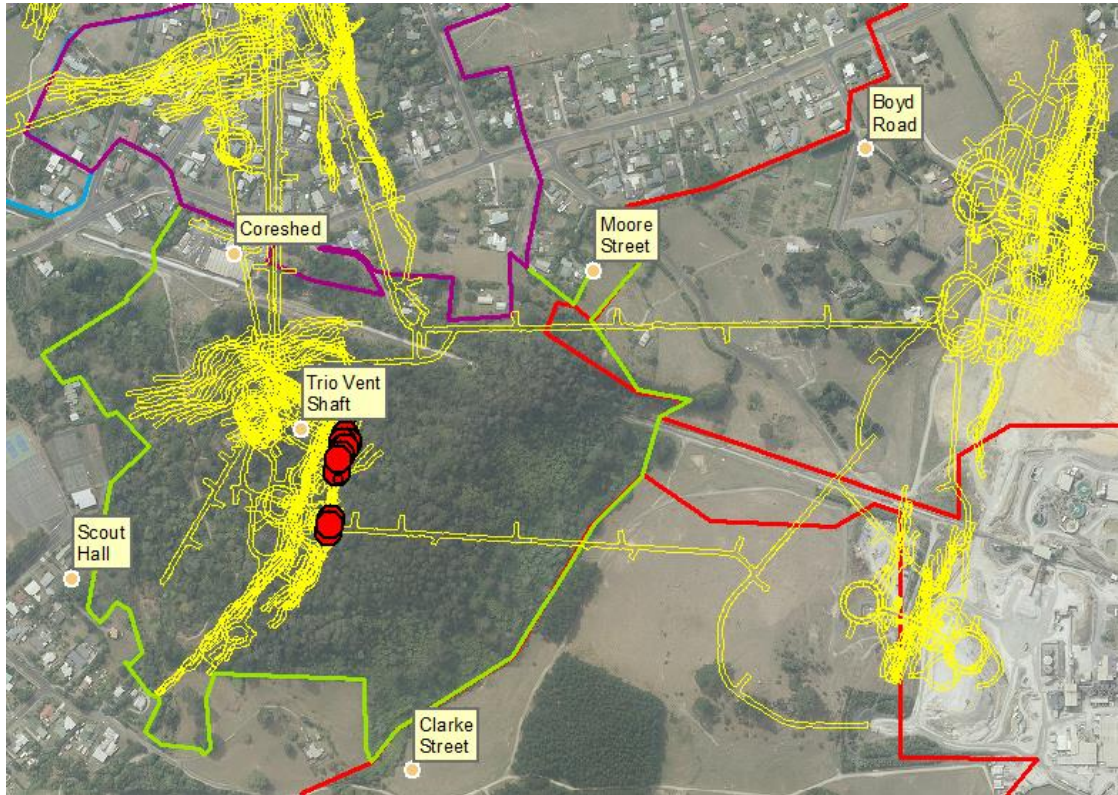


Figure 2 VMS Monitor & Blast Locations – Underground Operations (Favona & Trio)

Note: Larger icons indicate Production Blasts (>7kg MIC)

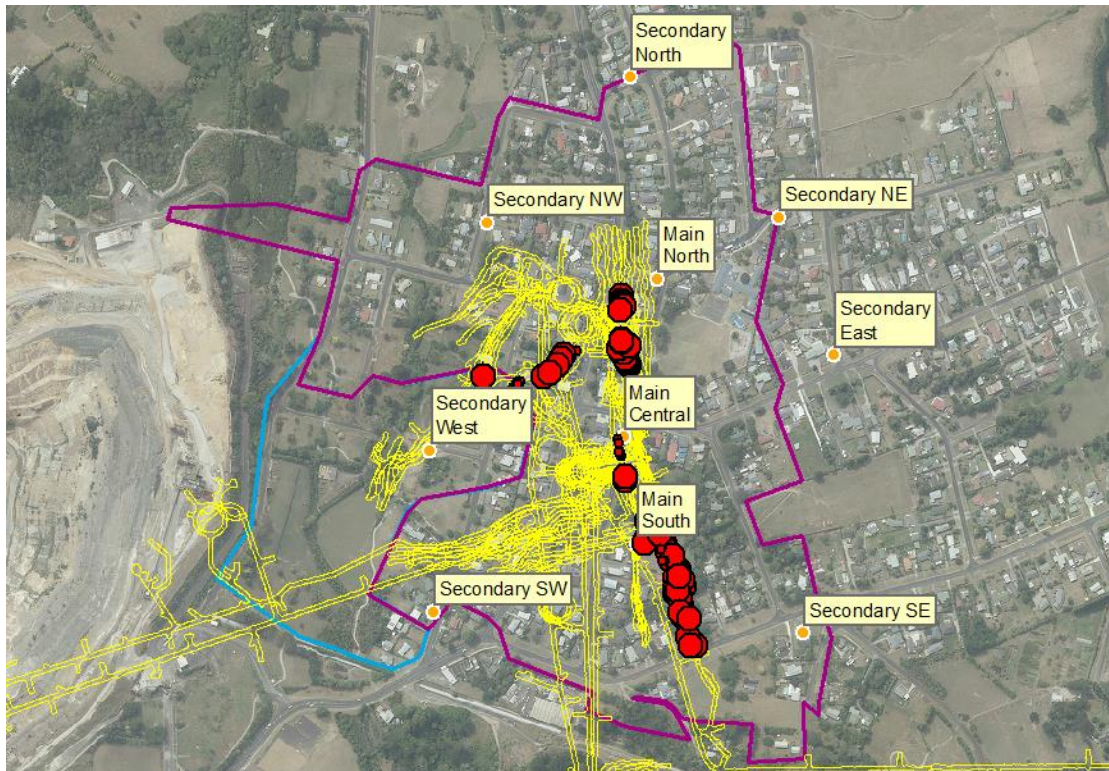


Figure 3: VMS Monitor & Blast Locations – Correnso, SUPA Operations

Note: Larger icons indicate Production Blasts (>7kg MIC)

3. Calibration

Calibration of monitoring equipment, including the roving monitors, was completed in June and November 2019. Calibration certificates can be viewed on Blasthub; refer to the monitoring results during those periods. The calibrations were undertaken by the Saros Group Pty Ltd in Queensland and conducted in accordance with AS/NZS ISO9000-2000 and AS ISO/IEC17025-2005 quality standards.

4. Compliance Assessment

4.1 Project Martha

154 blast events occurred in Martha Underground during the reporting period. 470 were development blasts during normal blasting windows, while 1 maintenance/safety blast outside routine blast times was recorded during the period.

Project Martha Development:

- Compliance monitors were triggered twice during the quarter (maximum vibration 0.9mm/s); both events had three or more blasts occurring concurrently.
- The highest six-month average¹ for development blasting at a compliance monitor was assessed as 0.52mm/s at Waihi CBD, below the consent limit average of 2mm/s.
- The development six month rolling 95 percentile¹ for all locations was assessed as 0.75mm/s, below the 5mm/s limit.
- No compliance monitors were triggered by the maintenance/safety blast.

4.2 Underground (Favona & Trio) Operations

Ongoing development-scale blasting was largely completed in the Trio Operations area during this reporting period (8 Trio development blasts, down from the 131 blasts total in the previous quarter). Trio development consisted of extending drives underneath the earlier Trio works to facilitate stoping. No blasting was undertaken within Favona. None of the Trio development blasts triggered compliance monitors.

12 production blasts (i.e. greater than 7kg MIC) occurred within Trio during the quarter. The depth of these production blasts was illustrated by only 6 blasts triggering compliance monitors, with a maximum PVS of 1.3mm/s. This ensured compliance was achieved during the quarter.

4.3 Correnso and SUPA

During the fourth quarter of 2019, 94 blast events (cf. 287 in the previous quarter) occurred in the Correnso and SUPA projects. The blast locations are presented in Figure 3 above, with the relative locations indicated for development and production blasting. The peak vibration levels for the period are shown in Figure 4 below.

Development:

- The highest six-month average¹ for development blasting at a compliance monitor was 0.57mm/s at Main Central, below the consent limit average of 2mm/s.
- The development six month rolling 95 percentile¹ for all locations was 0.75mm/s, below the 5mm/s limit.

Production:

- The highest six-month average¹ for production blasting at a compliance monitor was 1.80mm/s at Main Central, below the consent limit average of 3mm/s.
- The production six month rolling 95 percentile¹ for all locations was 4.08mm/s, below the 5mm/s limit.

One blast exceeded the 5mm/s level at a compliance monitor during the quarter:

- On 13 December, at 13:37hrs, from firing the 928-942 Daybreak West stope, vibrations above 5mm/s were registered at Main Central (6.0mm/s). The blast consisted of a single 76mm diameter hole, charged with two decks of explosive (both well below the design maximum of 30kg MIC), designed to remove a partial bridge that remained at the brow after firing of the previous panel. It is likely that the additional burden that was created due to the partial bridge confined the bottom deck of the blast hole, resulting in that charge being made to 'work harder' to overcome the strength of this bridged section. This resulted in more blast energy being transferred into the rock mass, leading to increased vibration. For all future blasts in the area the MIC were reduced to 20kg per delay.

¹ Data is presented as at the end of the quarter

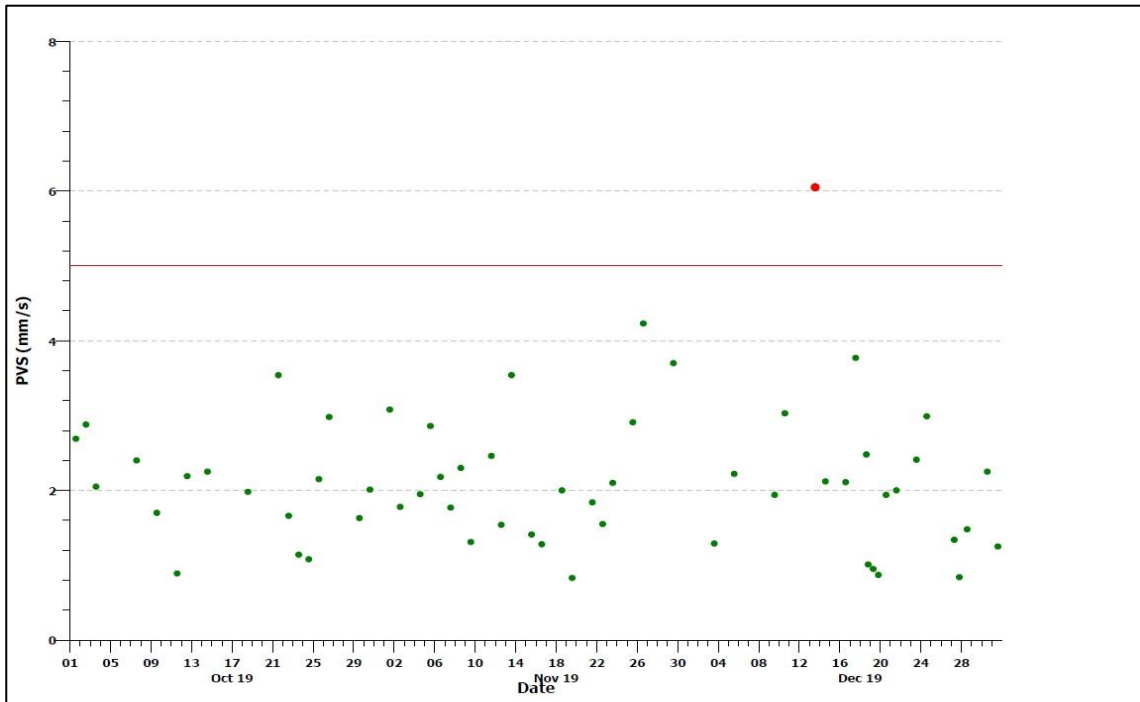


Figure 4: Peak Vibration Levels – Correnso/SUPA Operations

5. Blasting

The 204 blast events during the period was significantly lower that the 292 events in the previous quarter (Table 1). Although there was an increase in Martha Underground with development now in multiple headings, this was countered by a decrease in both Trio (moving from development to a stoping phase) and Correnso (reduced development).

Table 1: Quarterly blast events

Operation	2 nd Quarter 2019	3 rd Quarter 2019	4 th Quarter 2019
Martha Underground	-	103 (81 independent)	154 (98 independent)
Underground (Trio)	149 (31 Independent)	92 (43 independent)	20 (12 Independent)
Correnso/SUPA	178	168	94
Total	209	292	204

* Some blasts occurred simultaneously with blasting in other operational areas and did not contribute to the total number of blast events. Trio and Martha Underground events only contribute to the total when they are independent of Correnso.

Multiple blasts may be fired during the one blast event. There were 630 blasts in the fourth quarter of 2019, up significantly compared with 521 in the previous quarter (Figure 5). The increase was due primarily to a increased number of development headings in the Martha Underground, which more than countered a drop-off in blasts in both Correnso and Trio as development blasts in those operations have decreased.

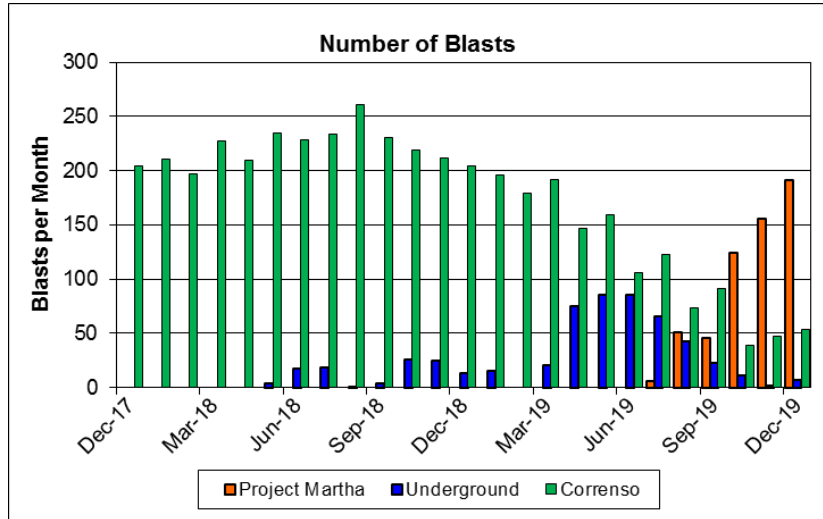


Figure 5: Number of Blasts (all operations)

6. Complaints

36 vibration-related complaints were received during the reporting period, down from the 73 received in the previous quarter (Figures 6 & 7). The number of complainants also decreased; 10 during the quarter cf. 18 in the previous period. These decreases are considered due to good blast management in Correnso with relatively few large resultant vibrations. 19 (53%) of the complaints were received from 2 residents. Table 2 provides a summary of the complaints received during the quarter.

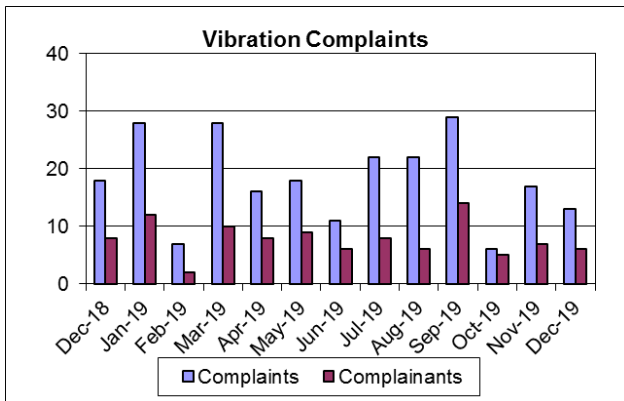


Figure 6: Number of Complaints & Complainants

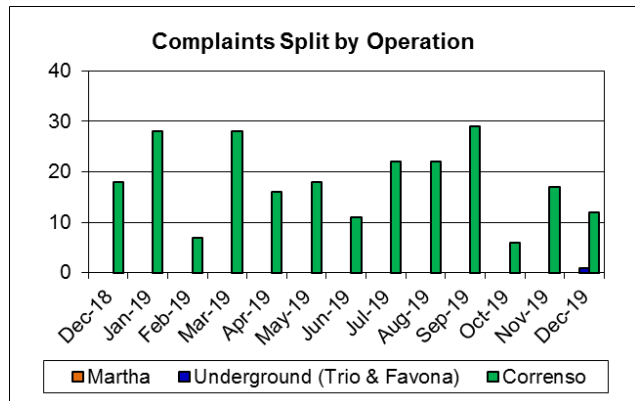


Figure 7: Complaints by Operation

Table 2: Summary of vibration complaints registered by OceanaGold

Date	Address	Nearest Monitor		Highest Blasthub Reading (mm/s)	Site
		Location	Reading (mm/s)		
14-Oct-19	Cuba St	Secondary East	1.8	2.2	Correnso
21-Oct-19	Stafford St	Secondary East	1.4	3.5	Correnso
21-Oct-19	Gladstone Rd	Main North	3.5	3.5	Correnso
21-Oct-19	Gladstone Rd	Secondary N	1.7	3.5	Correnso
26-Oct-19	Cuba St	Secondary East	2.3	3.0	Correnso
1-Nov-19	Gladstone Rd	Main North	3.1	3.1	Correnso
2-Nov-19	Cuba St	Secondary East	1.8	1.8	Correnso
2-Nov-19	Stafford St	Secondary SE	1.7	1.8	Correnso
5-Nov-19	Stafford St	Secondary SE	1.6	2.9	Correnso
5-Nov-19	Cuba St	Secondary East	2.0	2.9	Correnso
11-Nov-19	Gladstone Rd		n/a	n/a	Correnso
11-Nov-19	Gladstone Rd	Secondary North	1.6	2.5	Correnso
11-Nov-19	Gladstone Rd	Main South	1.6	2.5	Correnso
12-Nov-19	Cuba St	Secondary East	1.3	1.5	Correnso
13-Nov-19	Cuba St	Secondary East	2.3	3.5	Correnso
13-Nov-19	Gladstone Rd	Main North	3.5	3.5	Correnso
15-Nov-19	Cuba St	Secondary East	1.3	1.4	Correnso
16-Nov-19	Cuba St	Secondary East	0.9	1.3	Correnso
18-Nov-19	Gladstone Rd	Main North	2.0	2.0	Correnso
21-Nov-19	Cuba St	Secondary East	<0.75	1.8	Correnso
23-Nov-19	Gladstone Rd	Main North	1.5	2.1	Correnso
23-Nov-19	Gladstone Rd	Main North	1.5	2.1	Correnso
3-Dec-19	Gladstone Rd	Secondary North	n/a	n/a	Correnso
5-Dec-19	Cuba St	Secondary NE	0.9	2.2	Correnso
9-Dec-19	Cuba St	Secondary East	1.6	1.9	Correnso
9-Dec-19	Stafford St	Main South	1.9	1.9	Correnso
13-Dec-19	Cuba St	Secondary East	1.6	6.0	Correnso
13-Dec-19	Gladstone Rd	Main South	4.8	6.0	Correnso
17-Dec-19	Gladstone Rd	Main South	2.8	3.8	Correnso
21-Dec-19	Cuba St	Secondary East	2.0	2.0	Correnso
23-Dec-19	Stafford St	Secondary East	1.6	2.4	Correnso
23-Dec-19	Gladstone Rd	Secondary North	1.5	2.4	Correnso
23-Dec-19	Gladstone Rd	Secondary North	1.6	2.4	Correnso
24-Dec-19	Clarke St	Scout Hall	n/a	n/a	Trio
30-Dec-19	Stafford St	Secondary East	1.6	2.3	Correnso

7. Vibration and Complaint Management

A roving monitor was deployed at a Barry Rd property from 20 September to 09 October in response to a query whether a nearby compliance monitor was representative of vibrations at the property. Results from the roving monitor were compared with results from nearby Correnso compliance monitors (Main South and Secondary SE) (Figure 8).

The results from the roving monitor indicated that the property was on average receiving vibrations higher than the Secondary SE monitor and lower than Main South, which was to be expected given the properties location in relation to the compliance monitors and production blasting in Correnso. Overall, the roving monitor results were not considered anomalous.

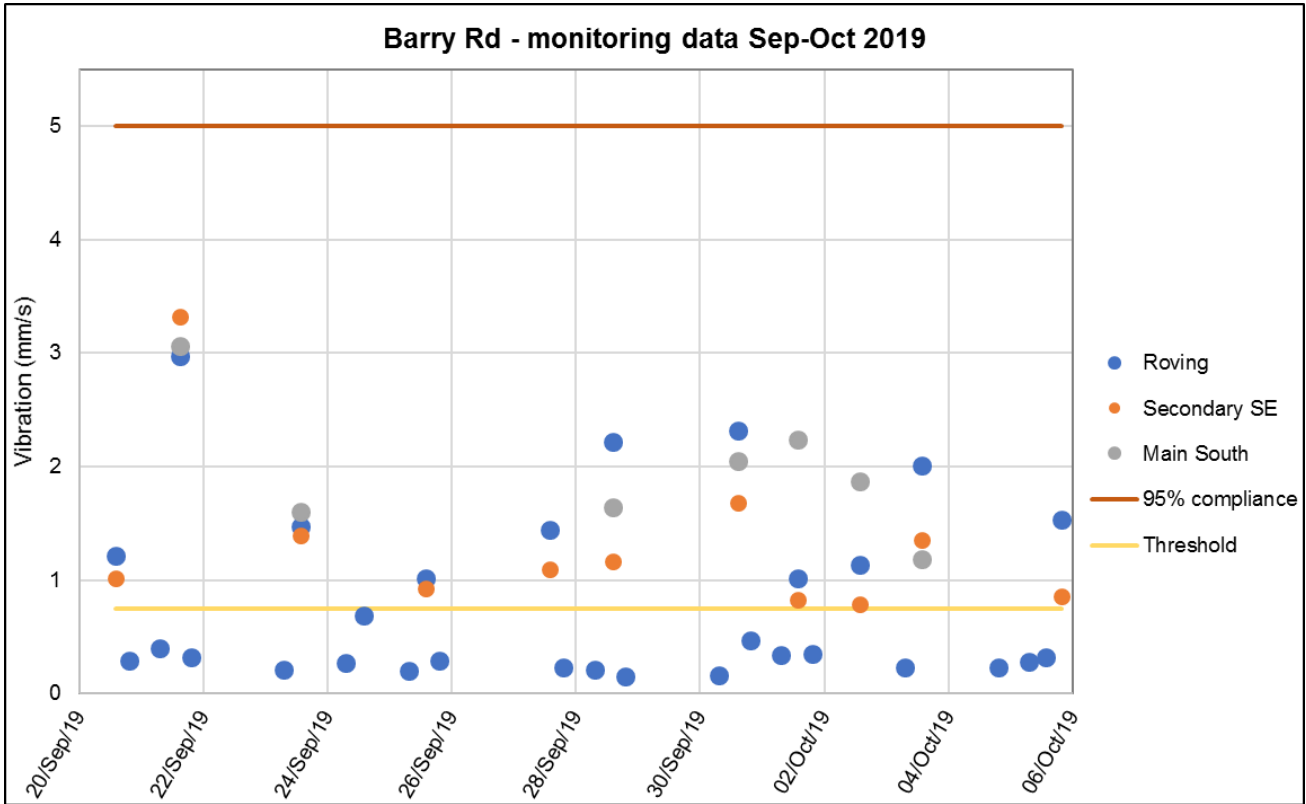


Figure 8: Roving monitor results