



OceanaGold New Zealand Ltd
First Quarter Summary Report 2017
Vibration Levels in Waihi

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Summary

- Results from the Blasthub vibration monitoring system for the first quarter 2017 are reported for Martha Mine, Favona, Trio, Correnso and SUPA Underground Mines. Most blasting was in relation to Correnso/SUPA, with blasting also recommencing in Martha Pit (North Wall remedial layback).
- Compliance for Correnso/SUPA development and production blasting was achieved for both the 95-percentile and average limits defined by the consent. One Correnso production result exceeded the 95-percentile level of 5mm/s (5.7mm/s on 06 January); this was investigated and mitigation implemented.
- Compliance for Martha Pit blasting was achieved, with a rolling 12-month performance of 95.8% compliant with the 5mm/s standard at the end of the quarter. One result recorded higher than the 5mm/s (7.3mm/s on 21 January); an investigation was undertaken and mitigation implemented.
- 59 vibration-related complaints were received during the period, up from the 52 received in the previous quarter. The number of complainants also increased; 21 cf. 10 in the previous period. Most complaints were related to Correnso activity, with 56% of the complaints from 2 residents.
- The total number of blast events (230) during the first quarter of 2017 was slightly up on the previous quarter (217), due to blasting recommencing in Martha Pit.

1. Introduction

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

- a) Hauraki District Council (HDC) Land Use Consent 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)

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 WG users. The system is set with trigger levels between 0.40 and 0.75 mm/s for Martha and Underground operations.

The Martha Mine monitoring comprises five monitors; located at Grey St, Bulltown Rd, Pitt St, Islington Tce, and at South School. 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 1.

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 one blast 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. Mining crossed the boundary into the SUPA area on 16 January 2017.



Figure 1 VMS Monitor & Blast Locations - Martha Mine



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

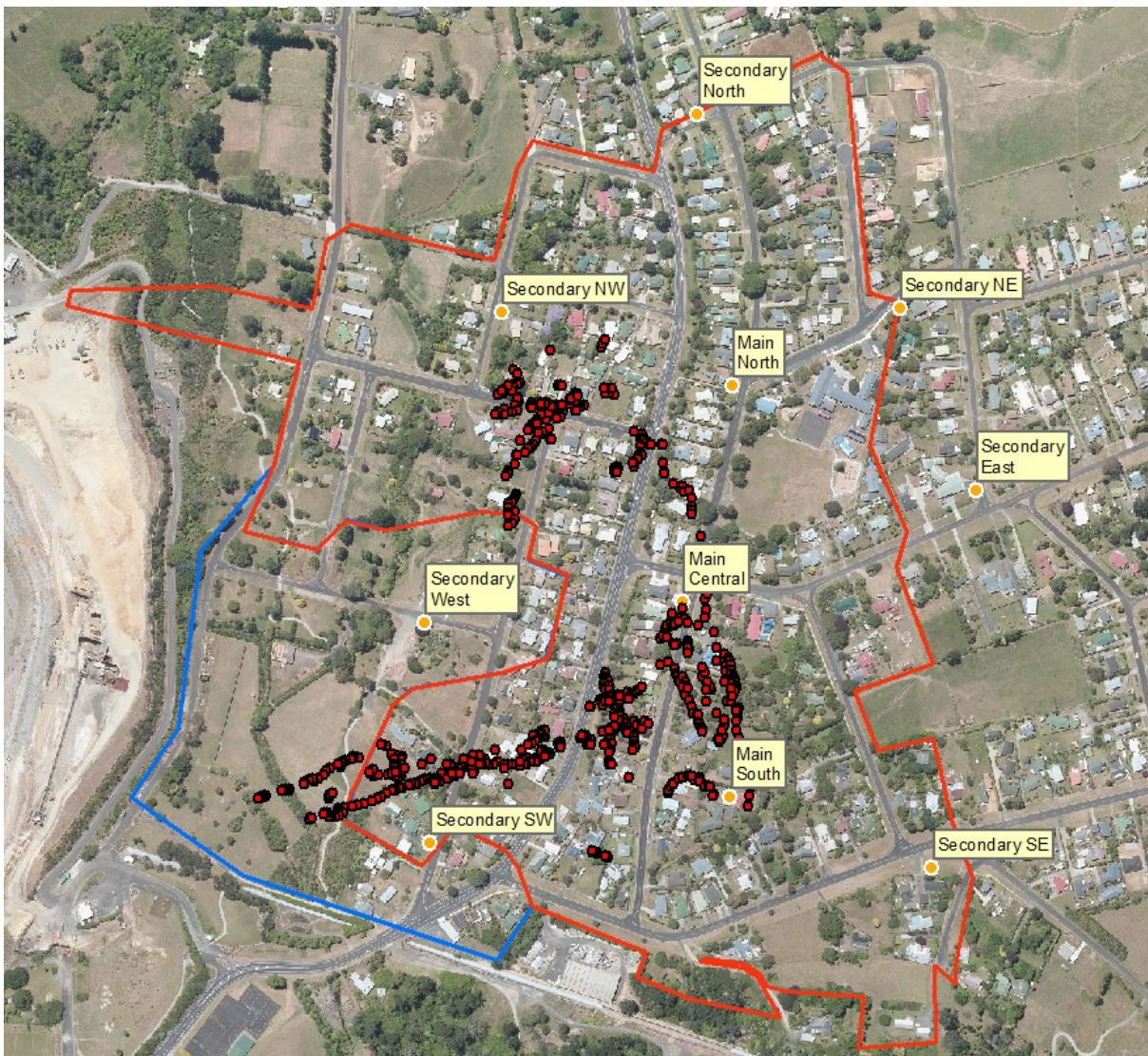


Figure 3: VMS Monitor & Blast Locations – Correnso & SUPA Operations

3. Calibration

Calibration of monitoring equipment, including the roving monitors, was completed June and November 2016. 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 Martha

Blasting in Martha Pit began again in the first quarter of 2017, with 21 blasts occurring in the North Wall remedial layback area. Fewer blasts than expected were required, as free-dig material was more available than forecast.

One blast exceeded 5mm/s at a compliance monitor during the quarter. This occurred on 21 January, with the fourth blast in the programme registering 7.3mm/s at the Bulltown Rd monitor. The previous blasts had not triggered monitors. An investigation into the specially designed blast indicated that deck-loading and the initiating sequence had a compounding effect on the resultant vibration. Clay zones located within the blast may also have aggravated the result by resisting the rock material 'releasing'. Charge weights in subsequent blasts in the panel were reduced and decking has not been required again.

At the end of the quarter, the rolling 12-month performance was 95.8% compliant with the 5mm/s standard.

4.2 Underground (Favona & Trio) Operations

One development blast has been undertaken in the Underground (Favona & Trio) Operations during the period; a small blast to improve infrastructure access through the main drive to Correnso. The blast was fired simultaneously with numerous Correnso development blasts and did not trigger any compliance monitors.

4.3 Correnso and SUPA

During the first quarter of 2017, 208 blast events (cf. 205 in the previous quarter) occurred in the Correnso and SUPA mines. Results are shown in Figure 4. The blasts were associated with development (primarily with the Daybreak and Empire extensions of Correnso but also into SUPA) and ore production (primarily within Correnso, with some starting within Daybreak and into SUPA).

Development:

- The highest average for development blasting at a compliance monitor was 0.75mm/s at Main Central, below the consent limit average of 2mm/s.
- The development six month rolling 95 percentile at all locations was 1.76mm/s, below the 5mm/s limit.

Production:

- The highest average for production blasting at a compliance monitor was 2.35mm/s at Main Central, below the consent limit average of 3mm/s.
- The production six month rolling 95 percentile at all locations was 4.30mm/s, below the 5mm/s limit.

Note:

All monitors not triggered by blasts have default vibration values of 0.5mm/s for the purpose of calculating compliance.

One blast exceeded 5mm/s at a compliance monitor during the quarter. This occurred on 06 January, registering 5.7mm/s at the Main South monitor. No drilling and charging anomalies were indicated in the subsequent investigation (the previous two shots having registered around 3.2mm/s), but strong geological structures cutting across the orebody may have been influential. Decking of the subsequent blast resulted in compliant vibration readings.

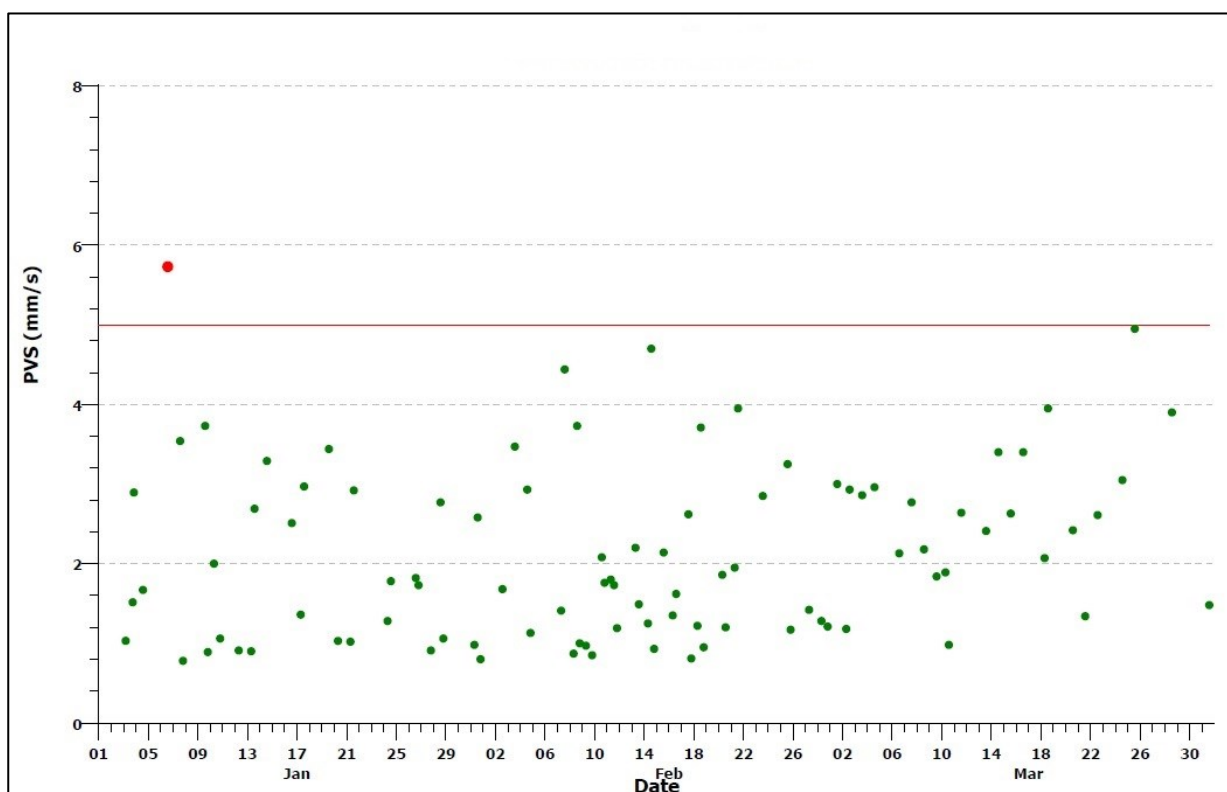


Figure 4: Peak Vibration Levels - Correnso Operations

5. Blasting

There were a similar number of blast events (230 cf.217) during the first quarter of 2017 compared to the previous quarter (Table 1). Although underground blasting was down slightly, the recommencement of pit blasting more than compensated.

Table 1: Quarterly blast events

Operation	3 rd Quarter 2016	4 th Quarter 2016	1 st Quarter 2017
Martha	0	0	21
Underground	0	0	1
Correnso/SUPA	205	217	208
Total	205	217	230

There were 727 blasts in the first quarter of 2017 compared with 695 in the previous quarter (Figure 6).

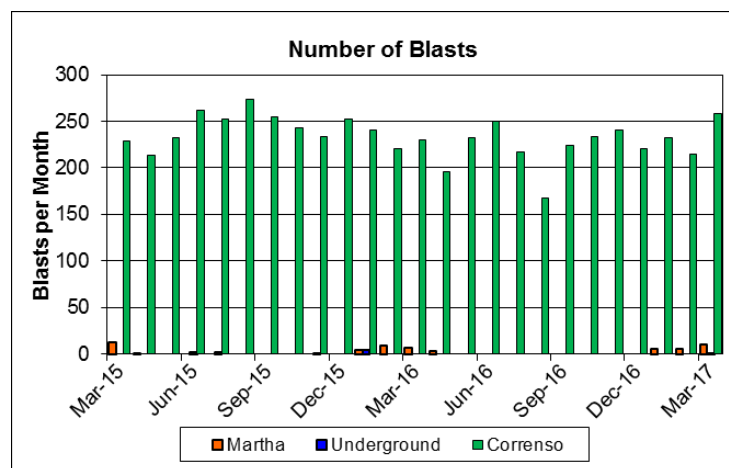


Figure 5: Number of Blasts (all operations)

6. Complaints

59 vibration-related complaints were received during the reporting period, up from the 52 received in the previous quarter (Figures 7 & 8). The number of complainants was up to 21 during the quarter cf. 10 in the previous period; this is probably due to the more widespread development under Correnso and SUPA, as well as new blasting in Martha Pit. Table 2 provides a summary of the complaints received during the quarter.

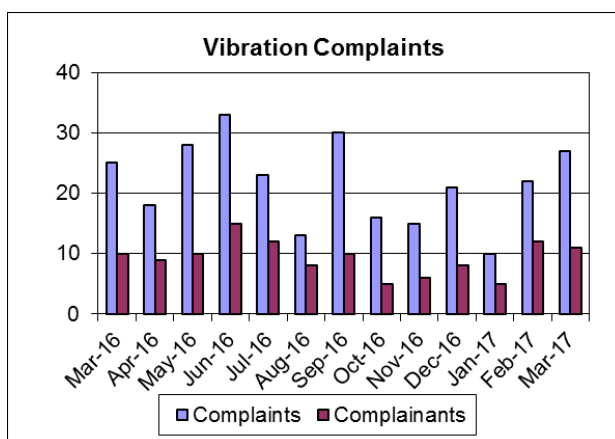


Figure 7: Number of Complaints & Complainants

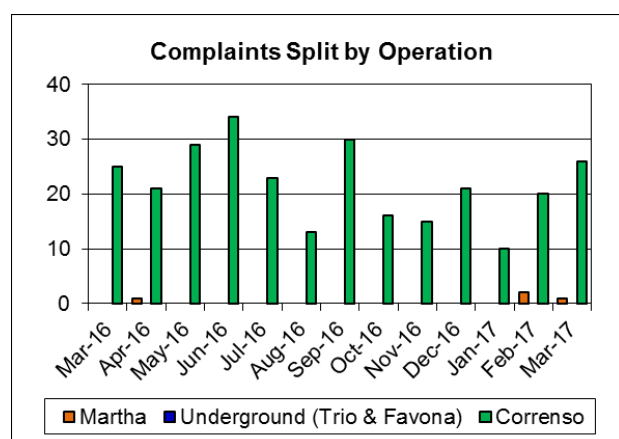


Figure 8: Complaints by Operation

33 (56%) of the complaints were received by 2 residents.

Table 2: Summary of vibration complaints registered by OceanaGold

Date	Address	Nearest Monitor		Highest Blasthub Reading (mm/s)	Site
		Location	Reading (mm/s)		
7-Jan-17	Cuba St	Secondary NE	1.5	3.5	Correnso
9-Jan-17	Gladstone Rd	Secondary North	3.7	3.7	Correnso
9-Jan-17	Gladstone Rd	Main Central	2.9	3.7	Correnso
13-Jan-17	Cuba St	Secondary East	1.3	2.6	Correnso
13-Jan-17	Gladstone Rd	Main North	1.6	2.6	Correnso
16-Jan-17	Cuba St	Secondary East	1.5	2.5	Correnso
16-Jan-17	Gladstone Rd	Main North	1.4	2.5	Correnso
17-Jan-17	Cuba St	Secondary East	1.4	2.9	Correnso
28-Jan-17	Cuba St	Secondary East	1.5	2.7	Correnso
31-Jan-17	Cuba St	Secondary East	1.3	2.5	Correnso
31-Jan-17	Barry Rd	Main South	2.5	2.5	Correnso
3-Feb-17	Cuba St	Secondary East	2.8	3.4	Correnso
3-Feb-17	Kenny St	Secondary SW	1.3	3.4	Correnso
3-Feb-17	Gladstone Rd	Main North	2.2	3.4	Correnso
4-Feb-17	Cuba St	Secondary East	2.0	2.9	Correnso
7-Feb-17	Gladstone Rd	Secondary North	1.7	4.4	Correnso
8-Feb-17	Gladstone Rd	Main South	4.4	4.4	Correnso
8-Feb-17	Kenny St	Non-specific			Correnso
8-Feb-17	Cuba St	Secondary NE	1.3	3.7	Correnso
8-Feb-17	Roycroft St	Secondary SW	1.3	3.7	Correnso
10-Feb-17	Gladstone Rd	Secondary North	2.0	2.0	Correnso
10-Feb-17	Gladstone Rd	Main North	1.5	2.0	Correnso
14-Feb-17	Gladstone Rd	Secondary North	3.7	4.7	Correnso
14-Feb-17	Gladstone Rd	Secondary North	3.7	4.7	Correnso
14-Feb-17	Gladstone Rd	Main North	3.5	4.7	Correnso
14-Feb-17	Smith St	Secondary NE	2.0	4.7	Correnso
14-Feb-17	Gladstone Rd	Main North	3.5	4.7	Correnso
14-Feb-17	Richmal St	Secondary NW	2.8	4.7	Correnso
21-Feb-17	Cuba St	Secondary East	2.1	4.0	Correnso
21-Feb-17	Gladstone Rd	Main North	3.0	3.7	Correnso
21-Feb-17	Gladstone Rd	Main North	1.5	4.0	Correnso
27-Feb-17	Pitt St	Bulltown Rd	1.6	1.6	Martha
27-Feb-17	Gladstone Rd	Main North	2.0	3.3	Correnso
27-Feb-17	Pitt St		No blast	No blast	Correnso
1-Mar-17	Bulltown Rd	Bulltown Rd	1.9	1.9	Martha
1-Mar-17	Kenny St	Secondary SW	2.6	3.0	Correnso
3-Mar-17	Cuba St	Secondary East	1.8	2.8	Correnso
3-Mar-17	Gladstone Rd	Main North	2.0	2.8	Correnso
6-Mar-17	Gladstone Rd	Main North	2.0	2.8	Correnso
6-Mar-17	Gladstone Rd	Main North	2.9	2.9	Correnso
6-Mar-17	Gladstone Rd	Main North	2.0	2.1	Correnso
6-Mar-17	Gladstone Rd	Main North	2.9	2.9	Correnso
6-Mar-17	Gladstone Rd	Main North	2.0	2.1	Correnso
7-Mar-17	Smith St	Secondary NE	1.5	2.7	Correnso
8-Mar-17	Mataura Rd	Main Central	2.1	2.1	Correnso
8-Mar-17	Gladstone Rd	Main North	1.6	2.1	Correnso
14-Mar-17	Cuba St	Secondary SE	1.2	3.4	Correnso
14-Mar-17	Gladstone Rd	Main North	1.8	3.4	Correnso

15-Mar-17	Cuba St	Secondary East	1.6	2.6	Correnso
16-Mar-17	Clarke St	Secondary SW	1.9	3.4	Correnso
20-Mar-17	Cuba St	Secondary East	1.3	2.4	Correnso
20-Mar-17	Gladstone Rd	Main North	1.9	4.0	Correnso
2-Mar-17	Clarke St	Secondary SW	2.6	3.0	Correnso
22-Mar-17	Cuba St	Secondary East	1.4	2.6	Correnso
22-Mar-17	Gladstone Rd	Main North	2.1	2.6	Correnso
28-Mar-17	Dobson St	Secondary NW	2.6	5.0	Correnso
28-Mar-17	Gladstone Rd	Main North	2.9	5.0	Correnso
28-Mar-17	Gladstone Rd	Main North	2.5	3.9	Correnso
31-Mar-17	Cuba St		No blast	No blast	Correnso

7. Vibration and Complaint Management

No roving monitoring was required or undertaken during the reporting period. A meeting was held with a group of neighbours from Kenny St to discuss the results from monitoring at their properties in the previous quarter.

APPENDIX 1

MARTHA VIBRATION CONDITIONS

MINING LICENCE 32 2388

10. (a) All blasting procedures shall be carried out so as to ensure the safety of persons in the mine and/or in the immediate vicinity of the mine site. The licensee shall notify the Inspector of Quarries of the blasting procedures to be employed and of any changes thereto and the blasting procedures shall be approved by the Inspector of Quarries. The blasting procedures shall address the following specific items: regular blasting times, warning and all clear signals, control of fly rock, vibration and air blast monitoring and such other matters as the Inspector may direct.

- (b) A construction period blasting programme shall be established and be publicly notified in newspapers circulating in the area prior to any such blasting taking place and at regular intervals not exceeding six (6) months thereafter. Changes to the blasting programme will be notified in newspapers circulating in the area at least three (3) days prior to implementation.

The Company Liaison Officer shall also ensure that the blasting programme and changes to the blasting programme are provided to all residents in the immediate area surrounding the mine who in the opinion of the Company Liaison Officer (after consultation with the Council Liaison Officer) are likely to experience the effects of blasting and vibration. The same respective notification time periods shall apply.

- (c) Blasting shall be restricted to within the following hours:

Monday-Friday	1000-1500
Saturday	1000-1200

- (d) Details of all blasts shall be recorded in accordance with condition 29.

- (e) During initial construction as defined in condition 3, but excluding:

- Upgrade of the conveyor system (but not including the creation of the conveyor slot)
- Construction of the pipeline from the Water Treatment Plant to the Ohinemuri River

and for a period of 12 months after initial construction ceases, vibration levels measured in the ground closest to any affected residence excluding those properties owned by the licensee within the area shown on the plan attached hereto shall not exceed 10 mm/s peak particle velocity measured in the frequency range between 3 Hz and 12 Hz, thereafter NZS 4403:1976 Codes of Practice for the Storage, Handling and Use of Explosives shall apply.

With respect to those initial construction activities excluded above the vibration levels measured in the ground closest to any affected residence excluding those properties owned by the licensee within the area shown on the plan attached hereto shall comply with the provisions of Rule 9.4.3 of the Operative Hauraki District Plan (1997).

- (f) The peak overall sound pressure level due to air blasts shall not exceed 128dB linear (unweighted), measured at any affected residence excluding those properties owned by the licensee within the area shown on the plan attached hereto.
- (g) Except where specifically provided in Condition 10(e) all blasting operations and measurements in relation to such operations shall be carried out in accordance with NZS 4403:1976 Code of Practice for the Storage, Handling and Use of Explosives.

20. (a) All blasting procedures shall be carried out so as to ensure the safety of persons in the mine and/or in the immediate vicinity of the mine site. The licensee shall notify the Inspector of Quarries of the blasting procedures to be employed and of any changes thereto and the blasting procedures shall be approved by the Inspector of Quarries. The blasting procedures shall address the following specific items: regular blasting times, warning and all clear signals, control of fly rock, vibration and air blast monitoring and such other matters as the Inspector may direct.

- (b) No blasting operations shall be carried out without the written approval of the Mine Manager, who shall satisfy himself that the blasting operations will not cause either danger, damage or undue discomfort to any person or danger to property.

- (c) A blasting programme shall be publicly notified in newspapers circulating in the area prior to any blasting taking place and at regular intervals not exceeding six (6) months thereafter. Changes to the

blasting programme will be notified in newspapers circulating in the area at least three (3) days prior to implementation.

The Company Liaison Officer shall also ensure that the blasting programme and changes to the blasting programme are provided to all residents in the immediate area surrounding the mine who in the opinion of the Company Liaison Officer (after consultation with the Council Liaison Officer) are likely to experience the effects of blasting and vibration. The same respective notification time periods shall apply.

- (d) Blasting for the open pit and underground operations shall be 95% compliant with a maximum level for ground vibration of 5mm/s and shall not exceed a Vmax of 10mm/s (both expressed as vector sum of velocity components). The 95% compliance limit is defined as the level not to be exceeded for 95% of blasts over the preceding twelve month period. Blasting is permitted within the following hours:

Open Pit Operations

Monday-Friday	1000-1500
Saturday	1000-1200

Underground Operations

Monday-Friday	0700-1900
Saturday	1000-1200

Blasting in the underground operations may also take place during the period 1200 to 1900 on Saturdays where necessary for safety or minor maintenance purposes.

- (da) There shall be no more than 4 blast events in underground operations per day (excluding blasts for safety or minor maintenance purposes as provided for in condition 20(d)).

A "blast event" is defined as:

- An individual or number of linked individual blasts of not more than the total duration periods specified below:
- Production (stope) blasts shall have a duration of not more than 6 seconds;
- Development blasts shall have a duration of not more than 12 seconds; and
- A combination of production and development blasts shall have a duration of not more than 18 seconds.

- (db) Blasting for safety or minor maintenance purposes as provided for in condition 20(d) shall be 95% compliant with a maximum level for ground vibration of 1 mm/s.

- (e) Details of all blasts shall be recorded as set out in condition 29.

- (f) The peak overall sound pressure level due to air blasts shall not exceed 128dB linear (unweighted), measured at any affected residence excluding those properties owned by the licensee within the area shown on the plan attached hereto.

- (g) After the 12 month period referred to in condition 10(e) has expired, vibration levels measured in the ground closest to any affected residence excluding those properties owned by the licensee within the area shown on the plan attached hereto shall comply with the provisions of Rule 9.4.3 of the Operative Hauraki District Plan (1997).

- (h) Except where specifically provided in condition 20(f) all blasting operations and measurements in relation to operations shall be carried out in accordance with NZS 4403:1976 Code of Practice for the Storage, Handling and Use of Explosives.

- (i) Vibration Management Plan

The licence holder shall prepare a Vibration Management Plan. This Management Plan shall be submitted to and approved by Hauraki District Council prior to commencing the Martha Exploration Project. The objective of this plan is to detail the methods to be used to comply with conditions 20 and 29.

APPENDIX 2

MARTHA VIBRATION CONDITIONS

HDC LAND USE CONSENT No. 97/98-105

3.10 **BLASTING AND VIBRATION**

- (a) All blasting procedures shall be carried out so as to ensure the safety of persons in the mine and/or in the immediate vicinity of the mine site. The consent holder shall notify the Health and Safety Inspector (Mining Act) of the blasting procedures to be employed and of any changes thereto and the blasting procedures shall be approved by the Health and Safety Inspector (Mining Act). The blasting procedures shall address the following specific items: regular blasting times, warning and all clear signals, control of fly rock, vibration and air blast monitoring and such other matters as the Inspector may direct.
- (b) No blasting operations shall be carried out without the written approval of the Mine Manager, who shall satisfy himself that the blasting operations will not cause either danger, damage or undue discomfort to any person or danger to property.
- (c) A blasting programme shall be publicly notified in newspapers circulating in the area prior to any blasting taking place and at regular intervals not exceeding six (6) months thereafter. Changes to the blasting programme shall be notified in newspapers circulating in the area at least three (3) days prior to implementation.
- The Company Liaison Officer shall also ensure that the blasting programme and changes to the blasting programme are provided to all residents in the immediate area surrounding the mine who in the opinion of the Company Liaison Officer (after consultation with the Council Liaison Officer) are likely to experience the effects of blasting and vibration. The same respective notification time periods shall apply.
- (d) Blasting shall be restricted to within the following hours:
- | | |
|-----------------|-----------|
| Monday - Friday | 1000-1500 |
| Saturday | 1000-1200 |
- (e) Details of all blasts shall be recorded.
- (f) The peak overall sound pressure level due to the air blasts:
- i) at any residence within the boundary of the Extended Martha Mine Area as shown on Planning Maps K1 - K5 of the Operative Hauraki District Plan not owned by the Waihi Gold Company; or
 - ii) at any residence outside the boundary of the Extended Martha Mine Area as shown on Planning Maps K1 - K5 of the Operative Hauraki District Plan except for those residences owned by the Waihi Gold Company in the area shown on the map attached in Appendix F;
- shall not exceed 128 dB linear (unweighted).
- (g) During initial construction (as defined in Condition 3.3), but excluding:
- upgrade of conveyor system (not including the creation of the conveyor slot), but including use of laydown areas
 - construction of pipeline from the Water Treatment Plant to the Ohinemuri River;
 - road construction and upgrading associated with the Extended Project;
 - construction of a new Scout Hall and a new Radio Club facility,
- and for a period of 12 months after initial construction activities cease, vibration levels measured in the ground closest to:
- i) any residence within the boundary of the Extended Martha Mine Area as shown on Planning Maps K1 - K5 of the Operative Hauraki District Plan not owned by the Waihi Gold Company; or
 - ii) any residence outside the boundary of the Extended Martha Mine Area as shown on Planning Maps K1 - K5 of the Operative Hauraki District Plan, except for those residences owned by the Waihi Gold Company in the area shown on the map attached in Appendix F:
- shall not exceed 10 mm/s peak particle velocity measured in the frequency range between 3 Hz and 12 Hz, thereafter NZS 4403:1976 Codes of Practice for the Storage, Handling and Use of Explosives shall apply.
- (h) After the 12 month period specified in Condition 3.10 (g) has expired, and at all times for those initial construction activities excluded under Condition 3.10 (g) above, vibration levels measured in the ground closest to:

- i) any residence within the boundary of the Extended Martha Mine Area as shown on Planning Maps K1 - K5 of the Operative Hauraki District Plan not owned by the Waihi Gold Company; or
 - ii) any residence outside the boundary of the Extended Martha Mine Area as shown on Planning Maps K1 - K5 of the Operative Hauraki District Plan except for those residences owned by the Waihi Gold Company in the area shown on the map attached in Appendix F:
- shall comply with the provisions of Rule 9.4.3 of the Operative Hauraki District Plan.
- (i) Except where specifically provided in Condition 3.8(g) all blasting operations and measurements in relation to such operations shall be carried out in accordance with NZS 4403:1976 Code of Practice for the Storage, Handling and Use of Explosives.

3.11 MONITORING AND REPORTING ON BLASTING AND VIBRATION

- (a) The consent holder shall monitor every blast event over 1 mm/sec in terms of blast location, charge weight per delay, number of holes, initiation timing and measured vibration. Where equipment malfunctions or is not available for recording (eg during maintenance), this shall be noted and included in the monitoring report presented to Council. Where blasting is to be undertaken in the vicinity of the overpressure sensor, the consent holder shall also monitor the overpressure level. The location of the fixed vibration and overpressure sensors shall be undertaken in consultation with Council, and changes to the location of these sensors and monitor shall be agreed with Council prior to their relocation. The consent holder shall deploy a roving monitor to record blast vibrations in the location where complaints regarding vibration have been made. The results of the monitoring shall be provided to Council.
- (b) The consent holder shall, unless otherwise directed to do so by the Council following consultation with the consent holder, provide a summary report to the Council at the end of each February, May, August and February on the blasting undertaken, and the vibration and overpressure levels recorded, as well as any complaints received.
- (c) Monitoring in the ground at the base of the Cornish Pumphouse shall be undertaken when blasting is carried out within a 250 metre radius of the structure. The peak component vibration levels shall not exceed 25 mm/s at frequencies in the range 20 to 30 Hz within the 250 metre radius. A report addressing changes to the building's structural integrity (with particular emphasis on changes that are likely to be caused by blast-induced vibrations within 250 metres) shall be supplied to Council on the anniversary of the date of commencement of this consent. The report shall be prepared by a registered engineer experienced in such work.

APPENDIX 3

FAVONA VIBRATION CONDITIONS

HDC LAND USE CONSENT No. 85.050.326E

Blasting and Vibration

Ground Vibration

11. The activity shall comply with Rule 9.4.3 of the Operative Hauraki District Plan including Standard 9.4.3.3A – Continuous Vibration and Standard 9.4.3.3B – Impulsive Vibration from Blasting as amended by Condition 12 below.

(NOTE: The magnitudes of vibrations from Favona Underground Mine Project activities may be increased by the concurrent Favona Exploration Decline Project and Martha Mine activities. In terms of the Operative Hauraki District Plan, Rule 9.4.2, vibrations from sources other than the Favona Underground Mine Project activities are background vibrations and are additive to vibrations from the Favona Underground Mine Project.)

Impulsive Vibration from Blasting

12. The activity shall comply with the following standard.

Time	Maximum number of blast events per period	Maximum ground vibration level (instantaneous vector sum of velocity components) (95% design)
Monday to Saturday (0700 to 2100)	4	6.0 mm/s
Monday to Saturday (2100 to 0700 the following day)	4	1.0 mm/s
Sundays and Public Holidays (0700 to 2100)	4	1.0 mm/s
Sundays and Public Holidays (2100 to 0700 the following day)	4	1.0 mm/s

Blast Event Duration:

Blast events involving:

- Production blasts only shall have a duration not more than 6 seconds;
- Development blasts only shall have a duration not more than 12 seconds;
- A combination of production and development blasts shall have a duration not more than 18 seconds.

(Note: Blast events of longer than the periods specified above are not permitted.)

A 'Blast Event' is defined as;

“An individual or number of linked individual blasts of not more than the total duration periods specified above.”

The maximum number of blast events does not include blast events necessary for safety and minor maintenance purposes.

The maximum ground vibration (instantaneous vector sum of velocity components) of 1.0mm/s shall apply to all maintenance blast events during the periods that this standard applies, as specified above.

13. The consent holder shall ensure that blast events at the Favona Mine shall not coincide with blast events at the Martha Mine.

14. Deleted.

Monitoring

15. Impulsive vibration from all events shall be monitored.
16. The monitoring system shall be automated to allow for the immediate analysis of each blast event.
17. Suitably trained personnel shall conduct monitoring. Equipment used for monitoring, equipment calibration and vibration measurement procedures shall comply with the current Australian Standard AS2187.2 (or equivalent international standards) and equipment manufacturers' recommendations.
18. Monitoring locations shall be at the three (3) locations shown on Plate C – Amended (dated 20 February 2003) prepared by Heilig and Partners PTY Ltd, appended to this consent as Attachment B.

The monitoring position shall be the point at or within the residence boundary nearest the project area. The monitoring position shall not be on or inside a building or other structure.

19. Before blasting starts, and provided the property owner consents, the consent holder shall complete a structural condition survey for each of the 3 properties selected for monitoring. The survey shall be carried out by an independent structural engineer suitably qualified and experienced in domestic building design and construction. The survey report shall include a visual inspection and video record of all existing built surfaces and defects including concrete access-ways.
20. A roving monitor shall be deployed to record vibrations at locations the subject of complaints
21. A complete record of each blast event shall be maintained. The record shall include:
- a) Types of measurement instrument used
 - b) Time and duration of blast event
 - c) Location of blasts
 - d) Locations of monitoring positions
 - e) Distances for the blasts to the monitoring position and nearest residence
 - f) Distance from monitoring position to nearest residence
 - g) Measured vibration levels
 - h) Total amount of explosive used
 - i) Delay sequence of the blast event
 - j) Maximum instantaneous charge
 - k) Volume of rock blasted
 - l) Complaints (including the nature of effects for example rattling window, was the complainant awoken) and whether the Vibration Mitigation Action Process has been undertaken.
 - m) Advice as to whether the blast was a safety or minor maintenance blast.
 - n) Design criteria not covered in items a) to m) above.

Health and Safety

22. All blasting and material storage and handling shall be carried out so as to ensure the safety of persons in the Favona Project Area and adjacent area. The Health and Safety in Employment Act, 1992, the Health and Safety in Employment (Mining Underground) Regulations, 1999 shall be complied with.

The consent holder shall notify the Health and Safety Inspector of the blasting procedures to be employed and of any changes to the procedures.

Vibration Management Plan

23. The consent holder shall, at least 1 month prior to commencement of mining, but not until the results of blasting and community consultation associated with the Favona Exploration Decline Project and any consequential review of the consent conditions for the Favona Underground Mine Project have been completed, submit a vibration management plan for written approval by the Manager – Planning and

Environmental Services. The objective of the plan is to provide generic detail on how vibration consent condition compliance will be achieved for the duration of the Favona Underground Project. The plan shall include a blasting programme that sets out in general terms the numbers, times (generally around shift changeovers), duration of blast events, and steps to minimise the duration of blast events, records to be kept and mitigation actions to be implemented in the event of non-compliance.

Management and Reporting

24. a) No blasting operations shall be carried out without the written approval of the Favona Mine Manager. Before blasting commences the Favona Mine Manager shall ensure that the operations will not cause danger, damage and undue discomfort to any person nor danger and damage to property.
- b) In the event that blast monitoring shows that the vibration standards have been exceeded, the consent holder shall implement mitigation actions to ensure compliance. Possible mitigation actions include:
- i) Limiting the rate of excavation advance
 - ii) Reducing the blast hold diameter
 - iii) Reducing the weight of explosives in the blast hole
 - iv) Using alternative explosive types
 - v) Using electronic delays to adjust sequencing
 - vi) Decking
 - vii) Changing the blast pattern
 - viii) Drilling and blasting in two passes
 - ix) Changing the method of mining
- c) The consent holder shall provide a report to Council for each blast event where the measured vibration exceeds the specified maximum limits. The reports shall be submitted within five (5) days after the blast event and include the records listed in Condition 21 above and mitigation actions taken to limit subsequent blast vibrations to the maximum limits or less.
- d) The consent holder shall provide a summary report to Council at six (6) monthly intervals after commencement of this consent. The report shall include the following:
- i) Confirmation of actions taken during the previous reporting period
 - ii) All vibration related complaints received during the current reporting period and mitigation actions taken by the consent holder
 - iii) Results of vibration monitoring.
- e) Monitoring records, reports and complaint schedules shall be stored and maintained in a systematic manner. Storage shall be secure and maintained for 12 months after completion of all blasting at the underground mine. Records shall be available for perusal by the Health and Safety Inspector, Council and their representatives.

APPENDIX 4

TRIO DEVELOPMENT VIBRATION CONDITIONS

HDC LAND USE CONSENT No. RC-15735

Blasting and Vibration

8. Ground Vibration

All blasting associated with the Trio Development project shall be designed at a 95% confidence level to comply with the following maximum ground vibration limits expressed as the instantaneous vector sum, as measured at the boundary of any residentially zoned site or the notional boundary of any occupied rural dwelling site not owned by the consent holder (or related company), or not subject to an agreement with the consent holder (or related company):

- Monday to Saturday – 0700 to 2100 1.5mm/s
- All other times and public holidays 1.0mm/s

In the event that a property is sold and is not subject to an agreement between the consent holder and the purchaser or related company, or in the event that there is no longer an agreement between the consent holder and the landowner, the measurement of vibration shall revert to being measured at the boundary of the residentially zoned site or the notional boundary of the occupied rural dwelling.

9. Blasting and Vibration Monitoring and Reporting

- a) Impulsive vibration from all blast events shall be monitored.
- b) The monitoring system shall be automated to allow for the immediate analysis of each blast event.
- c) Suitably trained personnel shall conduct monitoring. Equipment used for monitoring, equipment calibration and vibration measurement procedures shall comply with the current Australian Standard AS2187.2 (or equivalent international standards) and equipment manufacturers' recommendations.
- d) Monitoring locations shall be those shown in Figure 9 of the report prepared by Heilig & Partners Pty Ltd being Appendix 4 to the AEE application. The monitoring position shall be as close as practicable to a point on or within the residence boundary nearest the project area. The monitoring position shall not be on or inside a building or structure.
- e) Within 2 months of the exercise of this consent, and provided the property owner consents, the consent holder shall complete a structural condition survey for at least 2 additional occupied properties, and these shall be located above or in close proximity to the underground works subject of this consent and as agreed by the Manager, Planning and Environmental Services, Hauraki District Council. The survey shall be carried out by an independent structural engineer suitably qualified and experienced in domestic building design and construction. The survey report shall include a visual inspection and video record of all existing built surfaces and defects including concrete accessways.
- f) A roving monitor shall be deployed to record vibrations in locations where complaints regarding vibration have been made.
- g) A complete record of each blast event shall be maintained. The record shall include:
 - (i) Types of measurement instrument used
 - (ii) Time and duration of blast event
 - (iii) Location of blasts
 - (iv) Locations of monitoring positions
 - (v) Distances from the blasts to the monitoring position and nearest residence
 - (vi) Measured vibration levels
 - (vii) Total amount of explosive used
 - (viii) Delay sequence of the blast event
 - (ix) Maximum instantaneous charge
 - (x) Volume of rock blasted
 - (xi) Complaints (including the nature of effects, for example rattling window, was the complainant awoken) and whether the Vibration Mitigation Action Process has been undertaken
 - (xii) Advice as to whether the blast was a safety or minor maintenance blast
 - (xiii) Design criteria not covered in items i to xii above.
- h) In the event that blast monitoring shows that the vibration standards have been exceeded, the consent holder shall implement mitigation actions to ensure compliance. Possible mitigation actions include:
 - i) Limiting the rate of excavation advance
 - ii) Reducing the blast hole diameter
 - iii) Reducing the weight of explosive in the blast hole
 - iv) Using alternative explosive types
 - v) Using electronic delays to adjust sequencing
 - vi) Decking
 - vii) Changing the blast pattern
 - viii) Drilling and blasting in two passes

- ix) Changing the method of mining.
- i) The consent holder shall provide a report to Council for each blast event where the measured vibration exceeds the specified maximum limits. The reports shall be submitted within five (5) days after the blast event and include the records listed in Condition 9(g) above and mitigation actions taken to limit subsequent blast vibrations to the maximum limits or less.
- j) The consent holder shall, unless otherwise directed to do so by Council following consultation with the consent holder, provide a summary report to the Council at the end of each 3 month period from commencement of work to completion on the following:
 - (i) results of the vibration monitoring;
 - (ii) all complaints received during the previous 3 month period, action taken by the consent holder and the resolution (if any); and
 - (iii) any other matters of concern raised with the consent holder.

APPENDIX 5

TRIO MINE VIBRATION CONDITIONS

HDC LAND USE CONSENT No. RC-15774

Blasting and Vibration

8. Ground Vibration

All blasts will be designed at a 95% level of confidence to achieve the vibration levels specified in Condition 9.

9. Impulsive Vibration from Blasting

The activity shall comply with the following standard as measured at the boundary of any residentially zoned site or the notional boundary of any occupied rural dwelling not owned by the consent holder (or related company) or not subject to an agreement with the consent holder (or related company).

In the event that a property is sold and is not subject to an agreement between the consent holder (or related company) and the purchaser or related company, or in the event that there is no longer an agreement between the consent holder and the landowner, the measurement of vibration shall revert to being measured at the boundary of the residentially zoned site or the notional boundary of the occupied rural dwelling.

Time	Maximum number of blast events per period ¹	Maximum ground vibration level (instantaneous vector sum of velocity components - 95% design)
Monday to Saturday (0700 to 2100)	4	6.0 mm/s
Monday to Saturday (2100 to 0700 the following day)	4	1.0 mm/s
Sundays & Public Holidays (0700 to 2100)	4	1.0 mm/s
Sundays & Public Holidays (2100 to 0700)	4	1.0 mm/s

¹ Note: The Period means the four durations referred to in the column headed "Time"

Blast events involving:

- Production blasts shall have a duration not more than 6 seconds;
- Development blasts shall have a duration not more than 12 seconds; and
- A combination of production and development blasts shall have a duration not more than 18 seconds.

(Note: Blast events of longer than the periods specified above are not permitted.)

A 'Blast Event' is defined as;

"An individual or number of linked individual blasts of not more than the total duration periods specified above."

The maximum number of blast events does not include blast events necessary for safety and minor maintenance purposes.

The maximum ground vibration (instantaneous vector sum of velocity components) of 1.0mm/s shall apply to all maintenance blast events during the periods that this standard applies, as specified above.

10. The consent holder shall ensure that blast events at the Favona Mine shall not coincide with blast events at the Martha Mine.

11. Blasting and Vibration Monitoring and Reporting

- a) Impulsive vibration from all events shall be monitored
- b) The monitoring system shall be automated to allow for the immediate analysis of each blast event.
- c) Suitably trained personnel shall conduct monitoring. Equipment used for monitoring, equipment calibration and vibration measurement procedures shall comply with the current Australian Standard AS2187.2 (or equivalent international standards) and equipment manufacturers' recommendations.
- d) Unless otherwise confirmed in the Vibration Management Plan (Condition 13) monitoring locations shall be those shown in Figure 5 of the report prepared by Heilig & Partners Pty Ltd being Appendix 5 of the application AEE. The monitoring position shall be as close as practicable to a point on or within the residence boundary nearest the project area. The monitoring position shall not be on or inside a building or structure.
- e) Before blasting starts, and provided the property owner consents, the consent holder shall complete a structural condition survey for each of the properties selected for monitoring. Further, structural condition survey s on this same basis shall be undertaken on all properties not owned by the consent holder and which are located within the 5 mm/s vibration contour shown on Plate No E dated 21 November 2010 prepared by Heilig & Partners (Appendix C. Evidence by John Heilig) and include in Attachment 1 of this consent. The survey shall be carried out by an independent structural engineer suitably qualified and experienced in domestic building design and construction. The survey report shall include a visual inspection and video record of all existing built surfaces and defects including concrete access-ways.
- f) A roving monitor shall be deployed to record vibrations at locations the subject of complaints
- g) In addition to the monitoring locations as specified in Condition 11d, an additional monitoring location shall be established to determine the levels of vibration at the Cyanide Tanks and Ore Kilns on Union Hill. The final position(s) are to be confirmed in the Vibration Management Plan (Condition 13). Any subsequent proposed change in monitoring location shall require a revision to the Vibration Management Plan. The revised Plan shall be submitted for written approval by the Council's Manager – Planning and Environmental Services as set out in Condition 13 for relocation.
- h) A complete record of each blast event shall be maintained. The record shall include:
 - a) Types of measurement instrument used
 - b) Time and duration of blast event
 - c) Location of blasts
 - d) Locations of monitoring positions
 - e) Distances for the blasts to the monitoring position and nearest residence
 - f) Distance from monitoring position to nearest residence
 - g) Measured vibration levels
 - h) Total amount of explosive used
 - i) Delay sequence of the blast event
 - j) Maximum instantaneous charge
 - k) Volume of rock blasted
 - l) Complaints (including the nature of effects, for example rattling window, was the complainant awoken) and whether the Vibration Mitigation Action Process has been undertaken.
 - m) Advice as to whether the blast was a safety or minor maintenance blast.

n) Design criteria not covered in items i) to xii) above.

12. Health and Safety

All blasting and material storage and handling shall be carried out so as to ensure the safety of persons in the Trio Project Area and adjacent area. The Health and Safety in Employment Act 1992 the Health and Safety in Employment (Mining Underground) Regulations 1999 shall be complied with.

The consent holder shall notify the Health and Safety Inspector of the blasting procedures to be employed and of any changes to the procedures.

13. Vibration Management Plan

The consent holder shall, at least 1 month prior to commencement of mining, submit a Vibration Management Plan for written approval by the Council's Manager – Planning and Environmental Services. The objective of the Plan is to provide detail on how vibration consent condition compliance will be achieved for the duration of the Trio Underground Mine Project. The Plan shall include a blasting programme that sets out in general terms the numbers, times (generally around shift changeovers), duration of blast events, coordination of development and production blasts into one blast event and steps to minimise the duration of blast events, records to be kept (including blast design data), blast design review procedures, procedures to be adopted where vibration levels approach the maximum permitted levels and mitigation actions to be implemented in the event of non-compliance. The mitigation actions shall include procedures to repair any damage to structures identified as having resulted from activities at the Trio Underground Mine. The Plan shall also confirm the permanent monitoring locations to be established in accordance with Conditions 11d) and 11g).

14. Management and Reporting

- a) No blasting operations shall be carried out without the written approval of the Trio Mine Manager. Before blasting commences the Trio Mine Manager shall ensure that the operations will not cause danger, damage and undue discomfort to any person nor danger and damage to property.
- b) In the event that blast monitoring shows that the vibration standards have been exceeded, the consent holder shall implement mitigation actions to ensure compliance. Possible mitigation actions include:
 - (i) Limiting the rate of excavation advance
 - (ii) Reducing the blast hole diameter
 - (iii) Reducing the weight of explosive in the blast hole
 - (iv) Using alternative explosive types
 - (v) Using electronic delays to adjust sequencing
 - (vi) Decking
 - (vii) Changing the blast pattern
 - (viii) Drilling and blasting in two passes
 - (ix) Changing the method of mining
- c) The consent holder shall provide a report to Hauraki District Council for each blast event where the measured vibration exceeds the specified maximum limits. The reports shall be submitted within five (5) days after the blast event and include the records listed in Condition 11h) above and mitigation actions taken to limit subsequent blast vibrations to the maximum limits or less.
- d) The consent holder shall provide a summary report to Council at six (6) monthly intervals after commencement of this consent. The report shall include the following:

- (i) Confirmation of actions taken during the previous reporting period
 - (ii) All vibration related complaints received during the current reporting period and mitigation actions taken by the consent holder
 - (iii) Results of vibration monitoring.
- e) Monitoring records, reports and complaint schedules shall be stored and maintained in a systematic manner. Storage shall be secure and maintained for 12 months after completion of all blasting at the underground mine. Records shall be available for perusal by the Health and Safety Inspector, Council and their representatives.

Liaison Officer

25. At least 1 month prior to the exercising this consent, the consent holder shall appoint a person (the 'Liaison Officer') and any replacement person subject to the approval of the Hauraki District Council and the Waikato Regional Council (the 'Councils') to liaise between the consent holder, the community and the Councils. The Liaison Officer shall have sufficient delegated power to be able to deal immediately with complaints received and shall be required to investigate those complaints as soon as possible after receipt. The Liaison Officer shall be appointed for the duration of this project.

Complaints Procedure

26. The Standard Operating Procedure for Complaints (attached as Attachment 2 to this consent) shall be used for any complaints received from the community.

APPENDIX 6

CORRENZO VIBRATION CONDITIONS

HDC LAND USE CONSENT No. RC-202. 2012

Blasting and Vibration

13 Ground Vibration

All blast events shall comply with the vibration levels, numbers of events and durations specified in Condition 14.

14 Impulsive Vibration from Blasting

The activity shall comply with the following standard as measured at the boundary of any residentially zoned site or the notional boundary of any occupied rural dwelling not owned by the consent holder (or related company) or not subject to an agreement with the consent holder (or related company). In the event that a property is sold and is not subject to an agreement between the consent holder (or related company) and the purchaser or related company, or in the event that there is no longer an agreement between the consent holder and the landowner, the measurement of vibration shall revert to being on or close to the boundary of that residentially or low-density residentially zoned site or the notional boundary of the occupied rural dwelling.

- a) There shall be no more than three blast events per day, from Monday to Saturday and between 0700 and 2000.
- b) No blasting shall be undertaken at night (2000 to 0700 the following day), on Sundays or on public holidays.
- c) The peak particle velocity (vector sum) shall be no more than:
 - i) For development blasts;
 - 5mm/s for 95% of the monitored events.
 - 2mm/s on average.
 - ii) For production blasts;
 - 5mm/s for 95% of the monitored events.
 - 3mm/s on average.
- d) Compliance with the 95% and average limits shall be measured over a six-month rolling period.
- e) Compliance with the 95-percentile limit shall be determined separately for development blast events and for production blast events, and based on the highest recorded vibration for each blast event measured at any monitor, where the blast type is assigned on a monitor-by-monitor basis according to the blast with the minimum scaled distance from each monitor.
- f) Compliance with the average limit shall be determined separately for each blast monitor based on the total number of blast events in the six-month rolling period.
- g) For all blast events, including those involving a combination of production and development blasts (95% compliance);
 - i) Production blasts shall have a total duration of not more than 9 seconds;
 - ii) Development blasts shall have a total duration of not more than 12 seconds;
 - iii) A combination of production and development blasts shall have a duration of not more than 12 seconds.
- h) No blast event shall have a duration of more than 18 seconds.
- i) Duration is to be calculated as the time from the nominal firing time of the first charge to the nominal firing time of the last charge.
- j) A 'Blast Event' is defined as:

'An individual or number of linked individual blasts of not more than the total duration periods specified above.'
- k) A 'Development Blast' is defined as:

‘Any blast with a maximum instantaneous charge weight per hole of no more than 7 kilograms of explosive.’

- l) A ‘Production Blast’ is defined as:

‘Any blast in which a single hole contains a maximum instantaneous charge weight of more than 7 kilograms of explosive.’ Slot blasts are deemed to be Production Blasts for the purpose of this definition.

15 Minimisation and Mitigation of Blasting Impacts

- a) In addition to complying with the requirements of Condition 14, the consent holder shall minimise, to the extent practicable, the impacts of blasting vibrations for the Community. The measures to be applied in this regard shall be set out in the Vibration Management Plan (Condition 19) and will include details of how the following requirements will be achieved to the greatest extent practicable:
- i) Restrict the duration of blast events to the minimum consistent with safe and efficient mining operations;
 - ii) Fire the production blasts within the 1pm meal break;
 - iii) Fire the three defined daily blast windows at shift changes and meal breaks;
 - iv) Implement timely blast notification procedures;
 - v) Report blast vibration results in a timely manner.
- b) While blasting is occurring as provided for by this consent, the consent holder shall also continue to implement the Amenity Effect Programme (AEP) in respect of vibration as set out below provided that owners and/or tenants who have entered into a separate arrangement with the consent holder and/or have otherwise agreed not to receive the AEP will not be eligible to receive AEP payments under this condition.
- c) The consent holder shall use the recorded data from the vibration compliance monitoring network to estimate the vibration received at occupied residences from blasting within the Correnso Underground Mine, and shall make payments to the occupiers of those residences in accordance with the table and criteria below:

Table: AEP Payment Schedule

Vibration Magnitude (mm/s)	Payment per Blast Event (\$)
≥1.5	17.70
≥3.5	53.00
≥5	177.00
≥6	352.00

- d) The stated payment rates are those existing at 1 January 2013. The rates will be adjusted for the start of each calendar year by the Consumer Price Index (CPI) published by Statistics New Zealand and made publicly available on the consent holder’s website.
- e) An occupied residence shall be eligible to receive AEP payments if it receives 2 or more blast events generating vibration of 1.5mm/s or greater in any month.
- f) The AEP does not apply to any unoccupied houses or undeveloped residential property.
- g) Occupiers of eligible residences shall receive a minimum payment of \$250.
- h) Payments to occupiers of eligible residences shall be calculated six-monthly, and payment made within two months or as soon as practicable thereafter.
- i) Should AEP payments become taxable, the consent holder shall not be liable for any taxes associated with the payments. Nor shall the consent holder be liable for any future changes to national superannuation or other benefits as a result of an eligible occupier receiving the AEP payments required under this consent.

- 16 Where blast events provided under this consent occur simultaneously with blast events at Trio or Favona Underground Mines or the Martha Mine, the consent holder shall ensure that such blast events comply with the maximum ground vibration level limits specified in Condition 14 of this consent.

- 17 For the initial 100 blast events of each type, no more than one exceedance of 5mm/s in every 20 consecutive blast events shall be deemed to be compliant with the 95 percentile limit stated in Condition 14.

The assessment of compliance with the average limits stated in Condition 14 shall not apply until 100 blast events of each type have been fired.

Once 100 blast events of each type have been fired, compliance with both the 95 percentile and average limits shall be separately assessed for each blast type as per conditions 14 e) and f) respectively.

- 18 Ventilation Shaft Construction

No blasting shall be employed in the construction of the ventilation shaft which is approved in terms of this consent.

- 19 Vibration Management Plan

The consent holder shall prepare a Vibration Management Plan for written approval by the Council. The objective of the Plan is to provide detail on how compliance with vibration consent Conditions 14 to 22 and 80 will be achieved for the duration of this consent. This Plan shall be submitted to the Council at least 1 month prior to the exercise of this consent and the consent shall not be exercised until the Vibration Management Plan has been approved by the Council. The Vibration Management Plan may be reviewed and amended from time to time, subject to the approval of the Council but not in a manner inconsistent with these conditions.

The Plan shall specifically include the following:

- a) Measures to be adopted to meet the conditions of this consent to ensure that blast vibrations for both development and production blasts are minimised to the greatest extent practicable, including;
 - i) Description of the blast design criteria and blast design review procedures. All blasts shall be designed to a 95% level of confidence to achieve the vibration levels specified in Condition 14 and the requirements of Condition 15a).
 - ii) The numbers, times (generally around shift changeovers), duration of blast events, and in general terms the coordination of development and production blasts into one blast event and steps to minimise the duration of blast events.
 - iii) Procedures to be adopted where vibration levels approach the maximum permitted levels and mitigation actions to be implemented in the event of an exceedance of the limits stated in Condition 14.
 - iv) The methods and procedures to be adopted to enable the separate recording and reporting of development and slot / production blasting.
 - v) The methods and procedures to be adopted in deploying the roving monitor(s), data usage from the roving monitors, and identifying circumstances where vibration monitoring within structures shall be considered. Any monitoring undertaken in these circumstances is deemed not to be compliance monitoring.
- b) Further detail on the Amenity Effect Programme as required under Condition 15b).
- c) The location of fixed monitoring locations to be established in accordance with Condition 20d).
- d) The properties to be surveyed in accordance with condition 21 a).
- e) Records to be kept, including blast design data.

Advice note:

The Vibration Management Plan may be prepared in conjunction with the Vibration Management Plans prepared in accordance with the consent requirements applying to other mines in the Waihi area.

- 20 Blasting and Vibration Monitoring

- a) The consent holder shall monitor impulsive vibration from all blast events associated with the mining provided for under this consent.
- b) The monitoring system shall be automated to allow for the prompt analysis of each blast event.

- c) Suitably trained personnel shall conduct any monitoring required under this consent, including the installation of roving monitors. Equipment used for monitoring, equipment calibration and vibration measurement procedures shall comply with the current Australian Standard AS2187.2 (or equivalent international standards) and equipment manufacturers' recommendations.
- d) Unless otherwise required or confirmed in writing by the Council, the fixed monitoring locations for the Correnso Underground Mine shall be those shown in Figure 3. These monitoring locations pertain to the Correnso ore body and will need to be reviewed if the operations move to new areas.
- e) The fixed monitoring locations shall not be on or inside a building or structure.
- f) Pursuant to condition 20(d), data received from a roving monitor may identify a new or additional permanent monitoring location.
- g) A roving monitor shall be deployed to record vibrations in locations where complaints regarding vibration have been made in accordance with a procedure specified in the approved Vibration Management Plan required under Condition 19.
- h) A complete record of each blast event shall be maintained. The record shall include:
 - i) Types of measurement instrument used.
 - ii) Time and duration of blast event.
 - iii) Location of blasts.
 - iv) Locations of monitoring positions.
 - v) Distances from the blasts to the monitoring position and nearest residence.
 - vi) Measured vibration levels.
 - vii) Total amount of explosive used.
 - viii) Delay sequence of the blast event.
 - ix) Maximum instantaneous charge.
 - x) Volume of rock blasted.
 - xi) Complaints (including the nature of effects, for example rattling window, was the complainant awoken) and whether the vibration mitigation action process has been undertaken (Condition 22 c))
 - xii) Design criteria not covered in items (i) to (xi) above.

Advice note:

While this condition relates only to the monitoring of blast vibration associated with the mining activities provided for under this consent, similar conditions of the consent apply to all of the consent holder's other mining operations such that the consent holder is required to monitor blast vibrations from all of its mining activities.

21 Property Damage

- a) Before blasting associated with the Correnso Underground Mine starts, and provided the property owner consents, the consent holder shall complete a structural condition survey for at least 15 representative properties (excluding properties owned by the consent holder at that time) as agreed in writing by the Council. The representative properties are to be located in the vicinity of the vibration monitors required under Condition 20 d). In addition to these properties, structural condition surveys shall be carried out as follows (subject to owner's agreement):
 - i) At 'control' properties removed from the influence of any potential vibration effects from mining, as approved by the Council.
 - ii) At Waihi East School and kindergarten.
 - iii) At the former Mine Manager's house (57 Barry Road).

The survey properties shall be identified in the Vibration Management Plan (Condition 19). The surveys shall be carried out by an independent structural engineer suitably qualified and experienced in domestic building design and construction. The survey reports shall include a

visual inspection and video record of all existing built surfaces and defects including concrete accessways.

- b) Upon receipt of a complaint of property damage an appropriately qualified staff member of the consent holder shall investigate and respond to the complaint within five business days or as soon thereafter as practicable unless the matter is considered urgent.

If the resident does not agree with advice from the consent holder's representative the consent holder may, or if the cause of the damage is unclear the consent holder shall, engage an appropriately qualified independent third party to investigate and report to both the homeowner and consent holder. The consent holder shall request that report to be available in 30 days unless considered urgent by the independent third party in which case the report shall be made available as soon as practicable. If the resident does not agree with the advice and the consent holder does not engage a third party then the resident may contact the Council, and if the Council determines, after investigation, that a third party investigation is warranted then the consent holder shall commission and meet the reasonable costs of that investigation.

If the advice of the independent third party or the consent holder's representative determines that the cause of the damage is attributable to activities authorised by this consent then the consent holder will remedy the damage at its cost as soon as practicable in accordance with any recommendation by the third party and to the reasonable satisfaction of the resident.

If any dispute arises in accordance with this clause, then the consent holder will offer to the resident the opportunity to enter binding arbitration through the Independent Review Panel (IRP). If the resident chooses not to participate in that binding arbitration then the consent holder's obligations under this condition are at an end.

In the event that the IRP cannot conduct this arbitration function, the Council shall mediate the dispute under the same terms as the IRP.

For the purposes of this consent the IRP shall be as established and amended from time to time by the Waihi Community Forum (WCF).

22 Management and Reporting

- a) Throughout the period of mining provided for under this consent, at the start of each calendar month the consent holder shall prepare a two-dimensional plan showing the existing mining and the proposed areas of mining activities during that month. The plan shall be loaded onto a page of the consent holder's website. A downloadable pdf version of the plan shall be available from the web page and hard copies shall be available for collection from the Waihi Information Centre and the Hauraki District Council Waihi Service Centre, and on request.

The consent holder shall use its best endeavours to restrict its blasting to the work areas defined on the plan recognising that operational constraints prevail and may lead to deviations from the plan during the course of the month.

- b) No blasting operations shall be carried out without the written approval of the Mine Manager. Before blasting commences, the Mine Manager shall ensure that the operations will not cause danger, damage or undue discomfort to any person nor danger and damage to property.
- c) In the event that blast monitoring shows that the vibration standards have been exceeded, the consent holder shall implement mitigation actions to ensure compliance. Possible mitigation actions include but are not limited to:
 - i) Limiting the rate of excavation advance.
 - ii) Reducing the blast hole diameter.
 - iii) Reducing the weight of explosive in the blast hole.
 - iv) Using alternative explosive types.
 - v) Using electronic delays to adjust sequencing.
 - vi) Decking.
 - vii) Changing the blast pattern.
 - viii) Drilling and blasting in two passes.
 - ix) Changing the method of mining.

- d) The consent holder shall provide a report to Council for each blast event where the measured vibration exceeds the specified maximum limits. The reports shall be submitted within five (5) days after the blast event and include the records listed in Condition 20 h) above and mitigation actions taken to limit subsequent blast vibrations to the maximum limits or less as generally outlined in Condition 22 c).
- e) The consent holder shall, prior to the first development blast event pursuant to this consent, establish a page on its website that will show the recorded vibration magnitude for the last ten blast events for each of the compliance monitors required under Condition 20 d). The results of the most recent blast event will:
 - i) be posted on the web page as soon as practicable after the occurrence of that blast event; and
 - ii) remain provisional until they are verified
- f) The consent holder shall provide a summary report to Council at three (3) monthly intervals after commencement of the Correnso Underground Mine. The report shall include the following:
 - i) Confirmation of actions taken during the previous reporting period.
 - ii) All vibration related complaints received during the current reporting period and mitigation actions taken by the consent holder.
 - iii) Results of vibration monitoring separately for development and production blasts.
 - iv) All roving monitor data results recorded during the quarter.
- g) Monitoring records, reports and complaint schedules shall be stored securely and maintained in a systematic manner for 12 months after completion of all blasting at the underground mine. Records shall be available for perusal by Council and its representatives on request.

APPENDIX 7

SUPA VIBRATION CONDITIONS

HDC LAND USE CONSENT No. RC-202. 2016

Blasting and Vibration

7 Ground Vibration

All blast events shall comply with the vibration levels, numbers of events and durations specified in Condition 8.

8 Impulsive Vibration from Blasting

The activity shall comply with the following standard as measured at the boundary of any residentially zoned site or the notional boundary of any occupied rural dwelling not owned by the consent holder (or related company) or not subject to an agreement with the consent holder (or related company).

In the event that a property is sold and is not subject to an agreement between the consent holder (or related company) and the purchaser or related company, or in the event that there is no longer an agreement between the consent holder and the landowner, the measurement of vibration shall revert to being on or close to the boundary of that residentially or low-density residentially zoned site or the notional boundary of the occupied rural dwelling.

- a) There shall be no more than three blast events per day, from Monday to Saturday and between 0700 and 2000.
- b) No blasting shall be undertaken at night (2000 to 0700 the following day), on Sundays or on public holidays.
- c) The peak particle velocity (vector sum) shall be no more than:
 - i) For development blasts;
 - 5mm/s for 95% of the monitored events.
 - 2mm/s on average.
 - ii) For production blasts;
 - 5mm/s for 95% of the monitored events.
 - 3mm/s on average.
- d) Compliance with the 95% and average limits shall be measured over a six-month rolling period.
- e) Compliance with the 95-percentile limit shall be determined separately for development blast events and for production blast events, and based on the highest recorded vibration for each blast event measured at any monitor, where the blast type is assigned on a monitor-by-monitor basis according to the blast with the minimum scaled distance from each monitor.
- f) Compliance with the average limit shall be determined separately for each blast monitor based on the total number of blast events in the six-month rolling period.
- g) For all blast events, including those involving a combination of production and development blasts (95% compliance);
 - i) Production blasts shall have a total duration of not more than 9 seconds;
 - ii) Development blasts shall have a total duration of not more than 12 seconds;
 - iii) A combination of production and development blasts shall have a duration of not more than 12 seconds.
- h) No blast event shall have a duration of more than 18 seconds.
- i) Duration is to be calculated as the time from the nominal firing time of the first charge to the nominal firing time of the last charge.
- j) A 'Blast Event' is defined as:

'An individual or number of linked individual blasts of not more than the total duration periods specified above.'
- k) A 'Development Blast' is defined as:

'Any blast with a maximum instantaneous charge weight per hole of no more than 7 kilograms of explosive.'

- l) A 'Production Blast' is defined as:

'Any blast in which a single hole contains a maximum instantaneous charge weight of more than 7 kilograms of explosive.' Slot blasts are deemed to be Production Blasts for the purpose of this definition.

Advice Notes:

There shall be no more than three blast events per day from within CEPPA and SUPA combined. For condition 8c the averages and 95 percentiles will be calculated for vibration from blasting within both SUPA and CEPPA combined.

9 Minimisation and Mitigation of Blasting Impacts

- a) In addition to complying with the requirements of Condition 8, the consent holder shall minimise, to the extent practicable, the impacts of blasting vibrations for the Community. The measures to be applied in this regard shall be set out in the Vibration Management Plan (Condition 11) and will include details of how the following requirements will be achieved to the greatest extent practicable:
- i) Restrict the duration of blast events to the minimum consistent with safe and efficient mining operations;
 - ii) Fire the production blasts within the 1pm meal break;
 - iii) Fire the three defined daily blast windows at shift changes and meal breaks;
 - iv) Implement timely blast notification procedures;
 - v) Report blast vibration results in a timely manner.
- b) While blasting is occurring as provided for by this consent, the consent holder shall also continue to implement the Amenity Effect Programme (AEP) in respect of vibration as set out below provided that owners and/or tenants who have entered into a separate arrangement with the consent holder and/or have otherwise agreed not to receive the AEP will not be eligible to receive AEP payments under this condition.
- c) The consent holder shall use the recorded data from the vibration compliance monitoring network to estimate the vibration received at occupied residences from blasting within the Correnso Underground Mine, and shall make payments to the occupiers of those residences in accordance with the table and criteria below:

Table: AEP Payment Schedule

Vibration Magnitude (mm/s)	Payment per Blast Event (\$)
≥1.5	17.70
≥3.5	53.00
≥5	177.00
≥6	352.00

- d) The stated payment rates are those existing at 1 January 2013. The rates will be adjusted for the start of each calendar year by the Consumer Price Index (CPI) published by Statistics New Zealand and made publicly available on the consent holder's website.
- e) An occupied residence shall be eligible to receive AEP payments if it receives 2 or more blast events generating vibration of 1.5mm/s or greater in any month.
- f) The AEP does not apply to any unoccupied houses or undeveloped residential property.
- g) Occupiers of eligible residences shall receive a minimum payment of \$250.
- h) Payments to occupiers of eligible residences shall be calculated six-monthly, and payment made within two months or as soon as practicable thereafter.

- i) Should AEP payments become taxable, the consent holder shall not be liable for any taxes associated with the payments. Nor shall the consent holder be liable for any future changes to national superannuation or other benefits as a result of an eligible occupier receiving the AEP payments required under this consent.

Advice Notes:

For the purposes of determining AEP payments the AEP payments will be based on the recorded vibration data for both CEPPA and SUPA combined.

- 10 Where blast events provided under this consent occur simultaneously with blast events at Trio or Favona Underground Mines or the Martha Mine, the consent holder shall ensure that such blast events comply with the maximum ground vibration level limits specified in Condition 8 of this consent.

11 Vibration Management Plan

The consent holder shall prepare a Vibration Management Plan for written approval by the Council. The objective of the Plan is to provide detail on how compliance with vibration consent Conditions 7 to 14 and 42 will be achieved for the duration of this consent. This Plan shall be submitted to the Council at least 2 weeks prior to the exercise of this consent and the consent shall not be exercised until the Vibration Management Plan has been approved by the Council. The Vibration Management Plan may be reviewed and amended from time to time, subject to the approval of the Council but not in a manner inconsistent with these conditions.

The Plan shall specifically include the following:

- a) Measures to be adopted to meet the conditions of this consent to ensure that blast vibrations for both development and production blasts are minimised to the greatest extent practicable, including;
 - i) Description of the blast design criteria and blast design review procedures. All blasts shall be designed to a 95% level of confidence to achieve the vibration levels specified in Condition 8 and the requirements of Condition 9a).
 - ii) The numbers, times (generally around shift changeovers), duration of blast events, and in general terms the coordination of development and production blasts into one blast event and steps to minimise the duration of blast events.
 - iii) Procedures to be adopted where vibration levels approach the maximum permitted levels and mitigation actions to be implemented in the event of an exceedance of the limits stated in Condition 8.
 - iv) The methods and procedures to be adopted to enable the separate recording and reporting of development and slot / production blasting.
 - v) The methods and procedures to be adopted in deploying the roving monitor(s), data usage from the roving monitors, and identifying circumstances where vibration monitoring within structures shall be considered. Any monitoring undertaken in these circumstances is deemed not to be compliance monitoring.
- b) Further detail on the Amenity Effect Programme as required under Condition 9b).
- c) The location of fixed monitoring locations to be established in accordance with Condition 12d).
- d) Records to be kept, including blast design data.

Advice note:

The Vibration Management Plan may be prepared in conjunction with the Vibration Management Plans prepared in accordance with the consent requirements applying to other mines in the Waihi area.

12 Blasting and Vibration Monitoring

- a) The consent holder shall monitor impulsive vibration from all blast events associated with the mining provided for under this consent.
- b) The monitoring system shall be automated to allow for the prompt analysis of each blast event.

- c) Suitably trained personnel shall conduct any monitoring required under this consent, including the installation of roving monitors. Equipment used for monitoring, equipment calibration and vibration measurement procedures shall comply with the current Australian Standard AS2187.2 (or equivalent international standards) and equipment manufacturers' recommendations.
- d) Unless otherwise required or confirmed in writing by the Council, the fixed monitoring locations for the Correnso Underground Mine shall be those shown in Figure 2. These monitoring locations pertain to the Correnso ore body and will need to be reviewed if the operations move to new areas.
- e) The fixed monitoring locations shall not be on or inside a building or structure.
- f) Pursuant to condition 12(d), data received from a roving monitor may identify a new or additional permanent monitoring location.
- g) A roving monitor shall be deployed to record vibrations in locations where complaints regarding vibration have been made in accordance with a procedure specified in the approved Vibration Management Plan required under Condition 11.
- h) A complete record of each blast event shall be maintained. The record shall include:
 - i) Types of measurement instrument used.
 - ii) Time and duration of blast event.
 - iii) Location of blasts.
 - iv) Locations of monitoring positions.
 - v) Distances from the blasts to the monitoring position and nearest residence.
 - vi) Measured vibration levels.
 - vii) Total amount of explosive used.
 - viii) Delay sequence of the blast event.
 - ix) Maximum instantaneous charge.
 - x) Volume of rock blasted.
 - xi) Complaints (including the nature of effects, for example rattling window, was the complainant awoken) and whether the vibration mitigation action process has been undertaken (Condition 14 c))
 - xii) Design criteria not covered in items (i) to (xi) above.

Advice note:

While this condition relates only to the monitoring of blast vibration associated with the mining activities provided for under this consent, similar conditions of the consent apply to all of the consent holder's other mining operations such that the consent holder is required to monitor blast vibrations from all of its mining activities.

13 Property Damage

- a) Upon receipt of a complaint of property damage an appropriately qualified staff member of the consent holder shall investigate and respond to the complaint within five business days or as soon thereafter as practicable unless the matter is considered urgent.

If the resident does not agree with advice from the consent holder's representative the consent holder may, or if the cause of the damage is unclear the consent holder shall, engage an appropriately qualified independent third party to investigate and report to both the homeowner and consent holder. The consent holder shall request that report to be available in 30 days unless considered urgent by the independent third party in which case the report shall be made available as soon as practicable. If the resident does not agree with the advice and the consent holder does not engage a third party then the resident may contact the Council, and if the Council determines, after investigation, that a third party investigation is warranted then the consent holder shall commission and meet the reasonable costs of that investigation.

If the advice of the independent third party or the consent holder's representative determines that the cause of the damage is attributable to activities authorised by this consent then the consent

holder will remedy the damage at its cost as soon as practicable in accordance with any recommendation by the third party and to the reasonable satisfaction of the resident.

If any dispute arises in accordance with this clause, then the consent holder will offer to the resident the opportunity to enter binding arbitration through the Independent Review Panel (IRP). If the resident chooses not to participate in that binding arbitration then the consent holder's obligations under this condition are at an end.

In the event that the IRP cannot conduct this arbitration function, the Council shall mediate the dispute under the same terms as the IRP.

For the purposes of this consent the IRP shall be as established and amended from time to time by the Waihi Community Forum (WCF).

14 Management and Reporting

- a) Throughout the period of mining provided for under this consent, at the start of each calendar month the consent holder shall prepare a two-dimensional plan showing the existing mining and the proposed areas of mining activities during that month. The plan shall be loaded onto a page of the consent holder's website. A downloadable pdf version of the plan shall be available from the web page and hard copies shall be available for collection from the Waihi Information Centre and the Hauraki District Council Waihi Service Centre, and on request.

The consent holder shall use its best endeavours to restrict its blasting to the work areas defined on the plan recognising that operational constraints prevail and may lead to deviations from the plan during the course of the month.

- b) No blasting operations shall be carried out without the written approval of the Mine Manager. Before blasting commences, the Mine Manager shall ensure that the operations will not cause danger, damage or undue discomfort to any person nor danger and damage to property.
- c) In the event that blast monitoring shows that the vibration standards have been exceeded, the consent holder shall implement mitigation actions to ensure compliance. Possible mitigation actions include but are not limited to:
 - i) Limiting the rate of excavation advance.
 - ii) Reducing the blast hole diameter.
 - iii) Reducing the weight of explosive in the blast hole.
 - iv) Using alternative explosive types.
 - v) Using electronic delays to adjust sequencing.
 - vi) Decking.
 - vii) Changing the blast pattern.
 - viii) Drilling and blasting in two passes.
 - ix) Changing the method of mining.
- d) The consent holder shall provide a report to Council for each blast event where the measured vibration exceeds the specified maximum limits. The reports shall be submitted within five (5) days after the blast event and include the records listed in Condition 12 h) above and mitigation actions taken to limit subsequent blast vibrations to the maximum limits or less as generally outlined in Condition 14 c).
- e) The consent holder shall record the vibration magnitude for blast events resulting from the Slevin Underground mine on its website. The results of the most recent blast event will:
 - i) be posted on the web page as soon as practicable after the occurrence of that blast event; and
 - ii) remain provisional until they are verified
- f) The consent holder shall provide a summary report to Council at three (3) monthly intervals after the first exercise of this consent as provided for by condition 4. The report shall include the following:

- i) Confirmation of actions taken during the previous reporting period.
- ii) All vibration related complaints received during the current reporting period and mitigation actions taken by the consent holder.
- iii) Results of vibration monitoring separately for development and production blasts.
- iv) All roving monitor data results recorded during the quarter.
- g) Monitoring records, reports and complaint schedules shall be stored securely and maintained in a systematic manner for 12 months after completion of all blasting at the underground mine. Records shall be available for perusal by Council and its representatives on request.