



Monitoring Plan

Dewatering and Settlement Monitoring Plan

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Department	Sustainability
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1 PURPOSE

Consents granted by the Waikato Regional Council (WRC) and the Hauraki District Council (HDC) for the Martha Open Pit, Favona Underground Mine, Trio Underground Mine, Correnso Underground Mine, Slevin Underground Project Area (SUPA) and Project Martha require the preparation of a Dewatering and Settlement Monitoring Plan. The relevant consent conditions are reproduced in section 6.

2 SCOPE

This plan combines both the Martha Settlement and Groundwater Monitoring Plan 2004-2005 (v3) and the Favona Settlement, Dewatering and Water Quality Monitoring Plan 2006 (v1) into the one document. The Martha and Favona Plans have been combined to simplify the dewatering, groundwater and settlement monitoring which is conducted at similar monitoring networks and frequencies for Martha, Favona, Trio and Correnso/SUPA.

The plan describes the monitoring regime designed to assess the effects of:

- a) Mine dewatering on the regional groundwater system;
- b) Mine dewatering on settlement;
- c) Leachate from the Favona Ore Stockpile and Polishing Pond Stockpile containing potentially acid forming material on shallow groundwater quality; and
- d) The discharge of degraded-quality water from the Favona Underground, backfilled and flooded workings on groundwater quality.

3 REFERENCE AND COMPLIANCE

Level	Source
Legislation or Guidelines	- Land Use Consent 97/98-105 - Water Permit 971286 - Mining Licence 32-2388 - Land Use Consent 85.050.326.E - WRC Resource Consents 109742, 109743, 109744, 109745, and 109746 - HDC Resource Consent RC-15735 - WRC Resource Consents 121416, 121417, 121418, 121446, and 121447 - HDC Resource Consent RC-202.2012 - WRC Resource Consent 124860 - Water Permit AUTH139551.01.01 - Land Use Consent 202.2018.00000857.001
Corporate	OGC-450-STD-019 -Environmental Performance Standards \ Standard 3 – Water Management
	OGC-450-GUI-005 Risk Management Guidelines
Site	WAI-200-PRO-012 Groundwater Monitoring

Level	Source
	WAI-417-PRO-009 Management of Surface Intersecting Drill Hole WAI-200-PRO-021 Waihi Piezometer Network Monitoring

4 RISK ASSESSMENT

The site risk register is to be reviewed after all significant incidents. Formal Risk Assessments (FRA) are to be undertaken where changes to this document affect safety of personnel. Risk Assessments are to be conducted according to OGC-450-GUI-005 Risk Management Guidelines.

5 INTRODUCTION

5.1 Martha

The Martha Mine is an open pit operation that commenced construction in 1987. Mining at Martha was planned to cease in 2006, however mining was extended for an additional 10 years (scheduled until 2016). The Martha Pit is currently in abeyance due to a slip on the North Wall.

5.2 Favona

The Favona Underground mine is located north and east of the existing processing plant. Site preparation works were conducted in 2004, with the construction of the Favona Exploration Decline commencing in November 2004. Groundwater was not intercepted until May 2005, with minor flows until October 2005 when large volume dewatering from the vein was required. Dewatering holes have been drilled at strategic locations throughout the mine to lower the groundwater table surrounding the Favona ore body. Water from the dewatering holes drains into sumps and is pumped to the surface for treatment. Mining of the Favona mine is concluded and backfilling completed.

5.3 Trio

The Trio system sits under Union Hill, about halfway between the existing process plant and the Martha open pit. Trio is accessed from the existing Favona mine and utilises existing Martha and Favona mine surface infrastructure including the already consented stockpile areas. The Trio Underground Mine involves the mining of the Trio, Union and Amaranth mineralised veins (collectively referred to as the Trio system).

Trio mining and backfilling was completed in 2014.

5.4 Correnso

Mining of Correnso began in December 2013 with the construction of a development drive in Waihi East. Access to Correnso is via the existing Trio/Favona system.

Waste rock produced by the mine is managed two ways: 1) underground stockpiling and backfilling into stopes and 2) placement on temporary stockpiles on the surface.

- 1) Open stopes are progressively backfilled with waste rock during mining operations. Backfilled stopes are not treated by any specific compaction or consolidation process, but are subjected to blast vibrations, heavy vehicular trafficking, and further backfilling during mining of subsequent stopes above.
- 2) Waste rock is stockpiled at two locations on the surface. A short-term stockpile is maintained immediately behind the mill area, enabling easy access for back loading. A larger and longer-term volume can be stored at the 'Polishing Pond' Stockpile (near the water treatment plant polishing ponds). Waste rock placement at this stockpile started in early February 2007.

5.5 Slevin Underground Project Area

SUPA was granted consent in October 2016. It is a comparatively small project area and is an offshoot of Correnso. Access to SUPA will be from the CEPA project area. There are no additional monitoring requirements as Correnso monitoring adequately encompasses SUPA also.

5.6 Project Martha

Project Martha was granted consent in February 2019. Underground mining commenced in mid-2019. As part of the consent pre-conditions, this monitoring plan is to be submitted and certified two months prior to dewatering below 700mRL. Additional piezometers, planned in consultation with regulators, were drilled in 2019-2020. A further four piezometers were installed in 2022-2023, including one in the Martha Underground Mine. Upgrades to the network to monitor response from shallow Rex orebody mining were also completed in 2023.

6 RELEVANT CONSENT CONDITIONS

6.1 Martha

This site specific monitoring plan is required under Condition 3.30 of LUC Number 97/98-105; Water Permit Number 971286; and Condition 11 of Mining Licence 32-2388. Full copies of these Conditions are given in Appendix A.

The Conditions require a Dewatering and Settlement Monitoring Plan to address the following:

- a) An overall description of the groundwater and settlement monitoring system and the measures to be adopted to meet the objectives of the groundwater and settlement management system.
- b) Details of the piezometer network proposed to monitor the effects of pit dewatering on the aquifers under Waihi Township.
- c) Details of the settlement monitoring network proposed to monitor the extended zone which has been or is likely to be affected by settlement caused by mine dewatering.
- d) Details of the survey facilities in the Waihi Township considered by the consent holder to be potentially “at risk” of damage from ground settlement caused by mine dewatering.
- e) A settlement contingency plan to include mitigation measures to be implemented in the event that ground settlement caused by mine dewatering induces a tilt that exceeds 1 (vertical) in 1000 (horizontal) between any two network monitoring locations spaced no less than 25 m apart (i.e. Settlement no more than 25 mm over 25 m). The settlement contingency plan shall particularly address those facilities identified by the consent holder as being “at risk” from ground settlement caused by mining.
- f) A dewatering contingency monitoring plan that describes the steps the consent holder shall implement in the event that dewatering results in adverse impacts on affected aquifer systems and associated groundwater supplies used for domestic, stock or other purposes.
- g) In detailing the monitoring programmes, the consent holder shall provide information on the monitoring methods proposed, the parameters to be monitored and the calibration and maintenance of monitoring equipment.

The conditions allow the consent holder to review and update the plan as necessary.

Monitoring is to include:

- The daily volume of water abstracted.
- Monthly water level monitoring of the piezometer network.
- Six monthly monitoring of ground settlement.
- The chemistry of groundwater, pit runoff and dewatering water.

In the event that a tilt of greater than 1 in 1000 occurs over 25 m and such tilt is due to mine dewatering, or there is a significant variance from predicted settlement rates for the settlement zones given in Table 1 as follows:

Table 1: Maximum Zone Settlements

Zone	Maximum Total Settlement (mm), incl Project Martha (2020)
1	55
2	65
3	95
4	160
5	260
6	340
7	540

Note: Maximum Total Settlement incl. Project Martha Dewatering sourced from Project Martha Hearing Evidence, Appendix R, Table 2 (Engineering Geology Ltd, May 2018)

The consent holder is to:

- Explain the cause of the non-conformance.
- Agree with the consent Authorities on appropriate settlement contingency measures to be implemented.
- Implement settlement contingency measures as appropriate.
- Advise the councils of the steps proposed to be taken to prevent further occurrence of the situation.

6.2 Favona

Conditions 33 to 36 of the LUC and Conditions for the Favona Underground Mine Project granted by Hauraki District Council (No. 85.050.326.E granted in 2004) and Condition 2 of Schedule 2 – General Conditions attached to the WRC Resource Consents 109742, 109743, 109744, 109745, and 109746 state the following regarding the Settlement, Dewatering and Water Quality Monitoring Plan:

Prior to exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Settlement, Dewatering and Water Quality Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement, the groundwater hydraulic regime and on water quality, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system, as proposed in the consent application. The monitoring regime shall be designed to assess the effects of:

- mine dewatering on the regional groundwater system,
- mine dewatering on settlement;
- leachate from stockpiles containing potentially acid forming material on shallow groundwater quality, and

- d) the discharge of degraded-quality water from the backfilled and flooded workings on groundwater quality.
- e) Final details of the monitoring locations are to be agreed with the Council. The Plan shall also provide trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

The Plan shall be consistent with the recommendations included in the reports to the Council entitled;

- “Proposed Favona Underground Mine – Review of Groundwater Assessment” dated October 2003 and prepared by Pattle Delamore Partners; and
- “Technical Review of Water Quality and Geochemistry Issues - Favona Underground Project”, dated October 2003 and prepared by GEOKEM.

The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed, and updated as necessary, by the consent holder at least once every two years. Any updated Plan shall be promptly forwarded to the Council for approval and following approval the updated Plan shall be implemented in place of the previous version.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Settlement, Dewatering and Water Quality Monitoring Plan, then the conditions of this consent shall prevail.

Condition 3 of Schedule 2 – General Conditions attached to the WRC Resource Consents 109742, 109743, 109744, 109745, 109746 and Condition 38 of the LUC and Conditions for the Favona Underground Mine Project granted by Hauraki District Council (No. 85.050.326.E granted in 2004) state the following regarding Monitoring - Tilt:

In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations, installed in accordance with the Settlement, Dewatering and Water Quality Monitoring Plan required pursuant to condition 2 above, or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Council in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then:

1. explain the cause of the non-conformance,
2. agree with the Council on the appropriate settlement contingency measures to be implemented as described,
3. implement settlement contingency measures as appropriate,
4. advise the Council on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.

This latter condition is similar to that of Condition 10 (above) for the Martha Mine.

Condition 2 of WRC resource consent number 109742 states the following regarding other water users:

“If, in the opinion of the Council, the exercise of the consent adversely affects stock, domestic or other water supplies, then the consent holder shall, at its own cost, be responsible for providing to the owner of those water supplies an alternative equivalent water supply, to the satisfaction of Council. The consent holder shall be responsible for making an alternative water supply available within 12 hours of being directed to do so by the Council.”

Specific conditions relating to the Settlement, Dewatering and Water Quality Monitoring Programme are included in two other WRC consents for the Favona Underground Mine. These conditions relate directly to water quality monitoring as follows.

Resource Consent 109744 authorises the discharge of waste rock and ore onto land in temporary surface stockpiles and to discharge seepage from the temporary stockpiles into the ground. Condition 5 states the following:

“In addition to the provisions of conditions 4a) and 4b) above, PAF stockpile site preparation shall include:

(c) Shallow piezometers installed immediately up and down catchment of the stockpile(s) to monitor for leachate in the shallow groundwater system (as detailed in the Settlement, Dewatering & Water Quality Monitoring Plan prepared pursuant to condition 2 of Schedule Two – General Conditions.”

Resource Consent 109745 authorises the discharge of waste rock into land underground in the project area as backfill and to allow degraded quality groundwater to discharge from the flooded workings in the project area into the surrounding ground post closure. Condition 3 states the following in relation to groundwater quality:

“Piezometers shall be installed at sites to be approved by the WRC for the purpose of monitoring changes in groundwater quality arising from the exercise of this consent. The groundwater monitoring system shall be detailed in the Settlement, Dewatering & Water Quality Monitoring Plan, prepared pursuant to condition 2 of Schedule Two – General Conditions.”

6.3 Trio

Condition 14 of the HDC Resource Consent RC-15735¹ and Condition 5 of Schedule One – General Conditions attached to the WRC Resource Consents 121416, 121417, 121418, 121446, and 121447 state the following regarding the Settlement, Dewatering and Water Quality Monitoring Plan as it relates to the Trio Development Project:

Prior to (*note: this is specific to the WRC Condition; HDC requires the plan “within 2 months of exercise of the consent”*) the exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system, as proposed in the consent application. The monitoring regime shall be designed to assess the effects of:

¹ The HDC Trio Underground Mine consent (RC15774) does not have a requirement for a Dewatering and Settlement Monitoring Plan. The requirement for such a Plan is covered under the Trio Development Consent.

- (i) dewatering on the regional groundwater system; and
- (ii) dewatering on settlement.
- (iii) the discharge of degraded quality water from the backfilled and flooded workings on groundwater quality (*note: this third requirement is unique to the WRC Condition only*)

Final details of the monitoring locations are to be agreed with the Council. The Plan shall also provide trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Any updated Plan shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

6.4 Correnso

Conditions 27 to 34 of the HDC Resource Consent RC-202.2012 state the following regarding the Settlement, Dewatering and Water Quality Monitoring Plan as it relates to the Correnso Underground Mine:

The objectives of the groundwater and settlement management system shall be to ensure that dewatering operations do not give rise to surface instability and differential settlement beyond that authorised by this consent.

Within 2 months of the exercise of this consent, the consent holder shall prepare, and submit to the Council/s for written approval, a Dewatering and Settlement Monitoring Plan. The purpose of the Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system set out in Condition 27. The monitoring regime shall be designed to assess the effects of:

- a) Dewatering on the regional groundwater system; and
- b) Dewatering on settlement.

Monitoring locations are to provide appropriate resolution of groundwater levels and surface tilt relative to the scale of surface infrastructure, particularly in the areas above and adjacent to the mining activities provided for in this consent. Final details are to be agreed with the Council. The Plan shall also provide settlement trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

The exercise of the consent must be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Any updated Plan shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.

In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations installed in accordance with the Dewatering and Settlement Monitoring Plan required pursuant to Condition 28 of the consent, or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Hauraki District and Waikato Regional Councils in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then:

- a) Explain the cause of the non-conformance;
- b) Propose appropriate settlement contingency measures to the Councils and the timing of implementation thereof by the consent holder;
- c) Implement settlement contingency measures as appropriate within the agreed time limit;
- d) Advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.

The consent holder shall promptly advise the Council of any significant anomalies identified by the regular (monthly) reading of groundwater levels in the piezometer network. Such advice is to include an explanation of the anomalous results and actions proposed to address any issues identified. This report is to be provided to the Council within 10 working days of the anomalous results being identified.

A “significant anomaly” is defined as 15m or more offset occurring in piezometer recordings over a 1 month period.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Advice notes:

1. The Dewatering and Settlement Monitoring Plan shall be consistent with the Dewatering and Settlement Monitoring Plan prepared as a condition of the ground dewatering consent (RC 124860) granted by the Waikato Regional Council.
2. The monitoring undertaken in terms of the Dewatering and Settlement Monitoring Plan may need to be continued for a period beyond the term of this consent depending on recharge of the groundwater following cessation of underground mining activities and the filling of the Martha Pit.

Condition 5 of the WRC Resource Consent 124860 states the following regarding the Settlement, Dewatering and Water Quality Monitoring Plan as it relates to the Golden Link Project Area L:

Dewatering and Settlement Monitoring Plan

5. Prior to the exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system, as proposed in the consent application. The monitoring regime shall be designed to assess the effects of:

- (i) dewatering on the regional groundwater system; and

- (ii) dewatering on settlement; and
- (iii) the discharge of degraded quality water from the backfilled and flooded workings on groundwater quality.

Monitoring locations are to provide appropriate resolution of surface tilt relative to the scale of surface infrastructure and final details are to be agreed with the Councils. The Plan shall also provide trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Such updated Plans shall relate to the Correnso Mine or to any new mine within Area L. Any updated Plan shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

6.5 SUPA

Dewatering and Settlement Monitoring Plan

- 21 The objectives of the groundwater and settlement management system shall be to ensure that dewatering operations do not give rise to surface instability and differential settlement beyond that authorised by this consent.
- 22 Within 2 months of the exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.
- 23 The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system set out in Condition 21.

The monitoring regime shall be designed to assess the effects of:

- a) Dewatering on the regional groundwater system; and
 - b) Dewatering on settlement.
- 24 Monitoring locations are to provide appropriate resolution of groundwater levels and surface tilt relative to the scale of surface infrastructure, particularly in the areas above and adjacent to the mining activities provided for in this consent. Final details are to be agreed with the Council. The Plan shall also provide settlement trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.
 - 25 The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Any updated Plan

shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.

- 26 In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations installed in accordance with the Dewatering and Settlement Monitoring Plan required pursuant to Condition 22 of this consent, or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Hauraki District and Waikato Regional Councils in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then:
- Explain the cause of the non-conformance;
 - Propose appropriate settlement contingency measures to the Councils and the timing of implementation thereof by the consent holder;
 - Implement settlement contingency measures as appropriate within the agreed time limit;
 - Advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.
- 27 The consent holder shall as a matter of urgency, advise the Council of any significant anomalies identified by the regular (monthly) reading of groundwater levels in the piezometer network. Such advice is to include an explanation of the anomalous results and actions proposed to address any issues identified. This report is to be provided to the Council within 10 working days of the anomalous results being identified.
- A "significant anomaly" is defined as 15m or more offset occurring in piezometer recordings over a 1 month period.
- 28 In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Advice notes:

- The Dewatering and Settlement Monitoring Plan shall be consistent with the Dewatering and Settlement Monitoring Plan prepared as a condition of the ground dewatering consent (RC 124860) granted by the Waikato Regional Council and may be prepared in conjunction with similar plans prepared in accordance with the consent conditions applying to the Martha, Favona, Trio and CEPPA projects.
- The monitoring undertaken in terms of the Dewatering and Settlement Monitoring Plan may need to be continued for a period beyond the term of this consent depending on recharge of the groundwater following cessation of underground mining activities and the filling of the Martha Pit.

Dewatering and Settlement Monitoring Report

- 29 The consent holder shall provide to the Council an annual Dewatering and Settlement Monitoring Report. The Report shall, as a minimum, provide the following information:
- The volume of groundwater abstracted;

- b) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;
- c) An interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over the previous year, predictions of future impacts that may arise as a result of any trends that have been identified including review of the predicted post closure effects based on actual monitoring data, and what contingency actions, if any, the consent holder proposes to take in response to those predictions. This analysis shall be undertaken by a party appropriately experienced and qualified to assess the information;
- d) Any contingency actions that may have been taken during the year; and
- e) Comment on compliance with Conditions 21 to 28 of this consent including any reasons for non-compliance or difficulties in achieving conformance with the conditions of consent.

The report shall be forwarded in a form acceptable to the Council.

Advice note:

The Dewatering and Settlement Monitoring Report shall be consistent with the Dewatering and Settlement Monitoring Report prepared as a condition of the ground dewatering consent (RC 124860) granted by the Waikato Regional Council and may be prepared in conjunction with similar reports prepared in accordance with the consent conditions applying to the Martha, Favona, Trio and CEPPA projects.

6.6 Project Martha

Waikato Regional Council Consent

Resource Consent: AUTH139551.01.01 Water Permit - Dewatering Take

CONDITIONS

GENERAL

- 1 The activities to which this consent relates shall be generally undertaken in accordance with "Project Martha: Applications for Resource Consents and Assessment of Environmental Effects" and associated appendices dated 25 May 2018 and recorded as document number 12546836 on the Waikato Regional Council's document management system, and as identified in the resource consent conditions below which shall prevail in the event of any inconsistency between the aforementioned documentation and the conditions.
- 2 The consent holder shall notify the Waikato Regional Council in writing at least 10 working days in advance of the first exercise of this consent.

SCHEDULE ONE

- 3 The consent holder shall comply with the common conditions between the Waikato Regional Council and Hauraki District Council in Schedule One as relevant to the management of the mining and rehabilitation activities authorised by this consent.

DEWATERING LEVEL

- 4 The exercise of this consent shall not result in groundwater lowering to a level below 500mRL.

MONITORING

- 5 Upon commencement of this consent, the consent holder shall monitor the volume of water abstracted on a weekly basis and shall report this to the Waikato Regional Council.
- 6 Upon the first exercise of this consent the consent holder must telemeter – via a telemetry system developed after liaison with the Waikato Regional Council to ensure that the telemetry system is compatible with the Waikato Regional Council telemetry system standards and data protocols – continuous 15 minute values of: gross take volume (in units of cubic metres). The data must be reported once daily to the Waikato Regional Council via the telemetry system. There must be 96 values, respectively, per daily report. When no water is being taken the data must specify the gross take volume and calculated net take volume as zero.
- 7 The consent holder shall monitor the chemistry of the water abstracted under this consent. Prior to the commencement of this consent the sampling parameters and frequencies shall be agreed with the Waikato Regional Council, with the results forwarded to the Waikato Regional Council on an annual basis. The consent holder may change the sampling parameters and frequencies with the agreement of the Waikato Regional Council.

OTHER WATER USERS

- 8 If, in the opinion of the Waikato Regional Council, the exercise of this consent adversely affects any existing stock, domestic or other water supplies, then the consent holder shall, at its own cost, be responsible for providing to the owner of those water supplies an alternative equivalent water supply, to the satisfaction of Waikato Regional Council. The consent holder shall be responsible for making an alternative water supply available within 12 hours of being directed to do so by the Council.

MONITORING OF THE SHALLOW AND DEEP AQUIFERS

- 9 The consent holder shall upon commencement of this consent and at five yearly intervals thereafter, provide a report to the Waikato Regional Council commenting on the effect the groundwater take and dewatering activity is having on the deep and shallow aquifers under the Martha Pit and immediate surrounds. The report shall as a minimum, provide the following information:
- (a) The nature of the geology under the Martha Pit and immediate surrounds;
 - (b) Comment on the existing groundwater chemistry for the deep and shallow aquifers;
 - (c) Comment on the groundwater levels in the deep and shallow aquifers; and
 - (e) Provide details of any wetland areas and any other known aquatic ecological values that are dependent on the surface contribution of shallow and deep groundwater outflows.

Taking into account all of this information (and any other relevant data) the consent holder shall provide comment on the effects the dewatering activity is having on the shallow and deep aquifers under the Martha Pit and immediate surrounds.

ADMINISTRATIVE CHARGES

- 10 The consent holder shall pay to the Waikato Regional Council any administrative charge fixed in accordance with Section 36 of the Resource Management Act 1991, or any charge prescribed in accordance with regulations made under Section 360 of that Act.

REVIEW OF CONDITIONS

- 11 Pursuant to Section 128(1)(a)(i) and (iii) of the Act, the Waikato Regional Council may, 12 months from the commencement of this consent and annually thereafter, or on receipt of any of the reports required by this consent, review any or all of the conditions of this consent for the following purposes:
- (a) To review the effectiveness of the conditions of this resource consent in avoiding, remedying or mitigating any adverse effects on the environment that may arise from the exercise of this consent, and if necessary to avoid, remedy or mitigate such effects by way of further or amended conditions. In deciding to undertake a review and where further or amended conditions are deemed necessary, the Waikato Regional Council shall have regard to all of the information contained in the reports required under the conditions of this consent; or
 - (b) To address any adverse effects on the environment which have arisen as a result of the exercise of this consent that were not anticipated at the time of commencement of this consent; or
 - (c) To review the adequacy of, and the necessity for, any of the monitoring programmes or management plans that are part of the conditions of this consent.
- 12 Pursuant to Section 128(1)(a)(i) and (iii) of the Act, the Waikato Regional Council may review Conditions 41 to 46 in Schedule One of this consent following any change made to the Trust Deed referred to in Condition 41 of Schedule One.

SCHEDULE ONE

COMMON CONDITIONS BETWEEN THE HAURAKI DISTRICT COUNCIL AND THE WAIKATO REGIONAL COUNCIL

DEWATERING AND SETTLEMENT MONITORING PLAN

14. The objectives of the groundwater and settlement management system shall be to ensure that dewatering operations do not give rise to surface instability and differential settlement beyond that authorised by this consent.
15. Two months prior to dewatering below 700 m RL (mine datum), the consent holder shall prepare, and submit to the Councils for its certification, a Dewatering and Settlement Monitoring Plan. The purpose of the Dewatering and Settlement Monitoring Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.
16. The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system set

out in Condition 14 of this schedule. The monitoring regime shall be designed to assess the effects of:

Dewatering on the regional groundwater system; and

Dewatering on settlement.

17. Monitoring locations are to provide appropriate resolution of mine inflows and pumping, groundwater levels (both for shallow and deep aquifers) and ground surface tilt relative to the scale of surface infrastructure, throughout the area within the maximum extent of the groundwater cone of depression and particularly in the areas above and adjacent to the mining activities provided for in this consent. Final details are to be agreed with the Councils but are to include additional piezometers and extensometers located along the line of upper level workings in the Rex Orebody. The Dewatering and Settlement Monitoring Plan shall also provide groundwater and settlement trigger limits that will initiate the implementation of contingency mitigation and / or monitoring measures and shall detail any linkages with the operation of the Martha Pit and Martha Underground Mine.
18. The exercise of this consent shall be in accordance with the Dewatering and Settlement Monitoring Plan as certified by the Councils. The Dewatering and Settlement Monitoring Plan shall be reviewed and updated as necessary by the consent holder. Any updated Dewatering and Settlement Monitoring Plan shall be promptly forwarded to the Councils for certification, and following this process, the updated plan shall be implemented in place of the previous version.
19. In the event that a tilt greater 1 in 1,000 occurs between any two network monitoring locations installed in accordance with the Dewatering and Settlement Monitoring Plan required pursuant to Condition 15 of this schedule, or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Councils in writing within 20 working days of receiving the results of the monitoring. The consent holder shall then:
 - a) Explain the cause of the non-conformance;
 - b) Propose appropriate settlement contingency measures to the Councils and the timing of implementation thereof by the consent holder;
 - c) Implement settlement contingency measures as appropriate within the agreed time limit; and
 - d) Advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.
20. The consent holder shall as a matter of urgency, advise the Councils of any significant anomalies identified by the regular reading of groundwater levels in the piezometer network. Such advice is to include an explanation of the anomalous results and actions proposed to address any issues identified. This report is to be provided to the Councils within 10 working days of the anomalous results being identified.

A "significant anomaly" is defined as a drop in groundwater level greater than the seasonal variation in piezometers within the alluvium and younger volcanic rocks and a drop of 15 m or more in the recordings from piezometers tapping the upper 50 m of Andesite over a one month period.

21. In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Advice Note:

The monitoring undertaken in terms of the Dewatering and Settlement Monitoring Plan may need to be continued for a period beyond the term of this consent depending on recharge of the groundwater following cessation of underground mining activities and filling of the Martha Pit.

DEWATERING AND SETTLEMENT MONITORING REPORT

22. The consent holder shall provide to the Councils (within one month of an agreed anniversary date) an annual Dewatering and Settlement Monitoring Report. The report shall, as a minimum, provide the following information:
- a) The volume of groundwater abstracted;
 - b) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;
 - c) An interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over the previous year, predictions of the future impacts that may arise as a result of any trends that have been identified including review of the predicted post closure effects based on actual monitoring data, and what contingency actions, if any, the consent holder proposes to take in response to those predictions, this analysis shall be undertaken by a party appropriately experienced and qualified to assess the information;
 - d) Any contingency actions that may have been taken during the year; and
 - e) Comment on compliance with Conditions 14 to 21 of this schedule including any reasons for non-compliance or difficulties in achieving conformance with the conditions of consent.
 - f) The report shall be forwarded in a form acceptable to Councils.

PROJECT MARTHA LAND USE CONSENT FOR MARTHA UNDERGROUND MINE (LUC 202.2018.00000857.001)

71 (c). No stoping in the Rex Orebody shall occur above a depth of at least 40m below the top of the andesite, unless investigations reported to the Council demonstrate to its satisfaction that a lesser depth will ensure surface stability. Any such investigation report is to include, at least, results from groundwater monitoring above the Rex workings, results from extensometers installed from the surface above the Rex workings, and surface settlement results from markers in the area above the Rex Orebody.

OceanaGold intends to mine higher in the Rex orebody. A hydrogeological assessment was conducted by GWS Ltd. They found that “dewatering of the water table at the surface is generally noted not to occur as a result of mine underdrainage. Deep dewatering has not, therefore, resulted in near surface effects nor ground settlement beyond that expected beyond the consented envelope.”

Additional monitoring was agreed with the Council and implemented prior to mining higher in the Rex Orebody (Section 9.3.4).

7 MONITORING PLAN OBJECTIVES

7.1 General Objectives

The objectives of this Dewatering and Settlement Monitoring Plan are to:

- Outline the monitoring systems in place for dewatering, groundwater and settlement and the requirements for these systems in accordance with the relevant consent conditions.
- Identify trigger limits that will indicate when contingency mitigation and/or monitoring may be necessary;
- Identify what contingency mitigation and/or monitoring would be undertaken in the event that the trigger levels are exceeded, in order to ensure that adverse environmental effects are avoided, remedied or mitigated.

7.2 Specific Objectives

7.2.1 Dewatering Objectives

The objectives of the dewatering monitoring are to:

- Provide data on the dewatering level at the Martha Pit groundwater pumping site so that the drawdown profile can be developed as required by Condition 3.30 (h) of the LUC 97 / 98-105, Condition 13 (c) of Water Permit 971286, Condition 15 of LUC RC-15735 and Condition 6 (Schedule One) of RC 121446.
- Measure and record the daily volume of water pumped from the Martha pit as required under Condition 3.30 (d) of the LUC 97 / 98-105, Condition 7 of Water Permit 971286 and Condition 15(i) of RC-15735.
- Measure and record the daily volume of water pumped from the Favona underground required under Consent 109742, Condition 3.
- Provide data on water chemistry and pit wall run-off chemistry at the Martha pit as required by Condition 11 of Water Permit 971286.
- Provide data on the water chemistry of dewatering water from the underground.
- Ensure that groundwater is not lowered below the consented level of 500mRL.
- Measure and report on the volume of water pumped from the Martha Underground as required under Conditions 5 and 6 of Water Permit AUTH139551.01.01,

Note that objectives related to the Martha Pit are suspended whilst mining is in abeyance.

7.2.2 Groundwater Objectives

The objectives of the groundwater monitoring system are to:

- Monitor the effects on the regional groundwater system from dewatering the Martha Underground, Trio, Favona and Correnso/SUPA Underground.
- Monitor the leachate from the Favona Ore and Polishing Pond stockpiles containing potentially acid forming material on shallow groundwater quality.
- Monitor the discharge of degraded quality water from the Underground backfilled and flooded workings on groundwater quality.

If analysis of the groundwater level data identifies that the magnitude of dewatering is likely to lead to settlement under Waihi Township that is greater than that given in Table 1, or the yield from a water supply bore is adversely affected by mine dewatering, then steps are to be taken by OGNZL to limit, or mitigate, the effects to an acceptable level.

7.2.3 Settlement Objectives

The primary objective of the Waihi Township settlement monitoring is to:

- Measure the magnitude of ground surface settlement that results from dewatering and mining the Martha, Trio, Favona and Correnso/SUPA operations.

If analysis of the settlement data identifies that a structure or service may be damaged by mine activities, steps are to be taken to limit or mitigate the adverse effects to an acceptable level.

8 DEWATERING MONITORING

8.1 Background

Dewatering of the Martha Pit prior to Trio was carried out to maintain pit water levels as close as possible to the 880mRL level ($\pm 20\text{m}$) so that mining could continue and to minimize any wetting/drying cycle in the historical mine workings.

The close relationship between the Martha and Trio groundwater systems has implications for dewatering for the Trio Underground; to access the lower Trio system, the Martha system had to be lowered further. The Martha/Trio/Correnso/SUPA groundwater system was progressively lowered from 880mRL to 795mRL by the 3 dewatering wells in the Edwards Stope. After the slip in Martha, access to the pumps was severely restricted. Dewatering in Martha ceased May 5th, 2015. On May 18th 2015 dewatering began from Correnso Underground.

Correnso dewatering is conducted by draining groundwater into sumps and pumping to the surface via mono-pumps. The Project Martha dewatering consent, which allows dewatering to no lower than 500 mRL, was activated January 1st, 2020. Water levels are being lowered using dewatering bores drilled from the 800 mRL level (Figure 2).

Dewatering of the Favona mine has resulted in changes in water pressures in the rock surrounding the vein system and induced some minor surface settlement above and immediately adjacent to the vein system. Monitoring is undertaken to verify the effects predicted in the Assessment of Environmental Effects and supporting technical documents that accompanied the applications for the Favona mine consents.

The WTP treats the dewatering water from Martha, Favona, Trio, Correnso/SUPA and Project Martha to within compliance specifications and discharges the treated water into the Ohinemuri River under consent conditions 971318, 971319 and 971320.

8.2 Scope

This section of the monitoring plan covers:

- Location and method of measuring daily pump volume at the Underground.
- Location and method of dewatering water sampling for chemistry analysis.
- Measurement frequencies.
- Data recording and storage.
- Reporting.



Waihi Underground Pumping Schematic

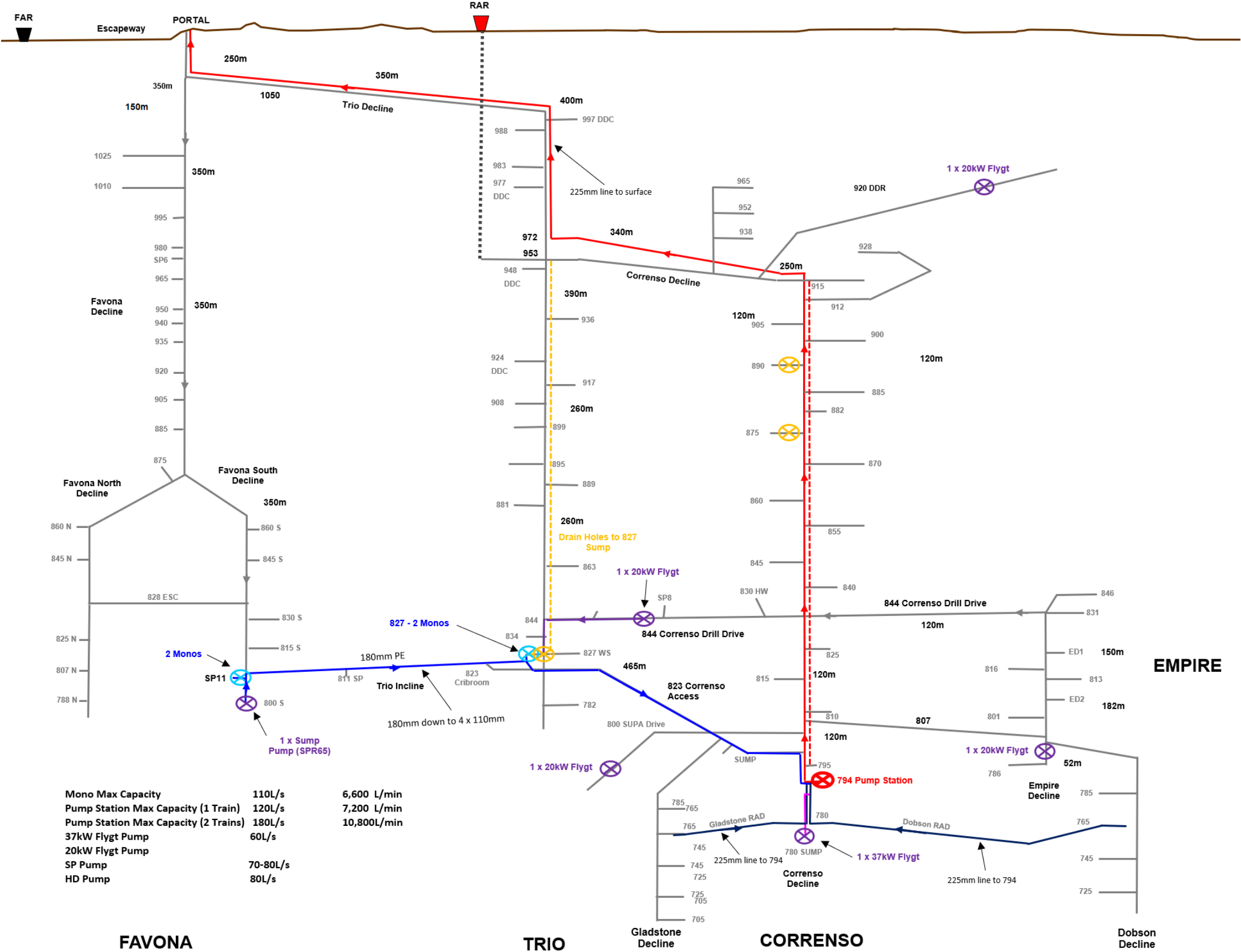


Figure 1: Underground pumping schematic



Waihi Underground Pumping Schematic

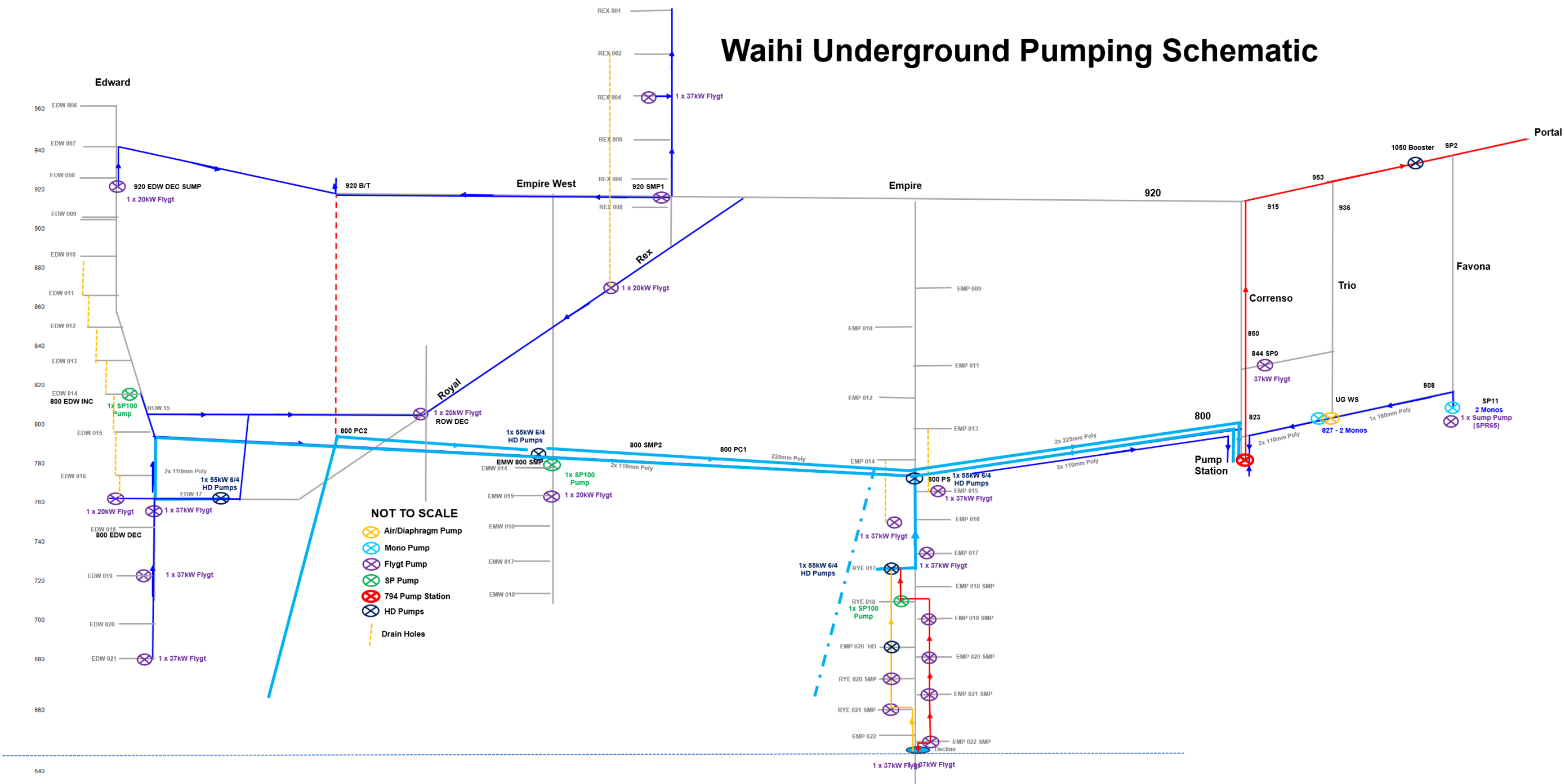


Figure 2: Martha Underground Pumping Schematic

8.3 Martha Pit Groundwater Level Monitoring

8.3.1 Location

Pit groundwater levels are currently not monitored due to pit access and electrical issues. Dewatering now occurs from Martha underground. In July 2022 a piezometer (ROW-17) was installed in an existing exploration drill hole. The collar is in the Edward decline at 773 mRL and the piezometer tip is at 472 mRL. The hole length is around 350 m, however vertically it is 300 m. It terminates approximately under the Empire West orebody and is set in deep Martha andesite.

8.3.2 Method and Frequency of Measurement

ROW-17 is equipped with telemetry and level data is accessed via Cirro.

8.3.3 Further dewatering

As dewatering advances, it is expected that new bores will be drilled to achieve target depths. Current groundwater take permit 139551 allows dewatering from 700mRL to 500 mRL.

8.4 Underground and Favona Dewatering Volume Measurement

8.4.1 Locations

Dewatering volumes for underground are monitored at the WTP on the automated Pi system. Totalising flow meters (Figure 3) are located at dewatering outflow pipelines from the underground portal. An additional flow meter was installed on the Favona line to provide data specific to the Favona mine. However, in 2021 the pump was removed as the area was dry.

In addition to Pi, data is accessible via a web portal. Condition 6 of WRC AUTH139551.01.01 requires installation of a telemetry system on the dewatering take. Daily data provision is presented in 15-minute totals from the underground water take.



Figure 3: Dewatering totalising flow meter

8.4.2 Method and Frequency of Measurement

Dewatering water pumped to the surface from the underground operations are a combination of groundwater and service water (treated water pumped into the mine). The volume of treated service water pumped into the mine is subtracted from the total amount of water pumped from underground to give a net dewatering volume.

8.4.3 Data Management

Meter readings from SCADA are recorded on an Access database daily and values compared with previous readings to identify anomalies. Where an anomaly is identified, the data sheets are to be checked and operations personnel consulted. If the anomaly persists, the meters are to be checked for accuracy. Flow meters are calibrated five-yearly.

8.5 Dewatering Water Chemistry Monitoring

8.5.1 Background

Dewatering water from the underground contains a mixture of groundwater, sediment, sulphide oxidation by-products and service water. As described above, dewatering water is treated through the WTP prior to discharge.

8.5.2 Location

Martha/Favona/Trio/Correnso/SUPA dewatering water from the underground dewatering well is sampled for chemistry from a water sampling spigot on the inflow pipeline to the WTP (Figure 4). Sampling is undertaken monthly according to the relevant sections of the Groundwater Monitoring Standard Operating Procedure (SOP) (WAI-200-PRO-012) provided in Appendix B.

Where possible, quarterly water samples are taken from the Favona mine, the bottom level of the Correnso mine and the Martha Underground dewatering bores. Results are presented in the annual Dewatering and Settlement Monitoring Report.



Figure 4: Underground dewatering sample spigot

8.5.3 Sampling Parameters and Frequency

The parameters monitored in the monthly sampling are shown in Table 2. The number of water chemistry parameters analysed are greater than the requirements outlined in the consent conditions (Appendix A).

Table 2: Underground Dewatering Sampling Parameters

Monthly Full Analysis Parameters (dissolved and acid soluble) RJH Code 38	
pH (field and lab)	
Conductivity (field and lab)	
Ca, K, Mg, Na	Sum of cations
Cl, HCO ₃ , SO ₄	Sum of anions
Acidity/ Total Alkalinity	Pb
Ag	Sb
Al	Se
As	Si
Cd	Tl
CN _{WAD}	TSS
Co	U
Cr	Zn
Cr (VI)	Free ammonia (NH ₃)
Cu	Total ammoniacal (NH ₄ -N)
F	Nitrate-N (NO ₃ N)
Fe	Nitrate-N + Nitrite-N (NO _x N)
Hardness	P - Total
Hg + Hg Total	
Mn	
Ni	

8.6 Pit Water Quality Monitoring

8.6.1 Background

Pit water quality monitoring is no longer required under Project Martha Water Take permit 139551. Discontinuing this monitoring was recommended by AECOM in their letter dated 2 June 2021, which was included in Appendix D of the Rehabilitation and Closure Plan 2021. This plan was approved by WRC on 30 September 2021 (Doc No: 21867206). Pit wall runoff sampling had previously been conducted quarterly from four surface sumps on benches above the lake level (1104 mRL). From September 2004 a comprehensive monitoring regime was implemented that focused on rain events. Four additional collection sites were installed to collect runoff from below the 1000 mRL. Over 72 samples of runoff from areas of un-oxidised batters were collected and a comprehensive suite of water quality parameters analysed by RJ Hill laboratories.

OGNZL geochemistry advisors AECOM have recommended sampling to recommence when final pit walls are established after MOP4 or MOP5 (if approved).

8.7 Dewatering Reporting

A summary of Pit water levels was included in the annual summary of monitoring, however pit levels are no longer available. Currently water levels in the underground are recorded in Favona and the deepest point of Correnso. A summary of the underground daily dewatering pumping volumes are provided quarterly to the WRC.

Pit water chemistry data is stored for use for pit lake quality assessment and data tables are provided in annual reports. Periodic analysis of data is conducted by AECOM. Any significant trends identified in the dewatering water chemistry will be commented on in the annual Dewatering and Settlement Monitoring Report.

9 GROUNDWATER MONITORING

9.1 Background

Piezometers are used to measure the level of the groundwater table within a geologic unit. Standpipes can measure water level, and if large enough diameter, to sample water for chemical analysis. Pneumatic and Vibrating Wire Piezometers (VWPs) only measure groundwater levels. A piezometer network has been established, maintained and monitored at monthly intervals around the Waihi Township and Martha Pit since 1987 and Favona Underground since 2004. This network is periodically amended as additional monitoring locations are added, or as damaged monitoring locations are repaired or decommissioned. The water levels in the piezometers are monitored to assess the effects of dewatering on the regional groundwater system.

The Favona piezometer network has been established surrounding the Favona underground to detect the discharge of degraded quality water from the backfilled and flooded workings, during operation and following closure. It was designed to monitor groundwater levels in surface soils, younger volcanics (ignimbrites and rhyolitic tephra) where present and andesite bed rock. Monitoring to date has shown some depressurisation of wells in the vein systems and lesser depressurisation in the deeper wells in the bedrock (100 m deep wells). There is no indication of dewatering in shallower wells (<50 m deep) in the bedrock.

The incline from Favona Underground to the Trio system had minor groundwater inflows, which were managed by linking into the existing Favona pumping network.

In 2011, in order to better understand the geology and hydrological system around the predicted Correnso ore body, OGNZL commissioned the drilling and installation of 6 boreholes (P90 – P95) (**Error! Reference source not found.**). Three additional piezometers (P100, P101 and P102) were added in 2014-2016. Each borehole contains between 3 and 4 VWPs and a data logger which continuously records data simultaneously from multiple aquifers, with water table depths ranging from 6 – 156 meters.

Further additions to the network include:

- In 2017 a new well, P106, was drilled on the northwestern side of Martha Pit.
- In 2019/2020 ten new monitoring wells were installed on the southern side of Martha Pit to provide better understanding for Project Martha.
- In 2020, three new piezometers were installed near Gladstone Hill, GLD004 S, I and D (shallow, intermediate, deep).
- Two new piezometers (P122 & P123, each connected to 4 VWPs) equipped with telemetry were added during December 2022 – January 2023.
- In 2023 there were a number of upgrades to the network to monitor response from shallow Rex orebody mining. P113 which was dry, was re-drilled in a nearby location, as P113A. P110, P111, P112, & P114 were upgraded to telemetry monitoring and water level loggers were installed in P110, P113 and P114.
- Also in 2023, a VWP (ROW-17) was installed in the Martha Underground Mine at 773 mRL with a single tip at 472 mRL.

An underground operating procedure has also been developed as required in Condition 24 of the Correnso Consent to ensure mining does not drain the overlying strata via existing drill holes. Management of Surface Intersecting Drill Holes (WAI-400-PRO-076) can be found in Appendix B.

9.2 Scope

This section of the monitoring plan includes:

- Locations of all piezometers within the Martha and Favona monitoring networks.
- Piezometer monitoring methods and procedures.
- A description of monitoring frequencies.
- A description of piezometer network maintenance.
- Trigger limits and mitigation measures for piezometers.
- Guides for recording and managing data.
- Guides for reporting of the piezometer level data.
- Guides for the assessment of the piezometer level data.
- A description of the remediation and mitigation plan.

9.3 Martha Groundwater Drawdown Network

A piezometer network has been established within the Waihi Township and surrounding the Martha mine to monitor groundwater drawdown and the effects of dewatering on the regional groundwater system. The connectivity between the Martha Pit, Trio and Correnso/SUPA system allows this same network to effectively monitor the effects of works related to Correnso/SUPA/Martha.

9.3.1 Piezometer Locations

The Martha Network piezometers currently monitored within the three main geological units (Alluvium, Younger Volcanics and Andesite) are listed in Table 3 and their locations are shown in Figure 5. A listing of all the piezometers in the monitoring networks is included in Appendix C. The piezometer network has been, and will continue to be, revised following annual reviews to remove piezometers which have gone dry, or are no longer providing accurate data. When rewatering the Martha Pit commences upon cessation of mining, water levels will rise and the currently dry piezometers will be monitored again.

Table 3: Martha Network Piezometers

Well ID	Depth (mRL)	2024 Average GWL (mRL)	Average Water Depth (m)	Piezometer Type
ALLUVIUM				
P2-4	1101	1108	7	Standpipe
P8-4	1112	1118	6	Standpipe
P91-1	1113	1119	6	VWP
P93-1	1105	1116	11	VWP
P94-1	1114	1115	1	VWP

Well ID	Depth (mRL)	2024 Average GWL (mRL)	Average Water Depth (m)	Piezometer Type
P101-1	1102	1107	5	VWP
P102-1	1109	1113	4	VWP
WC201-4	1104	1111	7	Standpipe
WC201-5	1110	1111	1	Standpipe
WC203-4	1099	1102	3	Standpipe
GLD004S	1080	1085	5	Standpipe
YOUNG VOLCANICS				
P2-3	1073	1092	19	Standpipe
P4-2	1048	1088	40	Standpipe
P7-2	1039	1091	52	Standpipe
P7-3	1081	1090	9	Standpipe
P8-3	1093	1116	23	Standpipe
P27-1	1074	1078	4	Standpipe
P90-1	1100	1115	15	VWP
P90-2	1020	1100	80	VWP
P91-2	1097	1119	22	VWP
P91-3	1011	1112	101	VWP
P92-1	1096	1119	23	VWP
P92-2	1000	1108	108	VWP
P93-3	1015	1089	74	VWP
P94-2	1094	1114	20	VWP
P94-3	1016	1101	85	VWP
P95-1	1091	1115	24	VWP
P95-2	1031	1102	71	VWP
P100-1	1066	1081	15	VWP
P100-2	996	1052	76	VWP
P101-2	1083	1107	24	VWP
P101-3	1068	1094	26	VWP
P102-2	1079	1092	13	VWP
P102-3	1055	1088	33	VWP
P107	1089	1111	22	Standpipe

Well ID	Depth (mRL)	2024 Average GWL (mRL)	Average Water Depth (m)	Piezometer Type
P108	1116	1121	5	Standpipe
P109	1091	1096	5	Standpipe
P110	1097	1104	7	Standpipe
P111-1	1100	1107	7	VWP
P112-1	1058	1058	0	VWP
P113	1062	1062	0	Standpipe
P113A-1	1090	1089	-	VWP
P113A-2	1069	1071	2	VWP
P114	1054	1055	1	Standpipe
P115	1072	1094	22	Standpipe
P116	1045	1092	47	Standpipe
P122-1	1092	1101	9	VWP
P122-2	1060	1060	0	VWP
BH6	1053	1111	58	Standpipe
BH9	1074	1096	22	Standpipe
BH11	1075	1093	18	Standpipe
BH12	1079	1106	27	Standpipe
GLD004I	1065	1086	21	Standpipe
WC202-2	1048	1072	24	Pneumatic
ANDESITE				
P2-1	974	975	1	Standpipe
P2-2	1035	1045	10	Standpipe
P7-1	989	1003	14	Standpipe
P9-1	1037	1118	81	Standpipe
P69-S	1114	1132	18	Standpipe
P69-D	1063	1091	28	Standpipe
P90-3	983	1084	101	VWP
P91-4	971	1103	132	VWP
P92-3	965	1102	137	VWP
P93-4	975	1039	64	VWP
P94-4	976	994	18	VWP

Well ID	Depth (mRL)	2024 Average GWL (mRL)	Average Water Depth (m)	Piezometer Type
P95-3	1001	1061	60	VWP
P100-3	981	1044	63	VWP
P100-4	956	989	33	VWP
P101-4	1037	1037	0	VWP
P102-4	1027	1032	5	VWP
P106-1	1100	1100	0	VWP
P106-2	1060	1060	0	VWP
P106-3	1010	1011	1	VWP
P106-4	974	974	0	VWP
P111-2	1088	1088	0	VWP
P111-3	1055	1060	5	VWP
P112-2	1035	1035	0	VWP
P112-3	998	998	0	VWP
P113A-3	1035	1059	24	VWP
P122-3	1032	1032	0	VWP
P122-4	933	932	-	VWP
P123-1	1044	1107	63	VWP
P123-2	1004	1003	-	VWP
P123-3	964	968	4	VWP
P123-4	924	925	1	VWP
P124-1	1079	NA	NA	VWP
P124-2	1037	NA	NA	VWP
P124-3	901	NA	NA	VWP
WC201-1	1059	1107	48	Pneumatic
WC201-2	1077	1109	32	Pneumatic
WC201-3	1097	1111	14	Pneumatic
WC202-1	1032	1073	41	Pneumatic
GLD004D	1020	1086	66	Standpipe

9.3.2 Monitoring Method

Martha Network piezometers are made up of a combination of standpipe, pneumatic and VWP. A flow chart indicating the steps to be followed when measuring the water levels in the piezometer network is shown in Figure 6 and detailed steps are provided in the Township Piezometer Network Monitoring (WAI-200-PRO-021) SOP provided in Appendix B.

9.3.3 Monitoring Frequencies

The piezometer network is monitored on a monthly basis. In the event of a rapid, or unusual, change in the groundwater level being detected in a piezometer, the monitoring frequency in that piezometer (and the piezometers immediately adjacent) will be increased to at least weekly. The results of this monitoring are to be continually reviewed by site Environmental staff. Weekly monitoring is discontinued when monitoring indicates that the piezometric level has stabilised.

9.3.4 Upper Rex Mining

Mining higher within the Rex orebody was proposed by OceanaGold. In consultation with Hauraki District Council additional monitoring and triggers specific to the Rex area were implemented.

GWS Ltd recommended real time monitoring and telemetry in four existing groundwater wells (P111, P112, P113, P114). As P113 was considered dry, a new deeper well (P113A) was drilled nearby to replace it, with three VWP tips installed. These upgrades were completed in 2023 prior to mining higher in the Rex Orebody.

9.3.4.1 Trigger responses

When considering a change that might represent an anomaly, there should be an emphasis on the depth of the piezometer and geologic unit in which that change is occurring. The primary focus of this monitoring is to ensure effects in the near surface (notably in the Young Volcanics) are avoided, managed or mitigated.

Therefore, trigger responses are established at P111-1, P112-1, P113A-1, P113A-2, and P114. In most cases, the natural groundwater level in the wells identified varies up to 2.0 m over the period of a season. It is considered an anomaly as being >2.0 m level decrease in less than a 1-month period. If a response is triggered, the following actions should be followed:

- Verify that the instruments and data collection is accurate.
- Check that any change is not the result of a recent climatic event.
- Commence daily groundwater level measurements at P109 and WC202-1.
- Cross check the groundwater level data with the geotechnical observations.
- Investigate the cause of the anomaly including any recent underground mining activity.
- Advise the Council of the anomaly (within 5 working days) and include an explanation of the anomalous results and actions proposed to further investigate or address any issues identified (if needed)



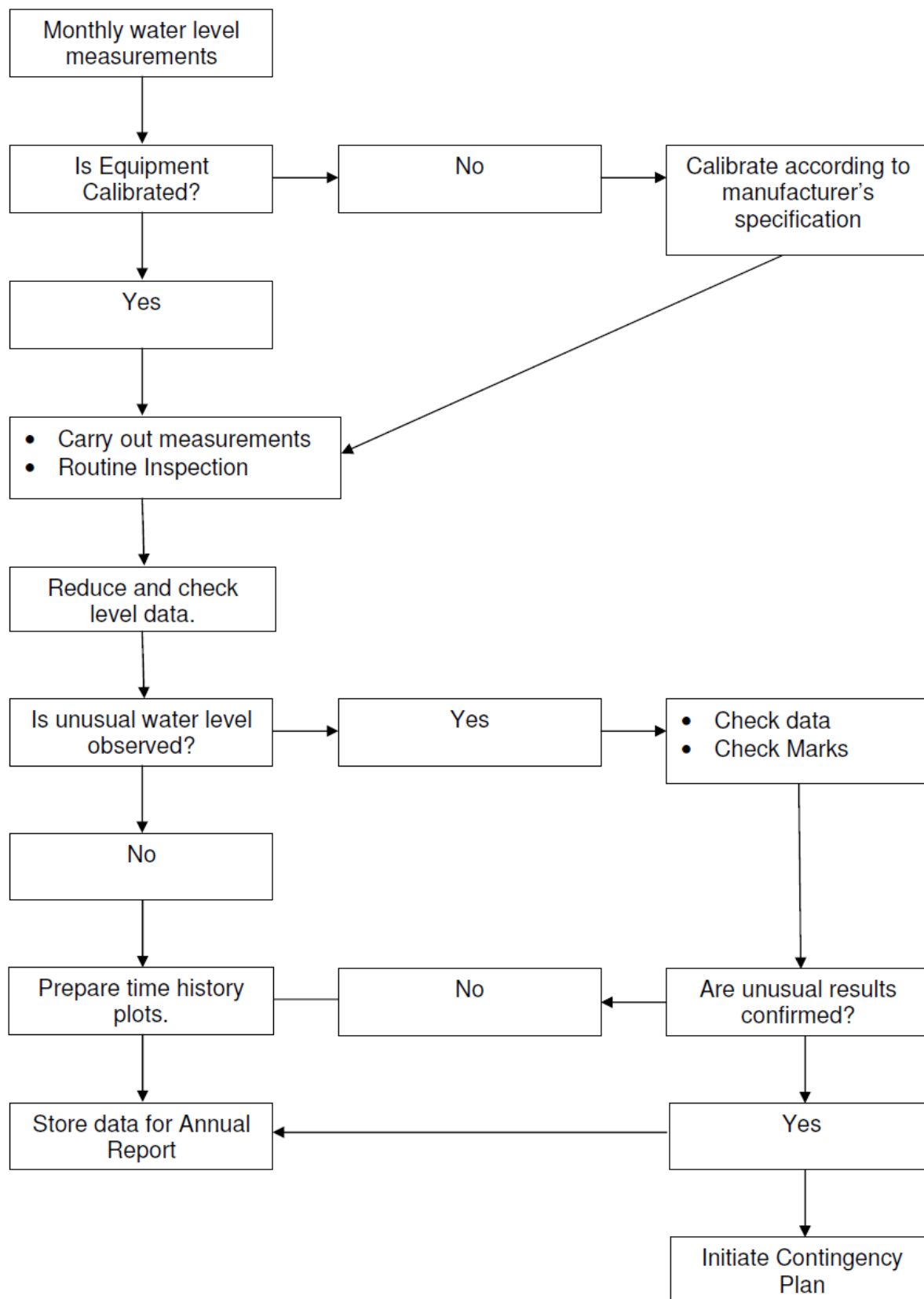


Figure 6: Flow Chart for Monthly Water Level Monitoring

9.4 Backfilled and Flooded Workings – Favona Network

During mine operation, the Martha and Favona mines will be inward gradient sites i.e. groundwater will be moving towards the mine not away from the mine. As a result, there are unlikely to be any water chemistry effects of mine water on the groundwater system outside of the mine during operations. Groundwater from Martha/Trio/SUPA is controlled by Correnso and Martha Underground dewatering; any effect on water chemistry will be drawn at depth and is unlikely to have any expression in shallow groundwater.

Martha and Favona are not directly connected; the amount of groundwater from Favona that will move to Martha is small in relation to the groundwater inflow to the Martha system. With a full mine lake and flooded Favona Mine, the hydraulic gradient between Favona and Martha will be minimal, and the velocity of groundwater movement will be slow. Given the mineralization in the ground around Martha and in the ground between Martha and Favona it is very unlikely that any effect on Martha could be sourced back to Favona.

However, to provide an indication of the likely post-closure water chemistry in accordance with the consent conditions, samples of the underground water discharge and discharges from the Polishing Pond stockpile (as detailed in the Site Water Management Plan) will be analysed for later use in an underground geochemical model. In addition, samples will be taken from monitoring wells P76D, P76I, P77D and P77I located between Favona and Martha to establish baseline groundwater chemistry for that rock mass, for input to the post-closure model. If the geochemical model for post-closure indicates the possibility of significant movement from Favona towards Martha within a rational time frame, a monitoring regime would be developed.

For Trio, sampling of intercepted inflows and discharges from the Polishing Pond stockpile is undertaken for use in geochemical modelling. Monitoring for post-closure water chemistry from Trio will be addressed as part of the Trio Mine Project; monitoring data from groundwater intercepts, flow gradients and waste rock discharges will be used to model likely flow-paths and mass balances, and the need for monitoring wells. It is expected that the existing wells for monitoring Martha and Favona will provide the majority of monitoring information in relation to any future Trio activities.

As Trio, Correnso/SUPA and Martha Underground are accessed from the Favona decline, there is effectively a direct connection between the Favona and Martha systems while Correnso/SUPA and Martha Underground are operating. Prior to any flooding, an option proposed is to construct a bulkhead to plug the preferential pathway.

9.4.1 Piezometer Locations

The current Favona Network piezometers are listed in Table 4 and their locations are shown in Figure 7.

Table 4: Favona Network Piezometers

Well ID	Depth (mRL)	2024 Average GWL (mRL)	Average Water Depth (m)	Piezometer Type
ALLUVIUM				
P63-S	1113	1117	4	Standpipe
P76-S	1109	1111	2	Standpipe
P77-S	1111	1115	4	Standpipe
P78-S	1110	1109	1	Standpipe
P87-S	1110	1115	5	Standpipe

Well ID	Depth (mRL)	2024 Average GWL (mRL)	Average Water Depth (m)	Piezometer Type
YOUNG VOLCANICS				
P63-I	1070	1090	20	Standpipe
P64-I	1086	1100	14	Standpipe
P67-D	1085			Standpipe
P76-I	1073	1103	30	Standpipe
P78-I	1066	1103	37	Standpipe
P79-S	1091	1096	5	Standpipe
P79-I	1061	1092	31	Standpipe
P87-I	1070	1110	40	Standpipe
ANDESITE				
P75	979	1063	84	Standpipe
P76-D	1056	1097	41	Standpipe
P77-I	1046	1095	49	Standpipe
P77-D	1031	1094	63	Standpipe
P78-D	1053	1072	19	Standpipe
P79-D	1048	1087	39	Standpipe
P87-D	1025	1102	77	Standpipe



Figure 7: Favona monitoring piezometers

9.4.2 Monitoring Method

A flow chart indicating the steps to be followed when measuring the water levels in the piezometer network is shown in Figure 6 and detailed steps are provided in the relevant sections of the Township Piezometer Network Monitoring (WAI-200-PRO-021) SOP provided in Appendix B. Water chemistry is monitored according to the relevant sections of the Groundwater Monitoring (WAI-200-PRO-012) SOP provided in Appendix B.

9.4.3 Monitoring Frequencies

The water levels of the Favona Network piezometers are monitored monthly. Water quality sampling is being undertaken where possible to establish background levels (refer to section 0).

9.5 Favona Contingency Plan

In relation to effects, settlement is principally related to depressurisation of the younger volcanics. As a result, groundwater trigger levels and contingency measures in general relate to that unit. Hence, the monitoring focus is to assess whether depressurisation in the deeper andesite is able to extend up into the overlying younger volcanics and if so, whether the magnitude of depressurisation is sufficient to give rise to measurable settlement. The monitoring system and the trigger levels have been developed to that end.

9.5.1 Favona Piezometer Trigger Levels

Favona trigger levels follow the same actions as introduced with the Correnso dewatering consent. These are outlined in Section 9.6.

9.6 Piezometer Action Plan

Condition 20 of the Project Martha Common Conditions states both Councils need to be advised of any significant anomalies in groundwater levels identified in the piezometer network.

A “significant anomaly” is defined as a drop in groundwater level greater than the seasonal variation in piezometers within the alluvium and younger volcanic rocks and a drop of 15 m or more in the recordings from piezometers tapping the upper 50 m of Andesite over a one month period. Such a change would require an explanation to council within 10 working days of the issue being identified.

There is a three-stage set of triggers based upon 5m, 10m or 15m water level changes within 1 month. Some piezometers can have natural 5m changes. Actions consist of monitoring frequency increases, historic data review, increased settlement marker monitoring, visual inspections and expert geotechnical review depending on the degree of water level change discovered (

Table 5).

Table 5: Piezometer responses and actions

Piezometer Response / Trigger	Action		
	Piezometer Monitoring	Settlement Monitoring	Other Actions
5 - 10m over 1 month	Commence weekly monitoring	-	Review historical piezometric data and note if has occurred previously.
10 - 15m over 1 month	Commence weekly monitoring	Commence weekly surveys	Undertake review to identify possible causes of change in monitoring. Undertake weekly visual inspections of area.
15m + over 1 month	Commence weekly monitoring	Commence weekly surveys	Notify Hauraki District Council as required by condition 33 of Schedule A Correnso Underground Mine Conditions of Consent.
			Undertake weekly visual inspections of area to identify evidence of settlement or damage.
			Seek independent advice from experienced geotechnical engineer
			Develop action plan to restore groundwater levels (e.g. grouting of potential drainage pathways, injection of water to maintain groundwater level).

9.7 Groundwater Quality

The groundwater quality monitoring program consists of six-monthly sampling (autumn and spring) of eight standpipe piezometers (P2-4, P8-4, P88, WC203-4, BH6, BH7, BH9, BH11, BH12). Samples are analysed for the parameters listed in Table 6. The objective is to develop a baseline aquifer water quality characterisation to provide a benchmark for desirable groundwater conditions criteria at closure around Martha Pit.

Table 6: Groundwater Quality Sampling Parameters

Scan and Sample Parameters Six monthly RJH Code 40

pH (field and lab)	
Conductivity (field and lab)	
Ca, K, Mg, Na	Sum of cations
Cl, HCO ₃ , SO ₄	Sum of anions
Total Alkalinity	Mn
Ag	Ni
Al	Pb
As	Sb
Cd	Se
CN _{WAD}	TSS
Co	U
Cr	Zn
Cu	Free ammonia (NH ₃)
F	Total ammoniacal (NH ₄ -N)
Fe	Nitrate-N (NO ₃ N)
Hardness	Nitrate-N + Nitrite-N (NO _x N)
Hg	

9.8 Groundwater Monitoring Procedures

9.8.1 Calibration and Maintenance of the Piezometer Measurement Equipment

Standpipe Piezometer Dipmeter

The piezometer dipmeter is to be maintained in good working condition at all times.

Calibration of the dipmeter tape against a reference tape is to be carried out at least once every twelve months by an accredited provider. If the difference between the dipmeter tape and the reference tape is found to be more than 0.1%, the dipmeter tape is to be replaced.

Pneumatic Piezometer Readout Unit

The pneumatic piezometer readout unit is calibrated at least once every two years. All calibration is undertaken by a manufacturer approved company or service technician and calibration records retained by OGNZL. If there is evidence of unusual behaviour, prolonged flushing of the tubes with inert gas to remove moisture is also an option.

Vibrating Wire Piezometer Logger Unit

Vibrating wire logger units do not require calibration. The unit's batteries are changed annually to ensure continuity of data.

9.8.2 Collection of the Piezometer Data

Standpipe Piezometers

Standpipe piezometers are measured according to the Township Piezometer Network Monitoring (WAI-200-PRO-021) SOP provided in Appendix B. Monitoring of standpipe piezometers is carried out by trained personnel. Water level measurements are compared with the previous monthly measurement for consistency. Where a significant difference between a current and previous measurement is noted, the measurement and field record are double checked. If an anomaly still exists the measurement datum is to be confirmed, or re-measured and recorded.

In addition, the wells depth to bottom is checked 6-monthly to determine any sediment build-up. Arrangement can then be made to 'jet out' any identified build-up that is considered to detrimentally affect the function of the piezometer.

Pneumatic Piezometers

Pneumatic piezometers are to be read according to the Township Piezometer Network Monitoring (WAI-200-PRO-021) SOP provided in Appendix B.

All personnel who take readings of the pneumatic piezometers are trained in the use of the pneumatic piezometer readout unit currently operated by OGNZL. All personnel who take readings of pneumatic piezometers are familiar with the manufacturer's operation and maintenance manual.

All readings taken on the pneumatic piezometers are to be made in accordance with the manufacturer's recommendations. All results are to be immediately checked against the previous month's readings and recorded on a field sheet for future input into a computer database. The measurement and field record are to be double checked before monitoring at each location is completed.

Vibrating Wire Piezometers

The reading of the logger units is conducted monthly by an OGNZL technician. They visit the sites and download the data manually onto a laptop. The data is then uploaded onto a spreadsheet in the office. All personnel who take readings of the VWPs are trained in the use of the readout unit and laptop.

9.8.3 Routine Network Inspection and Maintenance

A visual inspection of all monitoring locations is undertaken during routine monitoring of the piezometer network. If this inspection indicates that a piezometer is unreliable, damaged or malfunctioning, then steps are taken to repair, relocate, renew or decommission the monitoring site. Ongoing monitoring may be required to determine the fate of the monitoring location.

Alternatively, analysis of the monitoring data may identify a monitoring location that is unreliable or dubious. Re-measurement and a thorough inspection of this monitoring location is undertaken to

ascertain the reliability of the data and the monitoring location. Ongoing monitoring may be required to determine the ultimate fate of the monitoring location.

9.8.4 Guide for Recording and Managing Piezometer Data

Once a complete set of data has been collected in the field, it is transferred from the field sheet (for standpipe and pneumatic piezometers) and from a laptop for VWP's to the digital database as soon as practicable (at most within one week of the monitoring round being completed).

The groundwater level data is stored digitally in a Microsoft Excel Database managed and maintained by OGNZL. The water levels are corrected to the mine datum reference level to enable comparison between bores and areas. The field records are kept and filed in the OGNZL office.

9.9 Reporting Groundwater Monitoring Results

9.9.1 Ongoing Analysis

Preliminary analyses of the data plots after every monitoring round are undertaken by OGNZL Environmental staff. The purpose of this analysis is to identify if there is a reading/recording error to be re-checked, if unusual dewatering has occurred during the previous monitoring period, or if excessive dewatering that leads to excessive settlement is likely to occur in the immediate future. Unusual or excessive dewatering is a noticeable and sustained change in piezometer groundwater level trend.

Figure 6 shows that if unusual water level changes are observed these are checked and if confirmed, and the contingency plan (Figure 8) initiated.

OGNZL keeps and maintains a log of complaints from the public. If appropriate, OGNZL undertakes field investigations and investigates legitimate mine dewatering and settlement related claims from the public. The complaints log is maintained by the OGNZL Community Liaison Officer.

9.9.2 Annual Summary Analysis and Reporting

A report and summary of the groundwater level data is produced annually and issued to the consenting authorities. This report includes analysis and evaluation of the data by Chartered Professional Engineer or an experienced hydrogeologist. The annual report includes:

- a) The data from monitoring undertaken during the previous year including ground water contour plans (derived from the data) in respect of the piezometer network.
- b) Identification of any important trends in dewatering/rewatering behaviour.
- c) Interpretation and analysis of any change in groundwater profile over the previous year, any contingency actions that may have been taken during the year, predictions of future impacts on other bore users that may arise as a result of any trends that have been identified, and what contingency actions, if any, the consent holder proposes to take in response to those predictions.
- d) Comment on compliance with all relevant conditions of the consent.
- e) A summary and analysis of complaints relevant to the consent from the complaint log.
- f) Any reasons for non-compliance or difficulties in achieving conformance with the consent conditions.
- g) Any works that have been undertaken to improve environmental performance or that are proposed to be undertaken in the forthcoming year to improve environmental performance in relation to activities permitted by the consent.

- h) Peer review recommendations from the most recent review and reference to how they will or have been addressed

If analysis of the groundwater level data indicates that mine dewatering is likely to result in settlement greater than that in Table 1, a detailed inspection of all settlement susceptible structures within the affected area is to be commissioned by OGNZL. This inspection is to be undertaken by a suitably qualified and experienced Chartered Professional Engineer.

9.10 Groundwater Remediation and Mitigation

Figure 8 summarises the actions to be taken in initiating a contingency plan. The plan covers both groundwater level changes related to settlement and effects on wells used by others. Unusual water level changes would include:

- A sharp change in the dewatering trend.
- A rapid rise of water level.
- A loss of yield from a production well accompanied by a reduction in water level.

The contingency plan for groundwater monitoring is similar to that for settlement monitoring namely:

- Monitoring will be increased, and investigations undertaken to confirm whether the effect is due to mine dewatering and to confirm the extent of the effect.
- If adverse effects are likely, the plan requires mitigation options to be developed and agreed by the parties. In the case of settlement, these are as laid out in the contingency plan developed for settlement effects as summarised in Figure 13. In the case of an affected water well, OGNZL has agreements under which it will mitigate effects due to mine dewatering.

Effects on bore users are considered only likely where bores intercept fault zones or veins connected to the Favona system. The locations of the existing wells and monitoring to date would suggest that connections are unlikely or limited. Nevertheless, the Company has agreements in place with some of the local bore owners to replace these water supplies should effects develop and mitigation be necessary. In addition, Condition 2 of Resource Consent 109742 requires action by the Company in the event that stock, domestic or other water supplies are adversely affected by the exercise of the Favona mine dewatering consent.

For water well effects, contingency options may include:

- Upgrading a pump
- Supplying a different pump
- Deepening a well
- Supplying a new well
- Supplying water from an alternative source

In the event of groundwater contamination from waste rock stockpiles, the most effective solution would be to install a cut-off drain to intercept the water and pump it to the WTP for treatment. If an observed trend is noted in water levels and/or chemistry, this would initiate further investigation and if necessary result in a report to WRC explaining the cause of the observed trend and proposed mitigation. Stockpiles are planned to be temporary structures and therefore removal of the source material will ultimately stop the contamination.

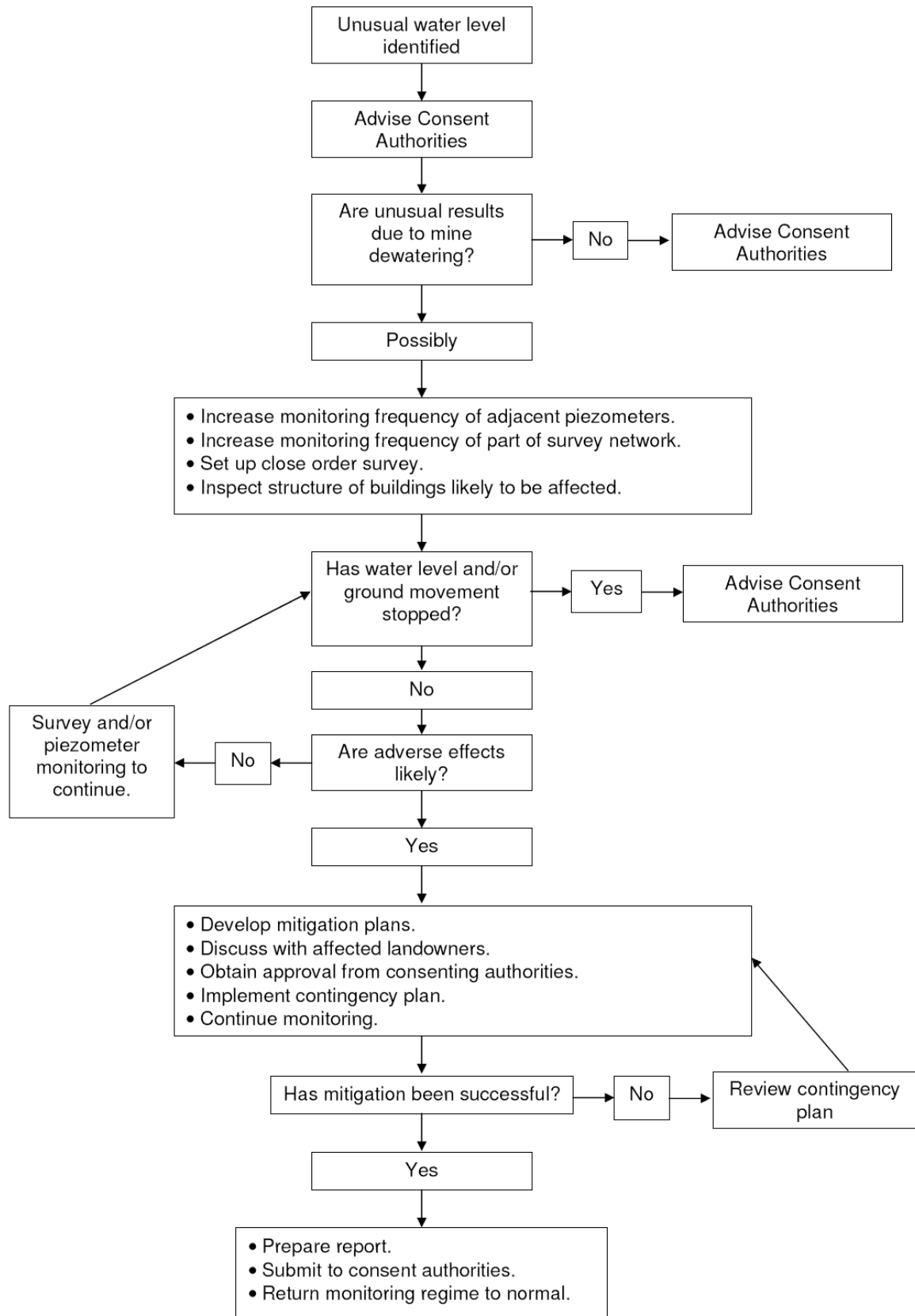


Figure 8: Flow Chart of Water Level Contingency Plan

9.11 Review and Improvement to the Piezometer Network

Review of the piezometer network is undertaken routinely to:

- Ensure that all areas presently affected by dewatering from Correnso, Favona and Martha Undergrounds are adequately covered and monitored by piezometers and survey marks.
- Ensure all areas likely to be affected by mine dewatering in the future, are adequately covered and monitored by piezometers and survey marks.
- Ensure that all areas likely to be affected by backfilling of stopes and flooding the underground workings following closure are adequately covered and monitored by piezometers.

At each additional or replacement piezometer drill-hole location, at least one piezometer should be installed within the following geologic units, if present:

- the andesite rocks,
- the younger volcanics, and,
- The upper alluvial unit or weathered rock zone.

The above three geological units are considered to be those of greatest strategic importance from a geotechnical perspective.

9.12 Shallow and Deep Aquifers

A new requirement was included in the Martha dewatering permit 139551.01.02. Condition 9 (e) requests OGNZL *provide details of any wetland areas and any other known aquatic ecological values that are dependent on the surface contribution of shallow and deep groundwater outflows.*

A new report was created in 2019 “Martha Shallow and Deep Aquifer Report” which addresses the requirements of Condition 9. The report was last issued in 2024 and concluded that there are currently no effects as a result of dewatering associated with Project Martha.

10 SETTLEMENT MONITORING

Settlement monitoring involves monitoring, analysing and reporting on the OGNZL network of survey marks that lie within the zone affected by dewatering of the Martha Pit, Trio, Project Martha, Correnso/SUPA and Favona Underground. The current network is monitored by OGNZL at six monthly intervals with surveys in May and November. The initial settlement survey network was established in 1980 during the exploration phase of the project and has been regularly monitored since December 1988. The network is continually amended as additional monitoring locations are added, or damaged monitoring locations are repaired or relocated.

10.1 Scope of Settlement Monitoring

The following sections cover:

- Locations of all existing survey monitoring locations
- Construction details for the survey network benchmarks
- A description of monitoring frequencies
- A description of survey network measurement procedures
- Maintenance of the survey network
- Guides for recording and managing data
- Guides for the assessment of the survey data
- Guides for reporting the survey data
- A description of the remediation and mitigation plan

10.1.1 Historic Shaft Monitoring

Under Water Right W1740 (granted July 1987, “Licensed Pit”), OceanaGold New Zealand (OGNZL) was required to monitor survey marks that have been established on, or immediately adjacent to, three historic mine shafts throughout the township. However, with the expiry of W1740 OGNZL now only monitors historic shafts on company land. There are two shafts. The remaining shafts are surveyed by HDC.

These survey marks are monitored concurrently with the six-monthly settlement survey and are monitored primarily to detect ground movements due to localised collapse of shaft support and their caps. As such it is inappropriate that these marks are included in the settlement survey network as their inclusion leads to a misleading representation of present-day mine related settlement. Monitoring of the historic shaft survey marks is, therefore, not included in this monitoring plan and associated settlement reports.

10.2 Survey Network Location

The location of the survey network within the Waihi Township and surrounding the Martha Pit, Martha Underground, Trio, Correnso/SUPA and Favona Underground is shown in Figure 9. A blown-up view of the Favona settlement marks in relation to the underground workings is shown in Figure 11. The location of the survey network monitoring locations and benchmarks are provided in Appendix D.

Due to the existing network monitoring Martha Pit, and the close association with the Trio system, the requirement for additional settlement marks for Trio was not considered necessary. The existing

network of settlement marks is extensive, and the dewatering associated with Trio is not expected to result in a significant increase in the zone of influence of dewatering and therefore zone of settlements. However, if there was an increase in the zone of influence it would be expected to be identified by the current settlement monitoring network and additional settlement marks could then be installed if there were concerns with any structures beyond the limits of the current monitoring network.

The existing survey network as shown in Figure 9 essentially covers the whole of the urban area. Extensions to the northeast and west take the network beyond the range of settlement induced by mine dewatering.

HDC and WRC have approved removal of erroneous and high-density marks outlined in a GWS review (GWS Tech Memo – Settlement Mark Removal 15.1.2021). A number of marks displayed unusual movement unrelated to dewatering settlement and some marks were deemed too close together to provide meaningful data.

Additional survey marks were required with the development of Correnso (refer **Error! Reference source not found.**), in recognition of operating under a residential area. These were recommended by Consulting Geotechnical Engineers (for both OGNZL and HDC) to provide closer definition of settlement and any potential tilt.

Six new settlement marks were added above the Rex underground in late 2024.

10.3 Close-Order Networks

A number of close-order survey networks had been established within the urban area to assess, in detail, effects on specific properties. These close-order surveys are no longer undertaken, having achieved their objectives. But a number of markers, which were constructed as deep and shallow pairs to highlight seasonal shrink-swell, are incorporated into the 6-monthly survey network.

The settlement markers established for the Favona Underground project are spaced at approximately 50 metre centres, but as the lines cross the decline the survey marks close up to 10 metre centres.

No close order networks are in place for Trio. Unlike Favona, the area has been historically dewatered, and the system is already significantly dewatered from the existing Martha Pit. Further dewatering is forecast to be restricted to the andesite rock mass and is expected to have less than minor effects on differential settlements (or tilt) which are normally the concern for buildings and buried services. If the existing broader settlement network indicates any anomaly, close order networks can be subsequently installed for investigation.

10.4 Settlement Monitoring Frequency

Six monthly settlement surveys are conducted during May and November. Tilt summaries are reported to the Councils no later than 20 working days after results become available following each survey. An annual Dewatering and Settlement Report is provided to the Councils in each year.

Following closure and flooding of the Favona Underground, Martha Pit, Trio, Correnso/SUPA and Martha Undergrounds it is expected that OGNZL will continue settlement monitoring on an annual basis for a period of five years or until rebound (groundwater recovery) is completed.

10.5 Settlement Monitoring Procedure

Figure 12 sets out the procedure to be followed for settlement monitoring. Features of that monitoring procedure are set out in the following sections.

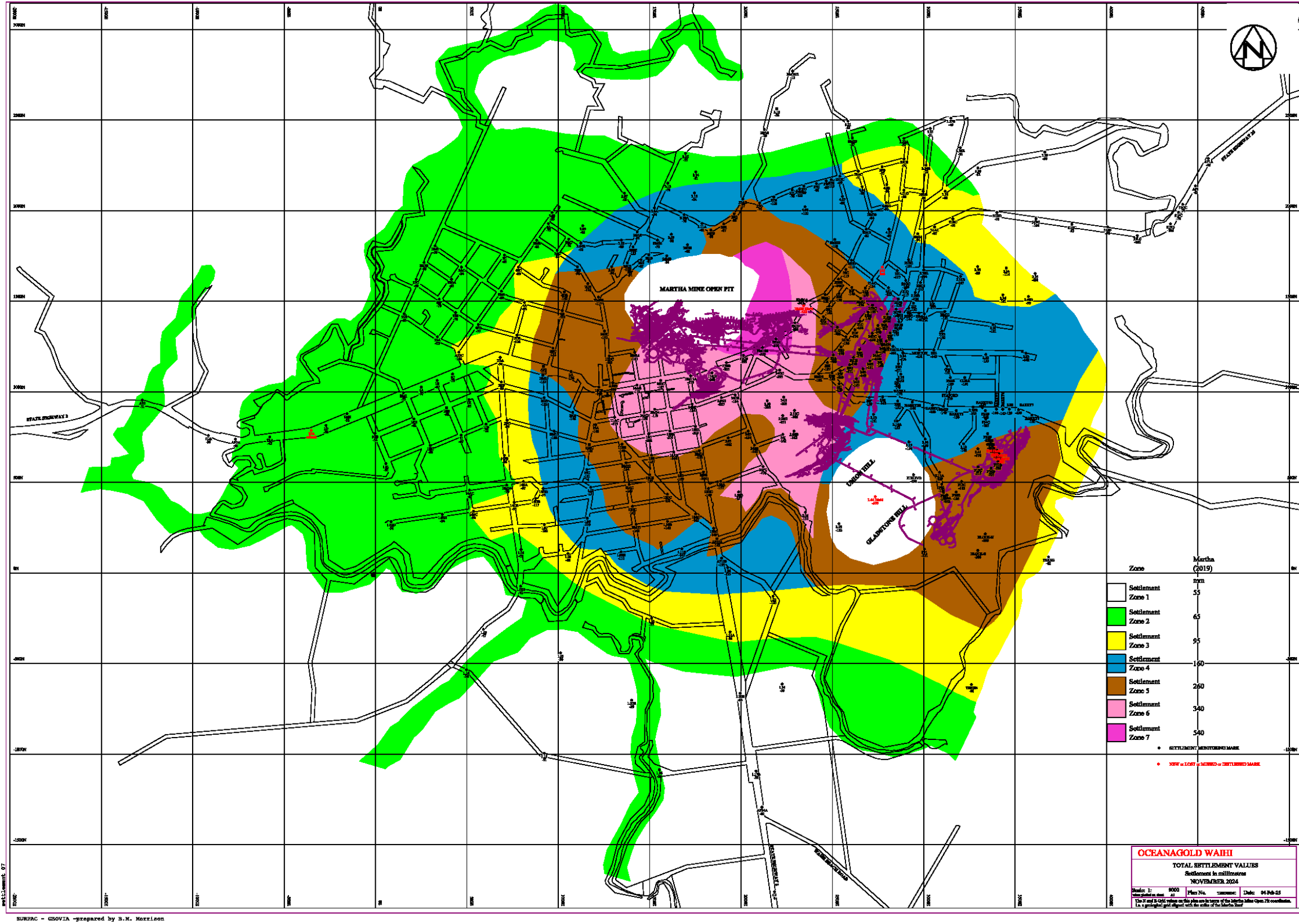
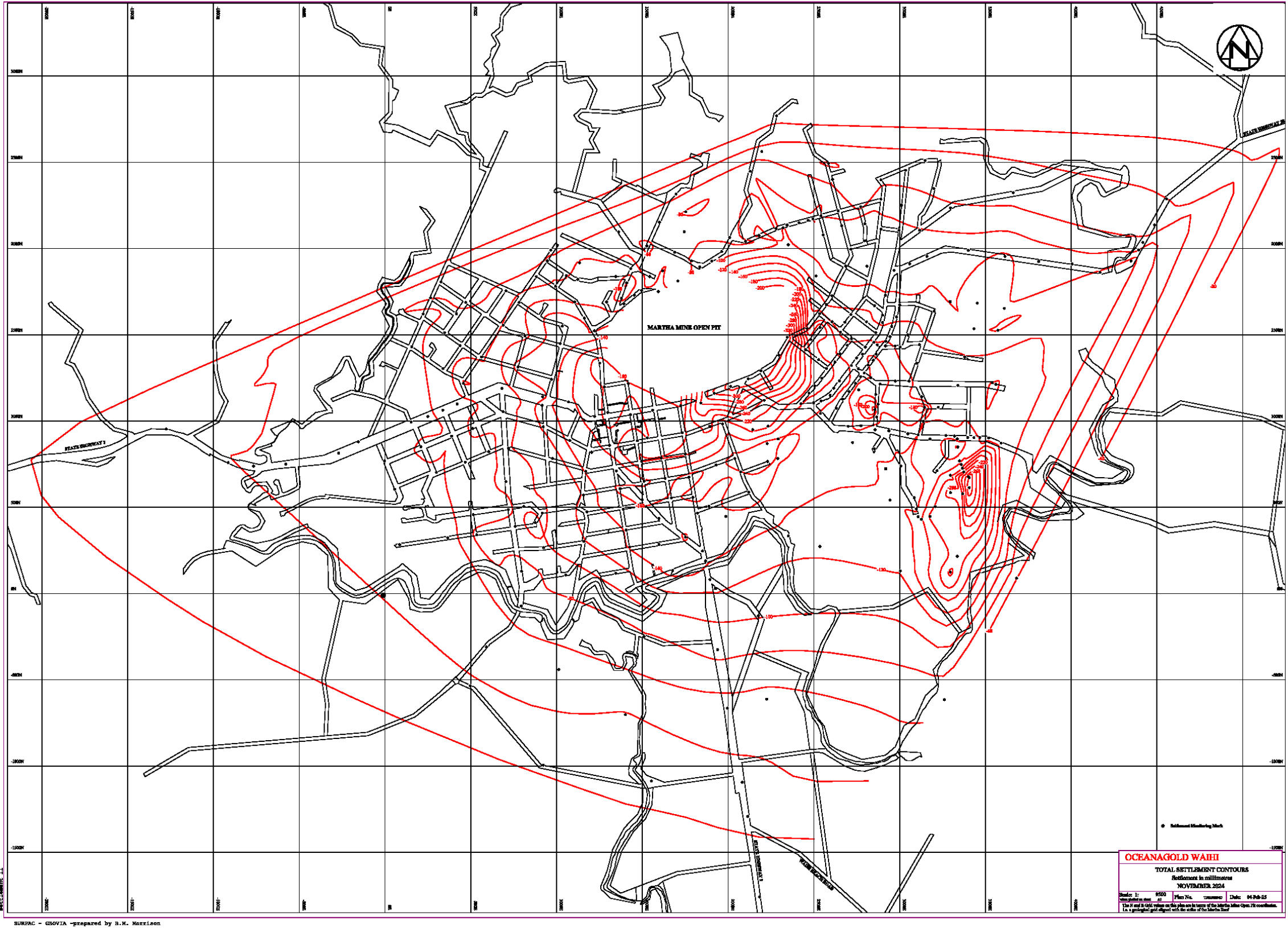


Figure 9: Location of Settlement Markers within the seven settlement zones



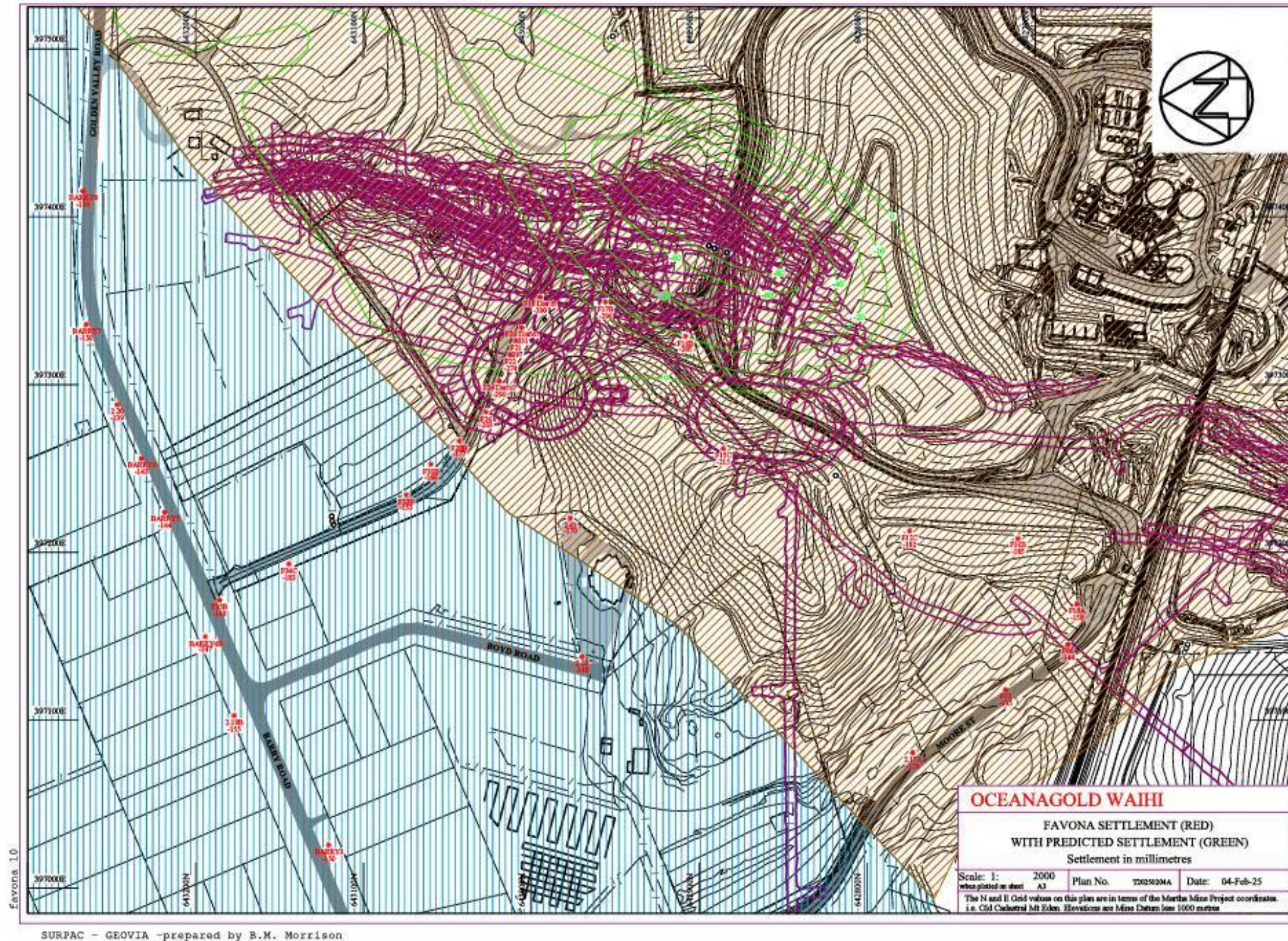


Figure 11: Favona settlement markers in relation to the underground workings and predicted settlement contours

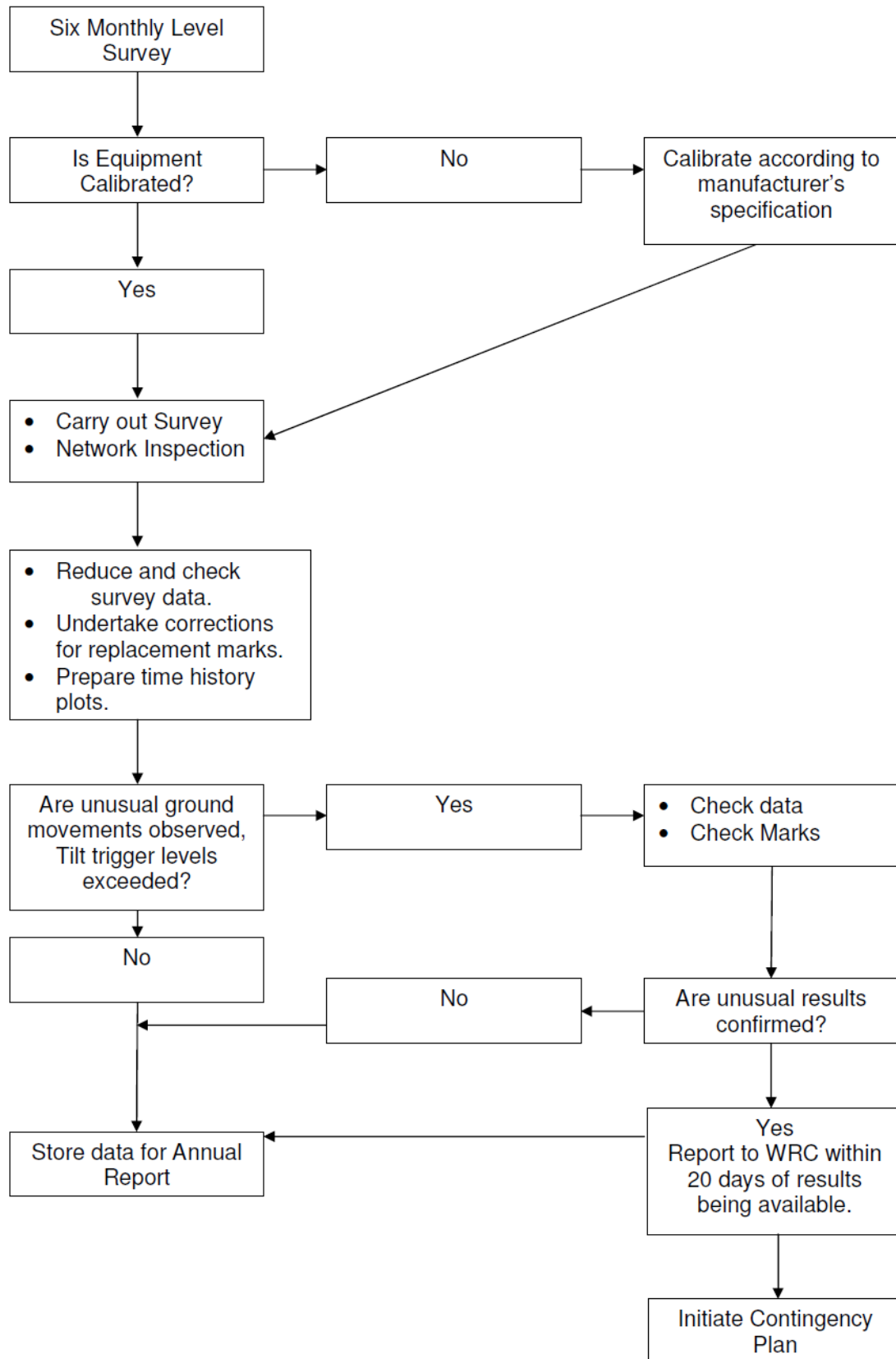


Figure 12: Flow chart for settlement monitoring

10.5.1 Equipment Maintenance and Calibration

All survey equipment used to measure the survey network is to be maintained in good working condition at all times and calibrated in accordance with the manufacturer's recommendations. Copies of the calibrations are to be retained by the OGNZL Survey Department.

10.5.2 Settlement Data Collection

Data collection is to be undertaken having regard to the following:

- All surveying and reduction of levels is performed under the supervision of a Registered Professional Surveyor.
- All levelling is completed in an industry-recognised manner that minimises misclose.
- All survey misclose is redistributed using an industry-recognised method such as a least squares adjustment method.
- All levelling is referenced back to stable benchmarks that are beyond the influence of mine dewatering.
- Levelling along roadsides is in accordance with a NZTA approved traffic management plan.

10.5.3 Routine Network Inspection and Maintenance

A visual inspection of all survey monitoring locations is undertaken during routine monitoring of the survey network. If this inspection indicates that a survey mark is unreliable, damaged or malfunctioning, then steps are taken to repair, relocate, renew or decommission the monitoring site. Ongoing monitoring may be required to determine the ultimate fate of the monitoring location.

Alternatively, analysis of the monitoring data may identify a monitoring location that is unreliable or dubious. Re-measurement and a thorough inspection of the monitoring location is undertaken to ascertain the reliability of the data and the monitoring location. Ongoing monitoring may be required to determine the ultimate fate of the monitoring location.

If it is identified that a monitoring location requires remediation such as repairs or relocation, then these are implemented as soon as practicable, before the next round of monitoring.

All new survey marks will be adjusted to allow for mine related settlement that has occurred since December 1989. This adjustment will be based on the settlement of adjacent survey marks, or, if appropriate, the average settlement of the settlement zone in which the survey mark lies (Refer to Figure 9 and Table 1 for the Settlement Zones). The level of each new survey mark, and each superseded survey mark, will be measured during the same survey round at least once. The length of survey "overlap" will be decided upon on an individual basis by the surveyor.

10.5.4 Data Checking and Storage

Once a complete set of data has been collected in the field, it is transferred to a master database for storage and the production of data plots. Checks involve updating of the time-history graphs (cumulative

change in ground surface over time) for each mark and checking the settlement trends produced against the zone trends. Where a settlement trend differs from a zone trend, that trend is compared with the trends of adjacent marks.

Where a settlement trend is different from those of adjacent marks, the mark is revisited and examined. If no damage to the mark is apparent, the mark and adjacent marks are check-levelled to confirm the measurement made before accepting the value and confirming on the database.

10.5.5 Survey Corrections

Where a survey mark has been replaced and a new record has been started, a correction is applied to provide a continuous record at each site from the time of the initiation of dewatering. The corrections are made as follows:

- The corrections are based on trend analysis where sufficient data exists.
- Where insufficient data for reliable trend analysis exists, corrections are based on the behaviour of surrounding marks.
- Where satisfactory corrections are not able to be applied, the mark is not included in the settlement contouring or in the calculation of tilt.

10.5.6 Time-History Plots

Corrected settlement data is plotted onto time-history graphs, together with the Zone maximum settlement and the Zone maximum rate of settlement to the end of mining. This is required to provide a visual check as to whether settlement is likely to exceed Zone maxima by the end of mining.

10.6 Reporting Survey Data

A number of reports are required in the conditions of the consents. These are as set out below.

10.6.1 Surveyors Reports

Current practice is for the surveyor to prepare a report following each 6-monthly survey. This report will continue and will include:

- Survey data.
- A plan of the total settlement values and contours at 20 mm intervals of total settlement.
- Comment on survey marks which are showing unusual behaviour.
- Changes made to the survey network, specifically marks that have been removed and replacement marks added to the network.

The two survey reports for each year are included in the annual summary report.

10.6.2 Annual Summary Report

A report and summary of the survey data is produced by OGNZL and submitted to the consenting authorities. This report is produced on an annual basis and includes analysis and evaluation of the data. The annual report includes:

- a) Summary data and graphs of monitoring undertaken during the previous year.
- b) Identification of any environmentally important trends in settlement behaviour.
- c) Interpretation and analysis of any change in ground surface profile and associated tilt over the previous year, any contingency actions that may have been taken during the year, predictions of future trends that have been identified, and what contingency actions, if any, the consent holder proposes to take in response to those predictions.
- d) A comparison of the average zone settlement with that predicted in Table 7.
- e) A summary of the settlement related complaints that were received during the previous year, and a description of the Company's response to each complaint.
- f) Comment on compliance with the conditions of the consents.
- g) Any reasons for non-compliance, or difficulties in achieving conformance, with the conditions of the consent.
- h) Any works that have been undertaken to improve environmental performance or that are proposed to be undertaken in the forthcoming year to improve environmental performance in relation to activities permitted by the consent.

If analysis of the data indicates that the magnitude and type of settlement within a part of Waihi is undesirable, then a detailed inspection of all settlement susceptible structures within the zone is to be commissioned by OGNZL. This inspection is to be undertaken by a suitably experienced person or persons.

10.6.3 Network Review and Analysis

A detailed review and analysis of the survey network has been undertaken at least once every two years to ensure that the global aspects of the survey network, such as the monitoring frequency and extent of the monitoring network, remains satisfactory. This review is now redundant. The current practice is that the survey marks are checked by the survey team each survey round and the network performance is reviewed by the responsible person at the same time as the preparation of the annual report for that year.

Reviews of the network are undertaken independently by the surveyor, the report author, the consultant reviewer, and the peer reviewer. Discrepancies and gaps are investigated during deliberation of the data and, if necessary, resolved with modifications for future monitoring.

Currently, OGNZL maintains a photographic record of the individual survey mark locations. This speeds up finding marks in the field and allows a prompt assessment of any modifications near marks that may cause an artificial movement in a survey mark. This record is updated as alterations are made to marks.

10.7 Unusual Ground Movements

10.7.1 Change in Settlement Rate

In the event of a rapid, or unusual, change in the rate of settlement being identified, Figure 12 shows that the results are to be checked. If the unusual level change is confirmed, the contingency plan described below in Section 7.8 and summarised in Figure 13 is initiated.

10.7.2 Exceedance of Tilt or Zone Maximum

In the event that survey marks exceed the zone maximum or a tilt is indicated to exceed 1 vertical in 1000 horizontal over a distance of no less than 25 m, Figure 12 shows the measurements are to be checked. If confirmed, the contingency plan described below in Section 10.8 and summarised in Figure 13 is to be initiated.

10.7.3 Favona Markers - Settlement and Tilt Trigger Levels

With 10 metre separation between close-order markers, the 1 in 1000 tilt is accomplished by a differential settlement of 10mm. This is close to the survey error. With 50 metre separation between markers, the differential increases to 50mm. This is twice the seasonal fluctuation and beyond survey error and so can be considered potentially to provide a realistic trigger.

The settlement analysis indicates that expected settlement is focused over the vein system where up to 80 mm has been predicted. No settlement is calculated to extend over the ridge towards town. As a result, Favona induced settlement is not expected in the markers along Moore Street.

Where markers are 50 m or more apart, settlement in excess of 50 mm would be needed to initiate the tilt trigger. For this reason, a 50 mm trigger for settlement is appropriate as this would be activated at or before activation of the tilt trigger. This is approximately twice the seasonal fluctuation so would be defensible in determining a real effect. The proposed settlement trigger limit is equivalent to the Martha Settlement Zone 3, and based on experience with Martha, no adverse effects are anticipated. Figure 13 describes the process that would be undertaken in the event that the trigger levels for tilt or settlement are exceeded.

The settlement trigger levels may need to be revisited in the light of ongoing survey results. Changes to the trigger levels would be expected only in response to unexpected settlement behaviour, and would be an outcome of a contingency action, e.g. review of the settlement model. Any change to the trigger levels are to be agreed with the Councils prior to their adoption.

10.8 Remediation and Mitigation of Settlement Effects

A contingency plan to be applied for unusual ground movements is summarised in Figure 13. If monitoring data and field investigations confirm that:

- The magnitude of ground movements due to dewatering the Martha Pit, Martha Underground, Trio, Correnso/SUPA and Favona Underground has exceeded those given in Table 1,
- Mine dewatering has resulted in a tilt greater than 1 in 1000 between any two network monitoring locations spaced no less than 25 metres apart.

OGNZL is to:

- a) Notify the Consenting Authorities within 20 working days of receiving the results of the monitoring.
- b) Explain the cause of the non-conformance.
- c) Agree with the consenting authorities on the appropriate settlement contingency measures to be implemented as described.
- d) Implement settlement contingency measures as appropriate.
- e) Advise the Consenting Authorities on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.

Current practice is for OGNZL to increase monitoring frequency; undertake geotechnical investigations; and/or to set up a close order survey around the mark or area of exceedance as a means to comply with requirement b) above. This is indicated by the first action box on the flow diagram in Figure 13.

Where agreed, remediation and mitigation plans are to be developed by OGNZL and forwarded to the consenting authorities for approval prior to their implementation. Such plans should also be agreed to by affected landowners.

The final composition of the remediation and mitigation plan, if required, will depend upon:

- The magnitude of ground movement
- The size of the affected area
- The soil conditions under the affected area
- The type of structure affected, if any
- Environmental and social issues
- The wishes of the affected parties and landowners, and;
- A cost-benefit analysis of the various mitigation options.

Figure 13 shows that these mitigation plans are to be monitored in terms of success and if necessary, revised.

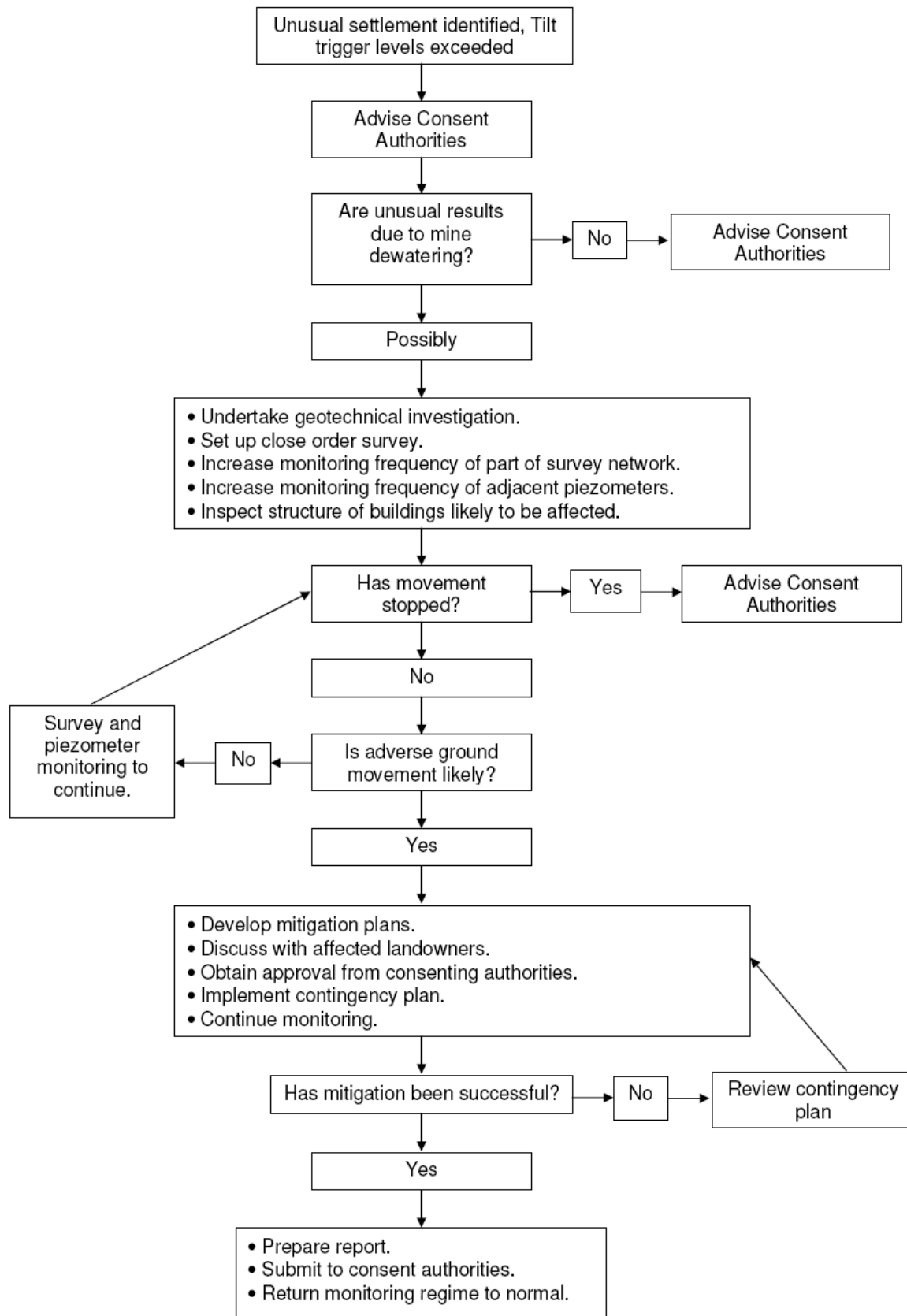


Figure 13: Flow chart of Settlement Contingency Plan

(After Table 5, evidence of Dr Semple as presented to the joint hearing committee dated 13 November 1997.)

Appended with trigger levels for Trio recommended by EGL (2010), trigger levels for Correnso recommended by EGL (2012) and trigger levels for Project Martha recommended by EGL (2018).

Refer to Figure 9 of this Document for a Plan of the Settlement Zones.

Table 7: Predicted Settlement by Zone

Settlement Zone	Range of Surface Movement (mm) Measured Dec. 1989 to May 1997	Measured Average Surface Settlement (mm) due to Mine Dewatering Dec.1989 to May 1997	Predicted Range in Surface Settlement (mm) due to the Extended Mining Operations	Predicted Average Surface Settlement (mm) at cessation of the Extended Mining Operations	Trigger Levels for Settlement (including dewatering for Trio Development) (mm)	Maximum Total Settlement, incl Correnso Dewatering (mm)	Maximum Total Settlement, incl Project Martha Dewatering (mm)
1	+2 to -10	0	0 to 10	0	25	35	55
2	+10 to -10	0	0 to 20	10	35	45	65
3	0 to -25	10	0 to 40	20	60	70	95
4	-15 to -35	25	30 to 80	45	110	125	160
5	-25 to -50	50	70 to 130	85	175	195	260
6	-55 to -85	65	100 to 180	120	220	240	340
7	-95 to -125	110	180 to 260	200	350	400	540

11 RESPONSIBILITIES AND ACCOUNTABILITIES

Role	Responsibility
General Manager	Ensure that resources are available to meet the Dewatering and Settlement consent conditions and monitoring as outlined in the Dewatering and Settlement Monitoring Plan.
Sustainability Manager	- Ensure that dewatering, groundwater and settlement monitoring is carried out according to the relevant consent conditions and as outlined in this Dewatering and Settlement Monitoring Plan. - Ensure that dewatering and settlement reports are produced and supplied to regulators on time as indicated in this Dewatering and Settlement Monitoring Plan. - Ensure that dewatering, groundwater and settlement monitoring data are reviewed according to this Dewatering and Settlement Monitoring Plan, and contingency and mitigation plans implemented as required.
Processing Superintendent	Ensure dewatering flows are monitored daily according to this Dewatering and Settlement Monitoring Plan.
TSF Engineer	Ensure resources are available to complete the 6-monthly settlement surveys as outlined in this Dewatering and Settlement Monitoring Plan.

12 RECORDS AND DOCUMENTATION

Water level data from VWPs with telemetry (P110, P111, P112, P113A, P114, P122, P123, ROW-17) is accessed via the Cirro system. Data from VWPs that do not have telemetry is downloaded onto a laptop in the field and then transferred to Microsoft Excel databases on an OGNZL network drive back in the office. Similarly, dipped standpipe levels and pneumatic piezo levels are recorded on field sheets and then also transferred to Microsoft Excel databases on an OGNZL network drive. The field records are kept and filed in the OGNZL office.

Dewatering volumes for underground are monitored at the WTP on the automated Pi system. Meter readings from SCADA are recorded on an Access database.

Groundwater quality data is recorded in the InForm module of the INX software.

Complaints are recorded in a log that is maintained by the OGNZL Community Liaison Officer.

This Monitoring Plan is a controlled document secured within the OceanaGold document control system Team Binder and published to the site through SharePoint.

13 AUDIT AND REVIEW

This plan shall be reviewed every 2 years minimum, as required by Condition 2 of Water Permit 109742 and forwarded to the WRC for approval. It will also be reviewed in any of the following circumstances:

- Following any event or investigation that impacts on this plan
- Any amendments to the site risk resulting in a changed or increased risk related to dewatering and settlement
- Any amendments to legislation that impacts on this plan

14 RESOURCE CONSENT CONDITION COMPLIANCE

The contents of this monitoring plan are prescribed in various resource consents and summarised in Table 8, with reference to the relevant section of this plan.

Table 8: Resource Consent Condition Compliance

Consent Requirement	Plan Reference
An overall description of the groundwater and settlement monitoring system and the measures to be adopted to meet the objectives of the groundwater and settlement management system.	Section 9 Groundwater Section 10 Settlement
Details of the piezometer network proposed to monitor the effects of mine dewatering on the aquifers under Waihi Township.	Sections 9.3 & 9.4 Appendix C
Details of the settlement monitoring network proposed to monitor the extended zone which has been or is likely to be affected by settlement caused by mine dewatering.	Section 10.2 Appendix D
Details of the survey facilities in the Waihi Township considered by the consent holder to be potentially “at risk” of damage from ground settlement caused by mine dewatering.	No facilities considered at risk
A settlement contingency plan to include mitigation measures to be implemented in the event that ground settlement caused by mine dewatering induces a tilt that exceeds 1 (vertical) in 1000 (horizontal) between any two network monitoring locations spaced no less than 25 m apart (i.e. Settlement no more than 25 mm over 25 m). The settlement contingency plan shall particularly address those facilities identified by the consent holder as being “at risk” from ground settlement caused by mining.	Figure 13
A dewatering contingency monitoring plan that describes the steps the consent holder shall implement in the event that dewatering results in adverse impacts on affected aquifer systems and associated groundwater supplies used for domestic, stock or other purposes.	Figure 8
In detailing the monitoring programmes, the consent holder shall provide information on the monitoring methods proposed, the	Section 8 Dewatering Section 9 Groundwater Section 10 Settlement

Consent Requirement	Plan Reference																
parameters to be monitored and the calibration and maintenance of monitoring equipment.																	
Monitoring is to include: • The daily volume of water abstracted. • Monthly water level monitoring of the piezometer network. • Six monthly monitoring of ground settlement. • The chemistry of groundwater, pit runoff and dewatering water.	Section 8.4 Sections 9.3.3 & 9.4.3 Section 10.4 Section 9.7																
In the event that a tilt of greater than 1 in 1000 occurs over 25 m and such tilt is due to mine dewatering, or there is a significant variance from predicted settlement rates for the settlement zones as follows: <table border="1"> <thead> <tr> <th>Zone</th><th>Maximum Total Settlement (mm), incl Project Martha (2020)</th></tr> </thead> <tbody> <tr> <td>1</td><td>55</td></tr> <tr> <td>2</td><td>65</td></tr> <tr> <td>3</td><td>95</td></tr> <tr> <td>4</td><td>160</td></tr> <tr> <td>5</td><td>260</td></tr> <tr> <td>6</td><td>340</td></tr> <tr> <td>7</td><td>540</td></tr> </tbody> </table> Note: Maximum Total Settlement incl. Project Martha Dewatering sourced from Project Martha Hearing Evidence, Appendix R, Table 2 (Engineering Geology Ltd, May 2018) The consent holder is to: • Explain the cause of the non-conformance. • Agree with the consent Authorities on appropriate settlement contingency measures to be implemented. • Implement settlement contingency measures as appropriate. • Advise the councils of the steps proposed to be taken to prevent further occurrence of the situation.	Zone	Maximum Total Settlement (mm), incl Project Martha (2020)	1	55	2	65	3	95	4	160	5	260	6	340	7	540	Section 10.7.2 Figure 13
Zone	Maximum Total Settlement (mm), incl Project Martha (2020)																
1	55																
2	65																
3	95																
4	160																
5	260																
6	340																
7	540																

15 DEFINITIONS

Term	Definition
CEPA	Correnso Extensions Project Area
HDC	Hauraki District Council
OGNZL	OceanaGold New Zealand Limited
SOP	Standard Operating Procedure
SUPA	Slevin Underground Project Area
WRC	Waikato Regional Council

16 REFERENCES

Engineering Geology Ltd, 2010. Proposed Trio Development Project – Assessment of Ground Settlement. Ref. 6723. Prepared for Newmont Waihi Gold, June 2010.

Engineering Geology Ltd, 2012. Evidence of Trevor Matuschka at Correnso Hearing. Prepared for Newmont Waihi Gold, November 2012.

GEOKEM, 2003: Report No. 0234 Technical review of water quality and geochemistry issues, Favona Underground Project. Prepared for Environment Waikato, October 2003

GWS Ltd, 2010. Proposed Trio Development Project – Assessment of Groundwater Inflows and Throughflows. Prepared for Newmont Waihi Gold, June 2010.

Pattle Delamore Partners Ltd, 2003: Proposed Favona Underground Mine – Review of Groundwater Assessment. Prepared for Environment Waikato, October 2003.

Pells Sullivan Meynink, 2010. Trio Development Project – Effects of Dewatering. Report PSM125.R40. Prepared for Newmont Waihi Gold, May 2010.

Engineering Geology Ltd, 2018. Evidence of Trevor Matuschka at Project Martha Hearing. Prepared for OceanaGold, November 2018.

APPENDIX A – RESOURCE CONSENTS

Resource Consent Certificate

Resource Consent: AUTH124860.01.02

File Number: 61 54 92A

Pursuant to the Resource Management Act 1991, the Waikato Regional Council hereby grants consent to:

Waihi Gold Company Limited
PO Box 190
Waihi 3641

(hereinafter referred to as the Consent Holder)

Consent Type: Water permit

Consent Subtype: Ground water take

Activity authorised: Undertake dewatering of underground workings (including groundwater and mine water) within the Golden Link Project Area, including the Correnso Underground Mine

Location: Golden Link Project Area - Area L

Spatial Reference: NZTM 1853105 E 5857374 N

Consent Duration: This consent shall commence on the date stated in condition 2 and expire twenty years from the date of commencement

Subject to the conditions overleaf:

General

1. This consent is subject to the conditions listed in Schedule One – General Conditions.
2. This consent shall commence five years from the date of grant unless the consent holder has by notification in writing to the Council nominated an earlier commencement date.
3. This consent shall lapse five years from the date of commencement if not exercised prior.

Monitoring - Abstraction Volume

4. The consent holder shall monitor the volume of water abstracted on a weekly basis and shall report this to the Waikato Regional Council on a quarterly basis.

Dewatering and Settlement Monitoring Plan

5. Prior to the exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system, as proposed in the consent application. The monitoring regime shall be designed to assess the effects of:

- (i) dewatering on the regional groundwater system; and
- (ii) dewatering on settlement; and
- (iii) the discharge of degraded quality water from the backfilled and flooded workings on groundwater quality.

Monitoring locations are to provide appropriate resolution of surface tilt relative to the scale of surface infrastructure and final details are to be agreed with the Councils. The Plan shall also provide trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Such updated Plans shall relate to the Correnso Mine or to any new mine within Area L. Any updated Plan shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Dewatering and Settlement Monitoring Report

6. The consent holder shall provide to the Councils an annual Dewatering and Settlement Monitoring Report. The Report shall, as a minimum, provide the following information:
 - (i) The volume of groundwater abstracted;
 - (ii) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;
 - (iii) An interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over the previous year, predictions of future impacts that may arise as a result of any trends that have been identified including review of the predicted post closure effects based on actual monitoring data, and what contingency actions, if any, the consent holder proposes to take in response to

- those predictions. This analysis shall be undertaken by a party appropriately experienced and qualified to assess the information;
- (iv) Any contingency actions that may have been taken during the year; and
 - (v) Comment on compliance with condition 5 of this consent including any reasons for non-compliance or difficulties in achieving conformance with the conditions of consent.

The report shall be forwarded in a form acceptable to the Councils.

Monitoring - Tilt

7. In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations installed in accordance with the Dewatering and Settlement Monitoring Plan required pursuant to condition 5 of this consent, and such tilt is caused by the de-watering and/or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Councils in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then engage in a process with the Councils:
- (i) explain the cause of the non-conformance,
 - (ii) Propose appropriate settlement contingency measures for discussion with Councils and agree with the Councils on the appropriate settlement contingency measures and the timing for their implementation as described,
 - (iii) implement agreed settlement contingency measures as appropriate within the agreed time limit,
 - (iv) advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.

Monitoring – Water Quality

8. The consent holder shall monitor throughout the period of operation, the chemistry of the groundwater, pit run-off and pit discharge water abstracted from the open pit. The monitoring data is to be used to correlate these inflows with pit lake water quality predictions, and to provide a database for input into the closure plans. The sampling parameters and frequencies shall be described in the Martha Extended Project dewatering consent (unless agreed otherwise with the Waikato Regional Council) with the results forwarded to the Waikato Regional Council on an annual basis.

Other Water Users

9. If, in the opinion of the Waikato Regional Council, the exercise of this consent adversely affects stock, domestic or other water supplies, then the consent holder shall, at its own cost, be responsible for providing to the owner of those water supplies an alternative equivalent water supply, to the satisfaction of Waikato Regional Council. The consent holder shall be responsible for making an alternative water supply available within 12 hours of being directed to do so by the Waikato Regional Council.

*For and on behalf of the
Waikato Regional Council*



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Advice notes

1. This resource consent does not give any right of access over private or public property. Arrangements for access must be made between the consent holder and the property owner.
2. This resource consent is transferable to another owner or occupier of the land concerned, upon application, on the same conditions and for the same use as originally granted (s.134-137 RMA).
3. The consent holder may apply to change the conditions of the resource consent under s.127 RMA.
4. The reasonable costs incurred by Waikato Regional Council arising from supervision and monitoring of this/these consents will be charged to the consent holder. This may include but not be limited to routine inspection of the site by Waikato Regional Council officers or agents, liaison with the consent holder, responding to complaints or enquiries relating to the site, and review and assessment of compliance with the conditions of consents.
5. Note that pursuant to s333 of the RMA 1991, enforcement officers may at all reasonable times go onto the property that is the subject of this consent, for the purpose of carrying out inspections, surveys, investigations, tests, measurements or taking samples.
6. If you intend to replace this consent upon its expiry, please note that an application for a new consent made at least 6 months prior to this consent's expiry gives you the right to continue exercising this consent after it expires in the event that your application is not processed prior to this consent's expiry.

SCHEDULE ONE – GENERAL CONDITIONS

Resource consents **124859 - 124864 (inclusive)** are subject to the following general conditions, which are applicable to all consents.

General

1. Except as otherwise provided for by subsequent conditions of consent, all activities to which this consent relates shall be undertaken generally in accordance with the information contained in the document titled **“Golden Link Project including the Correnso Underground Mine: Application for WRC for resource consent and AEE Volumes 1 and 2”** dated June 2012 and the s92 further information recorded as documents 2214077, 2214082 and 2265673 on the Waikato Regional Council's document system for the Golden Link Project.
2. The consent holder shall notify the Council in writing, at least two weeks in advance of the first exercise of this consent.

Annual Work Programme

3. The consent holder shall, within six months after the commencement of this consent and annually thereafter, prepare and submit to Council for information, an Annual Work Programme that outlines the anticipated activities to be performed during the following year and the management systems under which those activities will be undertaken. The Annual Work Programme shall include the following :
 - (i) Mining operations proposed for the forthcoming year.
 - (ii) Description of the sequencing of works, and description of the environmental procedures to be adopted during construction and the maintenance and management of facilities.
 - (iii) Proposed progressive rehabilitation and revegetation of the active areas of the mine operation.

The Annual Work Programme may also include any other information that the consent holder wishes, and may be combined with any other document which the consent holder is required to produce.

Liaison Officer

4. Within two weeks of the exercising of 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 consent. The name of the Liaison Officer together with the contact phone numbers for that person shall be publicly notified in local newspapers by the consent holder prior to the exercising of this consent and at least once a year thereafter.

Rehabilitation Plan

5. The consent holder shall prepare a Rehabilitation Plan covering all areas that may be affected by the construction and use of the workings associated with the underground mining within Area L of the Golden Link Project Area. This plan shall be submitted to the Waikato Regional Council and the Hauraki District Council (the “Councils”) for written approval prior to the exercise of this consent. The Plan shall set out details on backfilling and flooding the underground workings, backfilling the vent shaft and access decline, and removal of surface infrastructure. The consent holder may amend the Plan at any time. No amendments shall be made to the Plan without the written approval of the Councils.

Unless otherwise agreed in writing by the Councils, the consent holder shall undertake the rehabilitation works in accordance with the approved Rehabilitation Plan.

Bond

6. Unless otherwise agreed in writing by the Councils, the consent holder shall provide and maintain in favour of the Councils a rehabilitation bond to:
 - (ii) secure compliance with the conditions of this consent and to enable any adverse effect on the environment resulting from the consent holder's activities and not authorised by a resource consent to be avoided, remedied, or mitigated;
 - (iii) secure the completion of rehabilitation and closure of the activities authorised by this consent in accordance with the Rehabilitation Plan approved by the Councils;
 - (iv) ensure the performance of any monitoring obligations of the consent holder under this consent.
7. The bond shall be in a form approved by the Councils and shall, subject to these conditions, be on the terms and conditions required by the Councils.
8. The bond shall provide that the consent holder remains liable under the Resource Management Act 1991 for any breach of the conditions of consent which occurs before expiry of this consent and for any adverse effects on the environment which become apparent during or after the expiry of the consent.
9. Unless the bond is a cash bond, the performance of all of the conditions of the bond shall be guaranteed by a guarantor acceptable to the Councils. The guarantor shall bind itself to pay for the carrying out and completion of any condition in the event of any default of the consent holder, or any occurrence of any adverse environmental effect requiring remedy.
10. The amount of the bond shall be fixed prior to the exercise of this consent or as otherwise agreed and thereafter at least annually by the Councils who shall take into account any calculations and other matters submitted by the consent holder which are relevant to the determination of the amount. The amount of the bond shall be advised in writing to the consent holder at least one month prior to the review date.
11. The amount of the bond shall include:
 - (i) the estimated costs (including any contingencies necessary) of rehabilitation and closure in accordance with the conditions of this consent, on completion of the operations proposed for the next year;
 - (ii) any further sum which the Councils consider necessary to allow for remedying any adverse effect on the environment that may arise from the exercise of this consent;
 - (iii) the estimated costs of monitoring, in accordance with the monitoring conditions of this consent, until the consent expires; and
 - (iv) any further sum which the Councils consider necessary for monitoring any adverse effect on the environment that may arise from the exercise of this consent including monitoring anything which is done to avoid, remedy, or mitigate an adverse effect.
12. Should the consent holder not agree with the amount of the bond fixed by the Councils then the matter shall be referred to arbitration in accordance with the provisions of the Arbitration Act 1996. Arbitration shall be commenced by written notice by the consent holder to each of the Councils advising that the amount of the bond is disputed, such notice to be given by the consent holder within two weeks of notification of the amount of the rehabilitation bond. If the parties cannot agree upon an arbitrator within a week of receiving the notice from the consent holder, then an arbitrator shall be appointed by the President of the Institute of Professional Engineers of New Zealand. Such arbitrator shall give an award in writing within 30 days after his or her appointment, unless the consent holder and the Councils agree that time shall be extended. The parties shall bear their own costs in connection with

the arbitration. In all other respects, the provisions of the Arbitration Act 1996 shall apply. Pending the outcome of that arbitration, and subject to condition 8.8, the existing bond shall continue in force. That sum shall be adjusted in accordance with the arbitration determination.

13. If, for any reason other than default of the Councils, the decision of the arbitrator is not made available by the 30th day referred to above, then the amount of the bond shall be the sum fixed by the Councils, until such time as the arbitrator does make his/her decision. At that stage the new amount shall apply. The consent holder shall not exercise this consent if the variation of the existing bond or new bond is not provided in accordance with this condition.
14. The bond may be varied, cancelled, or renewed at any time by agreement between the consent holder and the Councils provided that cancellation will not be agreed to unless a further or new bond acceptable to the Councils is available to replace immediately that which is to be cancelled (subject however to the condition below as to release of the bond on the completion of the rehabilitation).
15. The Councils shall release the bond on the completion of the rehabilitation. This means when the rehabilitation has been completed in accordance with the approved Rehabilitation Plan and demonstrated to be successful, to the satisfaction of the Councils
16. All costs relating to the bond shall be paid by the consent holder.
17. This consent shall not be exercised unless and until the consent holder provides the bond to the Councils or provides such sureties as may be acceptable to the Councils until the bond is received.
Note: The bond covers only those elements of the Golden Link Project not already subject to the rehabilitation bond imposed by the land use consent and resource consents granted for the Martha Mine Extended Project and Favona and Trio Underground Mine Projects.
18. These conditions form an integrated whole and are not severable.

Review

19. The Waikato Regional Council may within the six month period following the anniversary of the commencement of this consent and annually thereafter, serve notice on the consent holder under section 128 of the Resource Management Act 1991, of its intention to review the conditions of this resource consent for the following purposes:
 - (i) to review the effectiveness of the conditions of this resource consent in avoiding, or mitigating, any adverse effects on the environment from the operation and, if considered appropriate by the Council, to avoid, remedy or mitigate such effects by way of further or amended conditions; and/or
 - (ii) if necessary and appropriate, in relation to discharges of contaminants, to require the holder of this resource consent to adopt the best practicable option to remove, or reduce, adverse effects on the environment resulting from the exercise of this consent; and/or
 - (iii) review the monitoring requirements in light of the results obtained from monitoring in preceding years

Costs associated with any review shall be borne by the consent holder.

Change to Consent

20. The consent holder may apply to the Council for a change or cancellation of any of the conditions of this consent in accordance with section 127 (1)(a) of the Resource Management Act 1991 at any time.

Administration

21. The consent holder shall pay to the Council any administrative charge fixed in accordance with section 36 of the Resource Management Act 1991, or any charge prescribed in accordance with regulations made under section 360 of the Resource Management Act.



WAIKATO REGIONAL COUNCIL

CONSENTS AND CONDITIONS

AS AMENDED BY THE ENVIRONMENT COURT

FOR THE EXTENDED MARTHA MINE PROJECT

BY WAIHI GOLD COMPANY

17 November 2008

4.0 Dewatering

That water permit 971286 be granted to Waihi Gold Company to dewater the pit (Areas A and B as identified on Waihi Gold Company plan no. T70725A dated 25 July 1997), and surrounding areas, at a rate of up to 15,000 m3 of surface water and groundwater per day, at or about map reference NZMS260 T13:620-202:

Term: Expires 15 July 2017

Lapse Period: 2 years from date of commencement

1. This consent is subject to each of the conditions set out in Schedule 1.
2. The annual average daily extraction rate shall be not greater than 10,000 m3 per day.
3. The consent holder shall prepare a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to be designed to monitor and assess the effects of dewatering on land settlement and the effects of the mining activities on the subsurface hydraulic regime. The Dewatering and Settlement Monitoring Plan shall address at least the following:
 - a) An overall description of the groundwater and settlement monitoring system and the measures to be adopted to meet the objectives of the groundwater and settlement management system.
 - b) Details of the piezometer network proposed to monitor the effects of pit dewatering on the aquifers under Waihi township.
 - c) Any monitoring bores additional to the existing piezometer network shall be installed and operational prior to the exercising of this consent.
 - d) Details of the settlement monitoring network proposed to monitor the extended zone which has been, or is likely to be, affected by settlement caused by mine dewatering.

Any settlement monitoring network locations additional to the existing monitoring locations shall be installed and operational prior to exercising this consent.

- e) Details of the survey of facilities in the Waihi township considered by the consent holder to be potentially "at risk" of damage from ground settlement caused by mine dewatering. The survey to be completed shall include collection of information about the facility location, the nature of construction materials, the nature of sensitive equipment that might be potentially "at risk", and the sensitivity of this equipment to ground settlement caused by mine dewatering and/or tilt.

This survey shall be completed prior to exercise of this consent.

- f) A settlement contingency plan to include mitigation measures to be implemented in the event that ground settlement caused by mine dewatering induces a tilt that exceeds 1 in 1000 between any two network monitoring locations spaced no less than 25 metres apart. The settlement contingency plan shall particularly address those facilities identified by the consent holder as being potentially "at risk" of damage from ground settlement caused by mine dewatering.
 - g) A dewatering contingency plan that describes the steps the consent holder shall implement in the event that dewatering results in adverse impacts on affected aquifer systems and associated groundwater supplies used for domestic, stock or other purposes.
 - h) In detailing the monitoring programmes the consent holder shall provide information on the monitoring methods proposed, the parameters to be monitored, and the calibration and maintenance of monitoring equipment.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

4. The Dewatering and Settlement Monitoring Plan shall be submitted to the Waikato Regional Council for approval at least one month prior to the exercise of this consent. The Waikato Regional Council shall consult with the Hauraki District Council prior to approving the Dewatering and Settlement Monitoring Plan. The consent holder shall review and update (as necessary) the Plan and shall provide promptly such updated Plan to the Waikato Regional Council annually for approval.
5. If in the opinion of Waikato Regional Council the exercise of this permit adversely affects stock, domestic or other water supplies, then the consent holder shall at its own cost be responsible for providing to the owner of those water supplies an alternative equivalent water supply, to the satisfaction of Council. The consent holder shall be responsible for making an alternative water supply available within 12 hours of being directed to do so by Waikato Regional Council.
6. If in the opinion of Waikato Regional Council the exercise of this permit adversely affects land or facilities, then the consent holder shall at its own cost be responsible for reinstating the facilities to an equivalent standard to the reasonable satisfaction of Council.
7. The consent holder shall measure and record the daily volume of water abstracted from the pit.
8. The consent holder shall undertake monthly water level monitoring of the piezometer network in accordance with the Dewatering and Settlement Monitoring Plan.
9. The consent holder shall monitor ground settlement at a minimum of six monthly intervals in accordance with the Dewatering and Settlement Monitoring Plan.
10. In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations spaced no less than 25 metres apart, and such tilt is caused by mine dewatering, or there is a significant variance from the predicted settlement rates described in the evidence of Dr Semple (Table 5, Figure 8 dated 13 November 1997 as presented to the joint hearing committee), the consent holder shall notify the Waikato Regional Council and the Hauraki District Council, in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then:
 - a) explain the cause of the non-conformance,
 - b) agree with the Waikato Regional Council and Hauraki District Council on the appropriate settlement contingency measures to be implemented as described,
 - c) implement settlement contingency measures as appropriate,
 - d) advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.
11. The consent holder shall monitor throughout the period of operation, the chemistry of the groundwater, pit run-off and pit discharge water abstracted from the open pit. The monitoring data is to be used to correlate these inflows with pit lake water quality predictions, and to provide a database for input into the closure plans. The sampling parameters and frequencies (unless agreed otherwise) shall be as described in Table 1 and 2 below with the results forwarded to Waikato Regional Council on an annual basis.

Sampling of water types shall be as follows:

- Type 1:* Groundwater (a representative sample of the pit groundwater inflows taken at a site unaffected by surface water inflows).
- Type 2:* Surface water (various locations on the pit benches and floor) selected to provide individual representative samples of run-off over oxidised and unoxidised rock.
- Type 3:* Combined (discharge end of pipeline from pit at the Water Treatment Plant).

Sampling groups and frequencies shall be as described in Table 1 and sampling parameters shall be as set out in Table 2 below.

Table 1: Sampling Groups and Frequencies

Type	Automatic/Daily	Quarterly	Annually
1	Group 1	Groups 1 & 2	Groups 1, 2 & 3
2		Groups 1 & 2	Groups 1, 2 & 3
3		Groups 1 & 2	Groups 1, 2 & 3

Table 2: Sampling Parameters

Group 1	Group 2	Group	3
pH	Cations (Na, K, Ca, Mg)	Cu	Ag
Conductivity	Anions	Zn	Fe (total) Mn (total)
	(alkalinity/acidity, Cl, SO ₄)	Pb	
	Fe	As	Cd
	Mn	Al	Se
	Suspended solids	Sb	
	Temperature	Ni	
	(Type 1 only)	Co	

Note:

Monitoring of metals shall be based on the soluble test method, defined as the concentration of dissolved metals measured in that fraction which passes through a 0.45 um filter except those metals designated as totals which shall be based on acid soluble concentrations determined on unfiltered samples.

12. All water quality sampling and analysis shall be undertaken using Standard Methods for the Examination of Water and Wastewater (19th Edition 1995, or updates), APHA, AWWA and WEF, unless otherwise agreed in writing by Waikato Regional Council. Analyses shall be undertaken at an appropriately qualified laboratory. All other measuring, testing, recording and analytical methods as may be required from time to time shall be to the satisfaction of Council.
13. The consent holder shall provide to the Waikato Regional Council and the Hauraki District Council an annual dewatering and settlement monitoring report. The report shall include at least the following information:
 - a) The data from monitoring undertaken during the previous year including ground water contour plans (derived from the data) in respect of the piezometer network.
 - b) Identification of any environmentally important trends in settlement and dewatering behaviour.
 - c) Interpretation and analysis of any change in ground water profile over the previous year, any contingency actions that may have been taken during the year, predictions of future impacts on other bore users that may arise as a result of any trends that have been identified, and what contingency actions, if any, the consent holder proposes to take in response to those predictions.
 - d) A comparison of the settlement survey data with that predicted in Table 5 and Figure 8 (dated 13 November 1997) by Dr Semple of Woodward-Clyde (NZ) Ltd as provided in evidence to the joint hearing committee.
 - e) Comment on compliance with all conditions of this consent.
 - f) A summary and analysis of complaints relevant to this consent from the complaint log (refer Schedule 1).
 - g) Any reasons for non-compliance or difficulties in achieving conformance with the conditions of this consent.

- h) Any works that have been undertaken to improve environmental performance or that are proposed to be undertaken in the forthcoming year to improve environmental performance in relation to activities permitted by this consent.

The report shall be forwarded in a format acceptable to the Waikato Regional Council.

Resource Consent Certificate

Resource Consent Number: 109742

File Number: 61 25 21A

Pursuant to the Resource Management Act 1991, the Waikato Regional Council hereby grants consent to:

Welcome Gold Mines Ltd & Auag Resources Ltd

P O Box 190

WAIHI 2981

(hereinafter referred to as the Consent Holder)

Consent type: Water Permit

Consent subtype: Groundwater take

Activity authorised: To take groundwater and mine water for dewatering the underground mine.

Location: Baxter Rd - Waihi

Map Reference: NZMS 260 T13:636-195

Consent duration: Granted for a period expiring 31 December 2028.

Subject to the conditions overleaf:

CONDITIONS

General

1. This consent is subject to the conditions listed in Schedule One –General Conditions and Schedule Two – General Conditions.

Other Water Users

2. If, in the opinion of the Waikato Regional Council (the “**Council**”), the exercise of this consent adversely affects stock, domestic or other water supplies, then the consent holder shall, at its own cost, be responsible for providing to the owner of those water supplies an alternative equivalent water supply, to the satisfaction of Council. The consent holder shall be responsible for making an alternative water supply available within 12 hours of being directed to do so by the Council.

Monitoring – Abstraction Rate

3. The consent holder shall monitor the volume of water abstracted from the mine on a weekly basis and shall report this to the Council on a quarterly basis.

*Dated at Hamilton this **13** day of **April 2004***

For and on behalf of the

Waikato Regional Council



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SCHEDULE TWO – GENERAL CONDITIONS

The granting of consents (109742 to 109746 inclusive) is subject to the following conditions, which shall apply to each individual consent.

Water Management Plan

1. Prior to exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Water Management Plan describing the water management system to be applied across the project area, with emphasis on management of stormwater including water storage options, decline and mine dewatering, and stockpile runoff.

The consent holder shall exercise this consent in accordance with the approved Water Management Plan.

Settlement, Dewatering and Water Quality Monitoring Plan

2. Prior to exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Settlement, Dewatering & Water Quality Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement, the groundwater hydraulic regime and on water quality, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system, as proposed in the consent application. The monitoring regime shall be designed to assess the effects of:

- a) mine dewatering on the regional groundwater system,
- b) mine dewatering on settlement;
- c) leachate from stockpiles containing potentially acid forming material on shallow groundwater quality, and
- d) the discharge of degraded-quality water from the backfilled and flooded workings on groundwater quality.

Final details of the monitoring locations are to be agreed with the Council. The Plan shall also provide trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

The Plan shall be consistent with the recommendations included in the reports to the Council entitled;

- *“Proposed Favona Underground Mine – Review of Groundwater Assessment” dated October 2003 and prepared by Pattle Delamore Partners; and*

- *“Technical Review of Water Quality and Geochemistry Issues - Favona Underground Project”, dated October 2003 and prepared by GEOKEM.*

The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed, and updated as necessary, by the consent holder at least once every two years. Any updated Plan shall be promptly forwarded to the Council for approval and following approval the updated Plan shall be implemented in place of the previous version.

109742

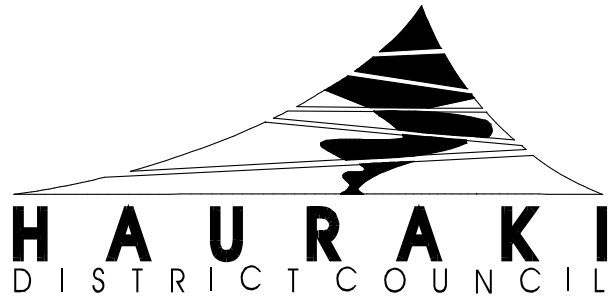
In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Settlement, Dewatering & Water Quality Monitoring Plan, then the conditions of this consent shall prevail.

3. In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations, installed in accordance with the Settlement, Dewatering & Water Quality Monitoring Plan required pursuant to condition 2 above, or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Council in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then:
 - a) explain the cause of the non-conformance,
 - b) agree with the Council on the appropriate settlement contingency measures to be implemented as described,
 - c) implement settlement contingency measures as appropriate,
 - d) advise the Council on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.

Settlement, Dewatering & Water Quality Monitoring Report

4. The consent holder shall provide to the Council (with a copy provided to the Hauraki District Council) an annual Settlement, Dewatering & Water Quality Monitoring Report. The report shall include at least the following information:
 - a) the volume of groundwater abstracted,
 - b) the data from monitoring undertaken during the previous year including groundwater contour plans (derived from the data) in respect of the piezometer network,
 - c) an interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over the previous year, predictions of future impacts that may arise as a result of any trends that have been identified including review of the predicted post closure effects based on actual monitoring data, and what contingency actions, if any, the consent holder proposes to take in response to those predictions. This analysis shall be undertaken by a party appropriately experienced and qualified to assess the information,
 - d) any contingency actions that may have been taken during the year,
 - e) comment on compliance with all conditions of this consent including any reasons for non-compliance or difficulties in achieving conformance with the conditions of this consent.

The report shall be forwarded in a format acceptable to the Council.



**LAND USE CONSENT AND CONDITIONS
FOR THE EXTENDED MARTHA MINE PROJECT
BY WAIHI GOLD COMPANY
(NO. 97/98 - 105)**

CONSENT ORDER

50 109 59

15 June 1999

3.30 Settlement

- a) The consent holder shall prepare a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of dewatering on land settlement and the effects of the mining activities on the subsurface hydraulic regime. The Dewatering and Settlement Monitoring Plan shall address at least the following:

- i) An overall description of the groundwater and settlement monitoring system and the measures to be adopted to meet the objectives of the groundwater and settlement monitoring system.
- ii) Details of the piezometer network proposed to monitor the effects of pit dewatering on the aquifers under Waihi Township.

Any monitoring bores additional to the existing piezometer network shall be installed and operational prior to the exercising of this consent.

- iii) Details of the settlement monitoring network proposed to monitor the extended zone which has been, or is likely to be, affected by settlement caused by mine dewatering.

Any settlement monitoring network locations additional to the existing monitoring locations shall be installed and operational prior to exercising this consent.

- iv) Details of the survey of facilities in the Waihi township considered by the consent holder to be potentially "at risk" of damage from ground settlement caused by mine dewatering. The survey to be completed shall include collection of information about the facility's location, the nature of construction materials, the nature of sensitive equipment that might be potentially "at risk", and the sensitivity of this equipment to ground settlement caused by mine dewatering and/or tilt.

This survey shall be completed prior to exercise of the Waikato Regional Council consent number 971286.

- v) A settlement contingency plan to include mitigation measures to be implemented in the event that ground settlement caused by mine dewatering induces a tilt that exceeds 1 in 1000 between any two network monitoring locations spaced no less than 25 metres apart. The settlement contingency plan shall particularly address those facilities identified by the consent holder as being potentially "at risk" of damage from ground settlement caused by mine dewatering.
- vi) A dewatering contingency plan that describes the steps the consent holder shall implement in the event that dewatering results in adverse impacts on affected aquifer systems and associated groundwater supplies used for domestic, stock or other purposes.

In detailing the monitoring programmes the consent holder shall provide information on the monitoring methods proposed, the parameters to be monitored, and the calibration and maintenance of monitoring equipment.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of Waikato Regional Council consent number 971286 shall prevail.

- b) The Dewatering and Settlement Monitoring Plan shall be submitted to Hauraki District Council for approval at least one month prior to the exercise of this consent. The Hauraki District Council shall consult with the Waikato Regional Council prior to approving the Dewatering and Settlement Monitoring Plan. The consent holder shall review and update (as necessary) the Plan and shall provide promptly such updated Plan to the Hauraki District Council annually for approval.
- c) If in the opinion of Hauraki District Council the dewatering adversely affects land or facilities, then the consent holder shall at its own cost be responsible for reinstating the facilities to an equivalent standard to the reasonable satisfaction of Council.
- d) The consent holder shall measure and record the daily volume of water abstracted from the pit.
- e) The consent holder shall undertake monthly water level monitoring of the piezometer network in accordance with the Dewatering and Settlement Monitoring Plan.
- f) The consent holder shall monitor ground settlement at a minimum of six monthly intervals in accordance with the Dewatering and Settlement Monitoring Plan.
- g) In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations spaced no less than 25 metres apart, and such tilt is caused by mine dewatering, or there is a significant variance from the predicted settlement rates described in the evidence of Dr Semple (Table 5, Figure 8 dated 13 November 1997 as presented to the Joint Hearing Committee – attached hereto as Appendix C), the consent holder shall notify the Hauraki District Council and the Waikato Regional Council, in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then:
 - explain the cause of the non-conformance,
 - agree with the Hauraki District Council and Waikato Regional Council on the appropriate settlement contingency measures to be implemented as described,
 - implement settlement contingency measures as appropriate,
 - advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.
- h) The consent holder shall provide to the Hauraki District Council and the Waikato Regional Council an annual dewatering and settlement monitoring report. The report shall include at least the following information:
 - The data from monitoring undertaken during the previous year including ground water contour plans (derived from the data) in respect of the piezometer network.
 - Identification of any environmentally important trends in settlement and dewatering behaviour.
 - Interpretation and analysis of any change in ground water profile over the previous year, any contingency actions that may have been taken during the year, predictions of future impacts on other bore users that may arise as a result of any trends that have been identified, and what contingency actions, if any, the consent holder proposes to take in response to those predictions.
 - A comparison of the settlement survey data with that predicted in Table 5 and Figure 8 (dated 13 November 1997) by Dr Semple of Woodward Clyde (NZ) Ltd as provided in evidence to the Joint Hearing Committee.
 - Comment on compliance with this condition.
 - A summary and analysis of complaints relevant to this condition.
 - Any reasons for non-compliance or difficulties in achieving conformance with this condition.
 - Any works that have been undertaken to improve environmental performance or that are proposed to be undertaken in the forthcoming year to improve environmental performance in relation to activities permitted by this condition.

The report shall be forwarded in a format acceptable to the Hauraki District Council.

(Note: This condition is complementary to Waikato Regional Council consent number 971286).

Extract from conditions of Hauraki District Council Resource Consent RC-15735, as pertaining to Dewatering and Settlement:

Dewatering and Settlement Monitoring Plan

14. Within 2 months of the exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system, as proposed in the consent application. The monitoring regime shall be designed to assess the effects of:

- (i) dewatering on the regional groundwater system; and
- (ii) dewatering on settlement.

Final details of the monitoring locations are to be agreed with the Council. The Plan shall also provide trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Any updated Plan shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Dewatering and Settlement Monitoring Report

15. The consent holder shall provide to the Council an annual Dewatering and Settlement Monitoring Report. The Report shall, as a minimum, provide the following information:

- (i) The volume of groundwater abstracted;
- (ii) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;
- (iii) An interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over the previous year, predictions of future impacts that may arise as a result of any trends that have been identified including review of the predicted post closure effects based on actual monitoring data, and what contingency actions, if any, the consent holder proposes to take in response to those predictions. This analysis shall be undertaken by a party appropriately experienced and qualified to assess the information;
- (iv) Any contingency actions that may have been taken during the year; and
- (v) Comment on compliance with condition 14 of this consent including any reasons for non-compliance or difficulties in achieving conformance with the conditions of consent.

The report shall be forwarded in a form acceptable to the Council.

Monitoring – Tilt

16. In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations installed in accordance with the De-watering and Settlement Monitoring Plan required pursuant to condition 14 of this consent, or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Hauraki District and Waikato Regional Councils in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then:

(i) Explain the cause of the non-conformance,

(ii) Agree with the Councils on the appropriate settlement contingency measures to be implemented as described,

(iii) Implement settlement contingency measures as appropriate,

(iv) Advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.

Extract from conditions of Waikato Regional Council Resource Consents 121416, 121417, 121418, 121446, and 121447, as pertaining to Dewatering and Settlement:

SCHEDULE ONE – GENERAL CONDITIONS

Resource Consents **121416, 121417, 121418, 121446, and 121447** are subject to the following general conditions, which are applicable to all consents.

Dewatering and Settlement Monitoring Plan

- 5 Prior to exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system, as proposed in the consent application. The monitoring regime shall be designed to assess the effects of:

- (i) dewatering on the regional groundwater system; and
- (ii) dewatering on settlement, and
- (iii) the discharge of degraded quality water from the backfilled and flooded workings on groundwater quality.

Final details of the monitoring locations are to be agreed with the Council. The Plan shall also provide trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Any updated Plan shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Dewatering and Settlement Monitoring Report

6. The consent holder shall provide to the Councils an annual Dewatering and Settlement Monitoring Report. The Report shall, as a minimum, provide the following information:
- (i) The volume of groundwater abstracted;
 - (ii) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;
 - (iii) An interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over the previous year, predictions of future impacts that may arise as a result of any trends that have been identified including review of the predicted post closure effects based on actual monitoring data, and what contingency actions, if any, the consent holder proposes to take in response to those predictions. This analysis shall be undertaken by a party appropriately experienced and qualified to assess the information;
 - (iv) Any contingency actions that may have been taken during the year; and
 - (v) Comment on compliance with condition 5 of this schedule including any reasons for non-compliance or difficulties in achieving conformance with the conditions of consent.

The report shall be forwarded in a form acceptable to the Council.

Monitoring – Tilt

7. In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations installed in accordance with the De-watering and Settlement Monitoring Plan required pursuant to condition 5 of this schedule, and such tilt is caused by the de-watering and/or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Councils in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then engage in a process with the Councils:
- (i) explain the cause of the non-conformance,
 - (ii) agree with the Councils on the appropriate settlement contingency measures to be implemented as described,
 - (iii) implement settlement contingency measures as appropriate,
 - (iv) advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.

Extract from conditions of HDC RC 202.2012, as pertaining to Dewatering and Settlement:

Surface Stability

- 23 Underground mining within the Correnso Underground Mine shall be conducted to ensure ground surface stability. This shall include adoption of the following measures:
- a) Mining methods shall be restricted to those that require stope voids to be backfilled to provide an operating floor for further stoping to proceed.
 - b) No stoping shall occur above whichever of the following criteria sets the lower (deeper) level:
 - i) A depth of at least 130m below the ground surface.
 - ii) A depth of at least 40m below the top of the andesite, unless geotechnical investigations reported to the Council demonstrate to its satisfaction that a greater or lesser depth is appropriate to ensure surface stability.
 - c) Backfilling of any other underground workings where geotechnical conditions require backfilling to ensure long-term stability.
 - d) Seismic monitoring and rock movement monitoring of underground mine workings for the duration of mining including backfilling and any other underground rehabilitation work.
 - e) Grouting of all future surface-drilled holes to a depth below the top of the andesite.
 - f) Any surface drillhole having significant and sustained water flows into the workings shall be grouted from underground within three shifts (36 hours) of being intersected. The hole shall be grouted to at least 30 metres from the collar using the same method used to grout uphole cable bolts.

Additional measures to be adopted to ensure ground surface stability shall be reported to the Council in accordance with Conditions 25 and 26.

- 24 Prior to the first exercise of this consent, the consent holder shall provide to the Council for its written approval, a report describing preventative and mitigation actions that would be implemented to ensure that the mining provided for under this consent does not drain the strata overlying the andesite via existing drillholes and structures. Preventative and mitigation actions may include:
- a) Avoiding intercepting the drillholes with mine workings;
 - b) Grouting drillholes from underground where underground development intercepts holes that are making water or geological defects with significant and sustained water flows;
 - c) Undertaking geotechnical investigations to demonstrate to the satisfaction of Council that draining of the drillhole(s) will not adversely affect surface stability.
- 25 The consent holder shall provide to the Council on an annual basis (within one month of the agreed anniversary) a report:
- a) Describing the location, depth height and volume (m3) of stopes; and a summary of the data required by Condition 26 regarding unfilled stope voids; and
 - b) Describing the lengths of development that, due to the encountered geotechnical conditions or where multiple levels overlap, will require backfilling prior to mine closure; and
 - c) Describing the backfilling and compaction associated with each stope; and
 - d) Describing the ground conditions revealed by the mine excavations; and
 - e) Describing the monitoring and measures adopted to ensure ground surface stability, particularly as provided for in Condition 23 and the outcomes of such measures; and
 - f) Describing the location and depth of exploratory drives;
 - g) Confirming that the extent of the mining works is confined to CEPPA, as defined in Figure 1.

26 Reporting on Filled/Unfilled Stopes and Seismic Monitoring

- a) The consent holder shall report to the Council on a monthly basis on the total stope volume and volume of filled stopes for that month for each mining method employed namely: cut and fill area; transverse stope area; and all Avoca areas combined. The report shall be in a form acceptable to the Council and the data shall be for the situation as at the 20th day of the reporting month. The report shall be delivered on or before the end of the calendar month covered.
- b) The consent holder shall report to the Council on a monthly basis detailing any anomalous results from the seismic monitoring and rock movement monitoring required by Condition 23. The report shall be delivered on or before the end of the calendar month covered.

Dewatering and Settlement Monitoring Plan

- 27 The objectives of the groundwater and settlement management system shall be to ensure that dewatering operations do not give rise to surface instability and differential settlement beyond that authorised by this consent.
- 28 Within 2 months of the exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.
- 29 The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system set out in Condition 27. The monitoring regime shall be designed to assess the effects of:
 - a) Dewatering on the regional groundwater system; and
 - b) Dewatering on settlement.
- 30 Monitoring locations are to provide appropriate resolution of groundwater levels and surface tilt relative to the scale of surface infrastructure, particularly in the areas above and adjacent to the mining activities provided for in this consent. Final details are to be agreed with the Council. The Plan shall also provide settlement trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.
- 31 The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Any updated Plan shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.
- 32 In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations installed in accordance with the Dewatering and Settlement Monitoring Plan required pursuant to Condition 28 of this consent, or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Hauraki District and Waikato Regional Councils in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then:
 - a) Explain the cause of the non-conformance;
 - b) Propose appropriate settlement contingency measures to the Councils and the timing of implementation thereof by the consent holder;
 - c) Implement settlement contingency measures as appropriate within the agreed time limit;
 - d) Advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.
- 33 The consent holder shall as a matter of urgency, advise the Council of any significant anomalies identified by the regular (monthly) reading of groundwater levels in the piezometer network. Such advice is to include an explanation of the anomalous results and actions proposed to address any issues identified. This report is to be provided to the Council within 10 working days of the anomalous results being identified.

A "significant anomaly" is defined as 15m or more offset occurring in piezometer recordings over a 1 month period.

- 34 In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Advice notes:

1. The Dewatering and Settlement Monitoring Plan shall be consistent with the Dewatering and Settlement Monitoring Plan prepared as a condition of the ground dewatering consent (RC 124860) granted by the Waikato Regional Council.
2. The monitoring undertaken in terms of the Dewatering and Settlement Monitoring Plan may need to be continued for a period beyond the term of this consent depending on recharge of the groundwater following cessation of underground mining activities and the filling of the Martha Pit.

Condition 5 of the WRC Resource Consent 124860 states the following regarding the Settlement, Dewatering and Water Quality Monitoring Plan as it relates to the Golden Link Project Area L:

Dewatering and Settlement Monitoring Plan

1. Prior to the exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system, as proposed in the consent application. The monitoring regime shall be designed to assess the effects of:

- (iv) dewatering on the regional groundwater system; and
- (v) dewatering on settlement; and
- (vi) the discharge of degraded quality water from the backfilled and flooded workings on groundwater quality.

Monitoring locations are to provide appropriate resolution of surface tilt relative to the scale of surface infrastructure and final details are to be agreed with the Councils. The Plan shall also provide trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Such updated Plans shall relate to the Correnso Mine or to any new mine within Area L. Any updated Plan shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.

In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Extract from conditions of RESOURCE CONSENT APPLICATION LUSE-202.2016.00000544.001 -SLEVIN UNDERGROUND PROJECT AREA (SUPA), as pertaining to Dewatering and Settlement:

Surface Stability

- 15 Underground mining within the Slevin Underground Mine shall be conducted to ensure ground surface stability. This shall include adoption of the following measures:
- a) Mining methods shall be restricted to those that require stope voids to be backfilled to provide an operating floor for further stoping to proceed.
 - b) No stoping shall occur above whichever of the following criteria sets the lower (deeper) level:
 - i) A depth of at least 130m below the ground surface.
 - ii) A depth of at least 40m below the top of the andesite, unless geotechnical investigations reported to the Council demonstrate to its satisfaction that a greater or lesser depth is appropriate to ensure surface stability.
 - c) Backfilling of any other underground workings where geotechnical conditions require backfilling to ensure long-term stability.
 - d) Seismic monitoring and rock movement monitoring of underground mine workings for the duration of mining including backfilling and any other underground rehabilitation work.
 - e) Grouting of all future surface-drilled holes to a depth below the top of the andesite.
 - f) Any surface drillhole having significant and sustained water flows into the workings shall be grouted from underground within three shifts (36 hours) of being intersected. The hole shall be grouted to at least 30 metres from the collar using the same method used to grout uphole cable bolts.

Additional measures to be adopted to ensure ground surface stability shall be reported to the Council in accordance with Conditions 19 and 20.

- 16 Unless otherwise approved by the Council, the following stand-off distances shall apply for mining in the vicinity of historical development and stoping:

Planned Mining	Historical Mining	Proposed Stand Off Distances
Development Drives	Development, rises and access drives	Historical development shall not be intentionally intersected
Development Drives	Unfilled portions of Stopes	Development drives shall have a minimum standoff distance of 10 m to unfilled portions of historical stopes.
AVOCA Stopes	Unfilled portions of Stopes	Stoping shall not occur within 25m of unfilled portions of historical stopes
AVOCA Stopes	Crown pillars	Standoff distance shall be increased to 30m, unless mitigation measures can be put in place. Mitigation measures include monitoring with laser scanning devices such as CAL-S, or filling of the unfilled void. via one or more boreholes from a location outside the standoff zone.

- 17 Prior to the first exercise of this consent as provided for by condition 4, the consent holder shall provide to the Council for its written approval a Void Management Plan. The objective of this Plan is to confirm the location and shape of old unfilled and filled mine voids and to identify the risks and controls required to ensure ground surface stability. The Plan will include, but will not be limited to modelling, probe drilling, stand off distances, monitoring and operating procedures. The consent holder shall review and update the Plan as necessary including whenever there is any change to the methods or procedures used for void detection monitoring or operating procedures and shall provide the updated Plan to the Council for approval.
- 18 Prior to the first exercise of this consent as provided for by condition 4, the consent holder shall provide to the Council for its written approval, a report describing preventative and mitigation actions that would be implemented to ensure that the mining provided for under this consent does not drain the strata overlying the andesite via existing drillholes and structures. Preventative and mitigation actions may include:
- Avoiding intercepting the drillholes with mine workings;
 - Grouting drillholes from underground where underground development intercepts holes that are making water or geological defects with significant and sustained water flows;
 - Undertaking geotechnical investigations to demonstrate to the satisfaction of Council that draining of the drillhole(s) will not adversely affect surface stability.
- 19 The consent holder shall provide to the Council an annual report (within one month of the anniversary date established by condition 4 or as otherwise agreed in writing by the Council):
- Describing the location, depth height and volume (m^3), of stopes; and a summary of the data required by Condition 20 regarding unfilled stope voids; and
 - Describing the lengths of development that, due to the encountered geotechnical conditions or where multiple levels overlap, will require backfilling prior to mine closure; and
 - Describing the backfilling and compaction associated with each stope; and d) Describing the ground conditions revealed by the mine excavations; and
 - Describing the monitoring and measures adopted to ensure ground surface stability, particularly as provided for in Condition 15 and the outcomes of such measures; and
 - Describing the location and depth of exploratory drives;
 - Confirming that the extent of the mining works is confined to SUPA, as defined in Figure 1.

These reports may be prepared in conjunction with similar reports prepared in accordance with the consent conditions applying to the Correnso Underground Mine.

20 Reporting on Filled/Unfilled Stopes and Seismic Monitoring

- The consent holder shall report to the Council on a monthly basis on the total stope volume and volume of filled stopes for that month for each mining method employed namely: cut and fill area; transverse stope area; and all Avoca areas combined. The report shall also include the probe drilled metres for the month, and longitudinal sections showing sterilised zones as a result of the stand-off distances as specified in Condition 16. The report shall also include the minimum stand off distance for each stope mined during the month where adjacent to an unfilled historic stope void. The report shall be in a form acceptable to the Council and the data shall be for the situation as at the 20th day of the reporting month. The report shall be delivered on or before the end of the calendar month covered.
- The consent holder shall report to the Council on a monthly basis detailing any anomalous results from the seismic monitoring and rock movement monitoring required by Condition 15. The report shall be delivered on or before the end of the calendar month covered.

These reports may be prepared in conjunction with similar reports prepared in accordance with the consent conditions applying to the Correnso Underground Mine.

Dewatering and Settlement Monitoring Plan

21 The objectives of the groundwater and settlement management system shall be to ensure that dewatering operations do not give rise to surface instability and differential settlement beyond that authorised by this consent.

22 Within 2 months of the exercise of this consent, the consent holder shall prepare, and submit to the Council for its written approval, a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.

23 The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system set out in Condition 21.

The monitoring regime shall be designed to assess the effects of:

- a) Dewatering on the regional groundwater system; and
- b) Dewatering on settlement.

24 Monitoring locations are to provide appropriate resolution of groundwater levels and surface tilt relative to the scale of surface infrastructure, particularly in the areas above and adjacent to the mining activities provided for in this consent. Final details are to be agreed with the Council. The Plan shall also provide settlement trigger limits that will initiate the implementation of contingency mitigation and/or monitoring measures and shall detail any linkages with the Martha pit operation.

25 The exercise of this consent shall be in accordance with the Plan as approved by the Council. The Plan shall be reviewed and updated as necessary by the consent holder. Any updated Plan shall be promptly forwarded to the Council for written approval and following approval, the updated Plan shall be implemented in place of the previous version.

26 In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations installed in accordance with the Dewatering and Settlement Monitoring Plan required pursuant to Condition 22 of this consent, or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Hauraki District and Waikato Regional Councils in writing, within 20 working days of receiving the results of the monitoring. The consent holder shall then:

- a) Explain the cause of the non-conformance;
- b) Propose appropriate settlement contingency measures to the Councils and the timing of implementation thereof by the consent holder;
- c) Implement settlement contingency measures as appropriate within the agreed time limit;
- d) Advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.

27 The consent holder shall as a matter of urgency, advise the Council of any significant anomalies identified by the regular (monthly) reading of groundwater levels in the piezometer network. Such advice is to include an explanation of the anomalous results and actions proposed to address any issues identified. This report is to be provided to the Council within 10 working days of the anomalous results being identified.

A "significant anomaly" is defined as 15m or more offset occurring in piezometer recordings over a 1 month period.

28 In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Advice notes:

1. The Dewatering and Settlement Monitoring Plan shall be consistent with the Dewatering and Settlement Monitoring Plan prepared as a condition of the ground dewatering consent (RC 124860) granted by the Waikato Regional Council and may be prepared in conjunction with similar plans prepared in accordance with the consent conditions applying to the Martha, Favona, Trio and CEPPA projects.

2. The monitoring undertaken in terms of the Dewatering and Settlement Monitoring Plan may need to be continued for a period beyond the term of this consent depending on recharge of the groundwater following cessation of underground mining activities and the filling of the Martha Pit.

Dewatering and Settlement Monitoring Report

29 The consent holder shall provide to the Council an annual Dewatering and Settlement Monitoring Report. The Report shall, as a minimum, provide the following information:

- a) The volume of groundwater abstracted;
- b) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;
- c) An interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over the previous year, predictions of future impacts that may arise as a result of any trends that have been identified including review of the predicted post closure effects based on actual monitoring data, and what contingency actions, if any, the consent holder proposes to take in response to those predictions. This analysis shall be undertaken by a party appropriately experienced and qualified to assess the information;
- d) Any contingency actions that may have been taken during the year; and
- e) Comment on compliance with Conditions 21 to 28 of this consent including any reasons for non-compliance or difficulties in achieving conformance with the conditions of consent.

The report shall be forwarded in a form acceptable to the Council.

Advice note:

The Dewatering and Settlement Monitoring Report shall be consistent with the Dewatering and Settlement Monitoring Report prepared as a condition of the ground dewatering consent (RC 124860) granted by the Waikato Regional Council and may be prepared in conjunction with similar reports prepared in accordance with the consent conditions applying to the Martha, Favona, Trio and CEPPA projects.

Waikato Regional Council Consent

Resource Consent: AUTH139551.01.01 Water Permit - Dewatering Take

CONDITIONS

GENERAL

1 The activities to which this consent relates shall be generally undertaken in accordance with “Project Martha: Applications for Resource Consents and Assessment of Environmental Effects” and associated appendices dated 25 May 2018 and recorded as document number 12546836 on the Waikato Regional Council’s document management system, and as identified in the resource consent conditions below which shall prevail in the event of any inconsistency between the aforementioned documentation and the conditions.

2 The consent holder shall notify the Waikato Regional Council in writing at least 10 working days in advance of the first exercise of this consent.

SCHEDULE ONE

3 The consent holder shall comply with the common conditions between the Waikato Regional Council and Hauraki District Council in Schedule One as relevant to the management of the mining and rehabilitation activities authorised by this consent.

DEWATERING LEVEL

4 The exercise of this consent shall not result in groundwater lowering to a level below 500mRL.

MONITORING

5 Upon commencement of this consent, the consent holder shall monitor the volume of water abstracted on a weekly basis and shall report this to the Waikato Regional Council.

6 Upon the first exercise of this consent the consent holder must telemeter – via a telemetry system developed after liaison with the Waikato Regional Council to ensure that the telemetry system is compatible with the Waikato Regional Council telemetry system standards and data protocols – continuous 15 minute values of: gross take volume (in units of cubic metres). The data must be reported once daily to the Waikato Regional Council via the telemetry system. There must be 96 values, respectively, per daily report. When no water is being taken the data must specify the gross take volume and calculated net take volume as zero.

7 The consent holder shall monitor the chemistry of the water abstracted under this consent. Prior to the commencement of this consent the sampling parameters and frequencies shall be agreed with the Waikato Regional Council, with the results forwarded to the Waikato Regional Council on an annual basis. The consent holder may change the sampling parameters and frequencies with the agreement of the Waikato Regional Council.

OTHER WATER USERS

8 If, in the opinion of the Waikato Regional Council, the exercise of this consent adversely affects any existing stock, domestic or other water supplies, then the consent holder shall, at its own cost, be responsible for providing to the owner of those water supplies an alternative equivalent water supply, to the satisfaction of Waikato Regional Council. The consent holder shall be responsible for making an alternative water supply available within 12 hours of being directed to do so by the Council.

MONITORING OF THE SHALLOW AND DEEP AQUIFERS

9 The consent holder shall upon commencement of this consent and at five yearly intervals thereafter, provide a report to the Waikato Regional Council commenting on the effect the groundwater take and dewatering activity is having on the deep and shallow aquifers under the Martha Pit and immediate surrounds. The report shall as a minimum, provide the following information:

- (a) The nature of the geology under the Martha Pit and immediate surrounds;
- (b) Comment on the existing groundwater chemistry for the deep and shallow aquifers;
- (c) Comment on the groundwater levels in the deep and shallow aquifers; and
- (e) Provide details of any wetland areas and any other known aquatic ecological values that are dependent on the surface contribution of shallow and deep groundwater outflows.

Taking into account all of this information (and any other relevant data) the consent holder shall provide comment on the effects the dewatering activity is having on the shallow and deep aquifers under the Martha Pit and immediate surrounds.

ADMINISTRATIVE CHARGES

10 The consent holder shall pay to the Waikato Regional Council any administrative charge fixed in accordance with Section 36 of the Resource Management Act 1991, or any charge prescribed in accordance with regulations made under Section 360 of that Act.

REVIEW OF CONDITIONS

11 Pursuant to Section 128(1)(a)(i) and (iii) of the Act, the Waikato Regional Council may, 12 months from the commencement of this consent and annually thereafter, or on receipt of any of the reports required by this consent, review any or all of the conditions of this consent for the following purposes:

- (a) To review the effectiveness of the conditions of this resource consent in avoiding, remedying or mitigating any adverse effects on the environment that may arise from the exercise of this consent, and if necessary to avoid, remedy or mitigate such effects by way of further or amended conditions. In deciding to undertake a review and where further or amended conditions are deemed necessary, the Waikato Regional Council shall have regard to all of the information contained in the reports required under the conditions of this consent; or
- (b) To address any adverse effects on the environment which have arisen as a result of the exercise of this consent that were not anticipated at the time of commencement of this consent; or
- (c) To review the adequacy of, and the necessity for, any of the monitoring programmes or management plans that are part of the conditions of this consent.

12 Pursuant to Section 128(1)(a)(i) and (iii) of the Act, the Waikato Regional Council may review Conditions 41 to 46 in Schedule One of this consent following any change made to the Trust Deed referred to in Condition 41 of Schedule One.

SCHEDULE ONE

COMMON CONDITIONS BETWEEN THE HAURAKI DISTRICT COUNCIL AND THE WAIKATO REGIONAL COUNCIL

DEWATERING AND SETTLEMENT MONITORING PLAN

14. The objectives of the groundwater and settlement management system shall be to ensure that dewatering operations do not give rise to surface instability and differential settlement beyond that authorised by this consent.
15. Two months prior to dewatering below 700 m RL (mine datum), the consent holder shall prepare, and submit to the Councils for its certification, a Dewatering and Settlement Monitoring Plan. The purpose of the Dewatering and Settlement Monitoring Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.
16. The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system set out in Condition 14 of this schedule. The monitoring regime shall be designed to assess the effects of:
 - Dewatering on the regional groundwater system; and
 - Dewatering on settlement.
17. Monitoring locations are to provide appropriate resolution of mine inflows and pumping, groundwater levels (both for shallow and deep aquifers) and ground surface tilt relative to the scale of surface infrastructure, throughout the area within the maximum extent of the groundwater cone of depression and particularly in the areas above and adjacent to the mining activities provided for in this consent. Final details are to be agreed with the Councils but are to include additional piezometers and extensometers located along the line of upper level workings in the Rex Orebody. The Dewatering and Settlement Monitoring Plan shall also provide groundwater and settlement trigger limits that will initiate the implementation of contingency mitigation and / or monitoring measures and shall detail any linkages with the operation of the Martha Pit and Martha Underground Mine.
18. The exercise of this consent shall be in accordance with the Dewatering and Settlement Monitoring Plan as certified by the Councils. The Dewatering and Settlement Monitoring Plan shall be reviewed and updated as necessary by the consent holder. Any updated Dewatering and Settlement Monitoring Plan shall be promptly forwarded to the Councils for certification, and following this process, the updated plan shall be implemented in place of the previous version.
19. In the event that a tilt greater 1 in 1,000 occurs between any two network monitoring locations installed in accordance with the Dewatering and Settlement Monitoring Plan required pursuant to Condition 15 of this schedule, or there is a significant variance from the predicted settlement rates, the consent holder shall notify the Councils in writing within 20 working days of receiving the results of the monitoring. The consent holder shall then:
 - a) Explain the cause of the non-conformance;
 - b) Propose appropriate settlement contingency measures to the Councils and the timing of implementation thereof by the consent holder;
 - c) Implement settlement contingency measures as appropriate within the agreed time limit; and
 - d) Advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.
20. The consent holder shall as a matter of urgency, advise the Councils of any significant anomalies identified by the regular reading of groundwater levels in the piezometer network. Such advice is to include an explanation of the anomalous results and actions proposed to address any issues identified. This report is to be provided to the Councils within 10 working days of the anomalous results being identified.

A “significant anomaly” is defined as a drop in groundwater level greater than the seasonal variation in piezometers within the alluvium and younger volcanic rocks and a drop of 15 m or more in the recordings from piezometers tapping the upper 50 m of Andesite over a one month period.

21. In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Advice Note:

The monitoring undertaken in terms of the Dewatering and Settlement Monitoring Plan may need to be continued for a period beyond the term of this consent depending on recharge of the groundwater following cessation of underground mining activities and filling of the Martha Pit.

DEWATERING AND SETTLEMENT MONITORING REPORT

22. The consent holder shall provide to the Councils (within one month of an agreed anniversary date) an annual Dewatering and Settlement Monitoring Report. The report shall, as a minimum, provide the following information:

- a) The volume of groundwater abstracted;
- b) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;
- c) An interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over the previous year, predictions of the future impacts that may arise as a result of any trends that have been identified including review of the predicted post closure effects based on actual monitoring data, and what contingency actions, if any, the consent holder proposes to take in response to those predictions, this analysis shall be undertaken by a party appropriately experienced and qualified to assess the information;
- d) Any contingency actions that may have been taken during the year; and
- e) Comment on compliance with Conditions 14 to 21 of this schedule including any reasons for non-compliance or difficulties in achieving conformance with the conditions of consent.
- f) The report shall be forwarded in a form acceptable to Councils.

Resource Consent Schedule

Resource Consent:	AUTH139551.01.01
Consent Type:	Water permit
Consent Subtype:	Groundwater take
Activity authorised:	To take groundwater, including geothermal water, associated with the dewatering of the Martha Pit and associated underground workings including the Martha Underground Mine.
Location:	Waihi
Lapse Period:	Five years from the date of commencement
Spatial Reference:	NZTM 1851702 E 5858472 N
Consent Duration:	This consent shall: i)commence five years from the date of grant unless the consent holder has by notification in writing to the Waikato Regional Council nominated an earlier commencement date; and ii)expire 25 years from the date of commencement.
Subject to the conditions overleaf:	

CONDITIONS

GENERAL

- 1 The activities to which this consent relates shall be generally undertaken in accordance with “Project Martha: Applications for Resource Consents and Assessment of Environmental Effects” and associated appendices dated 25 May 2018 and recorded as document number 12546836 on the Waikato Regional Council’s document management system, and as identified in the resource consent conditions below which shall prevail in the event of any inconsistency between the aforementioned documentation and the conditions.
- 2 The consent holder shall notify the Waikato Regional Council in writing at least 10 working days in advance of the first exercise of this consent.

SCHEDULE ONE

- 3 The consent holder shall comply with the common conditions between the Waikato Regional Council and Hauraki District Council in Schedule One as relevant to the management of the mining and rehabilitation activities authorised by this consent.

DEWATERING LEVEL

- 4 The exercise of this consent shall not result in groundwater lowering to a level below 500mRL.

MONITORING

- 5 Upon commencement of this consent, the consent holder shall monitor the volume of water abstracted on a weekly basis and shall report this to the Waikato Regional Council.
- 6 Upon the first exercise of this consent the consent holder must telemeter – via a telemetry system developed after liaison with the Waikato Regional Council to ensure that the telemetry system is compatible with the Waikato Regional Council telemetry system standards and data protocols – continuous 15 minute values of: gross take volume (in units of cubic metres). The data must be reported once daily to the Waikato Regional Council via the telemetry system. There must be 96 values, respectively, per daily report. When no water is being taken the data must specify the gross take volume and calculated net take volume as zero.
- 7 The consent holder shall monitor the chemistry of the water abstracted under this consent. Prior to the commencement of this consent the sampling parameters and frequencies shall be agreed with the Waikato Regional Council, with the results forwarded to the Waikato Regional Council on an annual basis. The consent holder may change the sampling parameters and frequencies with the agreement of the Waikato Regional Council.

OTHER WATER USERS

- 8 If, in the opinion of the Waikato Regional Council, the exercise of this consent adversely affects any existing stock, domestic or other water supplies, then the consent holder shall, at its own cost, be responsible for providing to the owner of those water supplies an alternative equivalent water supply, to the satisfaction of Waikato Regional Council. The consent holder shall be responsible for making an alternative water supply available within 12 hours of being directed to do so by the Council.

MONITORING OF THE SHALLOW AND DEEP AQUIFERS

- 9 The consent holder shall upon commencement of this consent and at five yearly intervals thereafter, provide a report to the Waikato Regional Council commenting on the effect the groundwater take and dewatering activity is having on the deep and shallow aquifers under the Martha Pit and immediate surrounds. The report shall as a minimum, provide the following information:
- (a) The nature of the geology under the Martha Pit and immediate surrounds;
 - (b) Comment on the existing groundwater chemistry for the deep and shallow aquifers;
 - (c) Comment on the groundwater levels in the deep and shallow aquifers;
- and
- (e) Provide details of any wetland areas and any other known aquatic ecological values that are dependent on the surface contribution of shallow and deep groundwater outflows.

Taking into account all of this information (and any other relevant data) the consent holder shall provide comment on the effects the dewatering activity is having on the shallow and deep aquifers under the Martha Pit and immediate surrounds.

ADMINISTRATIVE CHARGES

- 10 The consent holder shall pay to the Waikato Regional Council any administrative charge fixed in accordance with Section 36 of the Resource Management Act 1991, or any charge prescribed in accordance with regulations made under Section 360 of that Act.

REVIEW OF CONDITIONS

- 11 Pursuant to Section 128(1)(a)(i) and (iii) of the Act, the Waikato Regional Council may, 12 months from the commencement of this consent and annually thereafter, or on receipt of any of the reports required by this consent, review any or all of the conditions of this consent for the following purposes:
- (a) To review the effectiveness of the conditions of this resource consent in avoiding, remedying or mitigating any adverse effects on the environment that may arise from the exercise of this consent, and if necessary to avoid, remedy or mitigate such effects by way of further or amended conditions. In deciding to undertake a review and where further or amended conditions are deemed necessary, the Waikato Regional Council shall have regard to all of the information contained in the reports required under the conditions of this consent; or

- (b) To address any adverse effects on the environment which have arisen as a result of the exercise of this consent that were not anticipated at the time of commencement of this consent; or
 - (c) To review the adequacy of, and the necessity for, any of the monitoring programmes or management plans that are part of the conditions of this consent.
- 12 Pursuant to Section 128(1)(a)(i) and (iii) of the Act, the Waikato Regional Council may review Conditions 41 to 46 in Schedule One of this consent following any change made to the Trust Deed referred to in Condition 41 of Schedule One.

SCHEDULE ONE

COMMON CONDITIONS BETWEEN THE HAURAKI DISTRICT COUNCIL AND THE WAIKATO REGIONAL COUNCIL

DEWATERING AND SETTLEMENT MONITORING PLAN

23. The objectives of the groundwater and settlement management system shall be to ensure that dewatering operations do not give rise to surface instability and differential settlement beyond that authorised by this consent.
24. Two months prior to dewatering below 700 m RL (mine datum), the consent holder shall prepare, and submit to the Councils for its certification, a Dewatering and Settlement Monitoring Plan. The purpose of the Dewatering and Settlement Monitoring Plan is to monitor and assess the effects of the activities on land settlement and the groundwater hydraulic regime, and also to detail the contingency measures that will be actioned should groundwater or surface settlement triggers be exceeded.
25. The Plan shall, as a minimum, provide an overall description of the groundwater and settlement monitoring system and the measures to be adopted, including contingency measures, to meet the objectives of the groundwater and settlement management system set out in Condition 14 of this schedule. The monitoring regime shall be designed to assess the effects of:
 - Dewatering on the regional groundwater system; and
 - Dewatering on settlement.
26. Monitoring locations are to provide appropriate resolution of mine inflows and pumping, groundwater levels (both for shallow and deep aquifers) and ground surface tilt relative to the scale of surface infrastructure, throughout the area within the maximum extent of the groundwater cone of depression and particularly in the areas above and adjacent to the mining activities provided for in this consent. Final details are to be agreed with the Councils but are to include additional piezometers and extensometers located along the line of upper level workings in the Rex Orebody. The Dewatering and Settlement Monitoring Plan shall also provide groundwater and settlement trigger limits that will initiate the implementation of contingency mitigation and / or monitoring measures and shall detail any linkages with the operation of the Martha Pit and Martha Underground Mine.
27. The exercise of this consent shall be in accordance with the Dewatering and Settlement Monitoring Plan as certified by the Councils. The Dewatering and Settlement Monitoring Plan shall be reviewed and updated as necessary by the consent holder. Any updated Dewatering and Settlement Monitoring Plan shall be promptly forwarded to the Councils for certification, and following this process, the updated plan shall be implemented in place of the previous version.
28. In the event that a tilt greater 1 in 1,000 occurs between any two network monitoring locations installed in accordance with the Dewatering and Settlement Monitoring Plan required pursuant to Condition 15 of this schedule, or there is a significant variance from the predicted settlement rates,

the consent holder shall notify the Councils in writing within 20 working days of receiving the results of the monitoring. The consent holder shall then:

- e) Explain the cause of the non-conformance;
- f) Propose appropriate settlement contingency measures to the Councils and the timing of implementation thereof by the consent holder;
- g) Implement settlement contingency measures as appropriate within the agreed time limit; and
- h) Advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.

29. The consent holder shall as a matter of urgency, advise the Councils of any significant anomalies identified by the regular reading of groundwater levels in the piezometer network. Such advice is to include an explanation of the anomalous results and actions proposed to address any issues identified. This report is to be provided to the Councils within 10 working days of the anomalous results being identified.

A "significant anomaly" is defined as a drop in groundwater level greater than the seasonal variation in piezometers within the alluvium and younger volcanic rocks and a drop of 15 m or more in the recordings from piezometers tapping the upper 50 m of Andesite over a one month period.

30. In the event of any conflict or inconsistency between the conditions of this consent and the provisions of the Dewatering and Settlement Monitoring Plan, then the conditions of this consent shall prevail.

Advice Note:

The monitoring undertaken in terms of the Dewatering and Settlement Monitoring Plan may need to be continued for a period beyond the term of this consent depending on recharge of the groundwater following cessation of underground mining activities and filling of the Martha Pit.

DEWATERING AND SETTLEMENT MONITORING REPORT

31. The consent holder shall provide to the Councils (within one month of an agreed anniversary date) an annual Dewatering and Settlement Monitoring Report. The report shall, as a minimum, provide the following information:

- g) The volume of groundwater abstracted;
- h) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;
- i) An interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over the previous year, predictions of the future impacts that may arise as a result of any trends that have been identified including review of the predicted post closure effects based on actual monitoring data, and what contingency actions, if any, the consent holder proposes to take in response to those predictions, this analysis shall be undertaken by a party appropriately experienced and qualified to assess the information;
- j) Any contingency actions that may have been taken during the year; and
- k) Comment on compliance with Conditions 14 to 21 of this schedule including any reasons for non-compliance or difficulties in achieving conformance with the conditions of consent.
- l) The report shall be forwarded in a form acceptable to Councils.

APPENDIX B – STANDARD OPERATING PROCEDURES



Standard Operating Procedure

Groundwater Monitoring

Approval date: 20/10/2022

Document ID: WAI-200-PRO-012

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This document must not be released outside of the company without permission of the Departmental Manager.

Department	Sustainability
Location/Site	Waihi

Approval table

	Position title	Name	Date
Authored by	Senior Environmental Advisor	Cassie McArthur	05/09/2022
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1 PURPOSE

Groundwater surrounding the Tailings Storage Facilities and Favona Stockpile is monitored by a network of groundwater bores. The depth of water and the water quality of these bores are monitored to ensure that there are no adverse effects on ground water quality. This programme provides data which indicates whether the Tailings Storage Facilities (TSF) and stockpiles are performing as designed and predicted.

Groundwater bores are also installed in proposed Waihi North Project areas to collect baseline information related to groundwater ahead of consenting and possible construction.

2 SCOPE

This procedure details the monitoring programme and procedures for collection of groundwater samples from: Storage 1A and 2 wells, Favona Stockpile seepage detection wells, and Waihi North Project baseline wells.

3 RESPONSIBILITIES AND ACCOUNTABILITIES

Role	Responsibility
Sustainability Manager	Provision of adequate resources to conduct groundwater monitoring
Senior Environmental Advisor/ Environmental Advisor	Review of groundwater monitoring results
Environmental Officer	Collecting groundwater samples and following this SOP

4 JOB HAZARDS AND CONTROLS

- Access to sites - 4WD vehicle required. Access by 4WD is to be reviewed at the time of sampling to determine if access should be made by foot. Some paddocks are boggy and slippery in winter.
- Sprain/strain/trip - ensure safe lifting techniques when handling heavy sampling equipment. Be aware of uneven ground surfaces at bore sites and avoid if possible. Keep work area tidy and free of trip hazards, particularly suspended cables. Work from the tray of the vehicle, if possible, to avoid unnecessary bending.
- Cattle - avoid area if animals are boisterous. Wait for animals to be relocated before entering area.
- Weather conditions - seasonal precautions (warm clothing for winter, hydration and sun protection for summer). In strong winds, consider parking the vehicle facing into the wind to avoid door being wrenched from grip.
- Electrical – treat all electric fences as live and do not work near electric fences if possible.
- Remote and isolated work – use Enviro intentions board prior to leaving office. Carry multiple forms of communication device (radio and mobile phone at a minimum). If working at Wharekirauponga, complete Exploration Field Work induction and follow Exploration Field Work SOP (WAI-851-PRO-002).

5 MANAGEMENT PLAN

5.1 Required Labour Resources

1-2 people.

5.2 Monitoring Site Locations

The TSF groundwater monitoring locations are outlined in Appendix 1, Figures 1 & 2. The location of the Favona Stockpile seepage monitoring wells is shown in Figure 3. Projects monitoring bores are shown in Figure 4 to 7.

Live locations of all monitoring wells are maintained for field staff on the ArcGIS Explorer app available on iPhone and Android. Consult a Senior Environmental Advisor for access to the app and to download the relevant maps.

4WD access to all groundwater monitoring locations should be reviewed prior to sampling. If conditions dictate (i.e., ground conditions, weather conditions, constricted access, etc.) access should be made by foot.

Access to Projects monitoring bores at Wharekirauponga may require helicopter access. Consult the Exploration Department or Senior Environmental staff to organise access.

5.3 Monitoring Programme

5.3.1 Tailings Storage Facilities

The Tailings Storage Facility Monitoring Plan (WAI-200-PLN-010) provides a detailed monitoring programme for the groundwater bores around the TSFs. This is summarised below:

Selected bores:

Six Monthly Scan Wells	Scan	- Field pH, temperature, EC and water level - pH and EC at Enviro Lab using benchtop Hach meter
Six Monthly Scan and Sample Wells	Full Analysis	- Field pH, temp, EC and water level - Code 40 (Hill Laboratories analysis)

Six monthly sampling for the TSF network is scheduled to be conducted in quarter 1 and quarter 3 each year.

5.3.2 Favona Stockpile

The Favona Water Quality Report provides a detailed monitoring programme for the Favona Stockpile seepage monitoring wells: This is summarised below:

All bores:

Six Monthly	Scan analysis + lab pH and EC analysis	- Field pH, Temp, EC, water level - pH and EC at Enviro Lab using Hach bench meter - pH and EC at Hill Laboratories
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5.3.3 Projects Baseline Groundwater

Projects groundwater monitoring is undertaken on a quarterly basis. Selected bores:

Quarterly	Projects analysis	• Field pH, Temp, EC, water level • Code 89972 at Hill Laboratories
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5.4 Field Work Preparation and Required Equipment

Equipment Checklist:

- 12V Monsoon pump with controller AND/OR compressed air cylinder and regulator, MP15 Controller with flow cell AND/OR Hydrasleeves to fit well with weights and clips (32mm/50mm) AND/OR peristaltic pump and flow cell AND/OR disposable/stainless-steel bailers
- T-key to open flush mounted groundwater wells
- Water level probe
- InViron CoC sheet
- Groundwater field sheet (enough copies for the number of wells to be sampled)
- Sample containers if required
- Filter Kits
- Extra silicone and ¼ inch tubing
- Pen/pencil
- Chilly bin for full samples and ice packs (if required)
- 10L bucket and 1L measuring bottle
- Hose reel with wire rope and stainless-steel carabiner
- Calibration buffer solutions (pH 7.00 and 4.01)
- Keys to padlocks
- Calculator/phone calculator
- pH / conductivity / temperature meter
- Map or phone with ArcGIS mobile map
- Powderless sampling gloves
- Tarpaulin or plastic sheet
- Mobile phone
- Wet weather gear
- P.P.E.
- Towel
- Distilled and potable water for rinsing

For field work at Wharekirauponga, refer to the Regional Field Work SOP (WAI-851-PRO-002) for additional safety requirements and gear.

5.5 Field Work Preparation

If using a flow cell, calibrate the flow cell sonde and meter for pH and EC, following the relevant manufacturer's instructions for the meter.

If sample bottles are required, sample bottles, chilly bins and cool packs need to be prepared prior to each field visit.

The compressed air cylinder for the MP15 pump controller is stored at the Enviro Lab. The CO₂ cylinder for the MP15 Controller filled by Fire Security Services Ltd. Arrange with Fire Security Services to get them filled ahead of the planned sampling date if required.

The sample bottles required for each groundwater bore are:

TSF Scan Wells

Enviro Lab pH/EC (refer to Environmental Laboratory pH EC Measurement and Calibration Instructions WAI-200-PRO-037)

1 x UP1L (Unpreserved; Polyethylene, Container Size: 1 L)

Field pH, conductivity, and temperature – tested at Enviro Lab using Hach benchtop meter and in field with portable Cyberscan Meter

TSF Scan and Sample Wells

Code 40

1 x UP1L (Unpreserved; Polyethylene, Container Size: 1 L)

1 x C100 (NaOH pres; Black Polyethylene, Container Size: 100 mL)

1 x N250 (Nitric acid pres; Polyethylene, Container Size: 250 mL)

1 x FN100 (Nitric acid pres; Polyethylene; Client filtered, Container Size: 100 mL)

1 x S100 (Sulphuric acid pres; Polyethylene, Container Size: 100 mL)

Favona Groundwater Wells

Enviro Lab pH/EC and Hills Laboratories pH/EC

2 x UP1L (Unpreserved; Polyethylene, Container Size: 1 L)

Projects Groundwater Wells

Code 89972

1 x UP1L (Unpreserved; Polyethylene, Container Size: 1 L)

1 x N100 (Nitric acid pres; Polyethylene, Container Size: 100 mL)

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1 x FN100 (Nitric acid pres; Polyethylene; Client filtered, Container Size: 100 mL)

5.6 Field Procedures

5.6.1 Site

- Unlock well. Remove cap and place so as not to interfere with sampling activities.
- Measure 'depth to water'. All measurements are made from a measuring point taken as the top of the PVC pipe. If the PVC pipe is uneven, measure from the highest point of the PVC.
- Put on powderless gloves.
- Complete the top section of the Groundwater Field Sheet.

5.6.2 Sampling Types

There are multiple types of groundwater purging and sampling methods. The method is selected based on the well depth, water level, recharge rate and diameter of the individual well. The sampling types are:

5.6.2.1 Volumetric purging and sampling

Volumetric purging involves removing a calculated volume of water from the well prior to taking the sample to ensure a representative sample is collected. The water can be removed from the well using three different methods:

- Manual bailing (either disposable or stainless steel)
- Monsoon pump
- Waterra foot valve

5.6.2.2 Low flow purging and sampling

Low flow sampling involves purging standing water from a well while taking field chemistry readings until the readings become stable. Stable field readings indicate that water representative of the surrounding groundwater is being drawn from the well and a sample can be collected. Low flow sampling and purging can be done using two methods:

- Dedicated bladder pump with MP15 Controller
- Peristaltic pump

5.6.2.3 Discrete interval sampling

For wells that are unable to be sampled using volumetric or low flow methods, a discrete interval sampler may be used. Discrete interval sample methods involve taking a sample from the screen depth of the well and excluding water from the rest of the well from the sample. By collecting water only from the screened interval, standing water above the screen that is not representative of the surrounding groundwater will not be collected. The method for collecting a discrete interval sample is:

- Hydrasleeve

Instructions for each method are outlined below. If you are unsure about which method to use, consult Senior Environmental staff.

5.6.2.4 Volumetric Purging and Sampling

5.6.2.4.1 Bailing

- The amount of water that needs to be extracted from the bore needs is dependent on the depth of water in the bore and hence varies between site visits.
- The volume of stagnant water that needs to be purged before a sample is one well volume. This volume can be calculated using the height of the water column in the bore (depth to bottom of well minus the depth to water) and the cross-sectional area of the bore.

CALCULATION:

$$V = [(DTB) - (DTW)] * (X\text{-Sectional Area of Casing} * 1000)$$

OR in simple terms, for a 50mm diameter well:

$$V = [(DTB) - (DTW)] * 2 \text{ (for a 50mm diameter well)}$$

OR, for a 32mm diameter well:

$$V = [(DTB) - (DTW)] * 0.84 \text{ (for a 32mm diameter well)}$$

Where:

V = bore casing volume (litres)

DTW = Depth to water (m)

DTB = Depth to bottom (m)

X-Sect. Area of Casing = πr^2 (m²)

NOTE: A 50mm well casing contains 2 litres of water per metre. A 32mm well casing contains 0.84 litres of water per metre.

- Measure the water level of the well and complete the top section of the groundwater sampling field sheet.
- Attach the sampling 'fishing' line to a clean disposable bailer using a suitable knot (i.e. a fisherman's knot, two reef knots or three granny knots). The hose reel with wire rope and carabiner may also be used, ensure the reel is clean and any fixtures are made of stainless steel.
- Lower the bailer into the water column until the bailer sinks. The line the bailer is suspended on will go slack. Wait a few moments for the bailer to fill.
- Extract the bailer from the bore with the rope and pour water into the bucket.
- Repeat the two steps above until the required volume of water has been purged.
- Fill a container that has been prerinsed with distilled water with a bailed sample of groundwater and record field readings using the handheld water quality meter

- If samples are required, bail more groundwater, and carefully fill the appropriate sample bottles.
- Place the full samples in the chilly bin.
- Replace the lid on the shallow bore and lock it up.
- On completion of the sampling run, return to laboratory and place samples in refrigerator immediately or begin lab analysis.

NOTE: A stainless steel bailer may be required if the bore is deep, or the disposable bailer gets stuck down the bore. The stainless-steel bailer must be used with the hose reel and wire rope to ensure it is not lost down a bore. The stainless-steel bailer should be rinsed three times with distilled water three times before using on another bore. The bailer should also be cleaned using Decon solution at the Kenny Street lab after each sampling round.

5.6.2.4.2 Monsoon Pump

- Measure the water level of the well and complete the top section of the groundwater sampling field sheet.
- Remove any existing infrastructure down bore. Coil hoses onto a laid-out tarpaulin to minimise contamination.
- Place hose reel above bore and slowly lower the pump/hose/cable. Minimise rubbing of the hose/cable against the side of the bore collar or standpipe.
- Once the pump has been lowered to the screen depth (this will depend on the water levels, bore construction, and aim of the purging) fasten the hose becket to the hose/cable so the pump is suspended off the bottom of the bore. This will reduce sediment disturbance, optimise pump performance, and reduce wear on the pump impellers.
- Connect the pump controller to the pump cable via the Anderson plug and either plug the controller into the custom plug on the LV or use the back-up battery clips if the LV has no plug installed.
- Lower the dip-meter down below the current water level. This will have to be lowered and raised as purging is undertaken to monitor the water level in the bore.
- Run the pump, delivering water into the 10L bucket to monitor both water clarity and quantity.
- Manage the pump speed, with the aim of achieving a steady-state pumping rate whereby the water level ceases to fall and an acceptable flow rate is achieved.
- For purging less than 10 minutes, running the LV should not be required (the controller has an automatic shut-off if battery charge falls below 11V). If purging continues for a sustained period, the LV should be started and run on idle occasionally to recover battery charge and continue pump operation. If vehicle is run on idle to recharge, it will not be in gear and the driver must be seated inside the vehicle. Do not leave idling vehicles unattended.
- The goal is to extract at least the water volume in the bore AND have water samples of good clarity (indicating minimal sediment).
- Once the required volume of water has been purged, collect a sample in a container rinsed with distilled water. Take field readings using the handheld pH/EC meter.
- Next, fill required sample bottles if lab samples are required.

- Once purging and sampling has been completed, disconnect the controller from the LV, then the pump. Reel in the dip-meter.
- Place the hose reel above the bore, disconnect the hose becket, and slowly reel the pump up. Take care to minimize abrasion of the hose/cable against the bore collar or standpipe.
- Replace any existing infrastructure back into the bore, taking care to minimize contamination (dirt, manure, grease etc.).
- Pack equipment away.
- Rinse the hose reel with potable water before packing it away in the Environmental Lab.

5.6.2.4.3 Waterra Foot Valve

- Measure the water level of the well and complete the top section of the groundwater sampling field sheet.
- Attach the Waterra Foot Valve to a length of tubing that will extend to the screen depth of the well and leave at least 50cm of tubing at the surface
- Insert the foot valve into the well, foot valve first, until the valve is submerged beneath the water table to the desired pumping depth.
- Oscillate the tube (pulled up and then pushed down) over a short vertical range of motion by hand
- Water will build up in the oscillating tubing until it discharges at surface.
- Discharge the water into a 10L bucket to measure how much in total has been discharged.
- Keep removing water from the well until the calculated purge volume has been removed.
- Take samples using the same method, if required.
- If the foot valve and tubing are dedicated to the well, reinstall in the well.
- If the foot valve and tubing are to be used at another well, remove and ensure both are flushed with clean water prior to use in the next well.

5.6.2.5 Low Flow Sampling

5.6.2.5.1 MP15 Controller and Power Pack

- Measure the water level of the well and complete the top section of the groundwater sampling field sheet.
- Wells to be sampled using the MP15 Controller will have dedicated pumps already installed at the screen depth of the well. Tubing from the pumps to the top of the casing will already be installed. The tubing sends CO₂ down to the pump in one line and returns water from the pump to the surface in the other line.
- Connect the CO₂ and sampling lines from the Controller and flow cell to the bore.
- Open the CO₂ cylinder valve.
- Switch controller on and press start.
- Turn the flow cell meter on.

- The system should start purging and water should be forced through the flow cell sonde and discharge out the clear plastic outlet hose.
- Once this happens, record a field measurement on the Groundwater Fieldsheet. Take additional field measurements for every 500mL that are discharged through the flow cell.
- Allow the purge cycle to continue this way until the pH and conductivity measurements stabilise. For results to be stable, results within the below parameters must be returned for three consecutive readings:

Temperature	+/- 0.5 °C
EC	+/- 3%
pH	+/- 0.1 pH

- Once stable, disconnect the clear plastic hose leading from the deep bore to the flow cell sonde. The water should now discharge out of the short plastic hose from the bore, ready for samples to be collected if required.
- Fill the appropriate sample bottles.
- Disconnect the filter before the pump is turned off.
- Close CO2 cylinder valve and switch controller off.
- Disconnect all hoses and carefully store them until the next site.
- On completion of sampling run return to laboratory and place samples in refrigerator immediately.

5.6.2.5.2 Peristaltic pump:

- Measure the water level of the well and complete the top section of the groundwater sampling field sheet.
- Wells to be sampled using peristaltic pump should have dedicated ¼ inch polyethylene tubing already installed in the well, to the depth of the screen at the bottom of the well. If there is no tubing installed, lower tubing to the screen depth of the well with approximately 1m of tubing remaining above the top of the well casing to connect to the pump.
- Cut an approximately 10cm piece of silicone tubing and insert into the Geopump peristaltic pump head. Close the lever to secure the silicone tubing.
- Insert the ¼ inch tubing from the well into one end of the silicone tubing attached to the pump head.
- Cut an approximately 20cm piece on ¼ inch polyethylene tubing and insert one end into the other end of silicone tubing on the pump. Insert the free end of the ¼ inch tubing into the silicone tube at the bottom of the flow cell.
- Put a measuring container or bucket at the free end of ¼ inch tubing coming from the top end of the flow cell.
- Screw the pH/EC probe into the flow cell and attach to the YSI meter. Turn on the meter.
- Connect the Geopump to the battery or the Anderson plug at the front of the ute. Ensure the pump is set to the desired direction of flow. Turn the pump on at a high setting first,

then quickly lower the speed as much as possible without stalling the pump. Wait for water to flow through the flow cell.

- Once water starts to flow out of the discharge pipe at the top of the flow cell, record field readings on the groundwater sampling field sheet. The first sample should be recorded as 500mL volume on the field sheet.
- Measure the water level using the dipper. If the water level is dropping quickly, lower the flow of the pump.
- Once a further 500ml (i.e 1L in total) of water has discharged from the flow cell, record another set of field readings.
- Repeat the step above until field readings have stabilised. For results to be stable, results within the below parameters must be returned for three consecutive readings:
- Once readings are stable, fill sample containers using the clean ¼ inch tubing coming from the peristaltic pump (i.e. do not take samples of water flowing through the flow cell)

Temperature	+/- 0.5 °C
EC	+/- 3%
pH	+/- 0.1 pH

5.6.2.6 Discrete Interval Sampling

5.6.2.6.1 Hydrasleeve

- Measure the water level of the well and complete the top section of the groundwater sampling field sheet.
- Remove HydraSleeve from package and grasp top to “pop” open. Remember to save the discharge tube for later.
- Squeeze side fins together at top to bend reinforcing strips outward. Crimp the corners to remain open
- Alternatively, attach the line to one side of the HydraSleeve if spring clips are not being used. Be sure the top is sharply crimped open.
- Align the two holes at bottom of HydraSleeve together and attach weight with the weight clip. If not using the standard Hydrasleeve weight, ensure stainless steel weights are used. The sampler is now ready to be placed in the well.
- Sound the well to determine the exact depth. Lower the weighted HydraSleeve into the well and let it rest on the bottom.
- The HydraSleeve sits suspended off the bottom & typically sample will be collected from the area directly above the top of the sleeve at this point without adjustment. Attach the suspension line to the top of the well to suspend it at the required depth.
- The HydraSleeve must move upward at a rate of one foot per second or faster (about the speed a bailer is usually pulled upward) for water to pass through the check valve into the sample sleeve. Pull the HydraSleeve continuously upward from its starting point at a constant 30-60 cm per second until full.
- Pull the Hydrasleeve all the way to the surface and from the well casing. To discharge the sample from the Hydrasleeve, squeeze the full sampler just below the top to expel water resting above the flexible check valve. Fold the stiffeners over to make sure all of the water is off the top of the check valve. Then, push the pointed discharge tube

through the outer polyethylene sleeve as desired but at least 10 cm below the white reinforcing strips. Discharge the sample into the desired container. Raising and lowering the bottom of the sampler or pinching the sample sleeve just below the discharge tube will control the flow of the sample. The sample sleeve can also be squeezed, forcing fluid up through the discharge tube, similar to squeezing a tube of toothpaste.

- Dispose of the Hydrasleeve and tube.

5.6.3 Sample Verification

- At the completion of each sampling run a check is made on the samples before they are put in the refrigerator. The samples are checked for numbering continuity and for total numbers.
- All sample bottles should be placed in the Enviro laboratory fridge or sent to the lab immediately after the sample run and sample check is completed.
- Enter field pH, conductivity, temperature and water level into InViron and check results against trigger levels if relevant (refer to the current Groundwater trigger Levels excel sheet). If a trigger level is exceeded, inform Senior Environmental Staff immediately and initiate further field checks on groundwater bore.

5.6.4 Sample Dispatch

- RJ Hill Laboratories, Hamilton. Use pre-addressed and postage paid stickers
- Refer to the InViron Use and Compliance Assessment SOP (WAI-200-PRO-038) for instructions on how to create a sample run in InViron
- Fill out a chain of custody form. This includes instructions on laboratory analysis parameters and samples to be sent to the lab.
- Take all of the sample bottles out of the refrigerator and place in a chilly bin.
- Place chain of custody form inside chilly bin with the samples.
- Put the lid on the chilly bin and stick the address sticker on top, add tape to secure the sticker and the top of the chilly bin.
- Telephone the courier before 4pm and ask them to collect the chilly bin.

NOTES

- Field equipment should regularly be checked for good working order.
- Field instrumentation should be regularly calibrated against appropriate standards and recorded. Field instrumentation is used to determine pH, EC, temperature, and water level.
- Sterile powder-free gloves are to be worn during all sampling and filtering.
- Sample equipment and workspace should be maintained in a clean condition and free of likely contamination.
- Manuals for use of the MP15 controller and powerpack, Geopump peristaltic pump, and Monsoon pump are kept at the Environmental Lab at Kenny Street.

5.6.5 Chain of Custody

- The chain of custody and records control for groundwater sampling are automatically populated with the samples and sample reference numbers entered into InViron when creating a sample run. The sample analysis code and name of the person submitting the samples needs to be added prior to the chain of custody being added to the chilly bin.

5.7 Water Quality Database

- Results from the R J Hill Laboratory are automatically imported into InViron.
- Enter field data into the sample run in InViron. Refer to the InViron Use SOP for further details.

6 RECORDS AND DOCUMENTATION

- Sample run records and all associated groundwater quality results (field and laboratory results) are stored in INX InViron.
- Hard copies of completed groundwater field sheets are stored in a folder in the Environmental Storeroom at Moresby Ave. These are scanned to the G: Environmental drive annually.

7 AUDIT AND REVIEW

This procedure shall be reviewed every 3 years as a minimum and/or in any of the following circumstances:

- Following any event or investigation that impacts on this procedure
- Any amendments to the site risk register
- Any amendments to legislation

An aerial photograph of a large water treatment facility, likely a wastewater treatment plant, featuring a large central pond and several smaller ponds. The facility is surrounded by green fields and some trees. Numerous monitoring points are marked with purple dots and labeled with text boxes. The labels include: MWCT3S, MW1D15D, MW1D17D, MW1D13D, MW1D16D, MW1D11D/S, MW1C11D/S, MW1D10D/S, MW1C10D/S, MW1D9D/S, MW1C9D/S, MW1D8D/S, MW1C8D/S, MW1D7D/S, MW1C6D/S, MW1D6D/S, MW1C5D/S, MW1D5D/S, MW1D4D/S, MW1C4D/S, MW1D3D/S, MW1C3D/S, MW1D2D/S, MW1C1D/S, MW1C2D/S, MW1D18D/S, MW1D12D/S, MW1C12D/S, MW1D14D/S, MW1C14D/S, MW1D16D/S, MW1C16D/S, MW1D17D/S, MW1C17D/S, MW1D18D/S, MW1C18D/S, MW1D19D/S, MW1C19D/S, MW1D20D/S, MW1C20D/S, MW1D21D/S, MW1C21D/S, MW1D22D/S, MW1C22D/S, MW1D23D/S, MW1C23D/S, MW1D24D/S, MW1C24D/S, MW1D25D/S, MW1C25D/S, MW1D26D/S, MW1C26D/S, MW1D27D/S, MW1C27D/S, MW1D28D/S, MW1C28D/S, MW1D29D/S, MW1C29D/S, MW1D30D/S, MW1C30D/S, MW1D31D/S, MW1C31D/S, MW1D32D/S, MW1C32D/S, MW1D33D/S, MW1C33D/S, MW1D34D/S, MW1C34D/S, MW1D35D/S, MW1C35D/S, MW1D36D/S, MW1C36D/S, MW1D37D/S, MW1C37D/S, MW1D38D/S, MW1C38D/S, MW1D39D/S, MW1C39D/S, MW1D40D/S, MW1C40D/S, MW1D41D/S, MW1C41D/S, MW1D42D/S, MW1C42D/S, MW1D43D/S, MW1C43D/S, MW1D44D/S, MW1C44D/S, MW1D45D/S, MW1C45D/S, MW1D46D/S, MW1C46D/S, MW1D47D/S, MW1C47D/S, MW1D48D/S, MW1C48D/S, MW1D49D/S, MW1C49D/S, MW1D50D/S, MW1C50D/S, MW1D51D/S, MW1C51D/S, MW1D52D/S, MW1C52D/S, MW1D53D/S, MW1C53D/S, MW1D54D/S, MW1C54D/S, MW1D55D/S, MW1C55D/S, MW1D56D/S, MW1C56D/S, MW1D57D/S, MW1C57D/S, MW1D58D/S, MW1C58D/S, MW1D59D/S, MW1C59D/S, MW1D60D/S, MW1C60D/S, MW1D61D/S, MW1C61D/S, MW1D62D/S, MW1C62D/S, MW1D63D/S, MW1C63D/S, MW1D64D/S, MW1C64D/S, MW1D65D/S, MW1C65D/S, MW1D66D/S, MW1C66D/S, MW1D67D/S, MW1C67D/S, MW1D68D/S, MW1C68D/S, MW1D69D/S, MW1C69D/S, MW1D70D/S, MW1C70D/S, MW1D71D/S, MW1C71D/S, MW1D72D/S, MW1C72D/S, MW1D73D/S, MW1C73D/S, MW1D74D/S, MW1C74D/S, MW1D75D/S, MW1C75D/S, MW1D76D/S, MW1C76D/S, MW1D77D/S, MW1C77D/S, MW1D78D/S, MW1C78D/S, MW1D79D/S, MW1C79D/S, MW1D80D/S, MW1C80D/S, MW1D81D/S, MW1C81D/S, MW1D82D/S, MW1C82D/S, MW1D83D/S, MW1C83D/S, MW1D84D/S, MW1C84D/S, MW1D85D/S, MW1C85D/S, MW1D86D/S, MW1C86D/S, MW1D87D/S, MW1C87D/S, MW1D88D/S, MW1C88D/S, MW1D89D/S, MW1C89D/S, MW1D90D/S, MW1C90D/S, MW1D91D/S, MW1C91D/S, MW1D92D/S, MW1C92D/S, MW1D93D/S, MW1C93D/S, MW1D94D/S, MW1C94D/S, MW1D95D/S, MW1C95D/S, MW1D96D/S, MW1C96D/S, MW1D97D/S, MW1C97D/S, MW1D98D/S, MW1C98D/S, MW1D99D/S, MW1C99D/S, MW1D100D/S, MW1C100D/S.

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Figure 2: TSF2 Groundwater Well Locations



Figure 3: Favona Groundwater Well Locations



Figure 4: WNP Gladstone Open Pit Groundwater Well Locations



Figure 5: WNP TSF3 Groundwater Well Locations



Figure 6: WNP NRS Groundwater Well Locations



Figure 7: WNP Wharekairauponga Groundwater Well Locations



Standard Operating Procedure

Management of Surface Intersecting Drill Holes

Approved date: 2024

Document ID: WAI-400-PRO-076

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This document must not be released outside of the company without permission of the Departmental Manager.

Department	Underground
Location/Site	Waihi

Approval table

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Authored by	Underground Mine Manager	Charlie Gawith	01/12/2013
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	Superintendent Technical Services	Patrick Slagter	19/02/2025
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Document id: WAI-400-PRO-076

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1.0		All	All	New Document	20/1/2014
2.0	1/11/2015	All	All	Reformat to OGNZL	1/11/2015
3.0	14/11/2016	6 3, 5	7, 4, 5	Wording added relating to record keeping and the provision of results to HDC. Minor wording changes to sections 3 and 5 to correct errors.	14/11/2016
4.0	Feb 2025	All	All	Reformatted for review	18/03/2025

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1 PURPOSE

This procedure defines the process to instruct and manage the risks and controls associated with the Management of Surface Intersecting Drill Holes at Waihi Operations. Ensuring that the task is completed as efficiently as possible and with mitigated risk to personnel.

To ensure compliance with the requirements of the applicable New Zealand legislation and regulations.

2 SCOPE

This procedure applies to all employees and contractors of OceanaGold who undertake Management of Surface Intersecting Drill Holes tasks at the OceanaGold Project.

3 REFERENCE AND COMPLIANCE

Level	Source
Legislation or Guidelines	Health and Safety at Work Act 2015
	Health and Safety at Work (Mining Operations and Quarrying Operations) Regulations 2016
Corporate	OGC-450-STD-020 OceanaGold Safety Performance Standards
	OGC-450-GUI-005 Risk Management Guidelines
Site	WAI-250-PRO-007 PPE

4 RISK ASSESSMENT

The site risk register is to be reviewed after all significant incidents. Formal Risk Assessments (FRA) are to be undertaken where changes to this document affect safety of personnel. Risk Assessments are to be conducted according to OGC-450-GUI-005 Risk Management Guidelines.

5 PROCEDURE

Un-grouted drillholes of all sizes pose a problem in the underground workings because they may serve as a conduit for the inflow of water into the workings from surface sources or from natural water sources underground or from man-made dams or sumps.

The current underground diamond drilling contract requires that all diamond drillholes will be collar grouted to a minimum depth of six metres unless specified otherwise. Examples of exceptions would be drain holes or piezometer holes which have no grouting or holes that specifically require full-hole grouting. Holes drilled for long-term de-watering purposes are also not grouted.

Current and past surface drillholes are capped (poly-pipe inserted in the upper hole with a cement block placed over the collar at a 1 metre down-hole depth and covered by dirt) but not fully grouted.

All drillholes that are not fully grouted can potentially act as conduits connecting sources of water (fissures, dams, pits etc) with new or pre-existing development headings or stopes. These drillholes need to be dealt with to minimise or prevent the risk of water inrush to the underground workings or the effects of localised surface dewatering.

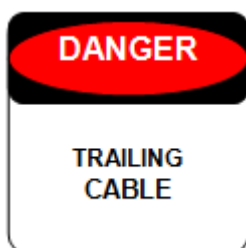
Permits

- OceanaGold Waihi Site Induction
- General underground induction

Equipment

- Flygt pumps
- Solo
- Extension cables
- Personal DANGER lock and tag

Signage



5.1 Intersecting “Dry” Diamond Drillholes

All surface drillholes that are expected to intersect underground development headings will be clearly marked on development mine plan approval documents by the engineer designing them.

This will serve as a means of alerting the production personnel that there may be water present in these drillholes and will allow the shift supervisor to plan for the grouting of the expected drillholes if required.

Note: An excessive volume of water will be considered as a constant flow of water that is more than could be expected from the void volume of the drillhole

All surface drillholes that are intersected in underground development headings are to be inspected by the shift supervisors and closely monitored to ensure they are not producing an excessive volume of water.

5.2 Intersecting Water Producing Diamond Drillholes

This portion of the procedure refers only to drillholes that continue to produce water once the initial water present in the drillhole should have drained out i.e. only those holes that are somehow connected to a source of water such as the upper aquifer.

Once monitoring has determined that a drillhole is producing more water than can reasonably be expected to have been contained in the original drillhole volume the hole will require plugging and grouting.

Note: The flow of water must be controlled within 36 hours of being intersected

The Underground Supervisor will immediately notify the Underground Manager of any intersected surface hole that has significant and sustained water flows.

An incident will be raised in order to track all facets of the management of the drillhole plugging and the Geology and Engineering functions will determine the most likely surface hole that has been intersected.

Note: In the event that the recovery in water pressures does not return fully to the pre-drained state, geotechnical advice will be sought regarding the need for more immediate investigations.

Following identification of the surface drillhole geology will notify the environmental department with the location of the collar of the hole and the estimated volume of water that the hole is producing.

The Environmental Department will then identify the closest piezometer locations and review the piezometer levels in the vicinity to ascertain if there was any water pressure response to the interception of the drillholes. It is expected pressures will return to pre interception levels.

Note: The tap of the van Ruth plug should not be left closed for extended periods as significant pressure build-up behind the van Ruth is possible.

A minimum of thirty metres of grout should be placed to ensure that it will withstand the high water pressure heads expected in long surface drillholes once the plug is in place and the hole is flooded with water.

Note: All completed grouting operations, where van Ruth plugs are involved, are to be reported to and recorded by the geology department.

If the water-producing hole cannot be grouted by normal means due to water flow then a van Ruth plug (grout and water control packer variety) with a pipe extension and a tap fitting should be inserted into

the hole and locked in place. The tap can then be used to control the water flow. The plug is there to control the water flow until alternative arrangements can be made to deal with the water volumes encountered.

All installed van Ruth plugs need to be sealed with suitable grout within two days of the date that they were installed. This seal comprises injecting cement (under pressure if necessary) to fill at least thirty meters of the drillhole immediately behind the plug.

If holes are unable to be grouted normally a specialist in the field of pressure grouting drillholes should be employed to seal holes. Once completed piezometer levels in the vicinity should be rechecked to ascertain there is subsequent recovery of pressures.

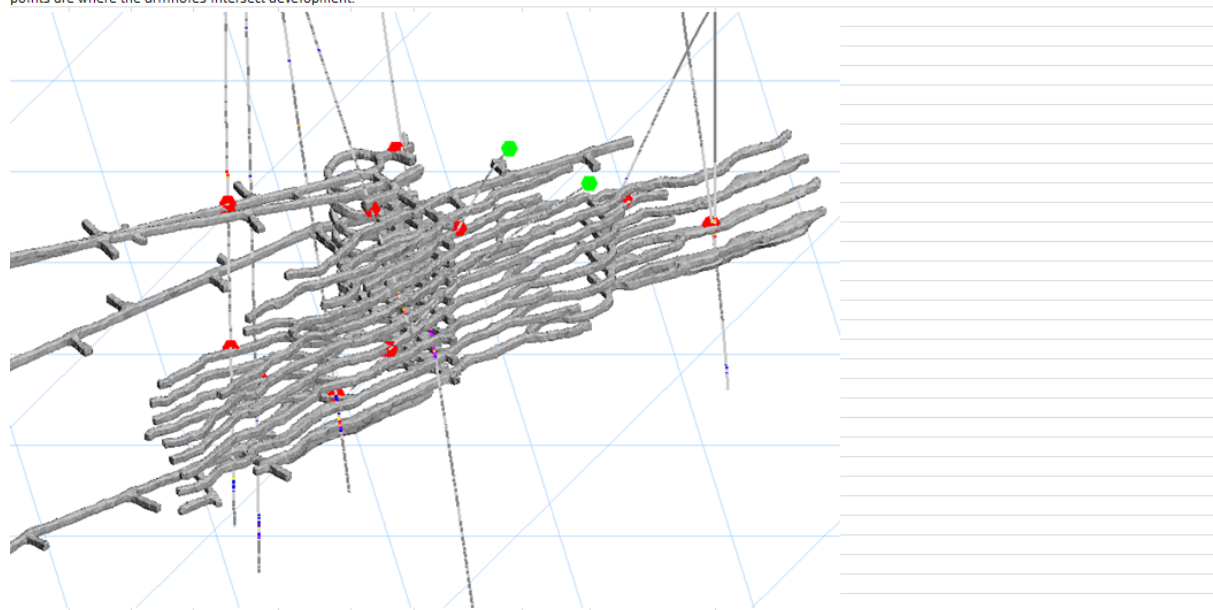
5.3 Documentation

A record of surface drillholes intersected by underground workings is kept in the following location: G:\Mining\Geology\Correnso\Drilling\Surface Drill Holes Intersected. The report contains information such as: date of intersection, co-ordinates of intersection, water status – whether it is producing water or not and at what rate.

The following is an example taken from the document which has been completed for the Correnso underground mine:

Hole ID	Level	Drive	E	N	m.R.L	Date intersected	Pickup	Grouting status	Comments
CGD008	810	C4-FW	396488.5	643473.4	821.4	13/06/2015	Estimated	Not grouted	Hole dry - no evidence of being a water conduit at this level: no Fe staining
UW320	912	ACC	396431.997	643265.11	917.774	13/04/2015	Surveyed	Not grouted	Hole dry
UW348	900	C1-N	396520.5	643263.45	907.62	14/12/2015	Estimated	Grouted	Trickling water which ceased within a day - grouted 16/12/2015
UW358A	900	C1-S	396586.70	643035.20	910.55	25/07/2016	Estimated	Grouted	Low flow, originally grouted within 12 hours, re-grouted after 36 hours. Surrounding split sets grouted as were acting as a conduit. Flow was approximately 1ltr/min
UW365	810	C4-FW	396488.4	643474.8	821.4	9/06/2015	Estimated	Not grouted	Hole dry
UW368	825	C7-S	396515.304	643114.23	833.067	26/08/2015	Surveyed	Grouted	Minor flow - hole re-grouted 16/12/2015
UW386	915	ORE PASS	396482.291	643218.53	914.937	4/02/2015	Surveyed	Not grouted	Hole dry - now in ore pass
UW390	840	C1-S	396541.39	643198.97	844.082	25/03/2015	Surveyed	Not grouted	Hole dry - no evidence of being a water conduit at this level: no Fe staining
UW393	840	C4-HW	396472.922	643416.31	851.398	16/08/2015	Estimated	Not grouted	Hole dry
UW402	953	CDD	396449.3	643126.9	930.5	17/12/2014	Surveyed	Grouted	Hole was producing minimal water for only a few hours
UW402	855	C7-S	396515.03	643092.42	864.645	18/10/2015	Surveyed	Not grouted	Dry - second time intersecting hole with development - was grouted on the 953

Below is an oblique view looking north-west of Correnso development with surface drillholes intersected and their pierce points. Green points are the drillhole collars in view while the red points are where the drillholes intersect development.



6 RESPONSIBILITIES AND ACCOUNTABILITIES

Role	Responsibility
Dept Superintendent	• Ensure adequate resources are available to carry out the requirements of this procedure safely • Ensure relevant training is provided for all personnel • Shall demonstrate personal accountability through compliance to this procedure
Dept Supervisors	• Ensure relevant personnel are trained in this procedure • Conduct regular workplace inspections to ensure all personnel are following the guidelines set out in this procedure • Shall demonstrate personal accountability through compliance to this procedure
Workers	• Comply with the requirements of this procedure • Provide feedback to the supervisor on improving ways to carry out a task and any concerns with current practices

7 RECORDS AND DOCUMENTATION

OceanaGold uses the on-line safety management system and software INX to record and store safety, health, hygiene, and training requirements. Records are stored securely and indefinitely within this facility. The following suites are specific to the type of data stored and managed:

- InControl – Event and incident reporting, action tracking, audits, inspections, task observations, Mine Record Entries and Management of Change
- InTuition – Worker's training and competency requirements
- Cority – Worker health monitoring and occupational hygiene monitoring programs.

All inspection and maintenance records are to be held by the relevant department or through corporate maintenance databases i.e., Pronto

This document is a controlled document secured within the OceanaGold document control system Team Binder and published to the site through SharePoint.

Any changes made to this document must be documented in the revision reference.

8 AUDIT AND REVIEW

This procedure shall be reviewed every Three years as a minimum and/or in any of the following circumstances:

- Following any event or investigation that impacts on this procedure
- Any amendments to the site risk register
- Any amendments to legislation

9 DEFINITIONS

Term	Definition

10 APPENDIX



Standard Operating Procedure

Waihi Piezometer Network Monitoring

Approved Date: September 2023

Document ID: WAI-200-PRO-021

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This document must not be released outside of the company without permission of the Departmental Manager.

Department	Sustainability – Environment
Location/Site	Waihi

Approval Table

	Position Title	Name	Date
Authored by	Advisor – Environment	Kristin Gillard	26/04/2023
Approved by	Superintendent – Environment	Mark Burroughs	04/09/2023

Document Issuance and Revision History

Document Name: Waihi Piezometer Network Monitoring

Document ID: WAI-200-PRO-021

Revision Number	Revision Date	Section	Page	Description	Effective Date
1.0				Transition to OG	1/11/2015
2.0	9/07/2018	5	6 – 9	Add procedure for filling pneumatic slope indicator with nitrogen. Review field procedure for pneumatic piezometer reading for new slope indicator.	11/07/2018
3.0	13/08/2020	5	9 – 10	Include field procedure for VW piezometers.	14/08/2020
4.1	26/04/2023	All	All	Review of whole document, including additional procedures for downloading Levellogger data.	04/09/2023

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1 PURPOSE

To monitor the piezometer network within the Waihi Township and around the Open Pit monthly, in accordance with the Dewatering and Settlement Monitoring Plan, in order to comply with the requirements of OceanaGold New Zealand's (OGNZL) consent conditions with Hauraki District Council and Waikato Regional Council.

2 SCOPE

The bore hole ("BH"), "P" series piezometers, pneumatic and vibrating wire piezometers are part of a network of piezometers commissioned by OceanaGold to monitor the local and regional effects of mine dewatering. OceanaGold also monitors selected private water bores to monitor potential effects of dewatering.

3 REFERENCE AND COMPLIANCE

Level	Source
Legislation or Guidelines	• Health and Safety at Work Act 2015
	• Health and Safety at Work (Mining Operations and Quarrying Operations) Regulations 2016
Corporate	• OGC-450-STD-020 OceanaGold Safety Performance Standards
	• OGC-450-GUI-005 Risk Management Guidelines
Site	• WAI-400-PHM-003 Inundation and Inrush
	• WAI-400-PLN-001 Water Management Plan
	• WAI-400-PLN-009 Dewatering & Settlement Monitoring Plan

4 RISK ASSESSMENT

The site risk register is to be reviewed after all significant incidents. Formal Risk Assessments (FRA) are to be undertaken where changes to this document affect safety of personnel. Risk Assessments are to be conducted according to OGC-450-GUI-005 Risk Management Guidelines.

5 PROCEDURES

5.1 Township Piezometers

The piezometer site locations are in Appendix 1 and are documented in the “Dewatering & Settlement Monitoring Plan.”

The piezometer sites are labelled with a ‘P’, ‘BH’ and ‘WC’ prefix. The privately-owned bores are identified by their location. There are three different types of piezometers, all requiring different monitoring equipment.

5.1.1 Field Work Preparation

Equipment Checklist:

- Screwdriver or water meter lid opener.
- Pen, clipboard and blank ‘Field Sheet’ (printed from data entry spreadsheet - <G:\Environmental\Monitoring Data\Piezometers\PIEZOMETER NETWORK - Data Entry.xls>).
- Security gate key (M1), V key and K key.
- Piezometer Allen key.
- Piezometer triangle key.
- 200m water level meter.
- Macqua dipper stand.
- Location map.
- Pneumatic piezometer readout unit (including tubing and connections).
- Last month’s field sheet to compare data whilst in the field.

5.1.2 Field Procedures – Dipped ‘BH’ and ‘P’ Series

- On arrival to each site, assess safety.
- Leave gates as they are found.
- Unlock padlock if present.
- Using a screwdriver or water meter lid opener, remove lid of meter box (some require the Allen key, triangle key or special socket wrench).
- Remove cap off PVC pipe in numerical order. One cap at a time to avoid confusion of results.
- Turn the dipper switch to ‘on.’
- Lower the dipper probe down the bore hole slowly. Be careful to ensure that the tape does not rub against the sharp edge of the steel standpipe casing (this can damage the cable insulation and expose/break the wires). Additionally, allowing the reel to free fall at great speed may damage the reel axle.
- The water level is reached when the dipper beeps. Raise and lower the probe until the beeper just comes on.
- Record this measurement (to the nearest cm, recorded at the highest part of the PVC pipe) on the field sheet in the appropriate column. Wind the tape back up, (again ensuring it does not rub against the steel standpipe). Slow down your wind up towards the end of the wind as you may get hit by the probe exiting the piezometer pipe.
- Replace cap of piezometer to avoid mixing up numbered caps.
- Repeat for remaining piezometers.
- Replace lid of meter box.
- Padlock lid (if present).

- Turn the dipper switch to 'off' to conserve battery power.
- Periodically check the end of the probe to ensure the contacts are clean and clear.

Note: Every six months (February and August) the piezometers are to be measured for depth to bottom (DTB). At this time, after each piezometer water level is recorded, the water level probe is lowered until it hits bottom. This measurement is recorded on the field sheet in the appropriate column. Use the 200m water level meter.

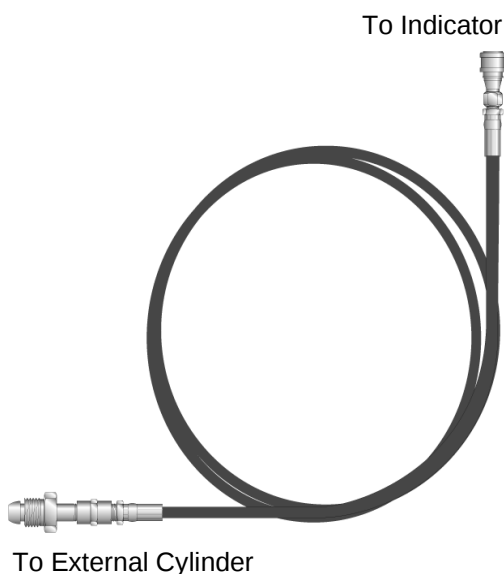
Checking the end of the probe is particularly important during this measuring, as the probe may hit mud at the bottom. This impedes the measuring capability of the meter, and it may need to be cleaned in water.

Additionally, it is useful to update the field sheet "depth to bottom" column periodically as this information can change.

5.1.3 Field Procedures – Pneumatic Piezometers

- At least 750 psi of nitrogen is required to take a reading using the pneumatic slope indicator. If the psi is low, refilling can be done at the Environmental Lab at Kenny Street. Filling is to be carried out by qualified approved fillers.
- Fill no higher than 2000 psi.

Filling the Tank



1. Use the filler hose to charge the internal tank with nitrogen gas from the small nitrogen bottle. Use the screw-in fitting to connect to the external nitrogen cylinder. Connect the socket end of the hose to the tank fill plug on the indicator.
2. Turn the tank control valve to the off position to prevent gas from escaping from the tank. Turn the regulator knob counter clockwise until the regulated pressure gauge reads zero. This protects the regulator.
3. Slowly open the valve of the nitrogen cylinder (typically less than one full turn) and begin filling tank.
4. When the tank pressure gauge reads 2000 psi (maximum fill), close the valve on the external cylinder.
5. Check that the valve on the external cylinder is turned off, then carefully loosen the hose fitting at the cylinder to release pressure from the filler hose. The filler hose connection to the indicator is made so that no gas will escape from the indicator tank.
6. Disconnect the filler hose from the indicator, and finally, disconnect the filler hose from the cylinder.

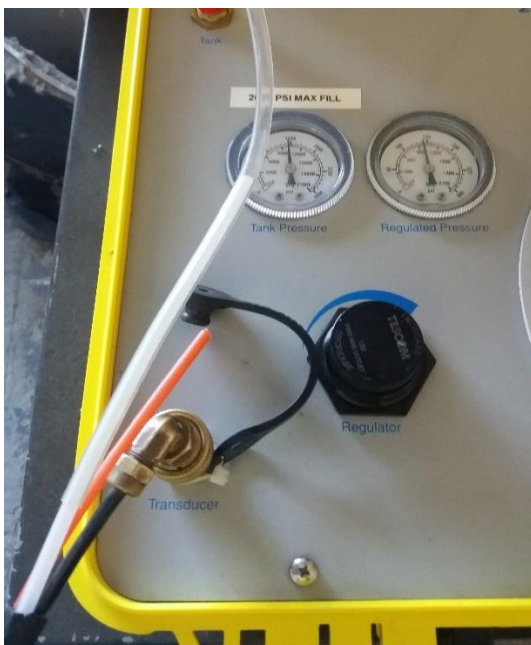


7. Record date of filling in Fillers Log for Pneumatic Slope Indicator.

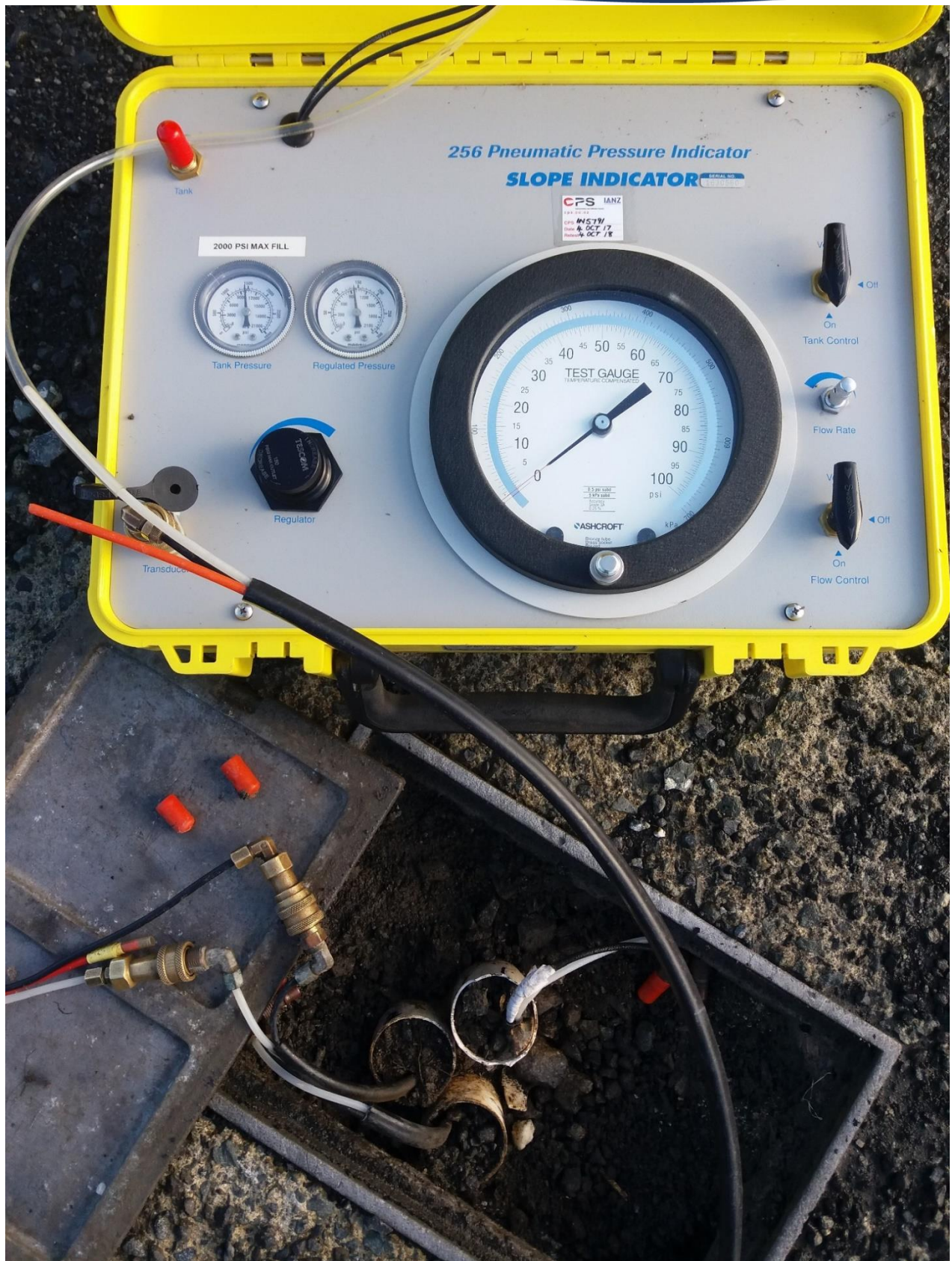
Note: Tank pressure normally drops 100 to 200 psi after the gas in the tank cools.

Set Up

1. Before leaving for the site, check that you have enough gas in the tank. The tank pressure should be higher than 52 bar or 750 psi. Refill the tank, if necessary.
2. Check the regulated pressure. As a rule, it should be no higher than the pressure rating of your pressure gauge. Turn the knob clockwise to increase the pressure or counter clockwise to decrease the pressure.
3. Turn the tank control valve to the on position to supply gas to the indicator. You can leave the valve in this position most of the time.
4. As a rule, you should zero the pressure gauge on site.



1. The twin-tubing from the transducer contains a black tube for nitrogen fill, and a clear/whitish tube for the return flow. Both ends have quick-connect plugs (female) to connect to the piezometer male ends. Connect black to black and white to white.
2. The black tube is terminated with a quick-connect male plug. Connect the black tube to the indicator's transducer socket.
3. The white tube is the vent tube. Connect the vent tube to the return flow indicator clear tube.



Activate

1. Turn the flow control valve to the on position.
2. If necessary, adjust the flow rate with the flow rate valve. The reading on the pressure gauge should increase at about 1 psi per second (slightly faster than 0.05 bar per second).

Tip: Transducers with longer lengths of tubing take more time to activate and read. Increasing the flow rate will not significantly reduce this time. In fact, a faster flow rate may result in a longer wait for the reading to stabilize because additional gas must flow through the transducer.

Read

1. Wait for a return flow of gas from the vent tube.
2. When you detect a return flow, turn the flow control valve to the off position.
3. Wait for the pressure reading to stabilize and return to zero.
4. Tap the gauge and write down the reading.

It is good practice to verify the reading.

Verify

1. Turn the flow control valve on.
2. Wait for a return flow, then turn the flow control valve off.
3. Wait for the reading to stabilize and compare to the first reading. Repeat this process until you have repeatable readings.
4. Record on the field sheet.

Shut Down

1. Disconnect the tubing from the indicator and replace any dust caps.
2. If this is the last reading for the day, turn the tank control valve off, turn the flow control to vent, and turn the regulator knob counter clockwise to reduce the regulated pressure to zero.

5.1.4 Township Piezometers Data Entry

- Back at the office, use an online converting tool to convert pneumatic field readings from psi to mH₂O 4°C before entering in the spreadsheet.
- Enter the data recorded on the field sheet into the master spreadsheet in the appropriate tab and column - G:\Environmental\Monitoring_Data\Piezometers\PIEZOMETER_NETWORK_-_Data_Entry.xls
- Assess groundwater trends, looking for any steep decrease in water levels or unusual trends.
- Field sheets are scanned and saved in this folder by year - G:\Environmental\Monitoring_Data\Piezometers\Town_Piezo_Network_Field_Sheets then filed in the “Waihi Township Piezo Data” folder in the Enviro storeroom.

5.2 Waihi East Vibrating Wire Piezometers

5.2.1 Field Work Preparation

Equipment Checklist:

- Location map
- Yellow pelican case and contents
 - Tablet and download cable.
 - Spare D batteries (x3).
 - Phillips screwdriver.
 - Notebook and pen.
 - Padlock keys.

5.2.2 Field Procedures – Vibrating Wire Piezometers

Downloading Data:

1. Open the cabinet using the appropriate key (labelled).
2. Most loggers have an external port connection to plug in the download cable directly. However, P93, P94 and P95 do not have an external port connection and the cover lid must be opened using a small Phillips screwdriver.
3. Once the tablet is connected to the VW logger via the download cable, open Logger Manager software on the tablet. The icon looks like this:



4. Select the appropriate device type, depending on the logger (either Quattro or V logger).
5. 'Retrieve Readings' (if this doesn't work, change the serial port in the 'Comm Setup' settings then retry).
6. 'Retrieve All.'
7. 'Save' readings to appropriate folder and name the file in YYYY/MM format, followed by the piezo number (e.g. 202305 P123).
8. 'Erase' the data once it has been downloaded.
9. Disconnect the cable and lock the cabinet.

Battery Changes:

- D batteries used in the Quattro loggers are changed annually. There is a notebook in the yellow pelican case where battery changes are recorded for future reference. Ensure the month and date are written in the notebook and on the new batteries if replaced.
- V loggers have flashing lights to indicate when the battery requires replacement.

Note: Ensure data has been downloaded before changing the batteries in a logger.

5.2.3 Waihi East Piezometers Data Entry

- Back at the office, transfer the saved download files to a USB stick. Copy these to the appropriate piezometer folder in the shared G drive - <G:\Environmental\Monitoring Data\Piezometers\Waihi East>
- P122 and P123 are on telemetry. Data can be retrieved from <https://app.cirro.live/#/private/login>
- Copy the data for each piezometer to the appropriate tab on the master spreadsheet - <G:\Environmental\Monitoring Data\Piezometers\Waihi East\Waihi East piezo data entry.xlsx>
- Drag formulas down in shaded columns.
- Assess groundwater trends, looking for any steep decrease in water levels, particularly in the andesite.
- Update charts as required.

5.3 Pit Piezometers and Levellogger Downloads

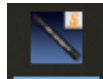
5.3.1 Field Work Preparation

Equipment Checklist:

- Tablet.
- Orange pelican case with old style Levellogger cradle inside.
- 100m water level meter (dipper).
- Pen and notebook.
- Pit key (use sign in/out book in Enviro storeroom).
- PPE (hard hat, gloves, safety glasses, hi vis clothing, steel capped boots).

5.3.2 Field Procedures – Levellogger Downloads

Contact Senior Geotechnical Engineer before accessing the Pit North Wall piezometers (P69S & P69D) to ensure it is safe. After confirmation that it is safe to access, the following steps can be taken to download water level data from the Levelloggers installed in both shallow and deep P69 standpipes.

1. Move the PVC cap to the side to allow access to the standpipe without pulling the Levellogger out.
2. Measure the water level from the top of the PVC standpipe (at the highest point) using the 100m water level meter (dipper) and record in a notebook.
3. While wearing gloves, pull the Levellogger (attached to the PVC cap with wire rope) out of the standpipe and unscrew it from the lid.
4. Connect the Levellogger cradle to the tablet using the USB port. Ensure the optical lenses on the Levellogger are clean and clear before fitting to the cradle.
5. Open the Levellogger software on the tablet. The icon looks like this: 
6. Ensure the correct 'Com Port' is selected and the USB optical reader has been recognised. The drop-down menu can be used to select the correct com port if it has not been selected automatically.
7. Select the retrieve icon: 
8. Wait for 'Datalogger Settings' to populate. If an error occurs, ensure the optical lenses are free from dirt/dust and condensation, and the correct com port is selected.

9. Check that the logger has sufficient battery life and free memory, is recording using the correct time and at appropriate intervals and is logging on continuous mode.
10. Select the 'Data Control' tab, then click on the download icon: 
11. Select 'All Data' and ensure the file is saved to the right folder.
10. Rename the file in YYYY/MM format, followed by the piezo number (e.g. 202305 P69S).
12. Close the program and disconnect the Levellogger.
13. Screw the Levellogger back onto the lid with the wire rope attached and carefully lower back into the standpipe while wearing gloves.
14. Replace the PVC well cap.

5.3.3 Pit Piezometers Data Entry

- Back at the office, transfer the saved download files to a USB stick. Copy these to the appropriate piezometer folder in the shared G drive (for Pit North Wall piezos - <G:\Environmental\Monitoring Data\Piezometers\Pit North Wall\North wall datalogger data\North Wall P69S + D loggers>).
- Open each Levellogger file and export data by selecting this icon: 
- Export 'Data' and save as a csv file in the same folder as above.
- Open the csv files and copy the data for each piezometer to the appropriate tab on the master spreadsheet –

<G:\Environmental\Monitoring Data\Piezometers\Pit North Wall\North Wall Piezo Summary.xlsx>

- Drag formulas down in shaded columns.
- Enter the dipped SWL to the column just to the right of the last entry and calculate the dipped level RL: **RL top of PVC – SWL = Dipped RL**. Compare the dipped RL to the Levellogger RL to determine if the logger is drifting (it may need restarting if there is a difference in RL's).
- Assess groundwater trends, looking for any steep decrease in water levels.
- Update charts and rainfall as required.

5.4 Trigger Limits

A 5m decrease in water level or any unusual trends should be reviewed by Senior Environmental staff, particularly in any of the deeper andesite piezometers.

5.5 Reporting Requirements

Water levels are to be reviewed monthly by the Environmental Advisor and commented on in the internal monthly environment report. If a significant change of >5m is detected, the measurement/s are to be verified and confirmed. If a significant change is confirmed, the Superintendent – Environment is to be informed (an investigation or specialist advice may be required).

Annual data is included in the Dewatering and Settlement Report.

5.6 Contingency Corrective Action

- Investigate any significant changes in water levels and identify actions that may be required.
- Seek advice from an approved external consultant (i.e., GWS Ltd).
- Enter event into INX, include corrective action(s).

6 RESPONSIBILITIES AND ACCOUNTABILITIES

Role	Responsibility
Superintendent – Environment	Oversight of monitoring and review of reports before submission to Council.
Senior Advisor – Environment	Data analysis and reporting to Council.
Advisor – Environment	Data review, analysis and reporting to Council as per consent requirement.
Environmental Officer	Field work preparation, data collection and data entry.

7 RECORDS AND DOCUMENTATION

All records related to piezometers and associated data are to be stored in the G: Environmental network drives. Records are stored securely and indefinitely within these folders.

This document is a controlled document secured within the OceanaGold document control system Team Binder and published to the site through SharePoint.

Any changes made to this document must be documented in the revision reference.

8 AUDIT AND REVIEW

This procedure shall be reviewed every 3 years as a minimum and/or in any of the following circumstances:

- Following any event or investigation that impacts on this procedure.
- Any amendments to the site risk register.
- Any amendments to legislation.

9 DEFINITIONS

Term	Definition
BH	Borehole
DTB	Depth to bottom
HDC	Hauraki District Council
psi	Pounds per square inch

WRC

Waikato Regional Council

10 APPENDIX

10.1 Appendix 1



APPENDIX C – PIEZOMETERS

Martha Network

Well ID	X Coord	Y Coord	Ground RL	Depth (mbgl)	Depth (mRL)	Formation	Type	Standpipe Screen (mbgl)
GLD004S	396597	642166	1089.0	9.0	1080.0	Alluvium	Standpipe	6.95 - 9.95
P2-4	394839	642818	1110.3	8.6	1101.0	Alluvium	Standpipe	7.6 - 8.6
P8-4	396145	643831	1125.7	13.9	1112.0	Alluvium	Standpipe	11.9 - 13.9
P91-1	396472	643572	1112.1	9.3	1112.8	Alluvium	VWP	NA
P93-1	396347	643345	1117.7	12.5	1105.0	Alluvium	VWP	NA
P94-1	396546	643306	1120.0	6.0	1114.0	Alluvium	VWP	NA
P101-1	396464	643037	1115.0	12.8	1102.0	Alluvium	VWP	NA
P102-1	396619	643016	1116.6	8.0	1109.0	Alluvium	VWP	NA
WC201-4	394750	642714	1112.6	9.1	1104.0	Alluvium	Standpipe	7.1 - 9.1
WC201-5	394750	642714	1112.6	2.7	1110.0	Alluvium	Standpipe	1.7 - 2.7
WC203-4	395449	642346	1103.7	4.4	1099.0	Alluvium	Standpipe	3.4 - 4.4
BH6	396131	643566	1117.7	74.0	1053.0	Young Volcanics	Standpipe	5 - 11 41 - 47 59-65
BH9	396041	642575	1106.7	35.1	1074.0	Young Volcanics	Standpipe	26.2 - 32.2
BH11	395384	642488	1112.8	37.0	1075.0	Young Volcanics	Standpipe	29.6 - 35.6
BH12	394854	642752	1109.0	33.3	1079.0	Young Volcanics	Standpipe	24.7 - 30.7
GLD004I	396597	642166	1089.0	24.0	1065.0	Young Volcanics	Standpipe	22.6 - 25.6
P2-3	394839	642818	1110.3	37.0	1073.0	Young Volcanics	Standpipe	35 - 37
P4-2	395280	641927	1101.6	53.6	1048.0	Young Volcanics	Standpipe	51.6 - 53.6
P7-2	396165	642220	1092.7	53.5	1039.0	Young Volcanics	Standpipe	51.5 - 53.5
P7-3	396165	642220	1092.7	12.0	1081.0	Young Volcanics	Standpipe	10 - 12
P8-3	396145	643831	1125.7	32.8	1093.0	Young Volcanics	Standpipe	30.8 - 32.8
P27-1	396104	642988	1107.8	34.2	1074.0	Young Volcanics	Standpipe	32.2 - 34.2
P90-1	396339	643592	1119.8	20.0	1099.8	Young Volcanics	VWP	NA
P90-2	396339	643592	1119.8	100.0	1019.8	Young Volcanics	VWP	NA
P91-2	396472	643572	1112.1	25.3	1096.8	Young Volcanics	VWP	NA
P91-3	396472	643572	1112.1	111.3	1010.8	Young Volcanics	VWP	NA
P92-1	396573	643540	1121.6	25.3	1096.0	Young Volcanics	VWP	NA
P92-2	396573	643540	1121.6	121.3	1000.0	Young Volcanics	VWP	NA
P93-3	396347	643345	1117.7	103.0	1015.0	Young Volcanics	VWP	NA
P94-2	396546	643306	1120.0	26.0	1094.0	Young Volcanics	VWP	NA
P94-3	396546	643306	1120.0	104.0	1016.0	Young Volcanics	VWP	NA
P95-1	396624	643310	1120.9	30.0	1091.0	Young Volcanics	VWP	NA
P95-2	396624	643310	1120.9	90.0	1031.0	Young Volcanics	VWP	NA
P100-1	396216	643131	1116.0	50.0	1066.0	Young Volcanics	VWP	NA
P100-2	396216	643131	1116.0	120.0	996.0	Young Volcanics	VWP	NA
P101-2	396464	643037	1115.0	32.0	1083.0	Young Volcanics	VWP	NA
P101-3	396464	643037	1115.0	47.0	1068.0	Young Volcanics	VWP	NA
P102-2	396619	643016	1116.6	38.0	1079.0	Young Volcanics	VWP	NA
P102-3	396619	643016	1116.6	62.0	1055.0	Young Volcanics	VWP	NA
P107	395287	642630	1118.9	29.9	1089.0	Young Volcanics	Standpipe	
P108	395563	642655	1125.8	9.8	1116.0	Young Volcanics	Standpipe	
P109	395495	642527	1113.0	22.0	1091.0	Young Volcanics	Standpipe	
P110	395653	642683	1114.0	17.0	1097.0	Young Volcanics	Standpipe	
P111-1	395581	642604	1113.4	13.0	1100.0	Young Volcanics	VWP	NA
P112-1	395710	642590	1107.8	50.0	1058.0	Young Volcanics	VWP	NA
P113A-1	395774	642654	1108.7	19.0	1090.0	Young Volcanics	VWP	NA
P113A-2	395774	642654	1108.7	39.0	1069.0	Young Volcanics	VWP	NA
P114	395817	642694	1114.0	60.0	1054.0	Young Volcanics	Standpipe	
P115	395751	642440	1109.5	37.5	1072.0	Young Volcanics	Standpipe	27.5 - 30.5
P116	395848	642355	1098.3	53.3	1045.0	Young Volcanics	Standpipe	49.8 - 52.8
P122-1	395391	642450	1111.9	20.0	1092.0	Young Volcanics	VWP	NA
P122-2	395391	642450	1111.9	52.0	1060.0	Young Volcanics	VWP	NA
WC202-2	395881	642769	1110.5	61.8	1048.0	Young Volcanics	Pneumatic	NA
GLD004D	396597	642166	1089.0	69.0	1020.0	Andesite	Standpipe	63 - 69
P2-1	394839	642818	1110.3	136.0	974.0	Andesite	Standpipe	134 - 136
P2-2	394839	642818	1110.3	75.7	1035.0	Andesite	Standpipe	73.7 - 75.7
P7-1	396165	642220	1092.7	101.2	989.0	Andesite	Standpipe	102 - 104

Well ID	X Coord	Y Coord	Ground RL	Depth (mbgl)	Depth (mRL)	Formation	Type	Standpipe Screen (mbgl)
P9-1	396472	643916	1122.1	85.1	1037.0	Andesite	Standpipe	83.1 - 85.1
P69-D	395522	643504	1165.3	101.2	1063.0	Andesite	Standpipe	97.65 - 101.15
P69-S	395522	643504	1165.4	51.0	1114.0	Andesite	Standpipe	47.45 - 50.95
P90-3	396339	643592	1119.8	137.0	982.8	Andesite	VWP	NA
P91-4	396472	643572	1112.1	151.3	970.8	Andesite	VWP	NA
P92-3	396573	643540	1121.6	156.3	965.0	Andesite	VWP	NA
P93-4	396347	643345	1117.7	143.0	975.0	Andesite	VWP	NA
P94-4	396546	643306	1120.0	144.0	976.0	Andesite	VWP	NA
P95-3	396624	643310	1120.9	120.0	1001.0	Andesite	VWP	NA
P100-3	396216	643131	1116.0	135.0	981.0	Andesite	VWP	NA
P100-4	396216	643131	1116.0	160.0	956.0	Andesite	VWP	NA
P101-4	396464	643037	1115.0	78.0	1037.0	Andesite	VWP	NA
P102-4	396619	643016	1116.6	90.0	1027.0	Andesite	VWP	NA
P106-1	395215	643265	1137.2	37.0	1100.0	Andesite	VWP	NA
P106-2	395215	643265	1137.2	77.0	1060.0	Andesite	VWP	NA
P106-3	395215	643265	1137.2	127.0	1010.0	Andesite	VWP	NA
P106-4	395215	643265	1137.2	163.0	974.0	Andesite	VWP	NA
P111-2	395581	642604	1113.4	25.0	1088.0	Andesite	VWP	NA
P111-3	395581	642604	1113.4	58.0	1055.0	Andesite	VWP	NA
P112-2	395710	642590	1107.8	72.0	1035.0	Andesite	VWP	NA
P112-3	395710	642590	1107.8	110.0	998.0	Andesite	VWP	NA
P113A-3	395774	642654	1108.7	74.0	1035.0	Andesite	VWP	NA
P122-3	395391	642450	1111.9	80.0	1032.0	Andesite	VWP	NA
P122-4	395391	642450	1111.9	179.0	933.0	Andesite	VWP	NA
P123-1	395137	643319	1124.4	80.0	1044.0	Andesite	VWP	NA
P123-2	395137	643319	1124.4	120.0	1004.0	Andesite	VWP	NA
P123-3	395137	643319	1124.4	160.0	964.0	Andesite	VWP	NA
P123-4	395137	643319	1124.4	200.0	924.0	Andesite	VWP	NA
WC201-1	394750	642714	1112.6	53.8	1059.0	Andesite	Pneumatic	NA
WC201-2	394750	642714	1112.6	35.4	1077.0	Andesite	Pneumatic	NA
WC201-3	394750	642714	1112.6	16.0	1097.0	Andesite	Pneumatic	NA
WC202-1	395881	642769	1110.5	78.8	1032.0	Andesite	Pneumatic	NA

Favona Network

Well ID	X Coord	Y Coord	Ground RL	Depth (mbgl)	Depth (mRL)	Formation	Type	Standpipe Screen (mbgl)
P63-S	397220	643120	1119.8	6.7	1113.0	Alluvium	Standpipe	4.7 - 6.7
P76-S	396903	642972	1113.1	5.0	1109.0	Alluvium	Standpipe	4.5 - 5.0
P77-S	396679	643039	1117.5	6.0	1111.0	Alluvium	Standpipe	5.5 - 6.0
P78-S	397435	643275	1115.4	6.5	1110.0	Alluvium	Standpipe	6 - 6.5
P87-S	396851	643383	1119.9	9.4	1110.0	Alluvium	Standpipe	7.4 - 9.4
P63-I	397220	643120	1120.3	50.1	1070.0	Young Volcanics	Standpipe	38.4 - 50.1
P64-I	397392	642887	1116.0	30.5	1086.0	Young Volcanics	Standpipe	30 - 30.5
P67-D	397575	642884	1098.8	14.2	1084.6	Young Volcanics	Standpipe	8.65 - 13.80
P76-I	396903	642972	1112.5	40.6	1073.0	Young Volcanics	Standpipe	38.6 - 40.6
P78-I	397435	643275	1115.3	49.5	1066.0	Young Volcanics	Standpipe	47.5 - 49.5
P79-S	396720	642307	1102.1	12.0	1091.0	Young Volcanics	Standpipe	11 - 12
P79-I	396720	642307	1102.2	41.5	1061.0	Young Volcanics	Standpipe	40.5 - 41.5
P87-I	396851	643383	1119.9	49.9	1070.0	Young Volcanics	Standpipe	47.9 - 49.9
P75	397085	642889	1130.0	150.6	979.0	Andesite	Standpipe	64 - 70 84 - 88 109 - 113 116.8 - 118.2 120.3 - 212.5 123 - 125
P76-D	396903	642972	1113.0	58.0	1056.0	Andesite	Standpipe	55 - 58
P77-I	396679	643039	1117.5	77.0	1046.0	Andesite	Standpipe	70 - 72
P77-D	396679	643039	1117.5	86.5	1031.0	Andesite	Standpipe	83.5 - 86.5
P78-D	397435	643275	1115.2	63.0	1053.0	Andesite	Standpipe	60 - 63
P79-D	396720	642307	1102.3	55.0	1048.0	Andesite	Standpipe	52 - 55
P87-D	396851	643383	1119.9	94.9	1025.0	Andesite	Standpipe	92.9 - 94.9
P88	397244	642812		43.5			Standpipe	41.2 - 42.7

APPENDIX D – SETTLEMENT MARKS

Zone	Station ID	Survey Date	X	Y	Z
Zone7	BM19B	Nov 2024	2117.17	1244.355	35.511
Zone7	19BB	Nov 2024	2191.56	1292.022	35.508
Zone7	17CB	Nov 2024	2014.23	1201.01	35.441
Zone6	R01	Nov 2024	1636.96	912.735	29.281
Zone6	R02	Nov 2024	1686.32	920.992	28.781
Zone6	R03	Nov 2024	1737.89	986.341	30.286
Zone6	R04	Nov 2024	1777.69	939.415	28.202
Zone6	R05	Nov 2024	1833.86	959.976	28.549
Zone6	R06	Nov 2024	1927.48	994.185	29.605
Zone6	BM20	Nov 2024	2342.50	1476.25	35.559
Zone6	BM20A	Nov 2024	2345.50	1484.901	35.736
Zone6	19CB	Nov 2024	2296.71	1381.4	34.902
Zone6	17BB	Nov 2024	1919.52	1160.787	37.326
Zone6	17AB	Nov 2024	1841.32	1104.802	36.852
Zone6	34GC	Nov 2024	2211.33	1119.517	32.117
Zone6	2.04B	Nov 2024	1893.21	968.34	29.064
Zone6	34H	Nov 2024	2233.59	970.561	32.142
Zone6	2.10	Nov 2024	2143.92	950.387	30.264
Zone6	18EE	Nov 2024	1750.73	809.328	23.418
Zone6	18C	Nov 2024	1494.95	767.193	27.453
Zone6	18IB	Nov 2024	1611.19	784.79	25.815
Zone6	34AD	Nov 2024	1470.88	886.92	29.749
Zone6	34BE	Nov 2024	1732.56	931.603	28.313
Zone6	10BC	Nov 2024	1560.13	1062.92	38.081
Zone6	34CB	Nov 2024	1967.74	983.202	30.023
Zone6	BM17A	Nov 2024	1724.44	1088.919	40.009
Zone6	BM34	Nov 2024	1528.38	903.297	30.304
Zone6	34FC	Nov 2024	2120.79	587.931	19.03
Zone6	11AC	Nov 2024	1308.26	859.512	29.324
Zone6	10AB	Nov 2024	1430.61	1036.998	34.981
Zone6	18AB	Nov 2024	1632.39	667.733	22.127
Zone6	2.08B	Nov 2024	2289.75	782.64	24.524
Zone6	2.11C	Nov 2024	2292.35	896.99	26.604
Zone6	1.28B	Nov 2024	1987.03	447.706	12.088
Zone6	2.09C	Nov 2024	2228.35	868.63	28.633
Zone6	34I	Nov 2024	2229.55	765.534	28.456
Zone6	2.06	Nov 2024	2351.95	334.473	11.271
Zone5	20C	Nov 2024	2450.61	1413.86	36.294

Zone	Station ID	Survey Date	X	Y	Z
Zone5	20E	Nov 2024	2535.65	1542.672	37.063
Zone5	A10B	Nov 2024	1298.62	1049.614	30.671
Zone5	21DC	Nov 2024	2573.96	1304.152	37.744
Zone5	25D	Nov 2024	2547.05	1248.02	36.848
Zone5	16BC	Nov 2024	1252.81	1336.473	39.437
Zone5	25A	Nov 2024	2505.13	1203.768	35.922
Zone5	25E	Nov 2024	2472.35	1162.013	34.757
Zone5	21O	Nov 2024	2527.37	1356.342	35.99
Zone5	20D	Nov 2024	2482.07	1473.478	36.535
Zone5	BM25	Nov 2024	2424.91	1100.253	33.466
Zone5	BM16	Nov 2024	1418.09	1218.03	46.413
Zone5	10DC	Nov 2024	1279.04	1198.326	35.284
Zone5	21N	Nov 2024	2623.25	1342.435	38.275
Zone5	25G	Nov 2024	2594.60	1149.415	37.574
Zone5	2.41	Nov 2024	3296.32	685.398	46.246
Zone5	25CB	Nov 2024	2615.91	1190.496	38.281
Zone5	25H	Nov 2024	2648.48	1232.956	38.906
Zone5	10CB	Nov 2024	1222.46	1025.855	29.763
Zone5	25F	Nov 2024	2542.53	1116.24	35.984
Zone5	24L	Nov 2024	2761.67	1181.326	39.31
Zone5	12CE	Nov 2024	1499.92	543.077	20.97
Zone5	BM12	Nov 2024	1370.27	607.735	23.943
Zone5	18FB	Nov 2024	1794.53	557.104	15.938
Zone5	25B	Nov 2024	2497.67	1105.828	34.814
Zone5	2.03	Nov 2024	1930.08	745.943	22.581
Zone5	13AC	Nov 2024	1751.98	327.376	18.583
Zone5	34EB	Nov 2024	2073.93	705.952	24.628
Zone5	18G	Nov 2024	1669.05	554.602	18.464
Zone5	25I	Nov 2024	2537.20	1045.036	34.674
Zone5	24DC	Nov 2024	2718.29	1323.13	39.623
Zone5	18B	Nov 2024	1510.36	650.578	23.55
Zone5	1.28A	Nov 2024	1888.26	505.887	13.199
Zone5	24AC	Nov 2024	2743.58	1218.90	40.079
Zone5	21C	Nov 2024	2651.57	1389.816	38.456
Zone5	2A	Nov 2024	1069.03	1111.858	23.787
Zone5	24K	Nov 2024	2783.89	1387.719	40.603
Zone5	22F	Nov 2024	2815.91	1325.407	40.223
Zone5	24E	Nov 2024	2758.43	1303.234	40.354

Zone	Station ID	Survey Date	X	Y	Z
Zone5	34D	Nov 2024	2038.90	783.43	25.332
Zone5	24F	Nov 2024	2772.80	1257.274	40.12
Zone5	BM18	Nov 2024	1771.96	674.528	19.417
Zone5	BM24	Nov 2024	2794.55	1279.361	40.39
Zone5	20AC	Nov 2024	2461.04	1536.905	37.007
Zone5	21EB	Nov 2024	2799.95	1429.087	41.622
Zone5	24G	Nov 2024	2705.96	1170.464	39.792
Zone5	12DC	Nov 2024	1596.95	435.491	19.955
Zone5	24B	Nov 2024	2667.67	1126.399	39.372
Zone5	12AC	Nov 2024	1388.32	488.888	19.036
Zone5	13BC	Nov 2024	1850.36	246.587	13.712
Zone5	18HC	Nov 2024	1821.52	466.47	14.879
Zone5	24J	Nov 2024	2749.39	1365.756	40.223
Zone5	15A	Nov 2024	1204.79	818.86	28.761
Zone5	24H	Nov 2024	2630.70	1072.279	36.147
Zone5	20BB	Nov 2024	2533.26	1622.291	37.866
Zone5	21M	Nov 2024	2694.90	1439.648	39.171
Zone5	1.10B	Nov 2024	1597.98	284.28	16.772
Zone5	BM13	Nov 2024	1426.61	269.34	13.563
Zone5	AP22A	Nov 2024	1868.44	188.57	12.397
Zone5	15BC	Nov 2024	1169.90	708.855	26.323
Zone5	12BC	Nov 2024	1405.27	368.295	14.907
Zone5	11BB	Nov 2024	1348.57	710.573	26.919
Zone5	4DB	Nov 2024	1033.26	1550.66	32.238
Zone5	20F	Nov 2024	2605.79	1575.98	37.562
Zone5	BM21	Nov 2024	2654.80	1515.397	39.417
Zone5	4B	Nov 2024	1021.54	1448.63	31.241
Zone5	21K	Nov 2024	2681.11	1572.207	39.992
Zone5	21BC	Nov 2024	2719.27	1477.799	41.262
Zone5	2BC	Nov 2024	970.20	1241.898	30.374
Zone5	2.17A	Nov 2024	3085.76	555.866	36.901
Zone5	30C	Nov 2024	2573.54	1675.395	38.435
Zone5	BM9B	Nov 2024	1220.25	1523.285	34.74
Zone5	7CB	Nov 2024	1161.74	1597.63	30.6
Zone5	AP3	Nov 2024	918.94	1140.585	26.057
Zone5	26F	Nov 2024	1392.77	1680.261	43.849
Zone5	26Q	Nov 2024	1963.00	1982.711	73.663
Zone5	26PB	Nov 2024	1834.84	1893.106	67.935

Zone	Station ID	Survey Date	X	Y	Z
Zone5	26R	Nov 2024	1905.59	1927.165	71.348
Zone4	23C	Nov 2024	2856.14	1068.014	37.538
Zone4	23AB	Nov 2024	3145.42	1078.732	37.183
Zone4	22C	Nov 2024	2846.39	1352.544	40.304
Zone4	2.24	Nov 2024	2885.91	1215.469	41.273
Zone4	BANK1	Nov 2024	2866.21	1023.248	37.783
Zone4	23D	Nov 2024	2861.42	1154.885	38.846
Zone4	23E	Nov 2024	2774.82	972.514	37.697
Zone4	2.25	Nov 2024	2874.51	1097.26	37.973
Zone4	MATAURA1	Nov 2024	2831.84	1250.806	41.059
Zone4	22GB	Nov 2024	2862.88	1387.968	40.834
Zone4	23F	Nov 2024	2700.77	968.793	36.639
Zone4	2.19B	Nov 2024	3270.21	916.063	38.554
Zone4	BARRY1	Nov 2024	3047.74	926.576	38.112
Zone4	2.14A	Nov 2024	2853.28	838.669	41.315
Zone4	23B	Nov 2024	2856.49	949.794	38.748
Zone4	2.13	Nov 2024	2725.42	874.951	47.205
Zone4	MORTON	Nov 2024	2975.42	1231.913	40.709
Zone4	BARRY3	Nov 2024	3176.85	895.991	37.681
Zone4	2.18	Nov 2024	3218.04	712.756	44.539
Zone4	1.11B	Nov 2024	1675.83	133.622	9.016
Zone4	BARRY4B	Nov 2024	3320.16	912.693	38.884
Zone4	2HB	Nov 2024	1078.24	886.849	24.379
Zone4	22E	Nov 2024	3055.20	1231.504	40.779
Zone4	BARRY5	Nov 2024	3397.59	904.647	40.988
Zone4	BARRY2B	Nov 2024	2937.67	943.59	38.553
Zone4	22BC	Nov 2024	2916.75	1435.773	42.098
Zone4	BARRY6	Nov 2024	3432.52	904.356	42.474
Zone4	21P	Nov 2024	2849.17	1456.9	41.841
Zone4	22H	Nov 2024	2869.25	1441.796	41.615
Zone4	2.23	Nov 2024	3560.02	1212.795	36.631
Zone4	22I	Nov 2024	2918.98	1461.367	41.908
Zone4	BM23	Nov 2024	3107.42	921.049	38.087
Zone4	22M	Nov 2024	2973.44	1434.656	41.666
Zone4	STAFORD	Nov 2024	3139.86	998.179	37.315
Zone4	2.20	Nov 2024	3467.69	904.56	43.782
Zone4	22L	Nov 2024	3047.70	1499.876	40.985
Zone4	2.16	Nov 2024	3007.62	739.64	33.5915

Zone	Station ID	Survey Date	X	Y	Z
Zone4	AP100	Nov 2024	1893.80	81.273	11.773
Zone4	2.15	Nov 2024	2918.94	723.52	38.363
Zone4	22A	Nov 2024	3003.28	1429.771	41.639
Zone4	2.22	Nov 2024	3339.13	1206.603	40.345
Zone4	BM2	Nov 2024	915.74	1091.799	24.818
Zone4	GW	Nov 2024	3128.83	1140.936	38.538
Zone4	1.05	Nov 2024	1176.96	473.454	21.808
Zone4	BARRY8	Nov 2024	3592.28	871.451	37.93
Zone4	CUBA	Nov 2024	3224.32	1079.177	35.823
Zone4	22D	Nov 2024	3100.02	1335.441	41.446
Zone4	BARRY7	Nov 2024	3518.87	901.897	43.609
Zone4	22J	Nov 2024	2944.47	1489.763	42.42
Zone4	21FB	Nov 2024	2861.65	1512.211	42.642
Zone4	21L	Nov 2024	2806.79	1575.074	43.079
Zone4	21AC	Nov 2024	2716.64	1617.767	39.685
Zone4	2.29B	Nov 2024	2953.39	1548.172	42.583
Zone4	26BE	Nov 2024	1408.78	1800.553	38.803
Zone4	1.26	Nov 2024	1926.81	30.053	15.084
Zone4	27KB	Nov 2024	2320.23	2120.206	63.323
Zone4	2GB	Nov 2024	922.38	967.661	22.664
Zone4	BM22	Nov 2024	3115.79	1442.952	40.613
Zone4	15C	Nov 2024	1156.82	571.077	24.201
Zone4	2.27	Nov 2024	3379.40	1371.481	37.75
Zone4	1.06	Nov 2024	1159.34	302.262	17.212
Zone4	21Q	Nov 2024	2899.60	1571.317	43.12
Zone4	21I	Nov 2024	2854.70	1668.793	41.636
Zone4	22KB	Nov 2024	2981.80	1603.49	42.842
Zone4	26CE	Nov 2024	1377.77	1711.891	40.589
Zone4	30BB	Nov 2024	2604.86	1726.496	41.543
Zone4	1.09B	Nov 2024	1344.14	117.48	9.915
Zone4	21GC	Nov 2024	2901.12	1614.054	43.437
Zone4	BM15	Nov 2024	976.94	783.004	20.509
Zone4	2.31B	Nov 2024	3201.23	1637.289	42.086
Zone4	SM822	Nov 2024	2512.91	1841.132	41.452
Zone4	27N	Nov 2024	2179.57	2075.99	71.905
Zone4	2.30B	Nov 2024	3000.35	1672.941	43.164
Zone4	27E	Nov 2024	2494.09	2171.622	50.335
Zone4	21HC	Nov 2024	2916.84	1728.842	42.875

Zone	Station ID	Survey Date	X	Y	Z
Zone4	4.08	Nov 2024	2350.64	2022.324	73.207
Zone4	7BB	Nov 2024	1105.69	1689.902	35.929
Zone4	3.01	Nov 2024	1291.95	1690.33	37.286
Zone4	4.07	Nov 2024	2554.47	2079.237	45.041
Zone4	3.04B	Nov 2024	1123.76	1821.498	39.273
Zone4	26AE	Nov 2024	1432.47	1883.479	37.542
Zone4	4.05	Nov 2024	2809.68	1897.682	40.612
Zone4	27J	Nov 2024	2344.14	2136.138	62.127
Zone4	27H	Nov 2024	2413.27	2149.757	57.023
Zone4	26H	Nov 2024	1452.90	1729.593	49.952
Zone4	26MB	Nov 2024	1593.46	1750.663	58.959
Zone4	BM30	Nov 2024	2715.36	1996.207	44.08
Zone4	3.02	Nov 2024	1344.87	1837.735	34.934
Zone4	27F	Nov 2024	2466.48	2164.026	52.312
Zone4	3.09	Nov 2024	1618.51	1870.174	51.91
Zone4	26JB	Nov 2024	1495.71	1756.55	53.721
Zone4	3.11A	Nov 2024	1786.17	1929.216	62.141
Zone4	30AB	Nov 2024	2685.64	1898.443	46.229
Zone4	27DC	Nov 2024	2541.24	2190.709	48.181
Zone4	27AB	Nov 2024	2009.08	2064.334	73.474
Zone4	3.10A	Nov 2024	1689.03	1978.29	53.428
Zone4	27L	Nov 2024	2280.24	2115.41	65.832
Zone4	3.13	Nov 2024	1744.89	2097.492	53.751
Zone4	27O	Nov 2024	2101.57	2042.821	75.018
Zone4	BM26	Nov 2024	1542.45	1837.805	45.414
Zone4	26OB	Nov 2024	1706.93	1812.27	67.173
Zone4	3.6A	Nov 2024	1526.28	2015.739	38.912
Zone4	21J	Nov 2024	2773.44	1688.923	lost
Zone3	2CE	Nov 2024	774.75	1313.191	34.6
Zone3	14DB	Nov 2024	876.99	411.215	15.137
Zone3	2.34	Nov 2024	3452.45	1683.502	37.699
Zone3	A33C	Nov 2024	456.03	1219.226	35.838
Zone3	2.36	Nov 2024	3433.14	1534.879	35.914
Zone3	1.25	Nov 2024	2175.94	-129.105	20.046
Zone3	1.07	Nov 2024	924.43	267.487	12.484
Zone3	2.40B	Nov 2024	3572.85	1526.452	33.141
Zone3	2.33	Nov 2024	3294.51	1691.952	40.294
Zone3	4EC	Nov 2024	782.01	1687.78	41.111

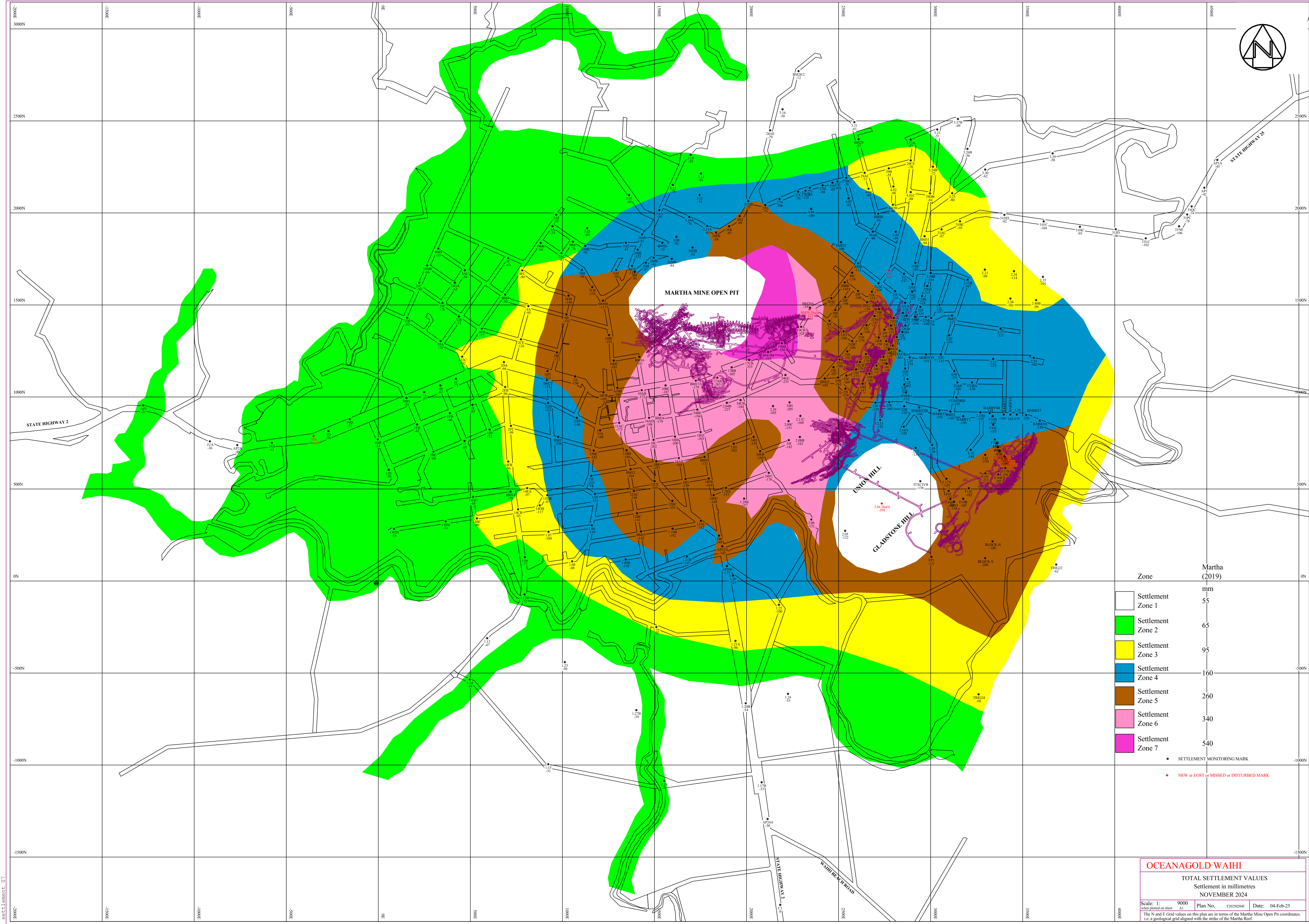
Zone	Station ID	Survey Date	X	Y	Z
Zone3	2FC	Nov 2024	720.33	843.055	23.908
Zone3	4.02	Nov 2024	2797.90	2143.571	45.751
Zone3	15DB	Nov 2024	917.56	466.148	15.583
Zone3	14EA	Nov 2024	808.56	504.723	17.072
Zone3	4A	Nov 2024	815.01	1494.154	40.677
Zone3	31BC	Nov 2024	3159.33	1954.857	45.488
Zone3	2DA	Nov 2024	682.15	1189.579	35.795
Zone3	BM31	Nov 2024	2967.04	1873.475	43.272
Zone3	14CB	Nov 2024	759.10	389.766	18.803
Zone3	4.03B	Nov 2024	2794.90	2044.783	43.789
Zone3	14BC	Nov 2024	535.45	340.67	20.896
Zone3	4.04	Nov 2024	2662.60	2131.765	45.907
Zone3	4.01C	Nov 2024	2891.78	2113.146	47.29
Zone3	1.08	Nov 2024	1052.91	107.171	16.511
Zone3	31AC	Nov 2024	3059.04	1910.629	44.056
Zone3	14FB	Nov 2024	705.60	649.144	20.133
Zone3	2EB	Nov 2024	689.02	1054.621	29.246
Zone3	1.21A	Nov 2024	1939.94	-325.504	19.644
Zone3	29DB	Nov 2024	2996.63	2106.66	47.795
Zone3	3.25	Nov 2024	3116.90	2107.056	49.801
Zone3	1.22	Nov 2024	1510.00	-249.925	15.856
Zone3	3.24B	Nov 2024	3012.46	2251.58	51.984
Zone3	29AC	Nov 2024	2641.62	2218.071	48.505
Zone3	29CE	Nov 2024	2891.84	2285.59	51.56
Zone3	29B	Nov 2024	2772.84	2242.22	49.992
Zone2	1.12B	Nov 2024	794.14	-73.011	11.033
Zone2	1K	Nov 2024	511.74	957.174	29.584
Zone2	7AC	Nov 2024	994.54	1781.82	43.509
Zone2	3.03	Nov 2024	1134.46	1917.237	39.332
Zone2	3.14	Nov 2024	1752.75	2214.323	48.746
Zone2	BM4	Nov 2024	689.21	1555.547	42.261
Zone2	3.12	Nov 2024	1599.68	2152.411	40.25
Zone2	33F	Nov 2024	347.95	1511.678	42.031
Zone2	4FB	Nov 2024	562.51	1370.97	39.356
Zone2	BM7	Nov 2024	1057.32	1843.069	44.1
Zone2	33E	Nov 2024	437.71	1437.524	40.973
Zone2	6A	Nov 2024	946.43	1928.115	47.495
Zone2	1C	Nov 2024	421.48	1098.886	34.776

Zone	Station ID	Survey Date	X	Y	Z
Zone2	1JB	Nov 2024	604.79	822.761	26.398
Zone2	1.04	Nov 2024	795.98	129.359	12.787
Zone2	33A	Nov 2024	338.15	1303.893	36.707
Zone2	BM14	Nov 2024	718.16	485.955	19.818
Zone2	3.07	Nov 2024	1362.08	2096.818	48.03
Zone2	1B	Nov 2024	337.50	1062.935	33.99
Zone2	1I	Nov 2024	468.34	761.228	27.262
Zone2	33DB	Nov 2024	265.40	1714.719	46.352
Zone2	BM6	Nov 2024	881.86	1837.081	46.218
Zone2	14AC	Nov 2024	515.17	457.622	24.008
Zone2	5C	Nov 2024	705.43	1754.71	45.154
Zone2	33GA	Nov 2024	415.95	1621.638	45.338
Zone2	1FB	Nov 2024	210.46	850.779	29.816
Zone2	1HC	Nov 2024	299.70	702.8	27.031
Zone2	1EB	Nov 2024	388.60	912.09	30.419
Zone2	BM29	Nov 2024	2608.80	2400.756	55.951
Zone2	1A	Nov 2024	249.92	1026.38	33.319
Zone2	3.22A	Nov 2024	2891.15	2398.649	56.648
Zone2	1O	Nov 2024	-271.35	814.183	22.702
Zone2	3.05	Nov 2024	966.29	1990.771	47.177
Zone2	3.15	Nov 2024	1696.24	2315.821	39.093
Zone2	1.03B	Nov 2024	365.55	323.37	19.371
Zone2	1.02D	Nov 2024	85.42	283.3	18.644
Zone2	5AC	Nov 2024	470.30	1688.454	47.024
Zone2	1GB	Nov 2024	-2.87	769.742	29.281
Zone2	BM5	Nov 2024	325.93	1806.47	47.792
Zone2	33B	Nov 2024	156.88	1430.804	34.4
Zone2	BM1	Nov 2024	152.75	994.869	32.762
Zone2	1ME	Nov 2024	-155.40	879.887	26.091
Zone2	33C	Nov 2024	222.53	1621.241	44.398
Zone2	1.01	Nov 2024	56.47	604.075	25.437
Zone2	1RA	Nov 2024	-579.06	750.356	16.726
Zone2	1.14	Nov 2024	496.74	-535.095	8.432
Zone2	AP2	Nov 2024	-1276.40	954.13	5.765
Zone2	1.16	Nov 2024	1552.97	-1086.27	18.352
Zone2	1PA	Nov 2024	-351.51	787.24	missed
Zone1	2.44	Nov 2024	2734.64	421.025	27.23
Zone1	2.05	Nov 2024	2535.68	272.682	20.758

Zone	Station ID	Survey Date	X	Y	Z
Zone1	31NE	Nov 2024	4349.43	1927.421	33.323
Zone1	31FC	Nov 2024	3614.22	1954.151	43.398
Zone1	31LC	Nov 2024	4168.53	1862.106	32.066
Zone1	2.35	Nov 2024	3609.80	1652.681	34.085
Zone1	31HC	Nov 2024	3810.83	1924.654	40.303
Zone1	31DD	Nov 2024	3400.43	1989.833	46.668
Zone1	31JD	Nov 2024	4005.65	1911.423	35.531
Zone1	28AE	Nov 2024	2128.26	2448.76	85.897
Zone1	31PC	Nov 2024	4393.52	1991.662	37.705
Zone1	31QC	Nov 2024	4417.71	2035.374	39.602
Zone1	3.30	Nov 2024	3296.29	2235.94	50.3605
Zone1	3.21	Nov 2024	2585.77	2493.375	64.915
Zone1	3.16	Nov 2024	2195.60	2563.077	95.596
Zone1	3.26B	Nov 2024	3200.09	2347.92	55.399
Zone1	1.20B	Nov 2024	1995.49	-664.093	22.019
Zone1	1.24	Nov 2024	2225.16	-613.228	16.681
Zone1	3.23	Nov 2024	3035.80	2453.651	59.607
Zone1	1.23	Nov 2024	1013.01	-440.769	13.259
Zone1	3.29	Nov 2024	3662.64	2323.533	44.901
Zone1	3.27B	Nov 2024	3148.37	2510.53	60.263
Zone1	1.13	Nov 2024	591.36	-310.80	7.046
Zone1	AP2A	Nov 2024	-766.18	738.506	12.304
Zone1	AP1A	Nov 2024	4557.10	2288.33	42.455
Zone1	AP1	Nov 2024	4486.29	2137.008	41.351
Zone1	1.27B	Nov 2024	1401.56	-701.57	15.3225
Zone1	1UA	Nov 2024	-914.75	759.054	8.719
Zone1	1.17B	Nov 2024	2082.20	-1093.92	25.571
Zone1	1.15	Nov 2024	923.35	-995.41	14.341
Zone1	AP24A	Nov 2024	2114.57	-1292.93	28.045
Zone1	AP20No2	Nov 2024	-2303.63	731.69	20.184
Zone1	BM28/2	Nov 2024	2282.46	2770.684	101.874
Zone1	AP19	Nov 2024	-3242.58	480.68	-6.5213
Zone1	BUH5	Nov 2024	5480.15	2780.649	52.7029
Zone1	C1	Nov 2024	2183.23	-1759.33	32.8139
Favona	F18	Nov 2024	3423.83	648.3	39.941
Favona	F20	Nov 2024	3411.70	665.722	40.873
Favona	F21	Nov 2024	3405.99	671.998	40.716
Favona	F17B	Nov 2024	3405.48	613.912	43.944
Favona	F24	Nov 2024	3388.13	690.846	40.598

Zone	Station ID	Survey Date	X	Y	Z
Favona	F22	Nov 2024	3399.79	678.393	40.662
Favona	F15C	Nov 2024	3297.17	585.319	57.302
Favona	BLOCK-S	Nov 2024	3295.82	124.324	24.806
Favona	F16B	Nov 2024	3367.38	578.696	46.361
Favona	F26	Nov 2024	3374.47	705.541	40.563
Favona	BLOCK-N	Nov 2024	3336.45	215.694	24.275
Favona	F10B	Nov 2024	3176.88	446.75	49.243
Favona	F34C	Nov 2024	3339.49	849.569	40.158
Favona	F12C	Nov 2024	3207.32	503.824	53.471
Favona	F28B	Nov 2024	3365.21	727.17	40.483
Favona	F30B	Nov 2024	3359.36	748.26	40.672
Favona	F08A	Nov 2024	3126.97	430.49	42.72
Favona	F32B	Nov 2024	3348.78	769.103	40.839
Favona	F35B	Nov 2024	3336.68	896.063	39.749
Favona	F06	Nov 2024	3107.08	445.21	40.474
Favona	ITXCIVB	Nov 2024	2943.85	542.17	32.585
Favona	F02	Nov 2024	3097.60	490	38.176
Favona	FP1	Nov 2024	3004.15	131.25	45.388
Favona	TRIG 24	Nov 2024	3260.76	-615.678	25.662
Favona	TRIG 22	Nov 2024	3681.97	89.358	26.128

APPENDIX E – SETTLEMENT MARKS & CONTOURS MAPS



Zone	Martha (2019)
Settlement Zone 1	55 mm
Settlement Zone 2	65
Settlement Zone 3	95
Settlement Zone 4	160
Settlement Zone 5	260
Settlement Zone 6	340
Settlement Zone 7	540

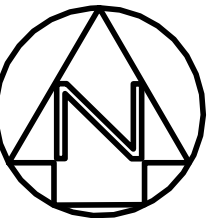
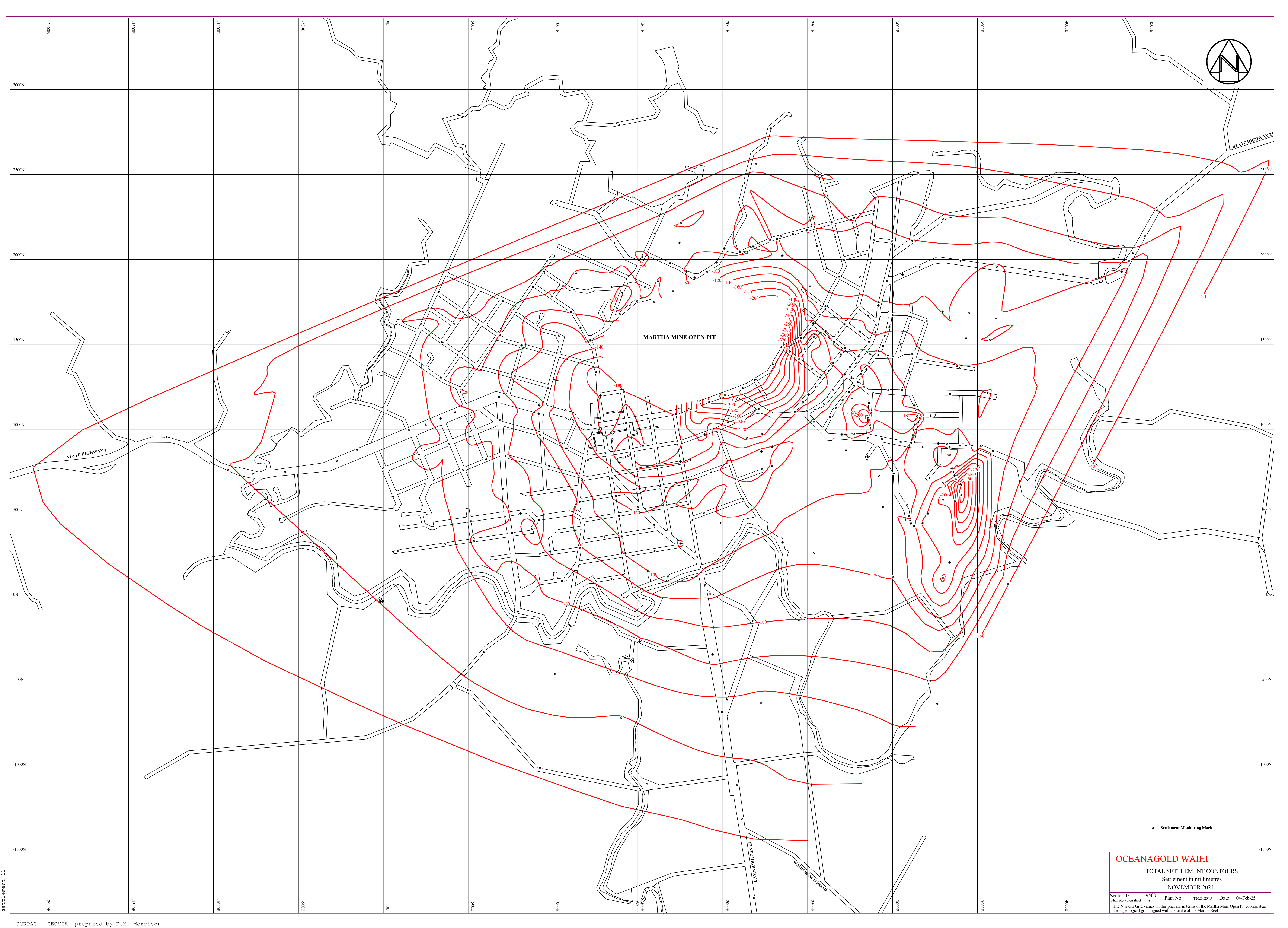
• SETTLEMENT MONITORING MARK

• NEW or LOST or MISSED or DISTURBED MARK

OCEANAGOLD WAIHI

TOTAL SETTLEMENT VALUES
Settlement in millimetres
NOVEMBER 2024

Scale: 1: 9000
when plotted on sheet A1
Plan No. T20260204C
Date: 04-Feb-25
The N and E Grid values on this plan are in terms of the Martha Mine Open Pit coordinates.
i.e. a geological grid aligned with the strike of the Martha Reef



STATE HIGHWAY 25

MARTHA MINE OPEN PIT

STATE HIGHWAY 2

STATE HIGHWAY 2

WAIHI BEACH ROAD

* Settlement Monitoring Mark

OCEANAGOLD WAIHI

TOTAL SETTLEMENT CONTOURS
Settlement in millimetres
NOVEMBER 2024

Scale: 1: 9500
when plotted on sheet A1
The N and E Grid values on this plan are in terms of the Martha Mine Open Pit coordinates.
i.e. a geological grid aligned with the strike of the Martha Reef

Plan No. T202502040 Date: 04-Feb-25

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