OCEANAGOLD
WAIHI OPERATION

Dewatering and Settlement Report 2023

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DEWATERING & SETTLEMENT MONITORING REPORT 2023

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EXECUTIVE SUMMARY

This annual Dewatering and Settlement Monitoring Report is a requirement of the consent conditions for the Martha, Favona, Trio, Correnso and Project Martha mining projects, in Waihi, New Zealand.

Compliance monitoring and assessment of groundwater and settlement trends are reported in this document for the period 1 January 2023 to 31 December 2023. Such monitoring and reporting have been completed in accordance with the current Dewatering and Settlement Monitoring Plan that was approved by the Hauraki District Council (HDC) and Waikato Regional Council (WRC) in August 2023.

On 16 July 2017, the Correnso groundwater take permit 124860 was replaced by the Project Martha groundwater take permit 139551. This allows dewatering to a lower level (500 mRL cf. 700 mRL).

New settlement triggers were applied during 2020 following approval of the Project Martha consents. These current trigger levels are based on settlement estimates, which trigger a notification to council and review of the area and ongoing settlement trends. Exceeding settlement trigger limits alone does not represent an issue. Settlement can occur with no material effect at the surface. Tilt, which is differential settlement, has the potential to be problematic for residential properties or public infrastructure and can be caused by shallow settlement effects. Tilts are only problematic if notably greater than 1 in 1000 and therefore this is the consented tilt trigger level. Shallow settlement effects can be linked to drawdown of the shallow water table and therefore monitoring of the piezometric levels is of importance.

The current settlement survey results indicate that 95.8% (345/360) of the marks graphed were within the predicted ranges of settlement resulting from mining activities. Fifteen (15) marks triggered further investigation. Five of these triggered settlement marks were located above the Favona mining area.

Six marks in the Favona area have measured tilts greater than 1 in 1000. These marks are situated on farmland that is owned by the company and are located directly above the Favona workings, as such, this ground movement has no material effect on residential property.

The remaining ten (10) of the above fifteen (15) triggered marks are located in the wider Waihi area. Generally, no effects were observed at surface near these locations, tilts were less than the 1 in 1000, and nearby shallow piezometers have not displayed any changes outside of normal seasonal trends. Settlements around marks BM20 and BM20A have resulted in tilts of around 1 in 1000; however, there is no residential property in this Slevin Park area.

Overall, the settlement and dewatering trends are within predicted expectations and no surface effects of concern have been identified to date.

Martha Open Pit

Dewatering from the Martha Pit was discontinued on 4 May 2015 after a slip on the north wall resulted in access and power supply to the dewatering pumps becoming limited. Dewatering from within the Correnso underground mine (still authorised under the original consents) was initiated on 18 May 2015. The Martha, Trio, Correnso and SUPA groundwater systems are hydraulically linked, and water levels are now controlled by the Martha Underground dewatering.

Generally, the groundwater level monitoring which has been completed to date indicates that the Martha Open Pit and Underground dewatering has:

- negligible effect on the shallow groundwater table,
- minor effect in the deeper younger volcanic groundwater pressures locally around the pit, and
- notable depressurisation or dewatering in the deep andesite.

As the drawdown effects are primarily deep and limited to within the andesite rock, no undesirable tilts have manifested at the surface. No new trends have developed during 2023.

Analysis of the relevant monitoring data has indicated that most settlement around Martha Pit had developed by the mid to late 1990s, but widespread small magnitude settlement has been ongoing and is likely to be related to dewatering of deeper structures within the andesite rock mass. Groundwater monitoring data does not show any widespread or significant dewatering of alluvium, or of the upper portions of the young volcanic materials which could lead to undesirable tilt at the surface.

No property damage complaints attributable to mine dewatering or settlement in response to mine dewatering were reported during 2023. Compliance was achieved with the consent conditions granted for the Martha Extended Project.

Favona

At the Favona Mine the measured piezometer levels indicate continued dewatering of the vein system, with the groundwater level being maintained at approximately 800 mRL mine datum by the end of 2023. Water levels in the country rock surrounding the vein system stand higher and are either not responding or responding slowly to dewatering.

Five Favona marks exceed the settlement predictions set for Project Martha. A settlement trend exists over a 150 m wide area above the underground workings with a maximum total settlement of 375 mm (F18), of which up to 326 mm can be attributed to Favona mining activity. This is greater than the 80 mm initially predicted by URS (2002 Technical Report) to be due to dewatering. This settlement is attributed to a combination of depressurisation stress (primary consolidation) associated with drawdown in the andesite rock and relaxation of the country rock as mining proceeded. Primary consolidation (i.e. which occurs the first time a mine is dewatered) is greater than a second cycle (i.e due to subsequent dewatering activities). It is therefore worthy of note that the Favona Mine is outside of the Martha groundwater system; the Martha system was historically dewatered for a longer period and to greater depth, and is currently undergoing a second period of dewatering.

Six tilt gradients attributable to Favona mining activity remain steeper than 1 in 1000. These locations are on farmland that is owned by the company and are south of the residential area along Barry Road. All of these locations have been recorded in previous surveying events.

The previous trigger levels which applied to the Favona piezometers have been removed. These have been superseded by the Waihi wide triggers that were introduced as part of the Correnso dewatering consent. The current trigger is a 15m water level change within a month. No Favona piezometer had such an increase or decrease. Compliance with the conditions of the Favona consents and Monitoring Plan was achieved.

Trio

The groundwater levels in this area are assessed to be controlled by the Martha Underground dewatering.

Correnso

The Correnso Underground Mine was granted consent and operations began on 20 December 2013.

The Correnso water take permit was activated in July 2017, allowing dewatering to lower the groundwater down to 700 mRL (WRC #124860, Schedule One – General Conditions, Condition 1), beyond the lowest level authorised for the mining of Trio.

New settlement trigger levels for Correnso were applied in 2017 and Project Martha superseded these in 2020. During 2023, no settlement mark in the Correnso Extensions Project Area (CEPA)

displayed dewatering related settlement and no consent related groundwater trigger was activated. Compliance was achieved with the consent conditions granted for the Correnso Project.

SUPA

The Slevin Underground Project Area is essentially an extension of the Correnso mining area. Mining within the SUPA area began 16 January 2017. No new WRC consents were required for the activity which is covered by existing WRC consent conditions. The HDC dewatering and settlement related conditions are similar to the WRC conditions for Correnso. No new monitoring or reporting is required as the existing networks adequately encompass SUPA.

MDDP

The Martha Drill Drives Project (MDDP) was granted consent on 9 August 2017. Mining in the MDDP began 17 August 2017 and was completed during 2019. The project involved the construction of two underground drill drives from the SUPA area towards Martha Pit. No specific HDC conditions relate to dewatering and settlement, rather it is covered by existing WRC Correnso consent conditions. No new monitoring or reporting is required as the existing networks adequately encompass MDDP.

Project Martha

Consents for Project Martha were granted on 1 February 2019. Joint HDC and WRC consents were activated on 27 July 2019 when blasting began in the project area. The current Project Martha groundwater take permit (139551) was activated on 1 January 2020 and allows dewatering down to 500 mRL. New dewatering bores were installed during 2020 to progressively lower the water level to enable Project Martha activities. At the end of 2023, the water level was at approximately 662 mRL.

In June 2023, amendments were made to the Dewatering and Settlement Monitoring Plan to specifically address additional monitoring requirements as a result of the proposal to mine the Rex orebody to a higher elevation. This was approved by WRC and HDC in August 2023, and more focused monitoring of groundwater level/pressure along the strike of the Rex orebody began in October 2023.

INTRODUCTION

This report is submitted to meet the requirements of the various consents which are currently held by Oceana Gold New Zealand Limited (OGNZL) that are related to mine-related dewatering and settlement. New consents have been issued for different projects as mining has progressed at Waihi with many having conditions and reporting requirements in common. A full list of the relevant conditions pertaining to dewatering and settlement are included in Appendix A. Consents for Martha, Favona, Trio, Correnso, SUPA, MDDP and Project Martha all require a dewatering and settlement monitoring plan. Below is a summary of the current common consent requirements:

The (annual monitoring report) report shall, as a minimum, provide the following information:

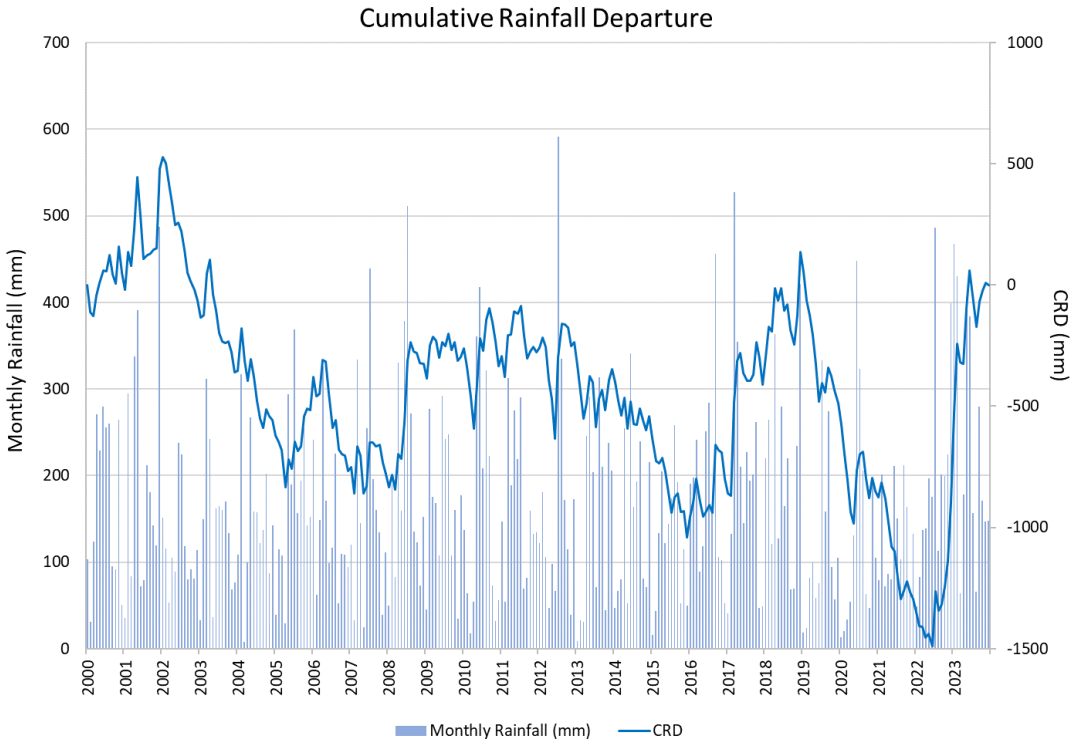
a) The volume of groundwater abstracted;
b) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;
c) An interpretation and analysis of the monitoring data, in particular any change in the groundwater 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;
e) Comment on compliance with [any conditions] 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 the Councils.

1 CLIMATE CONDITIONS

Historical rainfall data for Waihi has been collected since 1907, with annual measured rainfall ranging between 1249 and 3234 mm per annum.

Annual and seasonal rainfall trends are displayed in Figure 1. Cumulative Rainfall Departure (CRD) is a concept used to evaluate the temporal correlation of rainfall with surface water or groundwater levels. Rainfall departure signifies the difference between the normal rainfall and actual rainfall. The CRD plot presents monthly long-term trends in rainfall since 2000, with a rising slope since July 2022 indicating above average rainfall since then.

The 2023 annual rainfall (2898 mm) was more than the previous year (2403 mm in 2022), significantly more than 2021 (1560 mm), and 791 mm more than the historical average of 2107 mm. The month with the highest rainfall in 2023 was January (468 mm) followed by February (430 mm) and the driest month was March (64 mm) followed by August (66 mm).



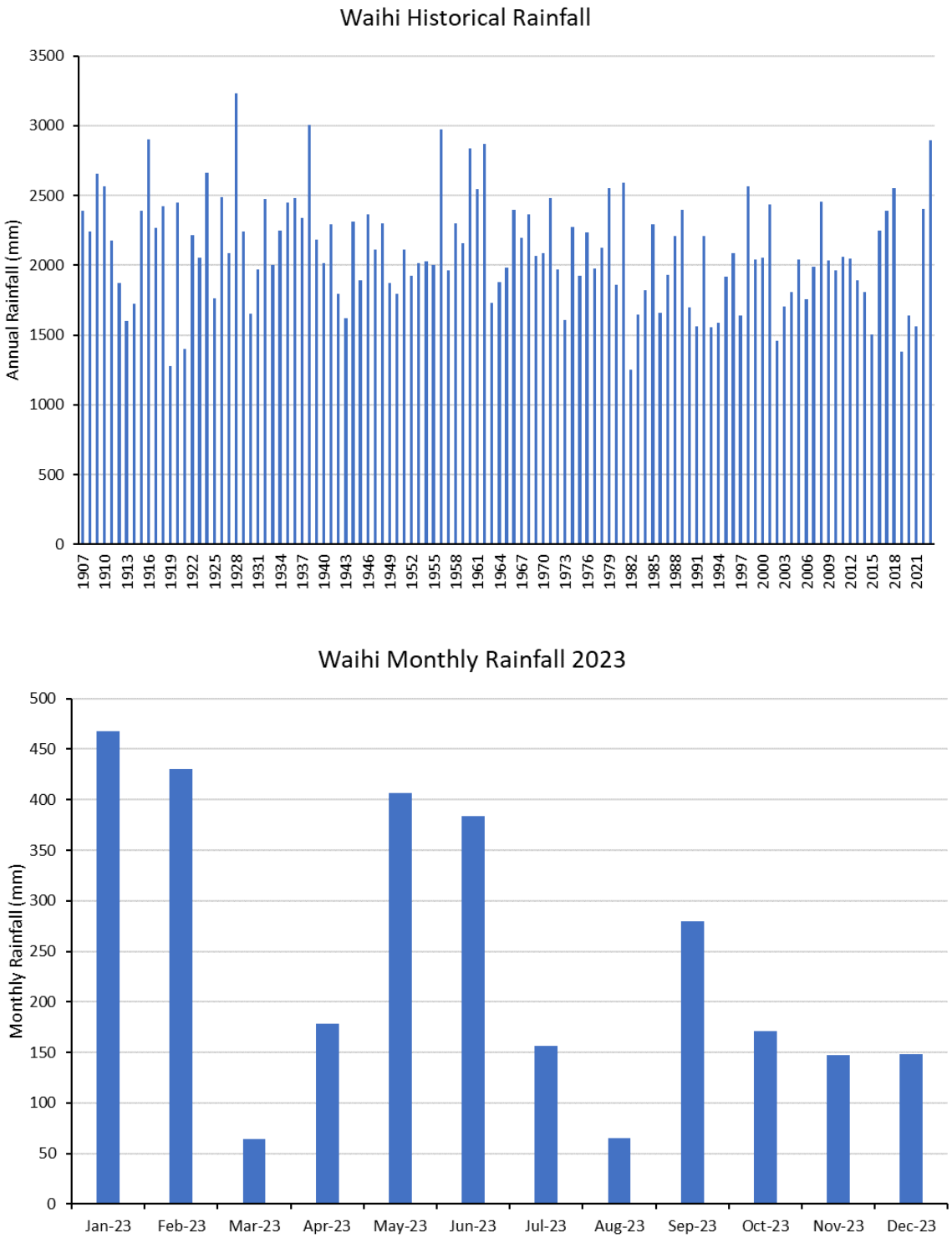


Figure 1. Annual and seasonal rainfall trends. A) CRD plot 2000–2023, B) Historical rainfall 1907–2023, C) Monthly rainfall 2023.

2 GEOLOGICAL SETTING

The mineralised veins of the Martha, Favona, Trio and Correnso gold deposits in Waihi are developed within Miocene age lava flows, intrusives and volcaniclastics of predominantly andesitic and minor dacitic composition (Figure 2). The andesites extend to depths greater than 600m below the surface and are extensively modified in places by weathering and hydrothermal alteration. The andesites are unconformably overlain by younger, unmineralised rhyolitic ignimbrites under much of the Waihi township. The ignimbrites drape over an eroded andesitic graben and horst landscape resulting in a volcaniclastic package that is highly variable in thickness (0 to >100m). Additionally, the ignimbrites exhibit variable textures, ranging from light weight, soft and pumice-rich horizons that are highly permeable to hard welded ignimbrites that appear less permeable. Paleosols (buried soils) and sedimentary deposits, such as alluvium and boulder alluvium (in places) mark the tops of successive eruption sequences.

There is a discontinuous layer of recent alluvium beneath the Waihi township that is located in areas where old streams and river channels cut into the ignimbrites and andesite units. These alluvial deposits are extensive to the east of Waihi where they are associated with the drainage systems of the Ohinemuri River catchment.

The most common effect of hydrothermal alteration on the andesitic host rocks surrounding the veins is the alteration of primary feldspars to illite and smectite clays and the introduction of pervasive potassic feldspar. Illite and smectite clays generally cause the host rocks to lose their internal strength forming weaker and usually more friable rock. The extent of clay alteration is highly variable and dependant on veining and the host rock type. In Waihi the strongly clay altered zones are usually concentrated within close proximity to the veins or faults (e.g. within the hanging wall of Favona) and within the vein zones themselves (e.g. Martha, Correnso and Trio). Potassic alteration on the other hand generally increases the overall strength of the host rocks which often results in the rocks surrounding the veins being more resistant to weathering and forming bluffs such as the Martha Hill (prior to mining of the Martha Open Pit) and Union Hill in Waihi. Paleo-weathering and hydrothermal alteration appear to have created an extensive low-permeability clay-rich horizon within the upper part of the andesite sequence. This horizon generally separates the andesites, hydro-geologically, from the younger overlying sequence of permeable rhyolitic ignimbrites. Exposure of the altered andesite in the southern wall of the Martha Pit indicates that the weathered clay horizon may extend up to 30m in thickness.

In the vicinity of the Martha vein zone the groundwater is largely concentrated within old underground mine workings, faults and veins where the historical mine workings act as effective conduits allowing inflow of groundwater water from the area surrounding the current Martha Open pit.

Principal veins and faults at both Martha and Favona dip to the south-east while the Correnso vein strikes north-north-west with an easterly dip. The Trio-Union-Amaranth veins are located on a paleotopographic high, informally referred to as the Union Horst that separates the Martha vein system from the Favona-Moonlight vein systems.

There is a hydrogeological connectivity between the Martha vein system and the Trio-Union-Amaranth vein system which is thought to be facilitated by the connecting Correnso structure. This was demonstrated historically by the rise and fall of ground water levels in the Union Hill shaft in unison with the rise and fall of water levels in the Martha Open Pit. There is only a very weak hydro-geological connectivity between the Martha system and the Favona system, shown by a lack of mutual response in the measured ground water levels. The zone of separation between the two groundwater systems is not well defined, but may be due to a fault boundary, either the No 9 fault or the Favona footwall fault, both of which are north to northeast trending and have a perceived strike extent exceeding 1km.

Groundwater inflow is predominantly controlled by infiltration from overlying layers and through outcrops of ignimbrite in the beds of streams and at the ground surface. The rhyolitic ignimbrite

sequence is generally considered compressible and to date has accounted for most of the dewatering induced settlement around the mine site. This is indicated by settlement magnitude generally corresponding to the thickness of the rhyolitic ignimbrite and the magnitude of dewatering in these materials.

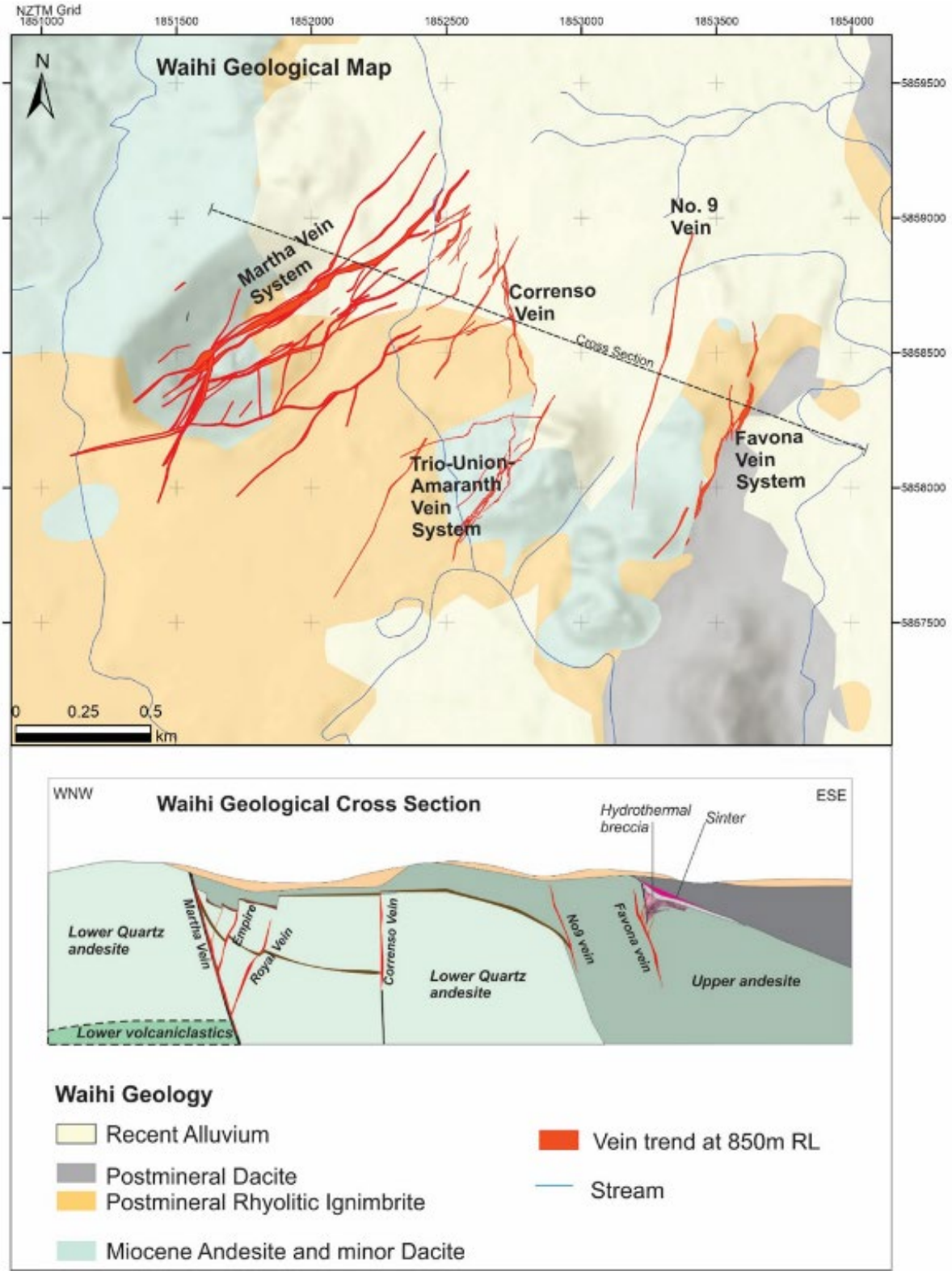


Figure 2. Geological map and cross section of the Waihi area showing the distribution of quartz veining and dominant geological rock units.

3 MINING ACTIVITIES

The main features of the mining activities during 2023 (in relation to dewatering and settlement) are described in the following sections.

3.1 Martha Open Pit

Access to the Martha Pit remained restricted during 2023 due to the north wall slip.

No production works were undertaken in the pit during 2023.

The pit remains in care and maintenance.

Highwall stabilisation work was completed on EDW-007 fresh air intake.

In pit waste rock storage (from Martha Underground) commenced.

3.2 Underground

3.2.1 Development & Production 2023

2023 saw development and production in the Martha mining area (Figure 3 & Figure 5), consisting mainly of declines, accesses, ore drives and stoping. Throughout 2023, 9,144m of development was completed. Approximately 171k tonnes of ore from development and 301k tonnes of ore from production was extracted over the period.

Limited mining activities were carried out in Correnso in 2023 (Figure 3 & Figure 4), with no blasting. Backfilling in line with the land use consents has commenced.

3.2.2 Future Mining Activities

Mining activities for 2024 will focus on ore drives and stoping in Martha in the areas of Rex, Empire West, Edward and Royal East. It is planned to remove approximately 480k tonnes of ore and complete approximately 10,000m of development for the year. The reader should refer to the Annual Work Programme (WAI-200-REP-002) for a full description of the planned future mining activities.

3.2.3 Waste Rock Management

Waste rock is managed by underground stockpiling, backfilling into stopes, and placement on temporary stockpiles on the surface and within Martha Open Pit.

On the surface, a short-term stockpile is maintained immediately behind the mill area, enabling easy access for backloading. Larger or longer-term volumes will be stored at the Favona ‘Polishing Pond’ Stockpile (near the water treatment plant) and within the Martha Open Pit.

Waste rock placement at the Favona ‘Polishing Pond’ Stockpile started in early February 2007. The stockpile stopped receiving material in 2011 and was empty until 2020 when it began to store waste rock from the Martha Underground. Previously, the site has also been utilised for interim placement of Martha ore.

Waste rock placement within the Martha Open Pit started in August 2023 and will continue into 2024.

Before undertaking stockpile construction, the Favona Underground Mine Settlement, Dewatering and Water Quality Monitoring Plan was prepared, and approved by Waikato Regional Council (WRC). A separate Favona Water Quality Monitoring Report is prepared mid-year and will be submitted to WRC at the appropriate time.

3.2.4 Groundwater Inflows

During 2023, there were no anomalous water inflows in the Edward, Empire West and Empire declines which are used for accessing deeper ore bodies for Project Martha.

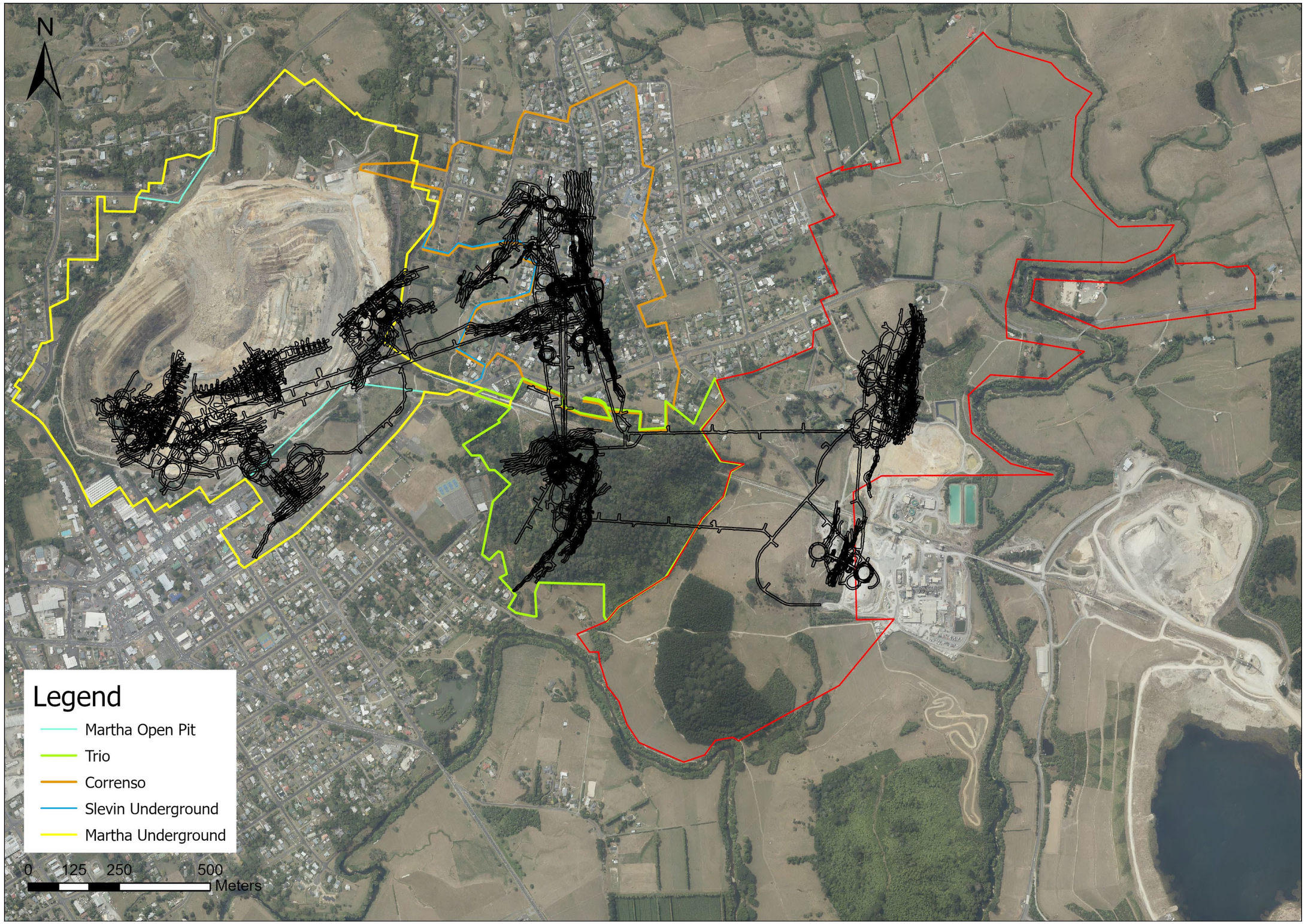


Figure 3. Current workings and boundaries.

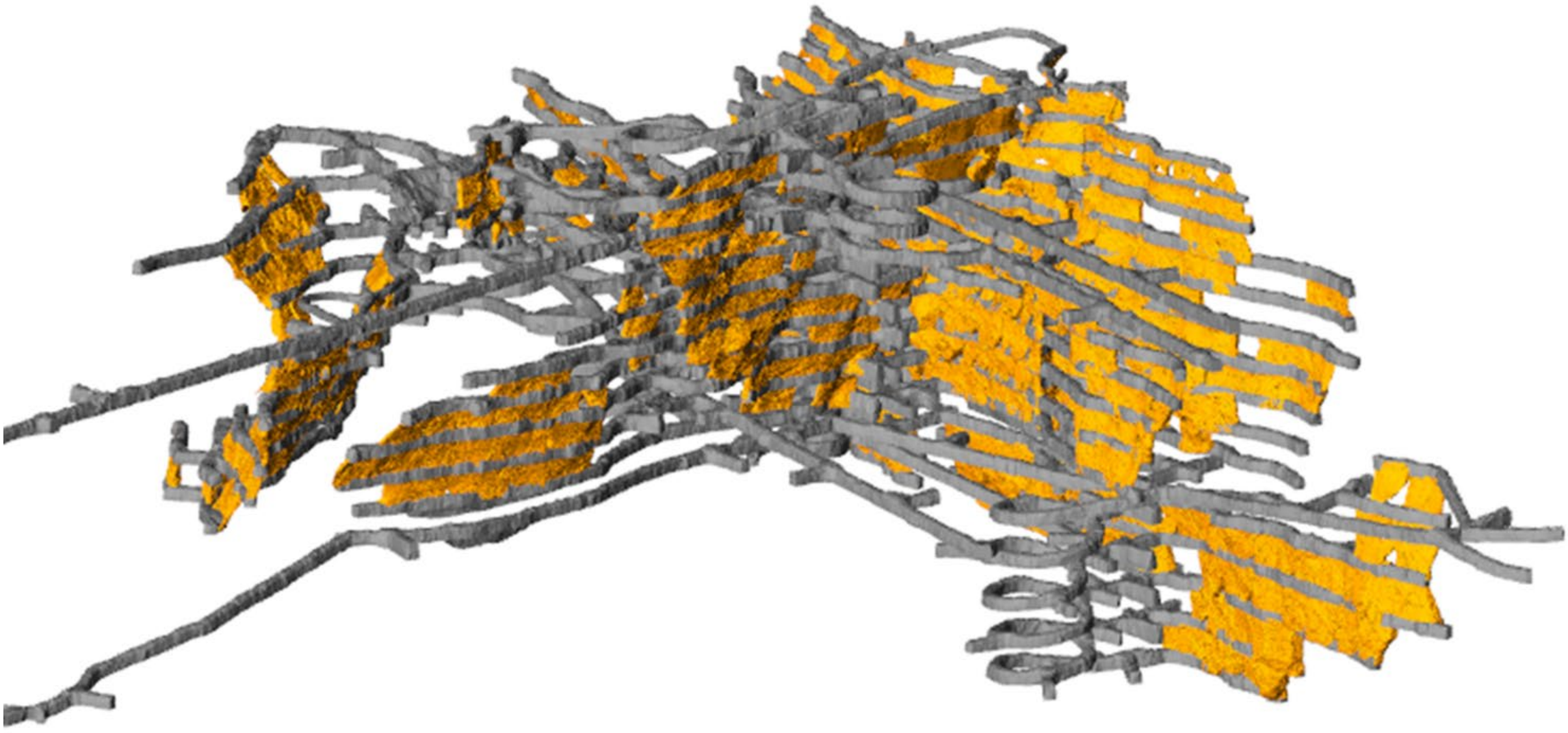


Figure 4. Oblique view of Correnso showing completed development and stoping activities. View is looking northeast from above.

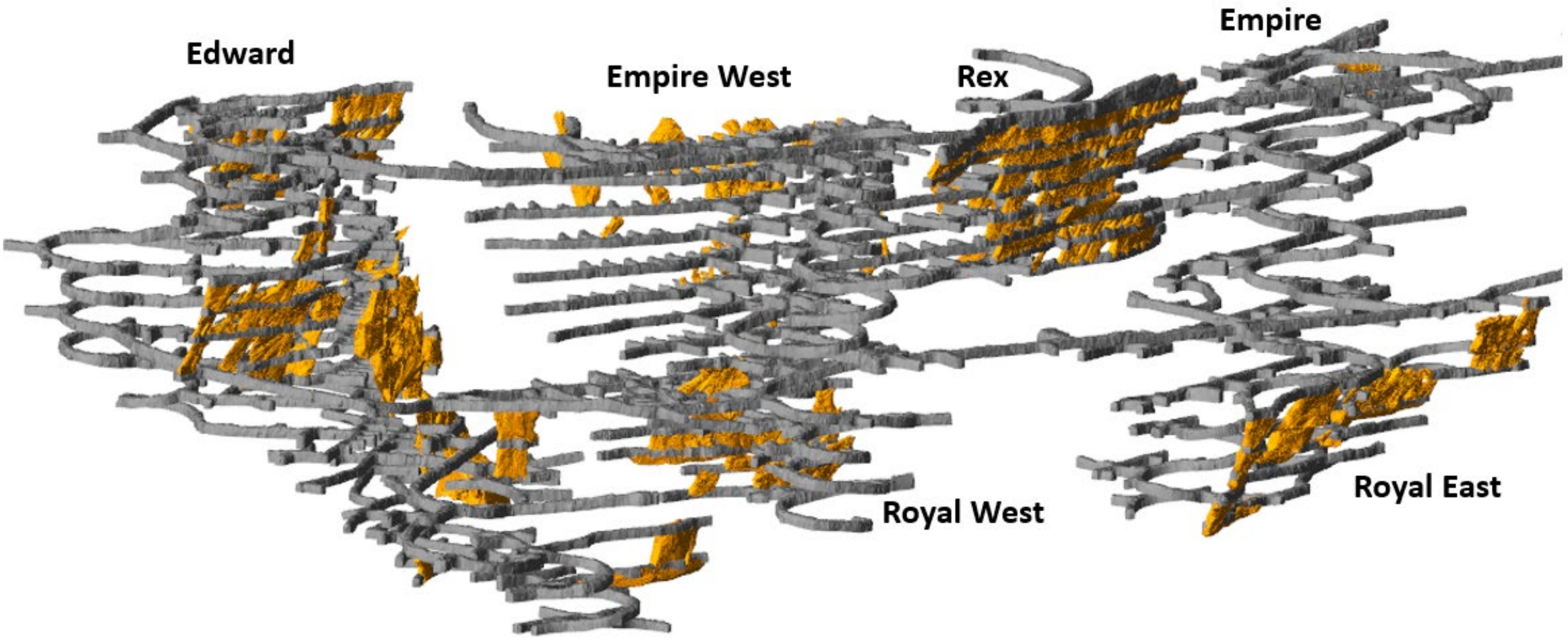


Figure 5. Oblique view of Martha showing completed development and stoping activities. View is looking northeast.

4 DEWATERING

Table 1 shows the annual combined abstraction rate from Martha, Favona, Correnso and Trio. Figure 6 shows groundwater take rates and water levels, and Figure 8 & Figure 9 show the current pump arrangement for underground dewatering.

During 2020, four dewatering pumps were installed in two bores (800 PC1 and 800 PC2) from the 800 mRL level to lower the groundwater levels for the Project Martha development. Dewatering to 500 mRL is permitted under the Project Martha consent. Water from these bores is connected to the existing Correnso dewatering line. Water levels began to be drawn down using these pumps during 2021. At the end of 2023, groundwater levels were drawn to 662 mRL (Figure 7).

Table 1. Martha, Favona, Trio & Correnso Mines - Annual dewatering volumes and rates.

Year	Total mine take (m^3)	Average pump rate (m^3/day)	Service water pumped underground (m^3)	Total mine take minus service water (m^3)
2015 (18/05 onwards)	1,338,760	5,871	60,727 (23/09 onwards)	1,278,033
2016	2,911,046	7,954	181,466	2,729,580
2017	3,637,734	9,996	219,198	3,418,536
2018	4,285,048	11,511	262,227	4,022,821
2019	3,153,288	8,639	254,859	2,898,429
2020	2,687,124	7,342	173,290	2,513,834
2021	3,379,568	9,259	182,803	3,196,765
2022	2,537,964	6,953	198,999	2,338,965
2023	4,045,764	11,084	229,295	3,816,469

During December 2019, at the request of a peer reviewer, a standalone flow meter was installed for the Favona dewatering line. Abstraction rates from Favona are shown in Table 2 below. In 2021, the pump was removed as the area was dry.

Table 2. Favona Mine - Annual dewatering volumes and rates.

Year	Favona mine take (m^3)	Average pump rate (m^3/day)
2019	1,637 (first reading 12/12/19)	125
2020	14,313	39
2021	14,539	39
2022	0	0
2023	0	0

Note: for continuity, Favona abstraction volumes are also included in 'Total mine take' numbers reported in Table 1.

4.1 Future Dewatering

The Project Martha dewatering consent allows dewatering to 500 mRL. Underground water levels were drawn to approximately 662 mRL in 2023. This will be progressively lowered during 2024, with a target pumping rate of 35 – 130 L/s, depending on rainfall and operational requirements. Water levels are projected to be lowered to approximately 630 mRL in 2024. Dewatering will be primarily from the drive and stope face as they mine below the dewatering bore levels.

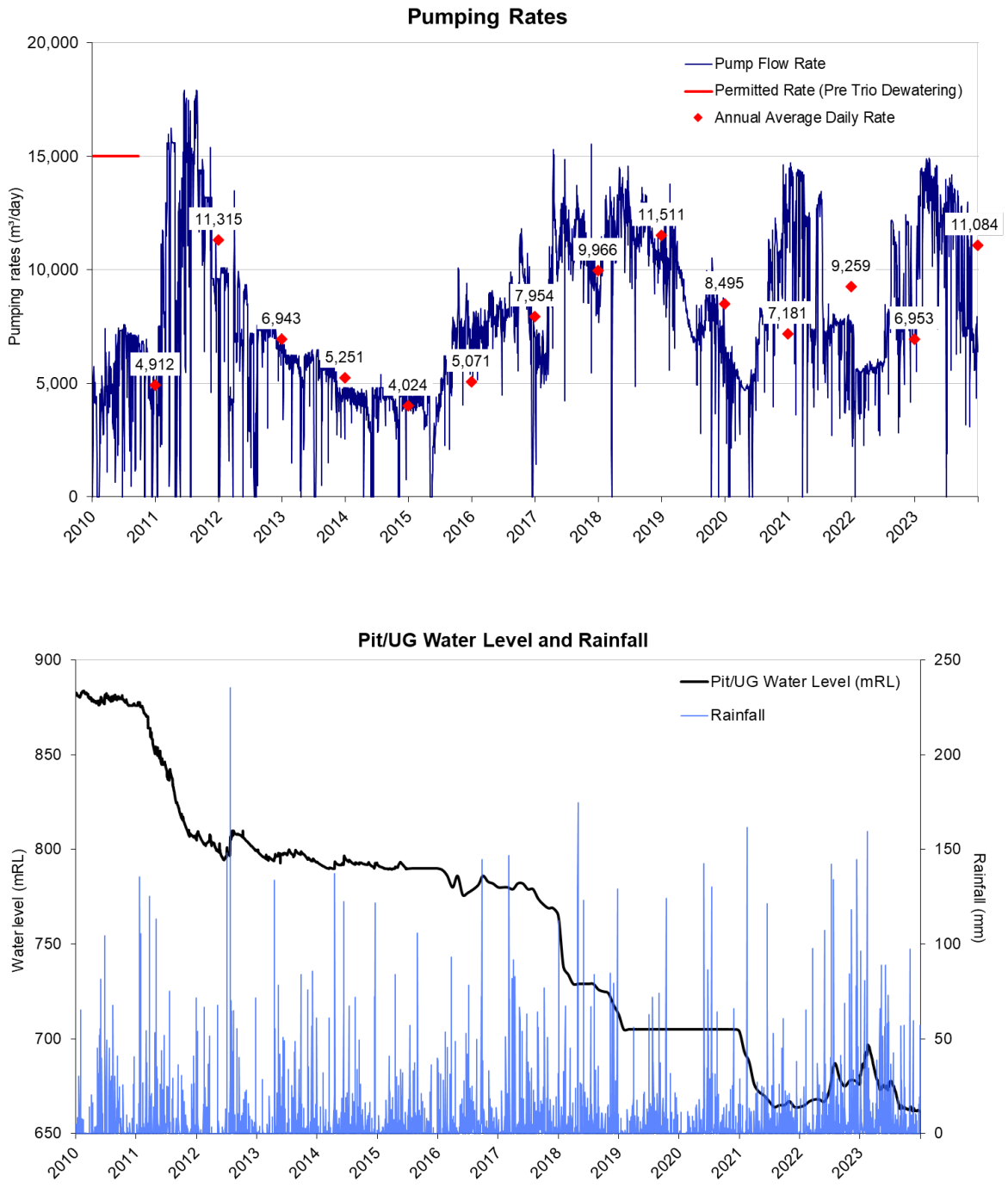
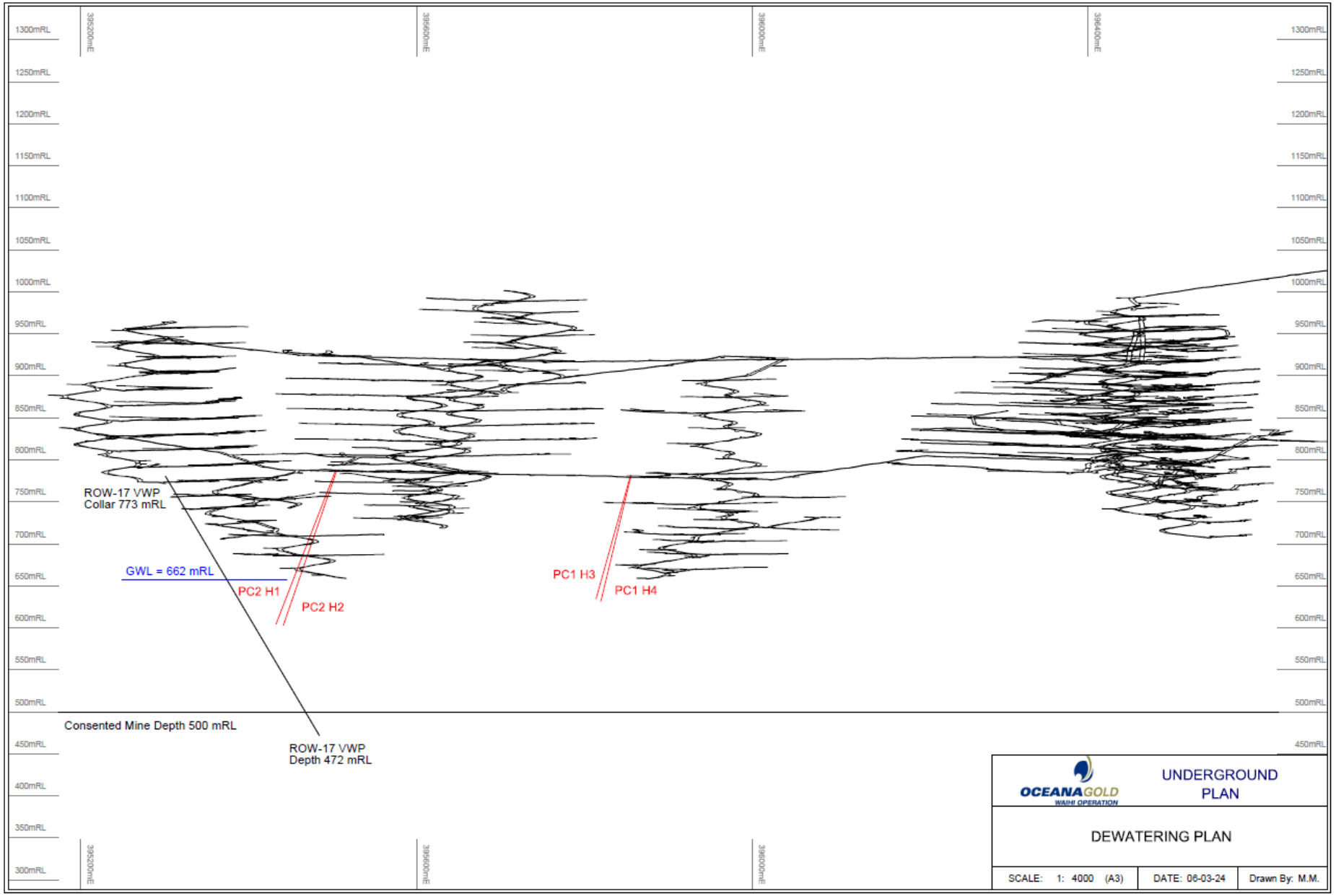


Figure 6. A) Underground dewatering pumping rates, B) Dewatering water level and rainfall.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395200mE
395600mE
396000mE
396400mE
ROW-17 VWP
Collar 773 mRL
GWL = 662 mRL
PC2 H1
PC2 H2
PC1 H3
PC1 H4
Consented Mine Depth 500 mRL
ROW-17 VWP
Depth 472 mRL
OCEANAGOLD
WAIHI OPERATION
UNDERGROUND
PLAN
DEWATERING PLAN
SCALE: 1: 4000 (A3)
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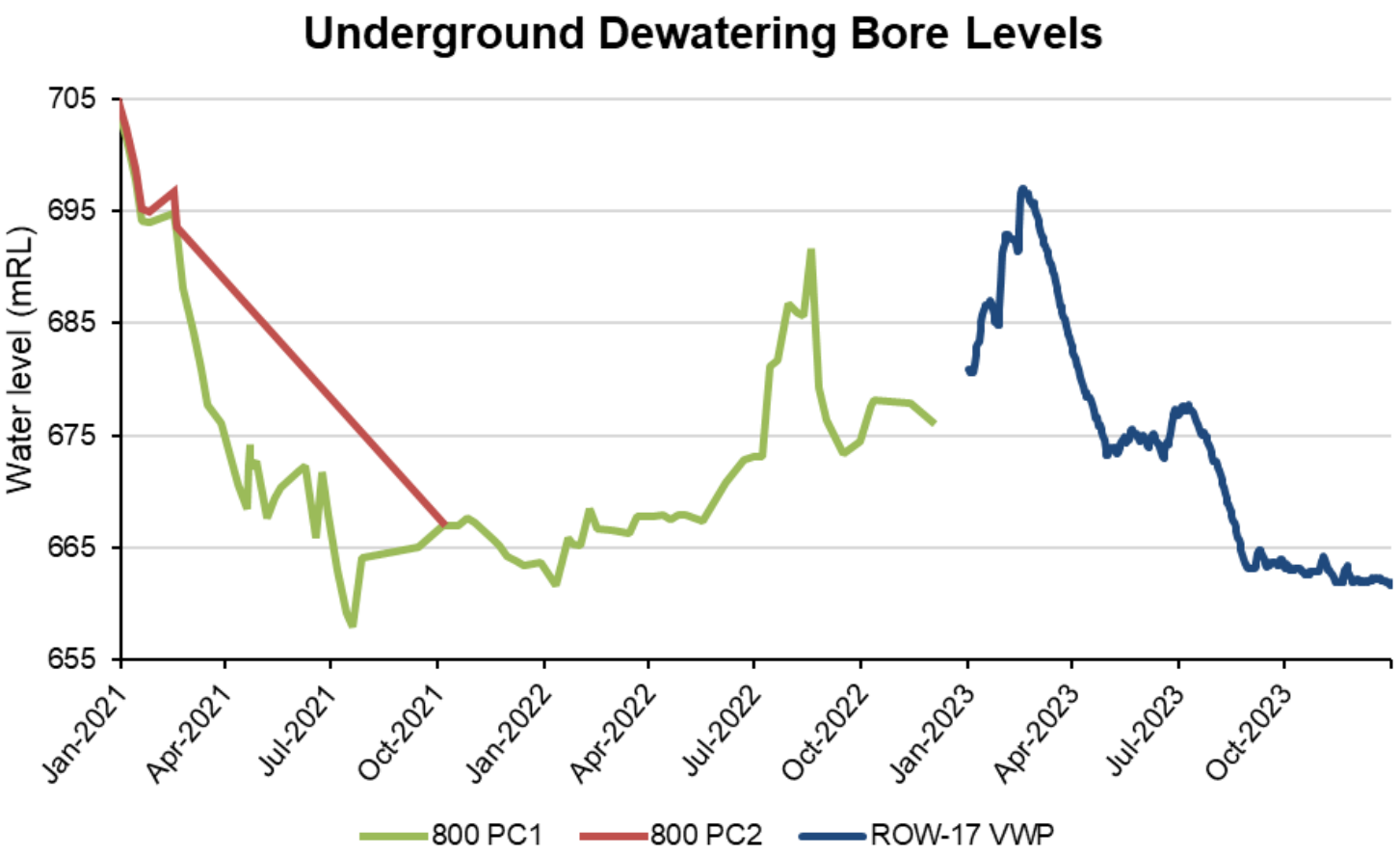


Figure 7. A) Project Martha dewatering bore locations, B) Underground dewatering bore levels.

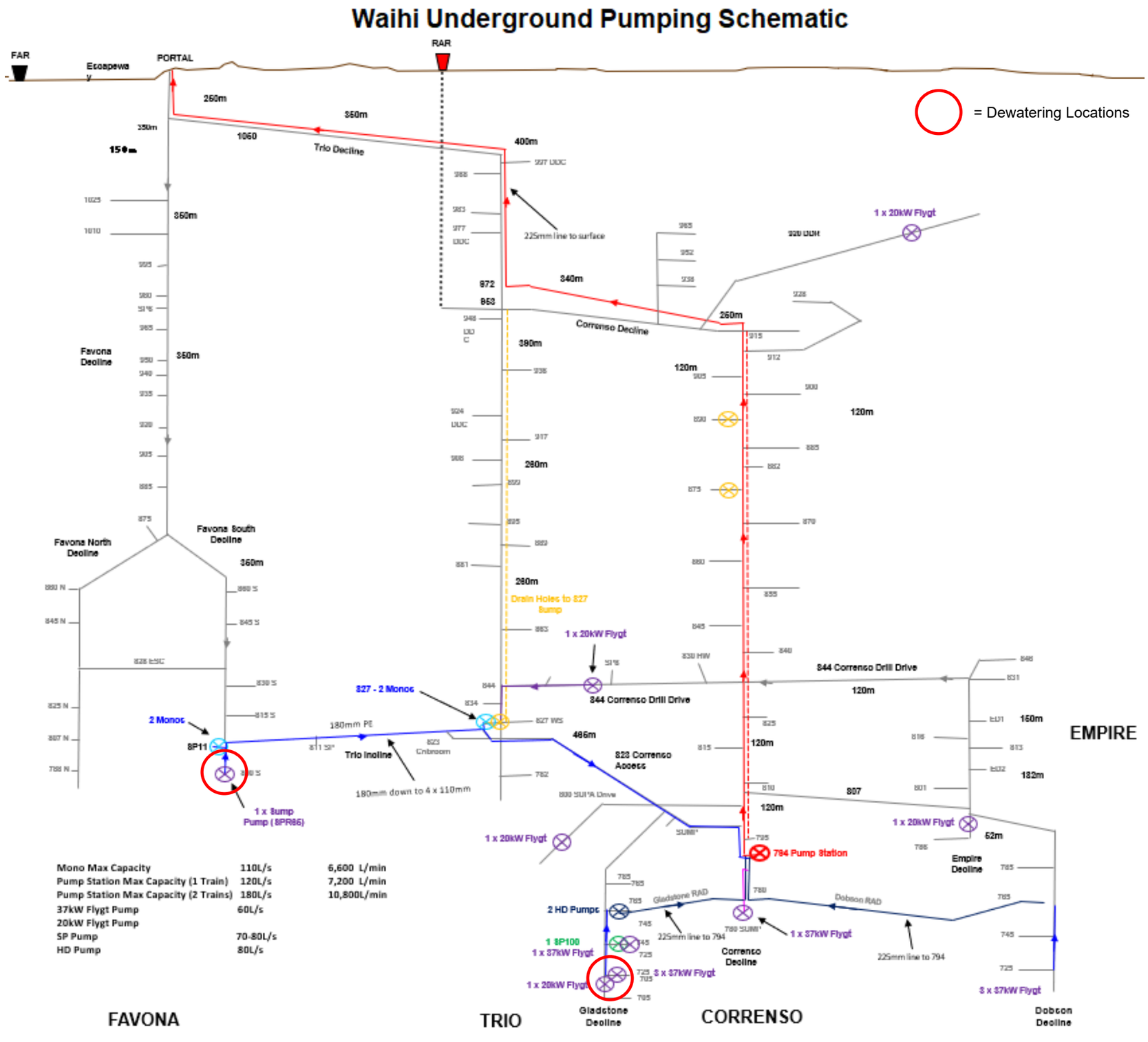


Figure 8. Correnso, Trio and Favona pumping schematic 2023.

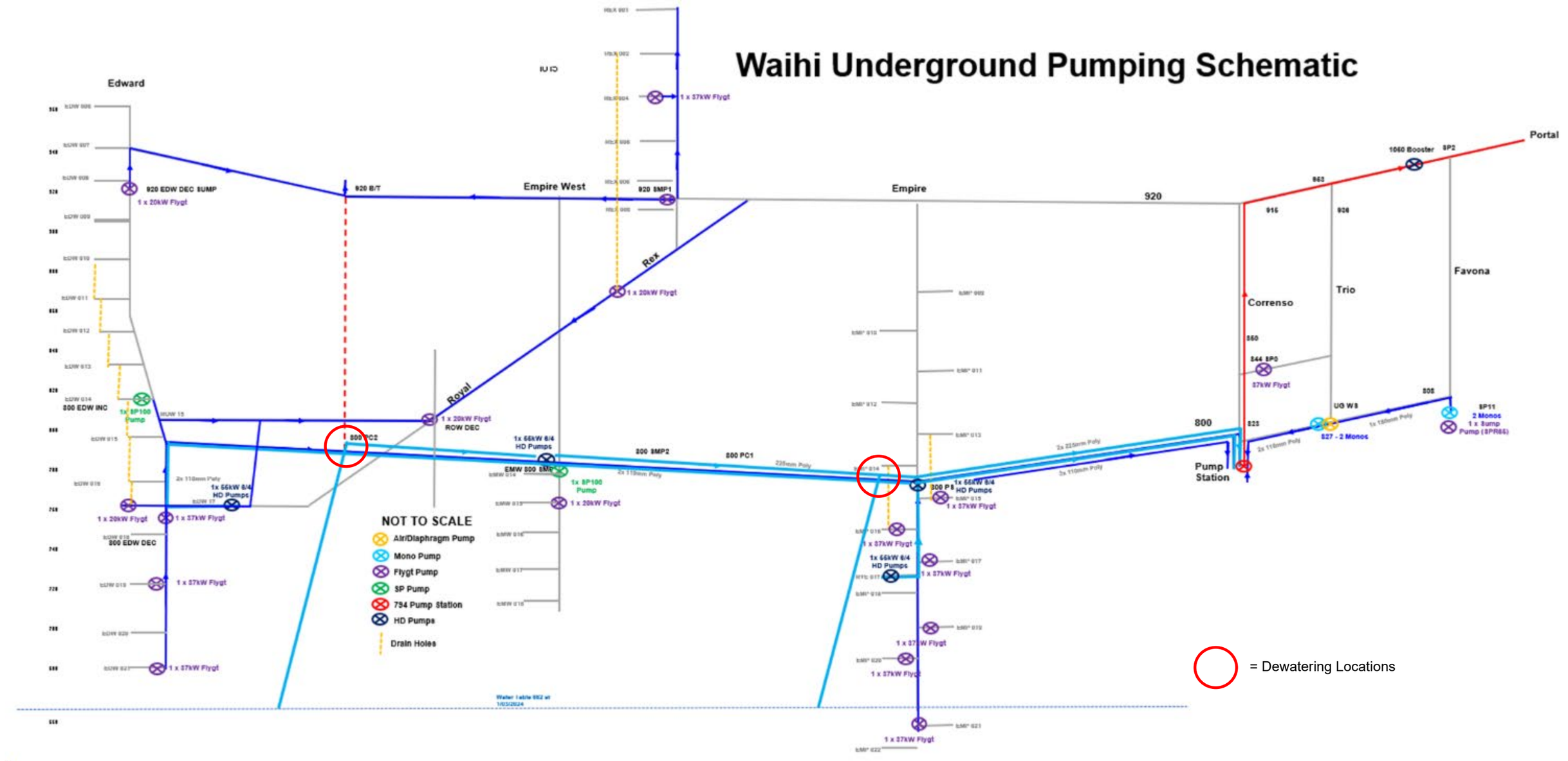


Figure 9. Martha Underground pumping schematic 2023.

5 GROUNDWATER MONITORING

This section is provided to meet Conditions 13a, b and c of the Martha Consent, Conditions 2a, 4b, and 4c, Schedule 2 of the Favona Consent, Conditions 6 (ii) and (iii) of the Trio Development Consent (referred to by the Trio Underground Mine Consent 6.1.1), Condition 35 of the Correnso Underground Mine Consent, Condition 29 of the SUPA Consent and Condition 22 of the Project Martha Consent. It includes:

- Data from monitoring undertaken during the previous year including groundwater contour plans (derived from the data) in respect of the piezometer network.
- Identification and interpretation of any environmentally important trends in dewatering behaviour or groundwater profile. Existing trends identified prior to end of 2022 will not be discussed in depth unless there has been a significant change or trigger reached.

5.1 Method

OGNZL has maintained a piezometer network within and around Martha Mine since 1987 and Favona Mine since 2004.

Additional Correnso/SUPA piezometers were installed in 2011, 2014 and 2016. P106 was drilled and four vibrating wire piezometers (VWP) installed in that drill hole during 2017. It is located to the northwest of Martha Pit (Figure 10).

Seven Project Martha piezometers were added to the network during 2019, three during 2021 and two more during 2022/23 (P122 & P123).

The current piezometer network, well depths and average 2023 water depths are shown in Table 3.

Table 3. Piezometer network well depths and average water depths for 2023.

ALLUVIUM					
Well ID	**Depth (mRL)**	**2023 Average GWL (mRL)**	**Average Water Depth (m)**	**Piezometer Type**	**Comment**
P2-4	1101	1108	7	Standpipe	
P8-4	1112	1119	7	Standpipe	
P63-S	1113	1118	5	Standpipe	
P76-S	1109	1112	3	Standpipe	
P77-S	1111	1115	4	Standpipe	
P87-S	1110	1116	6	Standpipe	
P91-1	1113	1120	7	VWP	
P93-1	1105	1117	12	VWP	
P94-1	1114	1115	1	VWP	
P101-1	1102	1110	8	VWP	
P102-1	1109	1115	6	VWP	
WC201-4	1104	1111	7	Standpipe	
WC201-5	1110	1111	1	Standpipe	
GLD04S	1080	1086	6	Standpipe	

YOUNG VOLCANICS					
Well ID	**Depth (mRL)**	**2023 Average GWL (mRL)**	**Average Water Depth (m)**	**Piezometer Type**	**Comment**
P2-3	1073	1092	19	Standpipe	
P4-2	1048	1089	41	Standpipe	
P7-2	1039	1091	52	Standpipe	
P7-3	1081	1091	10	Standpipe	
P8-3	1093	1117	24	Standpipe	
P27-1	1074	1079	5	Standpipe	
P63	1070	1091	21	Standpipe	
P64-I	1086	1102	16	Standpipe	
P76-I	1073	1105	32	Standpipe	
P77-I & P77-I2	1046	1103	57	Standpipe	
P78-S	1110	1111	1	Standpipe	
P78-I	1066	1106	40	Standpipe	
P79-S	1091	1097	6	Standpipe	
P79-I	1061	1095	34	Standpipe	
P87-I	1070	1111	41	Standpipe	
P90-1	1100	1115	15	VWP	
P90-2	1020	1101	81	VWP	
P91-2	1097	1119	22	VWP	
P91-3	1011	1113	102	VWP	
P92-1	1096	1120	24	VWP	
P92-2	1000	1109	109	VWP	
P93-2	1015	1091	76	VWP	
P94-2	1094	1115	21	VWP	
P94-3	1016	1102	86	VWP	
P95-1	1091	1117	26	VWP	
P95-2	1031	1103	72	VWP	
P100-1	1066	1085	19	VWP	
P100-2	996	1056	60	VWP	
P101-2	1083	1103	20	VWP	
P101-3	1068	1094	26	VWP	
P102-2	1079	1103	24	VWP	
P102-3	1055	1097	42	VWP	
P107	1089	1111	22	Standpipe	
P108	1116	1123	7	Standpipe	
P109	1091	1096	5	Standpipe	
P110	1097	1107	10	Standpipe	
P111-1	1100	1108	8	VWP	

P112-1	1058	1059	1	VWP	
P113	1062	-	-	Standpipe	Dry
P114	1054	1059	5	Standpipe	
P115	1072	1095	23	Standpipe	
P116	1045	1092	47	Standpipe	
P122-1	1092	1101	9	VWP	
P122-2	1060	-	-	VWP	Dry
BH6	1053	1112	59	Standpipe	
BH7	1079	1101	22	Standpipe	
BH9	1074	1098	24	Standpipe	
BH11	1075	1095	20	Standpipe	
BH12	1079	1106	27	Standpipe	
GLD04I	1065	1087	22	Standpipe	
ANDESITE					
Well ID	**Depth (mRL)**	**2023 Average GWL (mRL)**	**Average Water Depth (m)**	**Piezometer Type**	**Comment**
P2-1	974	975	1	Standpipe	
P2-2	1035	1046	11	Standpipe	
P7-1	989	1003	14	Standpipe	
P8-1	976	1027	51	Standpipe	
P9-1	1037	1119	82	Standpipe	
P69-S	1114	1137	23	Standpipe	
P69-D	1063	1092	29	Standpipe	
P75	979	1072	93	Standpipe	
P76-D	1056	1099	43	Standpipe	
P77-D	1031	1103	72	Standpipe	
P78-D	1053	1073	20	Standpipe	
P79-D	1048	1094	46	Standpipe	
P87-D	1025	1103	78	Standpipe	
P90-3	983	1087	104	VWP	
P91-4	971	1103	132	VWP	
P92-3	965	1102	137	VWP	
P93-4	975	1041	66	VWP	
P94-4	976	993	17	VWP	
P95-3	1001	1061	60	VWP	
P100-3	981	1048	67	VWP	
P100-4	956	990	34	VWP	
P101-4	1037	1040	3	VWP	
P102-4	1027	1032	5	VWP	
P106-1	1100	-	-	VWP	Dry

P106-2	1060	-	-	VWP	Dry
P106-3	1010	-	-	VWP	Dry
P106-4	974	-	-	VWP	Dry
P111-2	1088	-	-	VWP	Dry
P111-3	1055	1060	5	VWP	
P112-2	1035	-	-	VWP	Dry
P112-3	998	-	-	VWP	Dry
P122-3	1032	-	-	VWP	Dry
P122-4	933	-	-	VWP	Dry
P123-1	1044	1112	68	VWP	
P123-2	1004	1006	2	VWP	
P123-3	964	971	7	VWP	
P123-4	924	925	1	VWP	
WC201-1	1059	1064	5	Pneumatic	
WC201-2	1077	1080	3	Pneumatic	
WC201-3	1097	1100	3	Pneumatic	
WC202-1	1032	1079	47	Pneumatic	
GLD04D	1020	1086	66	Standpipe	

Note: VWP = Vibration Wire Piezometer.

All piezometers are monitored on a monthly basis as required by the consent conditions. The water levels are translated to the mine datum reference level to enable comparison between bores or areas. Vibrating wire piezometers record values at daily intervals with the data downloaded monthly.

5.2 Inspection and Maintenance

The piezometer dip-meters are maintained in good working condition. Calibration against a reference tape is carried out annually by Hydrologic NZ Ltd. The dip-meter tape is replaced if the difference against the reference tape is more than 0.1%. The dip-meters were calibrated in April, May, August and November 2023.

The consent conditions require an inspection of the piezometer installations and appraisal of the piezometer network every two years. In effect, inspections of the piezometer network are undertaken more frequently, with the piezometer monitoring procedure requiring 6-monthly sounding to the bottom of all standpipe piezometers to identify any locations with excess accumulated sediment.

The piezometer designs have screens which allow water to flow into the pipe at specified depths. Piezometers that are most impacted by sediment are flushed as required, with flushing of silted boreholes last occurring in November of 2019. Piezometers P4-1, P4-3, P8-2, P9-2, and P9-3 have showed little change after multiple flushing attempts and are no longer monitored.

5.3 Groundwater Results

The Waihi town piezometer network currently has 53 dipped piezometers and four pneumatic piezometers. An additional 14 data loggers connected to 50 vibrating wire piezometers are also included in monitoring Waihi East, south of the Martha Pit and northwest of the Martha Pit (Figure 10). Groundwater contour plans have been updated for the three principal geological units: alluvium (plus shallow groundwater in weathered young volcanic materials), young volcanics (including ignimbrite), and andesite. The groundwater plans are presented in Figure 11, Figure 13 and Figure 16 respectively.

5.3.1 Changes to Monitoring Network 2023

- Two new piezometer locations were added to the network during December 2022 – January 2023 (P122 & P123, each connected to 4 vibrating wire piezometers).
- Data has been collected from an underground vibrating wire piezometer (ROW-17) that was installed at 773 mRL with a single tip at 472 mRL.
- P113 which was dry, was re-drilled as P113A to form part of the new Rex monitoring network.
- Monitoring of BH8 was discontinued in May 2023 as this borehole likely collapsed and a replacement is not considered necessary given WC202 is at the same location.

5.3.2 Shallow Groundwater

Figure 11 shows the inferred contours for shallow groundwater in alluvium and weathered young volcanic materials and shows the water level trends over time. The overall contour pattern and the trend plots demonstrate that the shallow groundwater system remains essentially unaffected by dewatering of the surface and underground mining operations. Shallow groundwater levels are controlled principally by rainfall infiltration, low surface soil permeability and natural and assisted drainage to surface water systems.

Contouring of the area southwest of Martha Mine has been restricted by the loss of access to the wells at sites WC203 and WC206. For the purposes of completing the contour plan it was assumed that groundwater levels in the alluvium at these locations remained the same as in previous years.

Figure 10. Waihi piezometer network 2023.

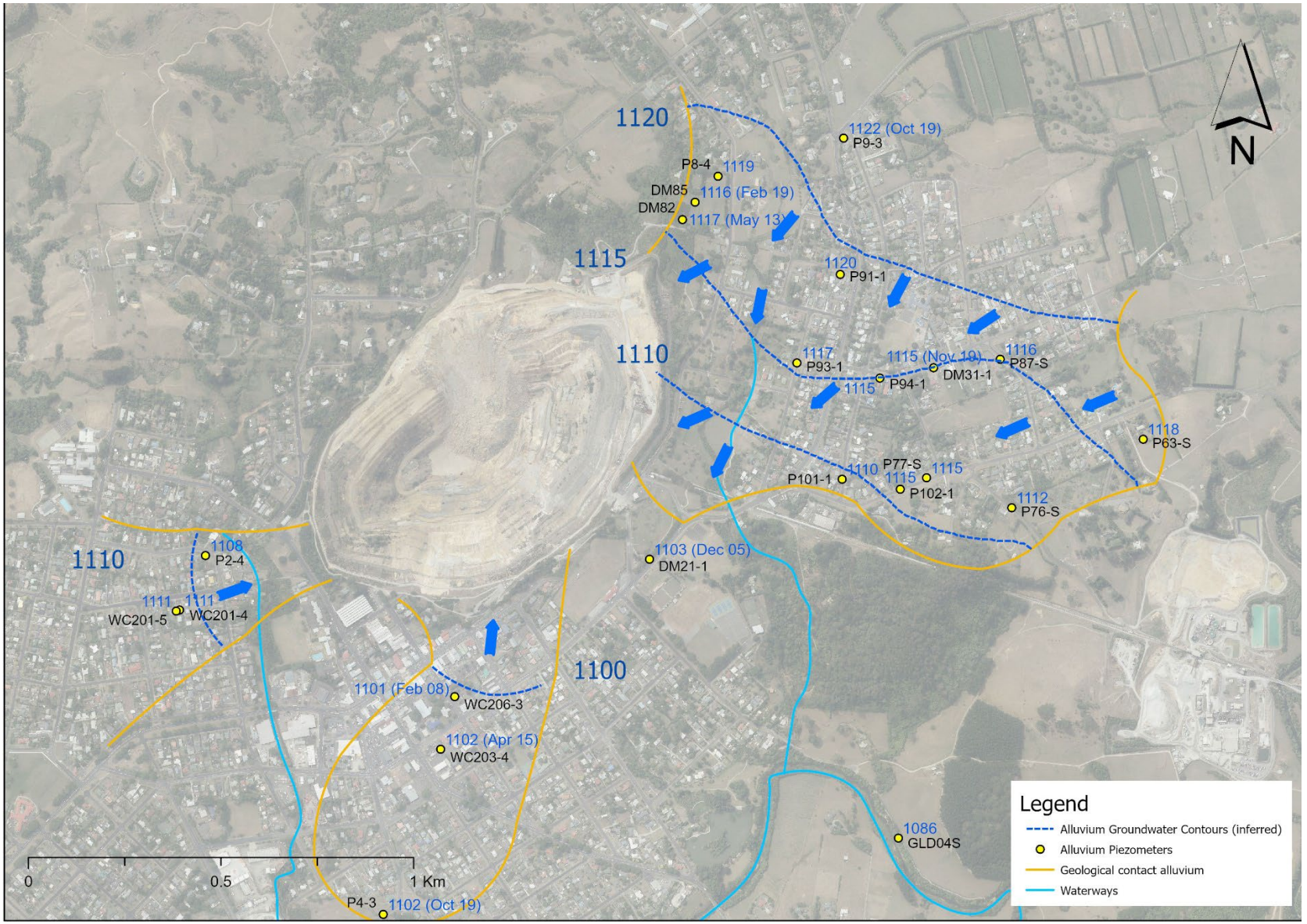


Figure 11. Alluvium water level contours.

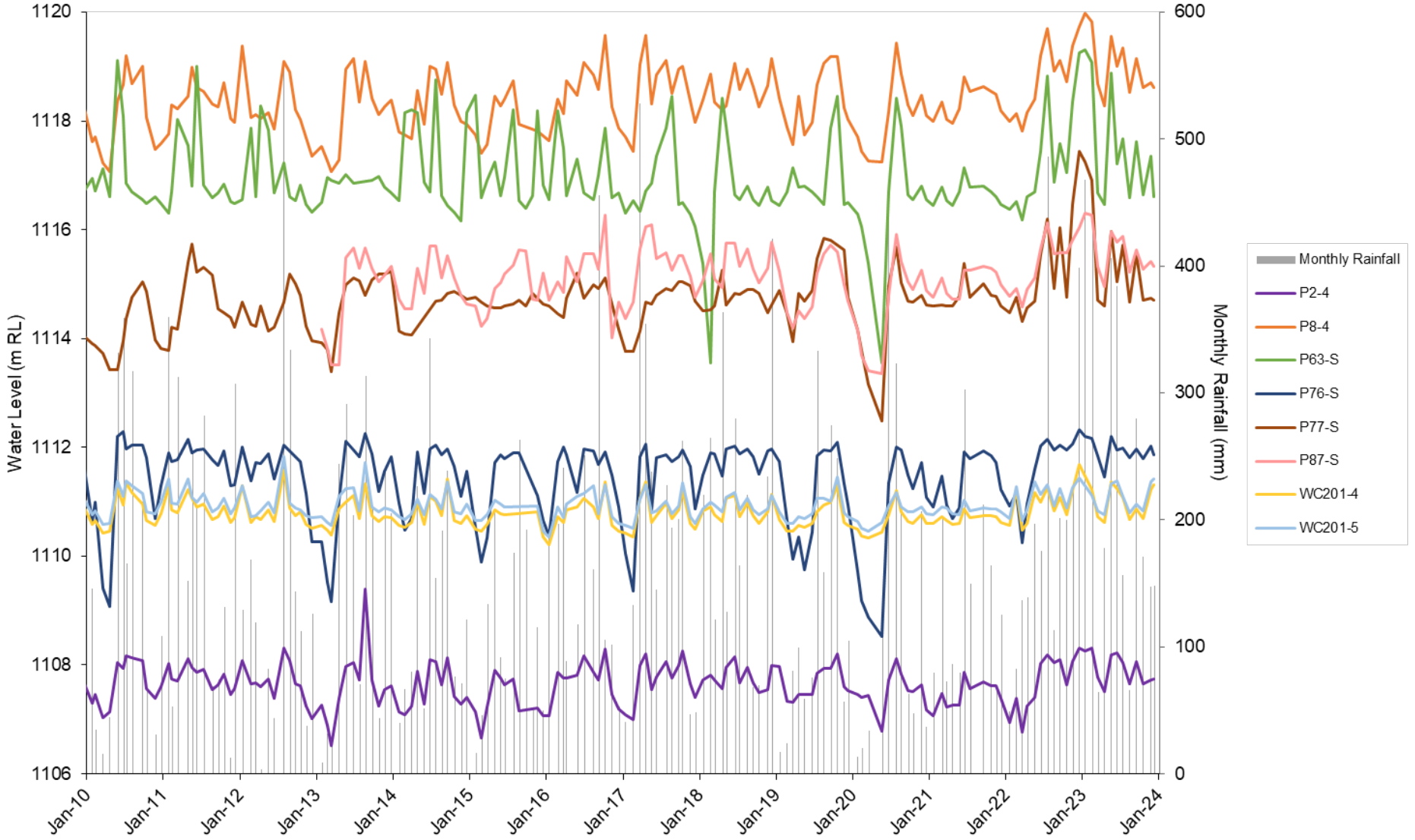


Figure 12. Groundwater level trends – shallow groundwater (alluvium & weathered contact of young volcanics).

5.3.3 Young Volcanics

Groundwater contours in the deeper portions of the young volcanic materials below the shallow groundwater system and groundwater level trends are shown on Figure 13, Figure 14 and Figure 15. Refer to Appendix F for conceptual hydrogeologic sections relative to the interpreted groundwater flow systems.

The young volcanic materials infill topographic depressions in the surface of the andesite rock body in which the open pit and underground mines are constructed.

Groundwater level change and the associated consolidation of the varying thickness of these relatively compressible young volcanic materials are considered to be responsible for much of the settlement and for the settlement patterns around the Martha and Favona Mines. Noting, that dewatering of the deep andesites is also contributing to general settlements across Waihi.

The dewatering pattern in the young volcanics around Martha Mine indicates drainage towards the open pit. The limited groundwater discharge at the contact of the young volcanic materials with the underlying andesite in the pit (see Figure 13 & Figure 14) suggests drainage is affected by features other than the contact (which defines a paleo-valley in the andesite). The most likely additional drain point is a substantial block cave evident in the pit wall. This block cave, referred to as the Milking Cow, was active during historical (pre-1950's) underground operations and resulted in substantial settlement of the ground surface, down-folding of fill and young volcanic strata, and close fracturing of the welded ignimbrite layers.

Prior to the start of dewatering at Martha Mine, groundwater levels in all rock units were similar. With the onset of mine dewatering, water levels in the veins and historic workings were drawn down. Groundwater levels in the various rock units below the shallow aquifer showed increasing vertical separation until the mid to late 1990's. Thereafter, the water levels (other than in the veins and workings) stabilised and have remained stable since. This pattern is demonstrated in the monitoring wells at site P2, with piezometer P2-1 following the vein water levels until the water level dropped below the piezometer tip. P2-2 measures the upper andesite water levels, P2-3, the young volcanic rock water levels and P2-4 the alluvium (shallow aquifer) water levels.

The development of the settlement pattern has shown a similar behaviour with an initial higher rate of settlement followed by a much-reduced rate of settlement once groundwater levels in the upper rock layers stabilised. These patterns are discussed in the following sections.

BH11 and BH12 have been included in the young volcanics hydrograph. These were historically listed as andesite piezometers. The piezometer network was reviewed by GWS Limited as part of a wider assessment of the Waihi piezometer network. The findings of the GWS review resulted in the installation of two new Martha vibrating wire piezometers (VWP), P122 and P123.

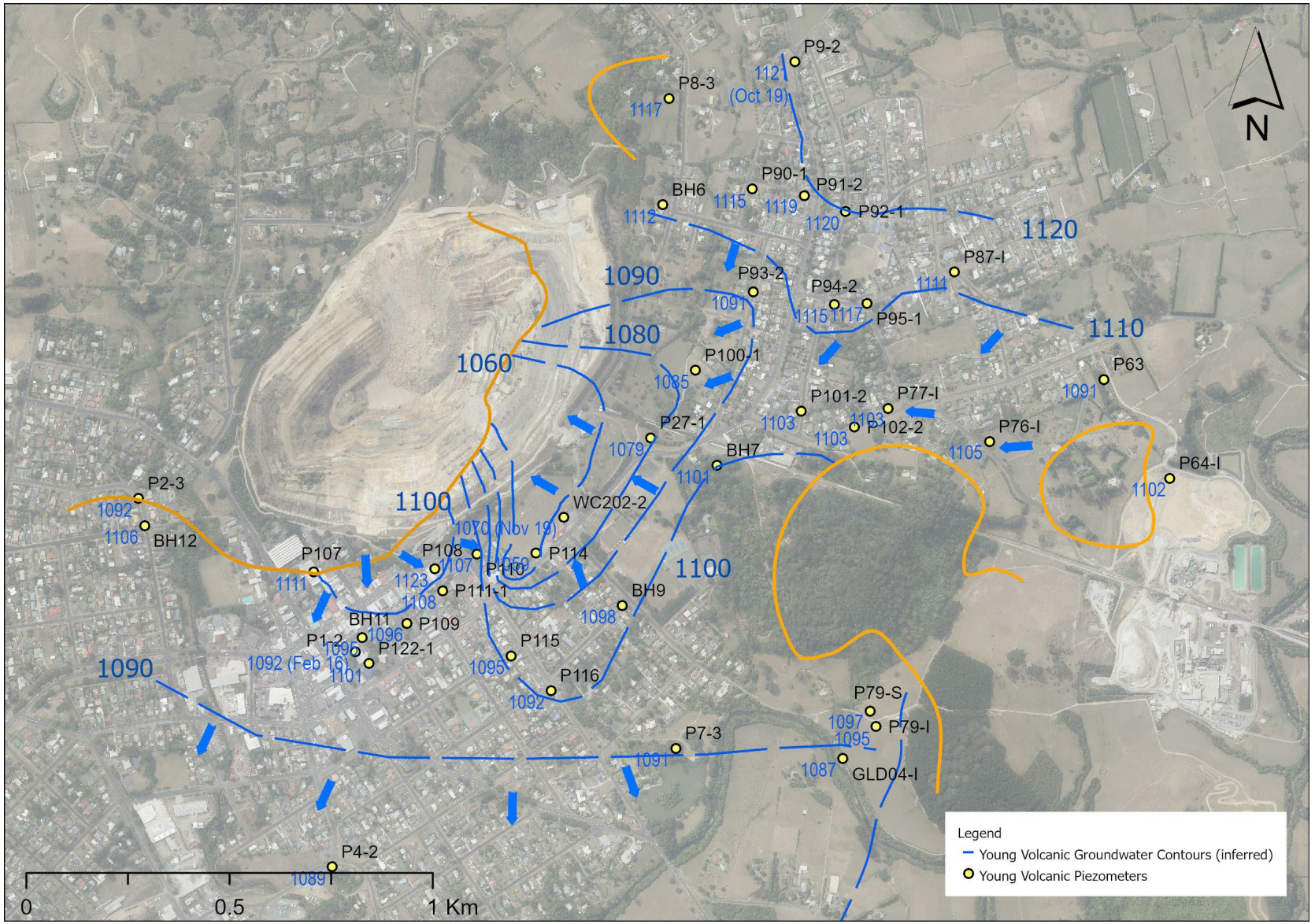


Figure 13. Deeper young volcanic water level contours.

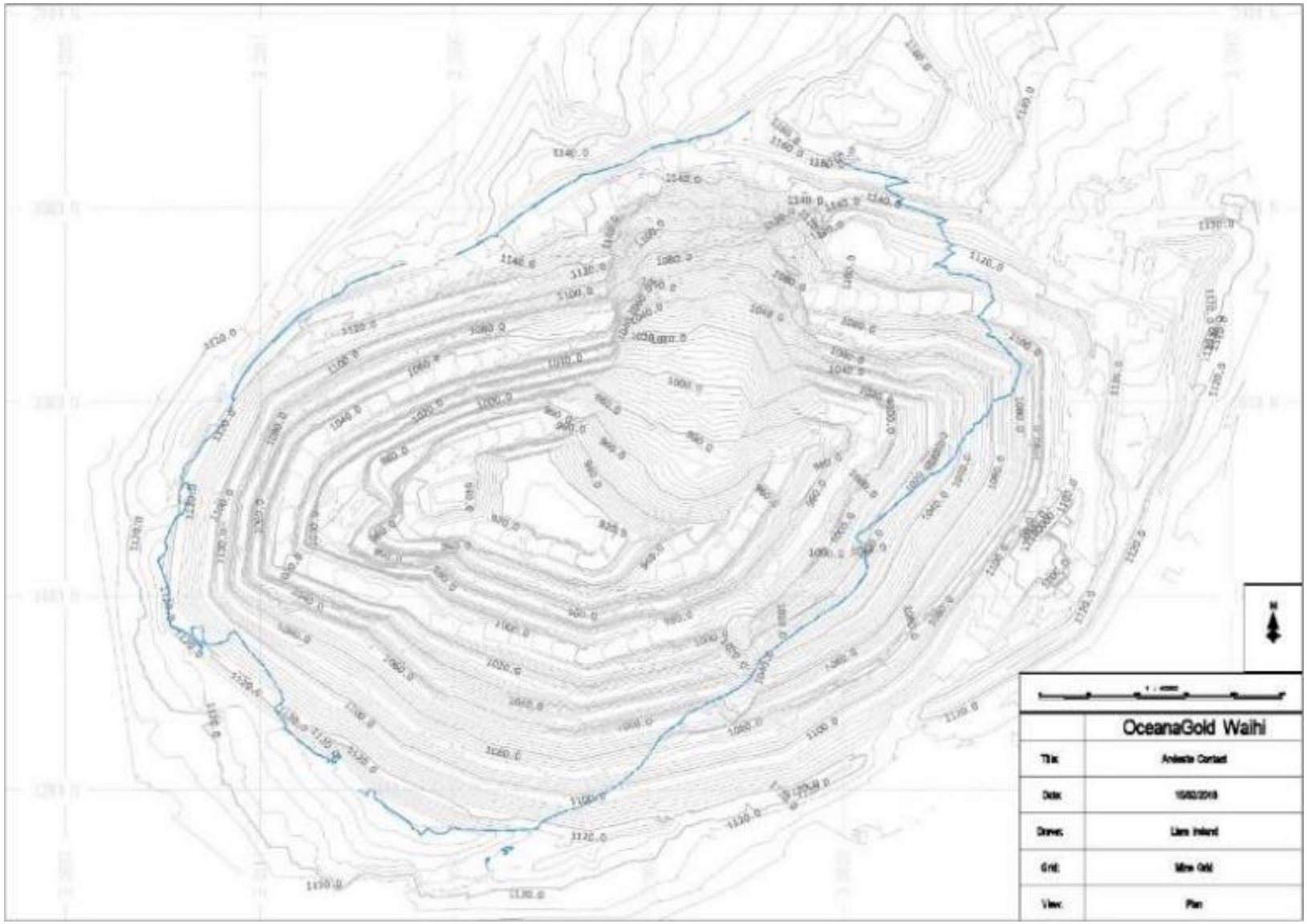


Figure 14. Groundwater level trends – deeper young volcanic materials.
Note: (blue line indicates contact of the young volcanics with the underlying andesite where seepage at the base of the young volcanics would occur).

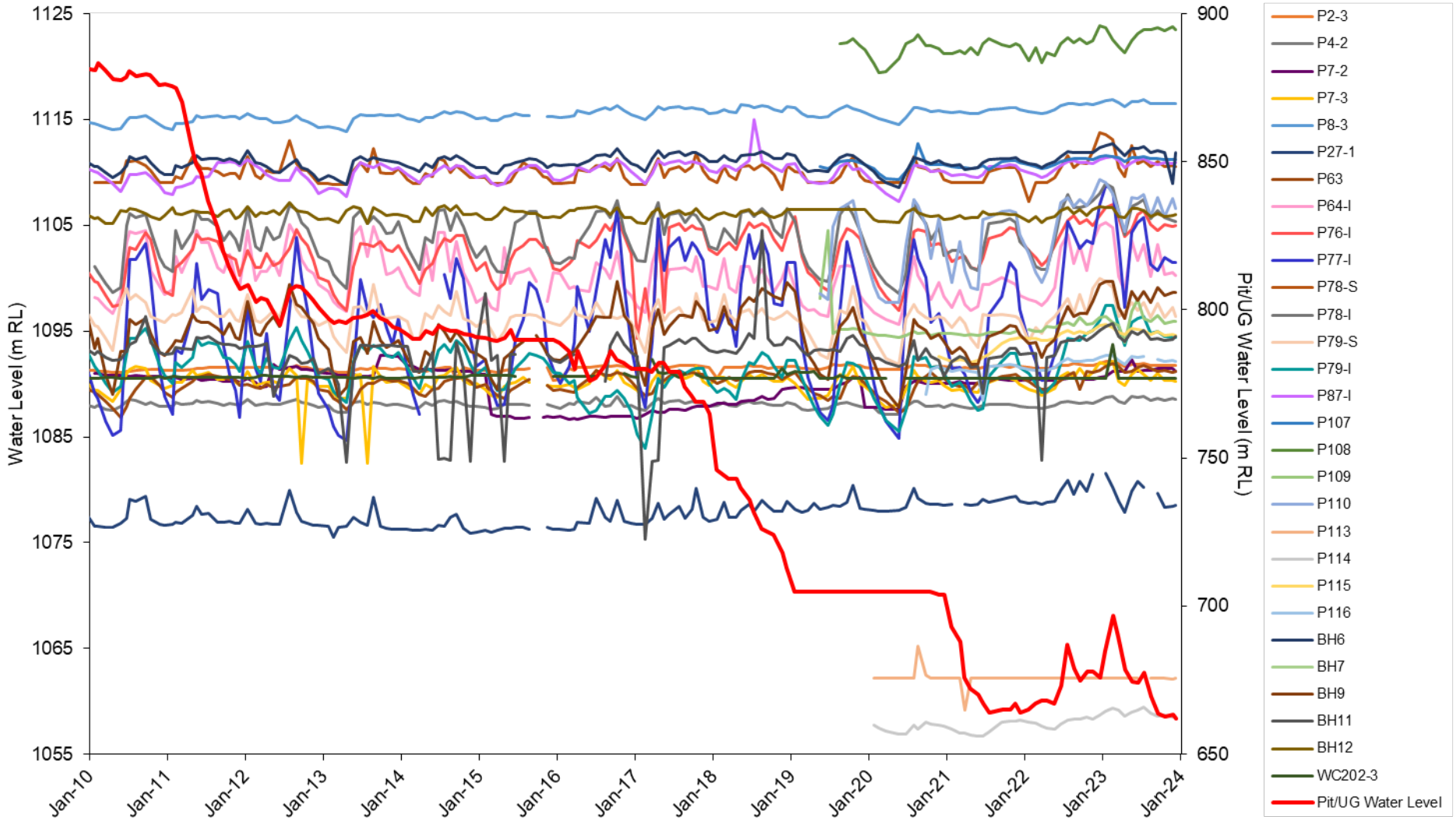


Figure 15. Groundwater level trends – deeper young volcanics near underlying andesite contact.

5.3.4 Andesite

Andesite rock forms the local basement rock body for the Waihi area and hosts the mineralisation which was being mined at Martha Pit and is currently mined in the Underground.

Figure 16 shows the scope of the dewatering effects in the andesite rock body as a result of dewatering. Data from the vibrating wire piezometer units have been included. Figure 17 provides the water level trends in the andesite rock body. While groundwater level data is available for the vein systems and the shallower andesite rock, no monitoring data is available for intermediate depths within the andesite rock mass outside of development areas. Hence, groundwater levels between the vein and the shallow rock mass have been interpolated. Refer to Appendix F for conceptual hydrogeologic sections relative to the interpreted groundwater flow systems.

Groundwater levels in the andesite vein systems have responded rapidly and substantially to mine dewatering along the strike of the Martha vein system, Trio vein system (beneath Union Hill), and Favona/Moonlight vein systems (Figure 16). An area of dewatering, indicated between Martha Mine and Trio/Correnso vein systems, suggests a relatively close linkage. Outside of these structures, the dewatering effect in the andesite rock is attenuated or absent. This is illustrated by the different responses shown on Figure 17.

The Martha Mine dewatering effect continues to be abruptly attenuated to the north of the mine and also to the west of the mine. This is considered to be the result of faulting which truncates the veining. A lobe of dewatering extends to the southwest of Martha Mine and this is considered to be due to the drainage effect along the north-south Edward lode structure. Dewatering is shown to reduce eastwards along the Martha system but may extend further at depth as the host rocks are more deeply buried in that direction and no deep monitoring wells are available for confirmation.

Figure 16 also indicates the dewatering centralised on the Favona system with the restriction of connection between Favona and the Union systems. The geological model in Section 3 indicates an up-thrown block (Union Horst, Figure 16) between the Union and Favona systems. This structural hiatus is likely to account for the restricted groundwater interconnection between the Martha-Union and Favona systems.

The vibrating wire and Favona piezometers have been excluded from Figure 17 and are presented in Figure 18 to Figure 35.

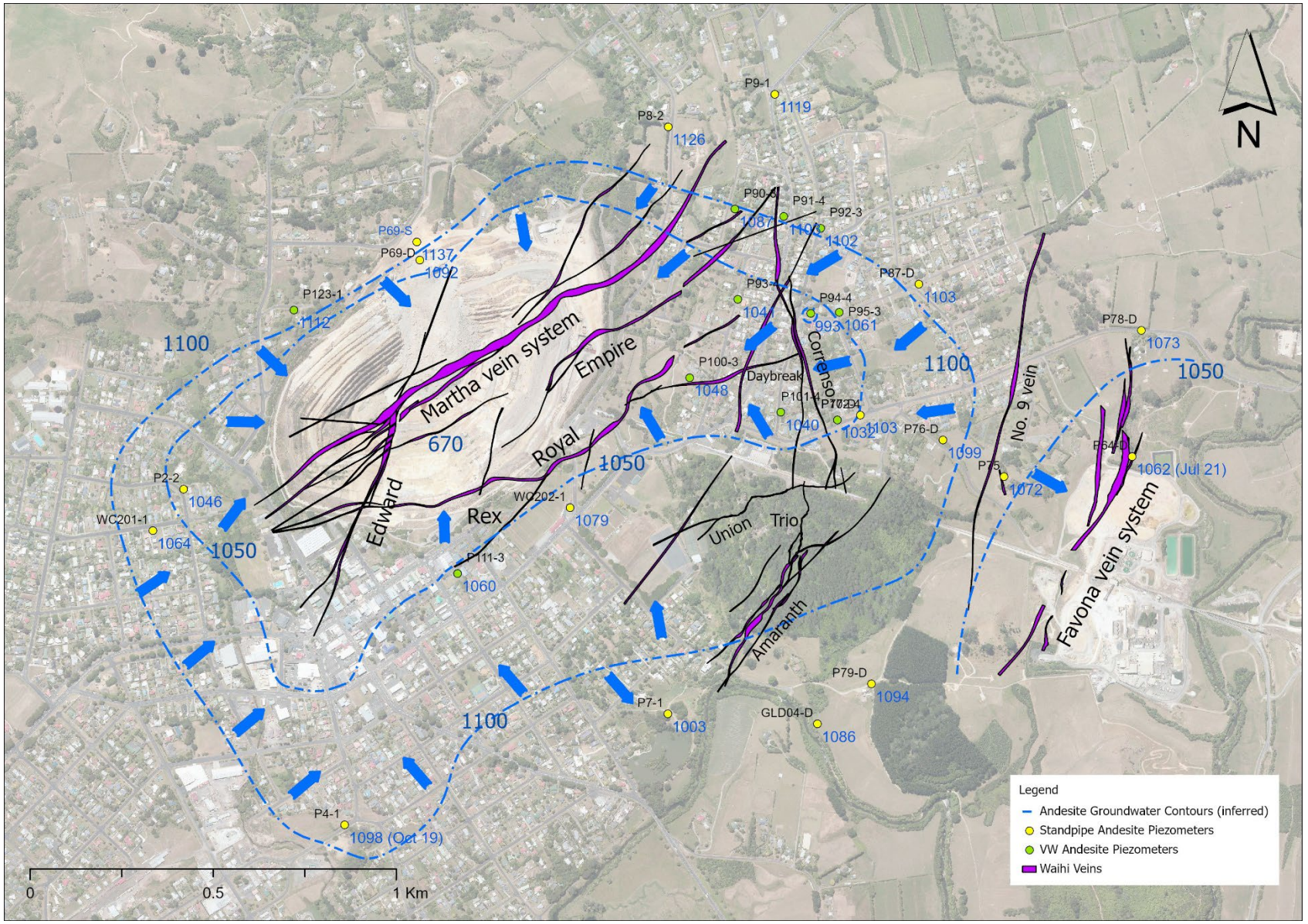


Figure 16. Upper andesite water level contours.

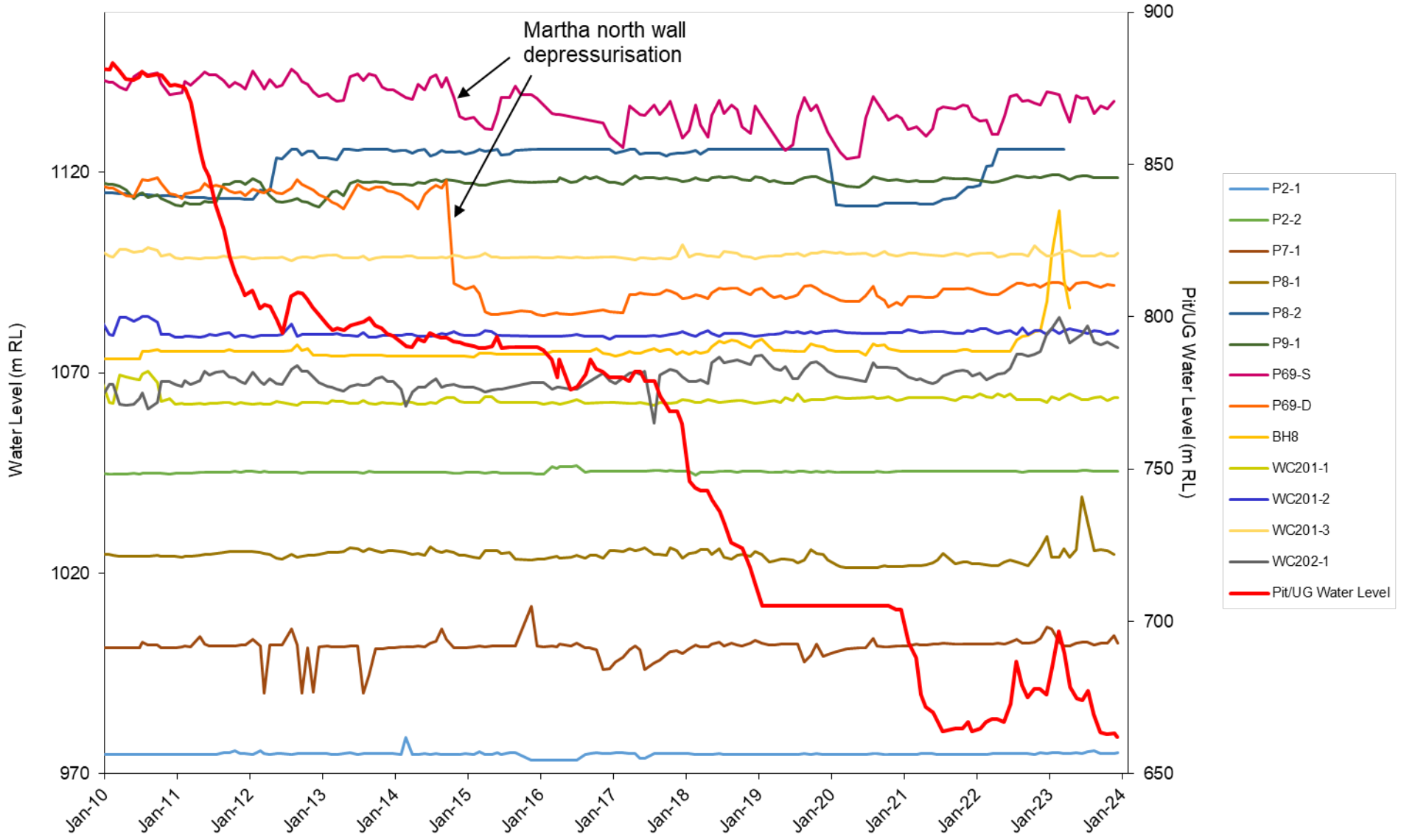


Figure 17. Andesite water level trends.

5.3.5 Martha Groundwater Assessment

The Martha groundwater levels remained relatively stable during the reporting period, following expected trends with an increase in piezometric levels in response to heavy rainfall in the first half of 2023 (See Figures 12, 15 and 17). No triggers were breached during the monitoring period. However, many piezometers showed increases in water level likely due to the above average rainfall experienced towards the end of 2022 and beginning of 2023. Groundwater levels recovered and returned to normal historical ranges from April 2023 onwards.

Project Martha piezometers P107 to P110 and P113 to P116 are standpipes installed at varying ground elevations. Figure 15 shows these water levels have remained relatively stable. P113 has remained dry since installation.

Upper Rex Monitoring

In June 2023, amendments were made to the Dewatering and Settlement Monitoring Plan to specifically address additional monitoring requirements as a result of the proposal to mine the Rex orebody to a higher elevation. This was approved by WRC and HDC in August 2023, and more focused monitoring of groundwater level/pressure along the strike of the Rex orebody began in October 2023. Five Project Martha piezometers (P110, P111, P112, P113A & P114) were upgraded with telemetry, providing hourly water level data.

Trigger responses were set for P111, P112, P113A and P114 at a change in water level greater than two metres in less than a one-month period as outlined in the Dewatering and Settlement Monitoring Plan (June 2023). If a response is triggered, this is considered a significant anomaly and further action should be followed as per the Plan. No triggers were reached for the piezometers monitoring groundwater levels in the upper Rex area.

Vibrating wire piezometer P111 (Figure 18) was installed with three tips, one in the young volcanics and two in the andesite layer. The young volcanic piezometer is measuring some water pressure at 1108mRL. The upper andesite piezometer appears to be dry with levels recorded below the tip level, indicating this area may be previously affected by dewatering. The lower andesite piezometer is measuring around 5m of water pressure above the tip, at 1060mRL.

P112 is also a vibrating wire piezometer installed with three tips, one in the young volcanics and two in the andesite layer. The young volcanic piezometer is measuring around 1m of water pressure above the tip at 1059mRL, while both the andesite piezometers have been dry (1035mRL & 998mRL) since installation in July 2020 (Figure 19).

As the original P113 standpipe piezometer is considered dry, a new deeper monitoring bore was drilled to replace it. The new bore, P113A has three vibrating wire piezometers installed at 1090mRL, 1070mRL, and 1035mRL. The shallow tip (19mBGL) appears to be dry at 1090mRL, while water levels in the deeper tips have remained stable since installation in October 2023. The intermediate tip (39mBGL) is measuring around 3m of water pressure above the tip at 1072mRL, and the deep tip (74mBGL) is measuring around 25m of water pressure above the tip at 1060mRL (Figure 20).

The standpipe piezometers, P110 and P114 have telemetry installed, providing hourly water level data for closer monitoring of groundwater levels in the upper Rex area. Depths of these bores are at 1097mRL for P110, and 1054mRL for P114. Water levels in both of these are stable with P110 measuring around 9m of water pressure at 1106mRL, and P114 measuring around 4m of water pressure at 1058mRL. The other Project Martha standpipe piezometers remained stable during the reporting period, following expected seasonal trends, and continue to be dipped on a monthly basis.

The key to the lithology zone shading for hydrographs below (Figure 18 to Figure 22 and Figure 27 to Figure 35) is shown in Table 4.

Table 4. Lithology shading.

Lithology	
Alluvium	
Young Volcanics	
Andesite	

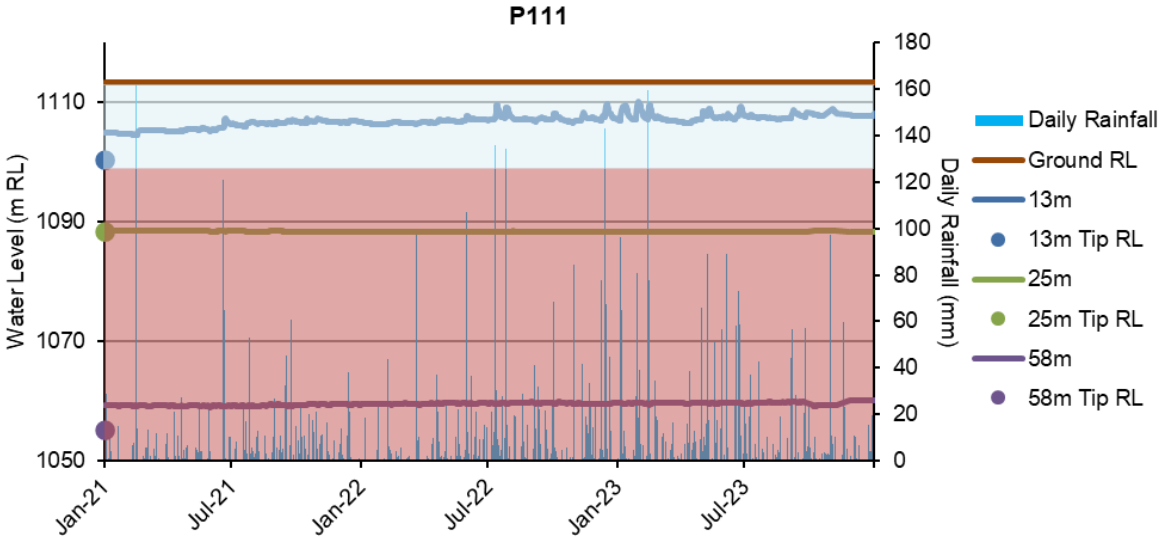


Figure 18. P111 vibrating wire piezometer.

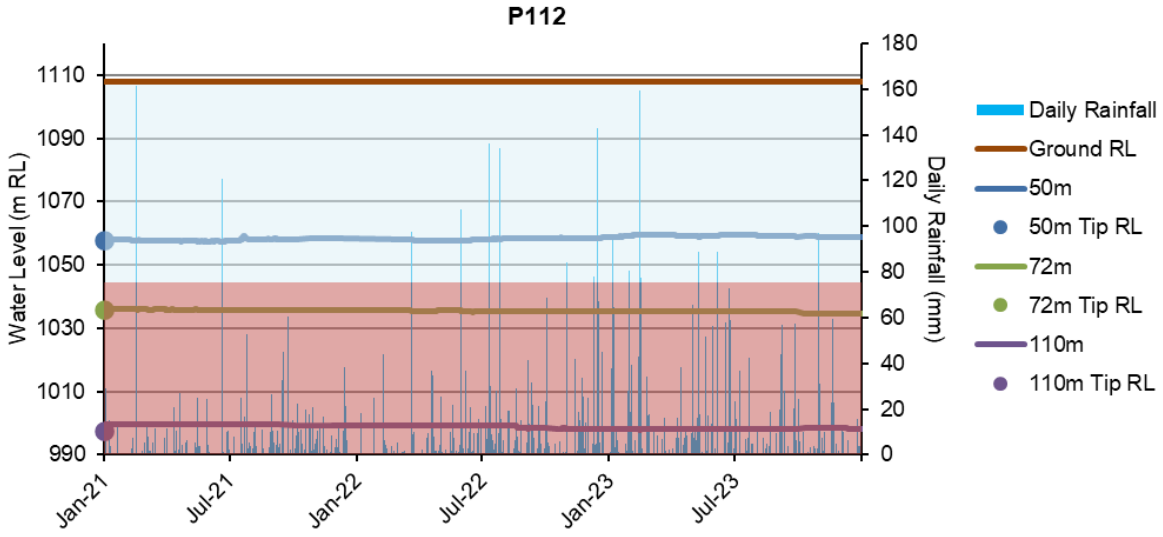


Figure 19. P112 vibrating wire piezometer.

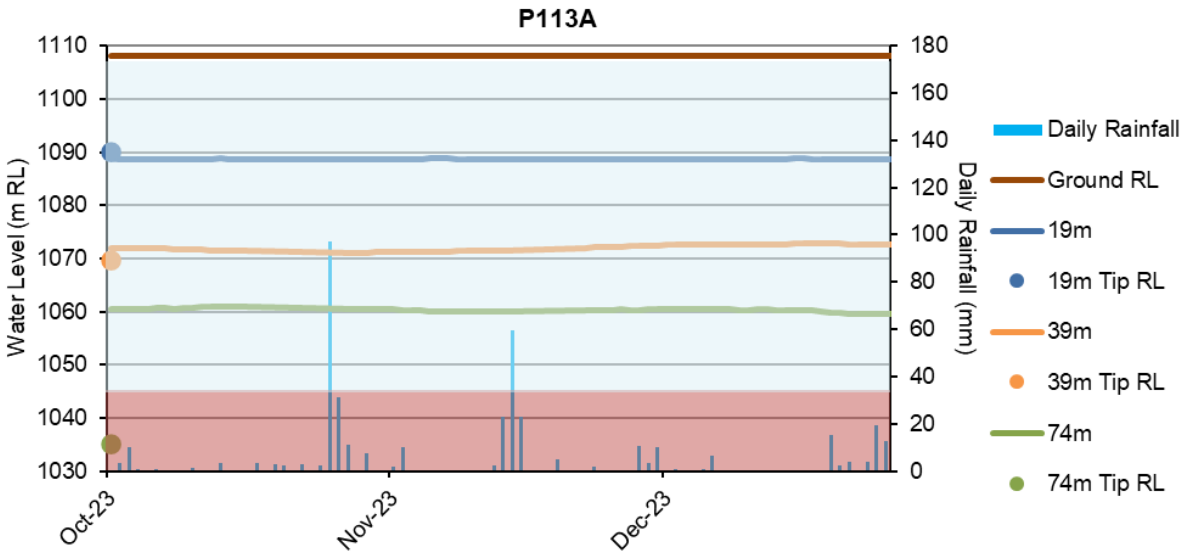


Figure 20. P113A vibrating wire piezometer.

Two new Project Martha piezometers were installed in 2022 – 2023. Locations and tip depths were advised by GWS and discussed with the hydrogeologic peer reviewer. Tip depths and average water levels for 2023 are shown in Table 5. Some tips show little water pressure, indicating dry conditions.

Table 5. Project Martha piezometer depths and water levels.

Piezometer	Target Material	Depth (mRL)	2023 Average GWL (mRL)	Average Water Depth (m)	Comment
P122-1	Upper young volcanics	1092	1101	9	
P122-2	Base young volcanics	1060	-	-	Dry
P122-3	Upper andesite	1032	-	-	Dry
P122-4	Lower andesite	933	-	-	Dry
P123-1	Upper andesite	1044	1112	68	
P123-2	Lower andesite	1004	1006	2	
P123-3	Lower andesite	964	971	7	
P123-4	Lower andesite	924	925	1	

P122 was installed in January 2023 with four tips, one in the upper young volcanics, one in the base young volcanics, and two in the andesite layer. Water levels appear to have stabilised in the upper young volcanic piezometer tip with around 9m of water pressure measured at 1101mRL. The other three piezometers appear to be dry at 1060mRL, 1032mRL, and 933mRL (Figure 21).

P123 was installed in December 2022 with all four tips in the andesite layer and these seem to have now stabilised. The 1044mRL tip is measuring around 68m of water pressure above the tip at 1112mRL, the 1004mRL tip is measuring around 2m of water pressure at 1006mRL, the 964mRL tip is measuring around 7m of water pressure at 971mRL, and the 924mRL tip is measuring around 1m of water pressure at 925mRL (Figure 22).

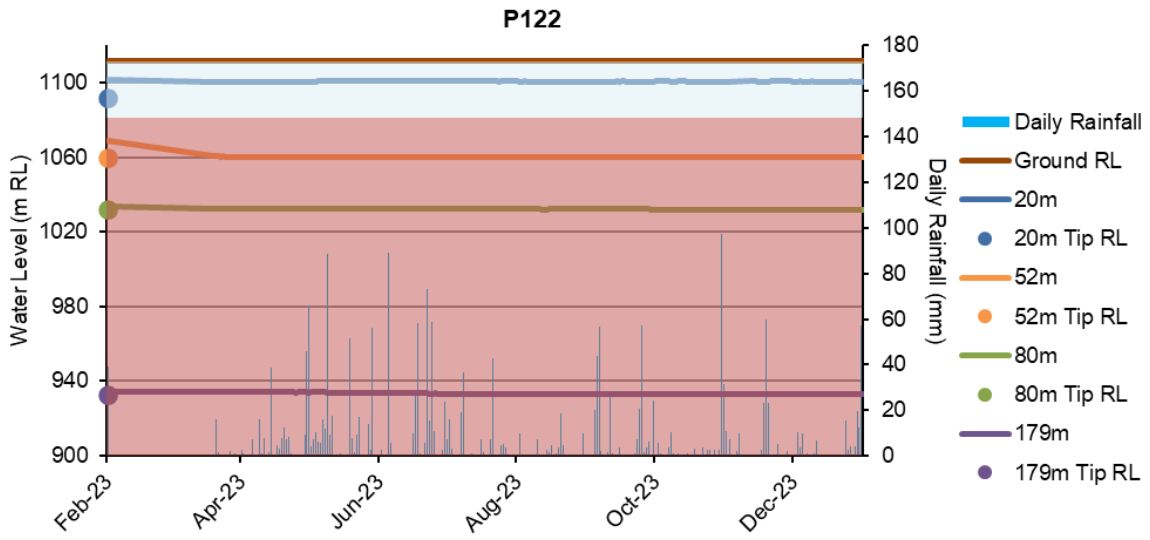


Figure 21. P122 vibrating wire piezometer.

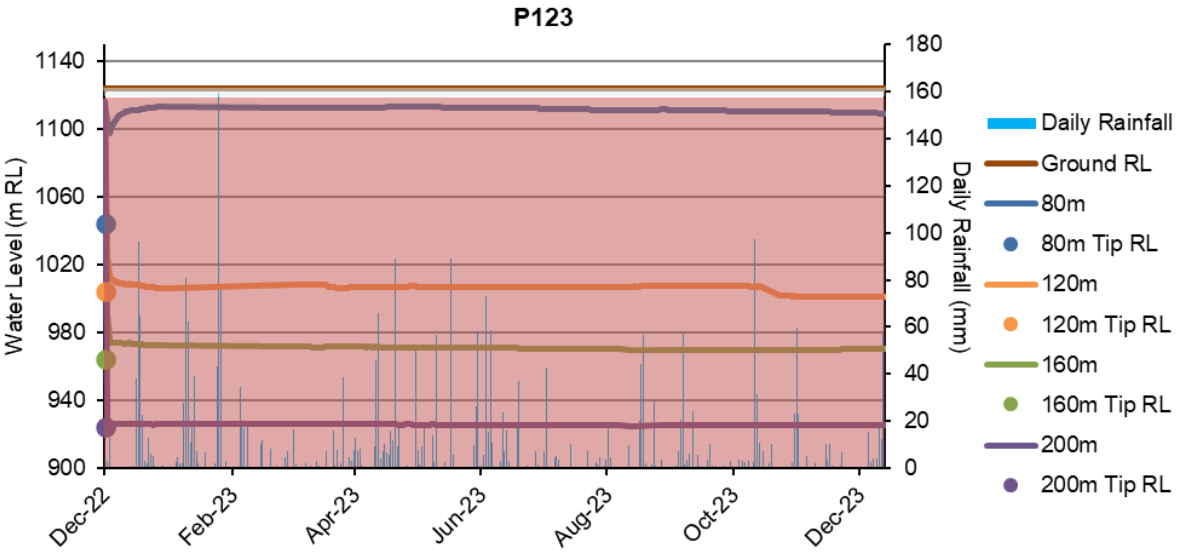


Figure 22. P123 vibrating wire piezometer.

Underground Piezometer ROW-17

In July 2022 a piezometer was installed in an existing exploration drill hole (Figure 23). The drill hole 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. Piezometer readings show the December 2023 water level at 662 mRL (Figure 24).

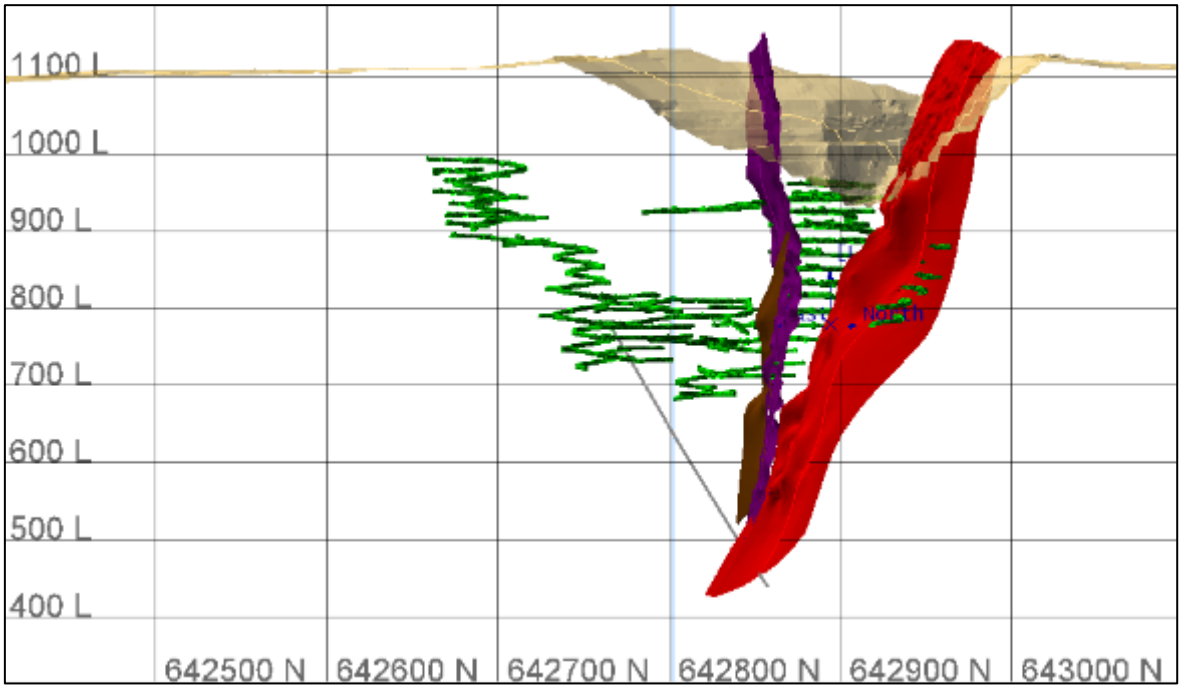


Figure 23. Underground piezometer cross section.

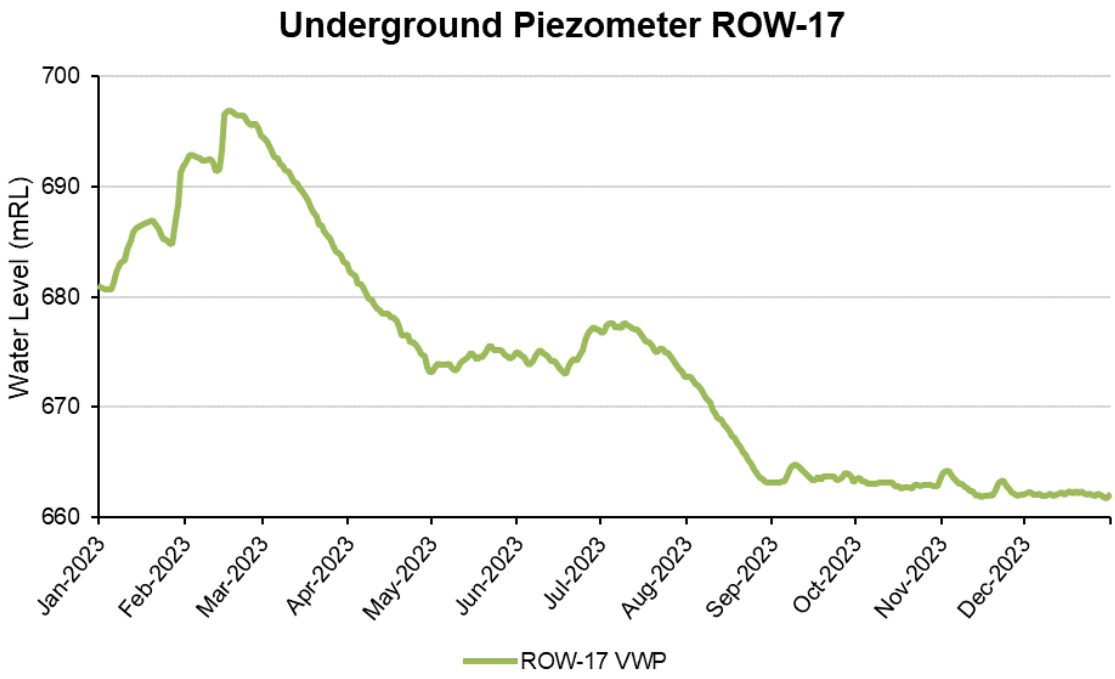


Figure 24. Underground piezometer water level.

Project Martha Water Chemistry

A review of existing piezometers suitable for baseline water chemistry sampling of shallow and deep aquifers of the mine area was undertaken by WWLA in May 2023 in order to demonstrate compliance with Project Martha Consent 139551. Due to limitations of sampling equipment (due to narrow bore diameter, bore depth and large purge volumes required) some of the suggested locations are unable to be sampled easily. Locations that can be sampled have been added to the groundwater monitoring schedule, with the first round of sampling to be undertaken in Autumn 2024. Results will be provided in the next annual report.

5.3.6 Favona Groundwater Assessment

In the Favona Mine groundwater congregates at the 800 level and this is the assumed groundwater level in this area. However, mine development links Favona to Trio and Correnso, which are both part of the Martha groundwater system. Figure 25 shows water level trends in the Favona andesite with the underground dewatering level and Figure 26 shows selected Favona andesite piezometers with rainfall. This demonstrates how water levels for most Favona wells are influenced by seasonal rainfall periods and not by Martha/Underground dewatering. The majority of the relevant piezometers have shown an increasing trend towards the end of 2022 and beginning of 2023 due to higher than usual rainfall. P79-D has recovered to typical levels held prior to its depressurisation in 2016. A slight delayed response to rainfall and drier periods can be noted in four piezometers, with P87-D less responsive. No well had a 15m (or greater) decrease during the reporting period.

The Dewatering and Settlement Monitoring Plan states the intentions of OGNZL for baseline groundwater quality sampling for assessment of post closure effects of groundwater movement between the Favona and Martha mineralised groundwater systems, and specifies sampling requirements for standpipe piezometers P7-6D, P76-I, P77-D and P77-I. These locations have now been added to the groundwater monitoring schedule, with the first round of sampling scheduled to be undertaken in Autumn 2024. The results of this monitoring will be presented in the next annual report.

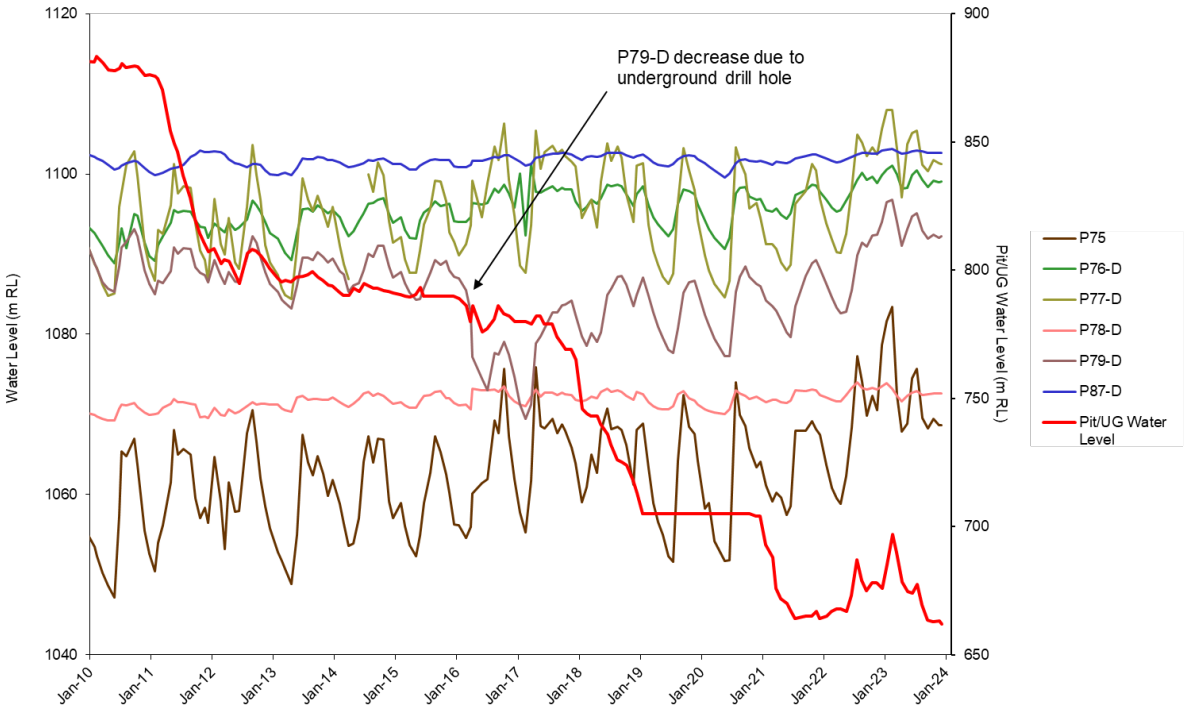


Figure 25. Favona andesite water level trends with underground dewatering level.

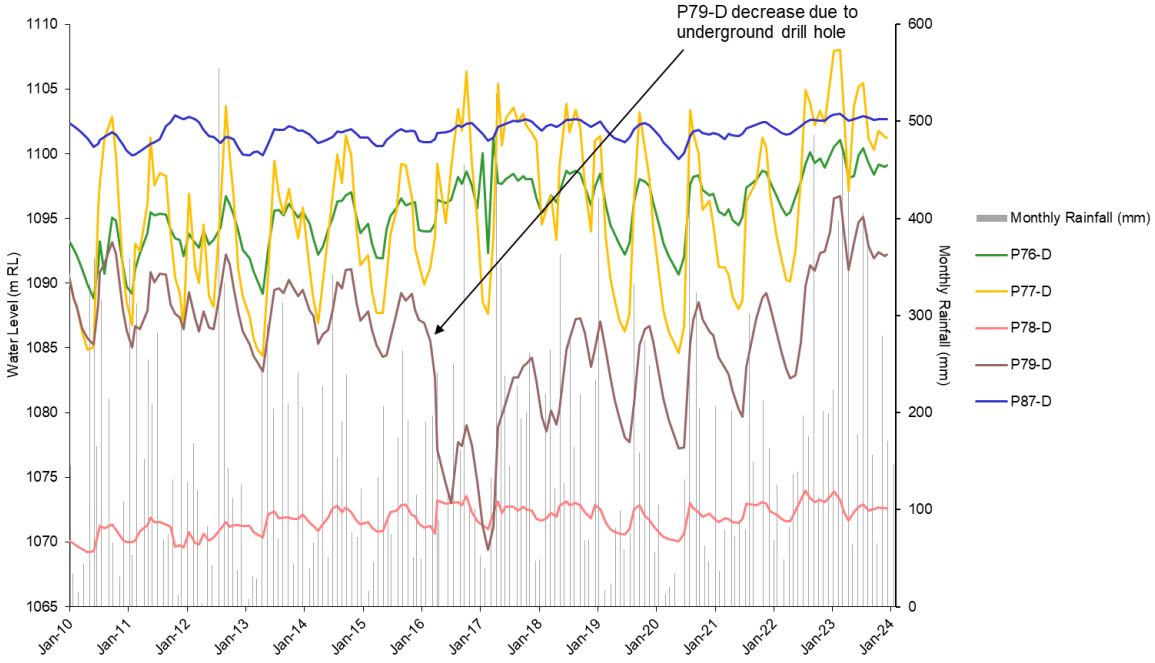


Figure 26. Selected Favona andesite piezometers with rainfall.

5.3.7 Waihi East – CEPA

Six boreholes were drilled between July – September 2011, each with three or four vibrating wire piezometer tips installed. These are located east of the Martha Pit to provide improved groundwater information in an area with few existing wells and in the vicinity of the Correnso Project. Two additional vibrating wire piezometers and 39 additional settlement markers were installed in early 2014. One further piezometer was installed in 2016 for monitoring related to the Daybreak/SUPA orebody.

The piezometers were located across and perpendicular to the Correnso vein system in three lines (P90, P91 and P92 forming one line, P93, P94 and P95 a second line and P100, P101 and P102 the third). Separation distance between the northern and southern lines is some 500m. The piezometers were constructed to intercept the shallow aquifer, young volcanics, and andesite rock (Table 6).

Table 6. Summary of geological units and depths - Waihi East piezometers.

Bore	Shallow	Young Volcanics		Andesite	
		Upper	Basal Zone		
P90	-	20.0m	100.0m	137.0m	
P91	9.3m	25.5m	111.3m	151.3m	
P92	-	23.3m	121.3m	156.3m	
P93	12.3m	26.0m	100.0m	143.0m	
P94	6.0m	25.0m	104.0m	144.0m	
P95	-	35.0m	90.0m	120.0m	
P100	-	50.0m	120.0m	135.0m	160.0m
P101	12.8m	32.0m	47.0m	78.0m	
P102	8.0m	38.0m	62.0m	90.0m	

Figure 27 to Figure 35 present the records from the piezometers expressing water level as mRL. The charts also display the depth of the piezometer tips, lithology shading and daily rainfall. Separation between the shallow and deeper piezometers is evident in the records. The nine groundwater monitoring piezometers have indicated stable water levels in Waihi East. Exceptions are discussed below.

Note: In the following plots the gaps in the data are usually due to either brief logger malfunction issues or flat batteries in the unit. The exception to this is the data gaps in P90-2 which are due to the cable being severed by drainage works associated with nearby residential construction. This cable was repaired in February 2024.

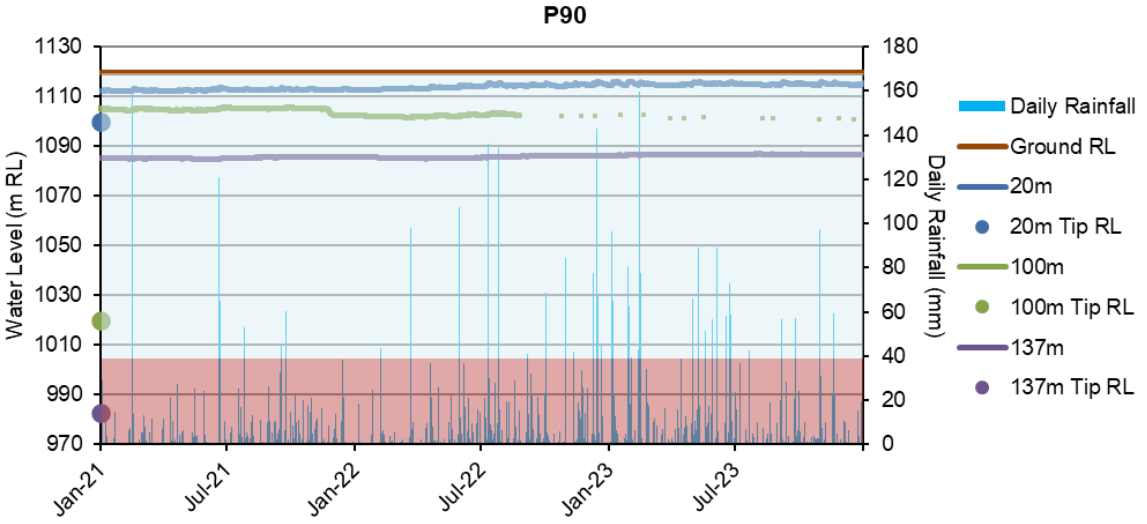


Figure 27. P90 vibrating wire piezometer.

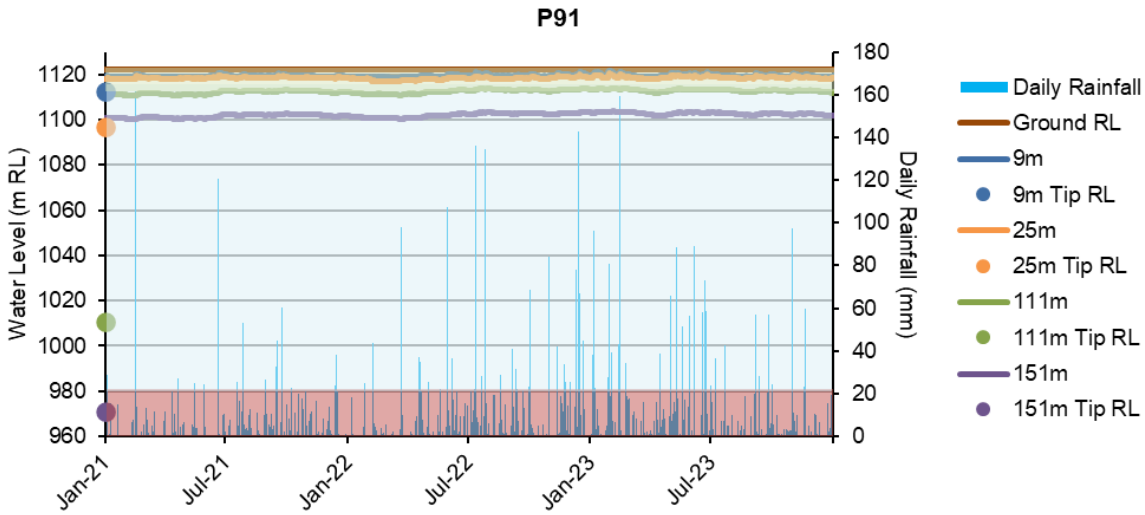


Figure 28. P91 vibrating wire piezometer.

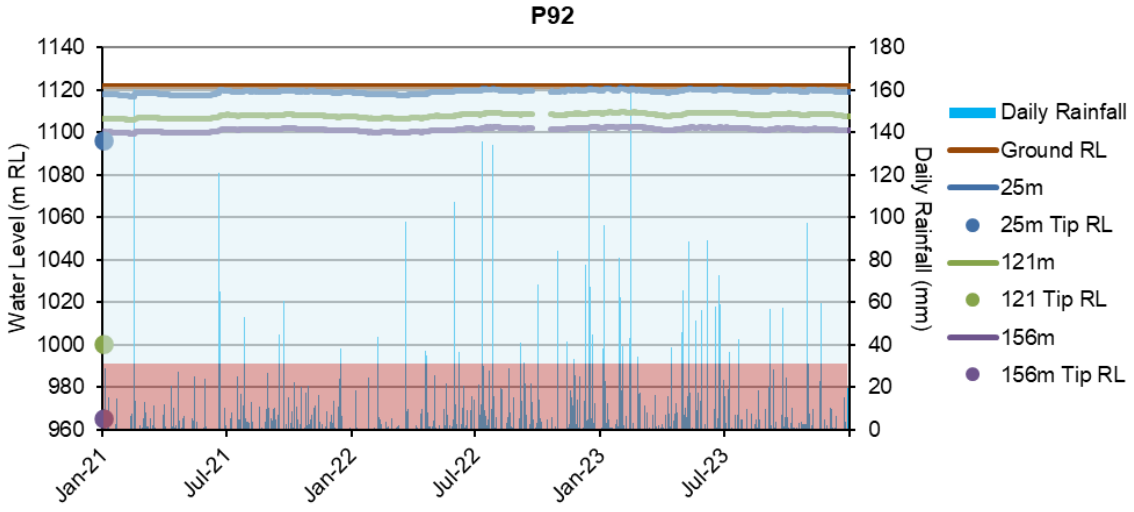


Figure 29. P92 vibrating wire piezometer.

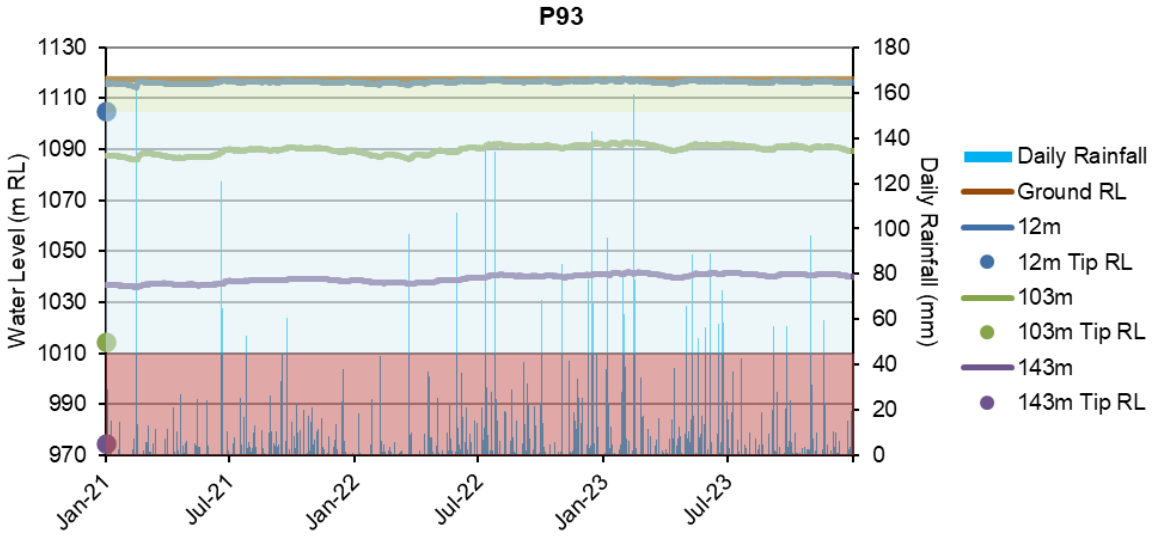


Figure 30. P93 vibrating wire piezometer.

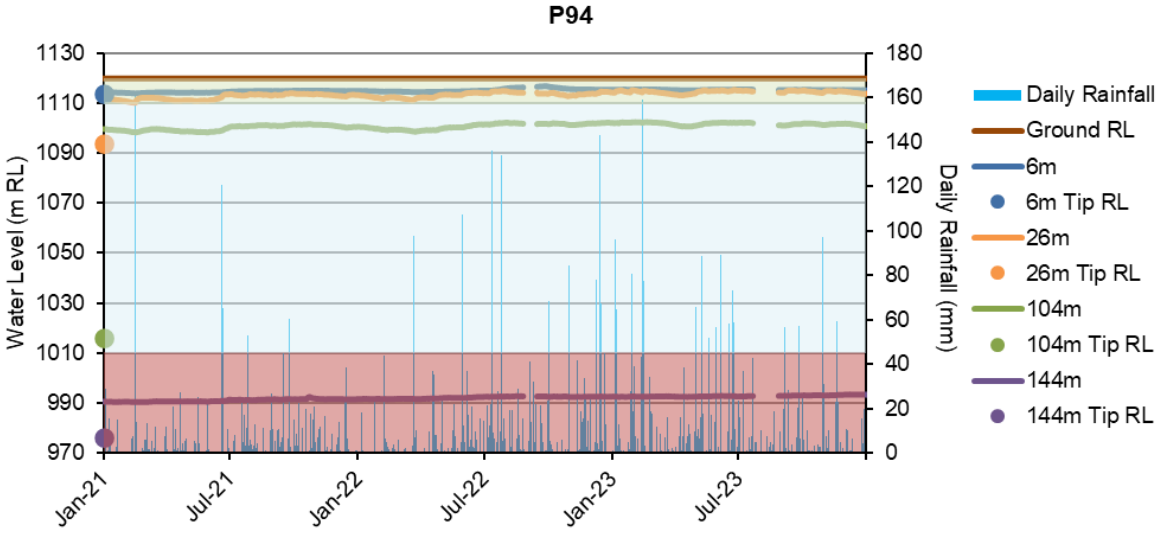


Figure 31. P94 vibrating wire piezometer.

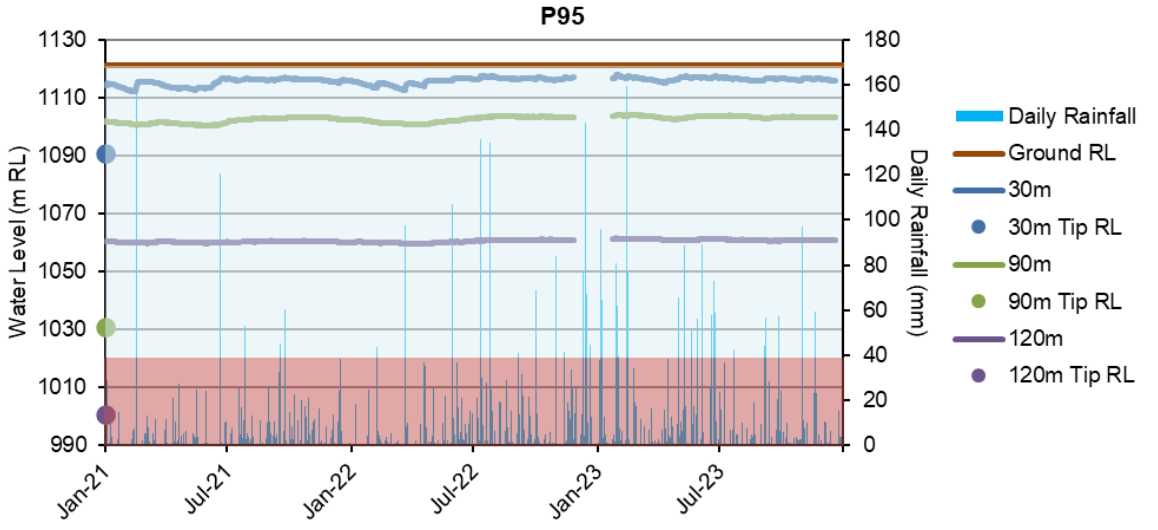


Figure 32. P95 vibrating wire piezometer.

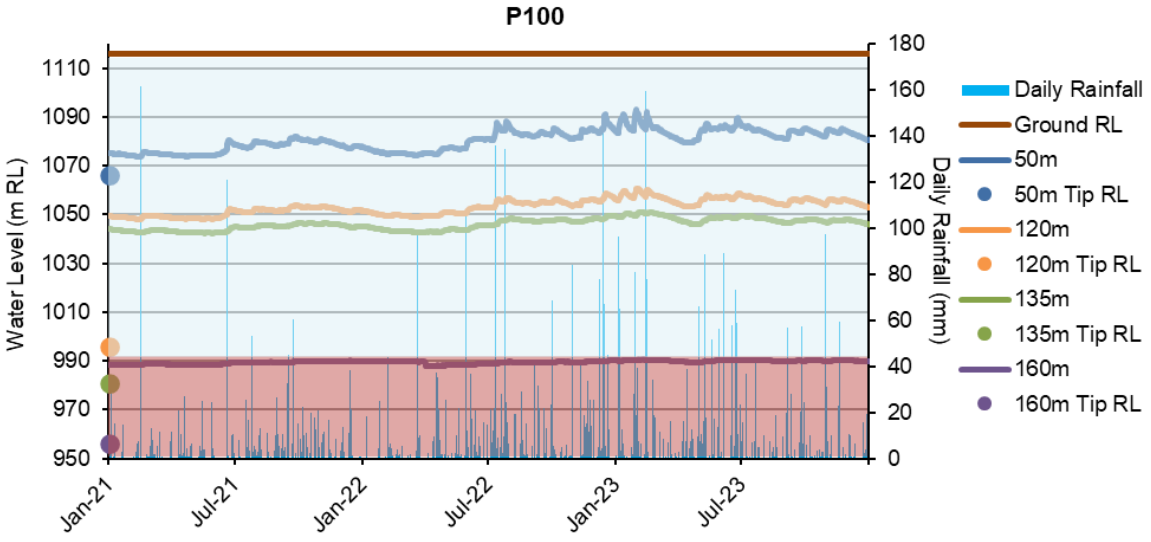


Figure 33. P100 vibrating wire piezometer.

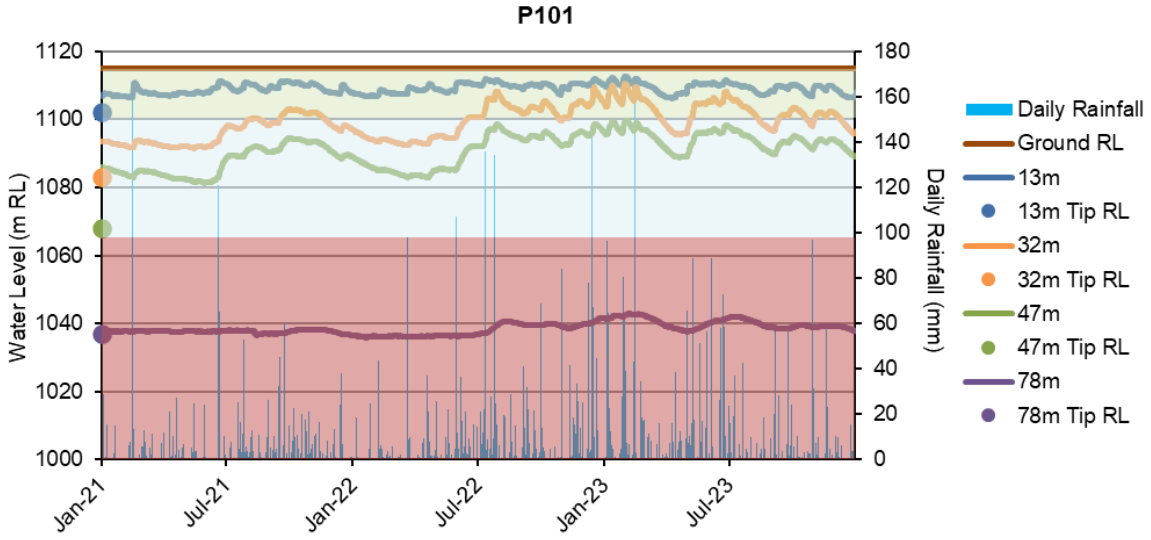


Figure 34. P101 vibrating wire piezometer.

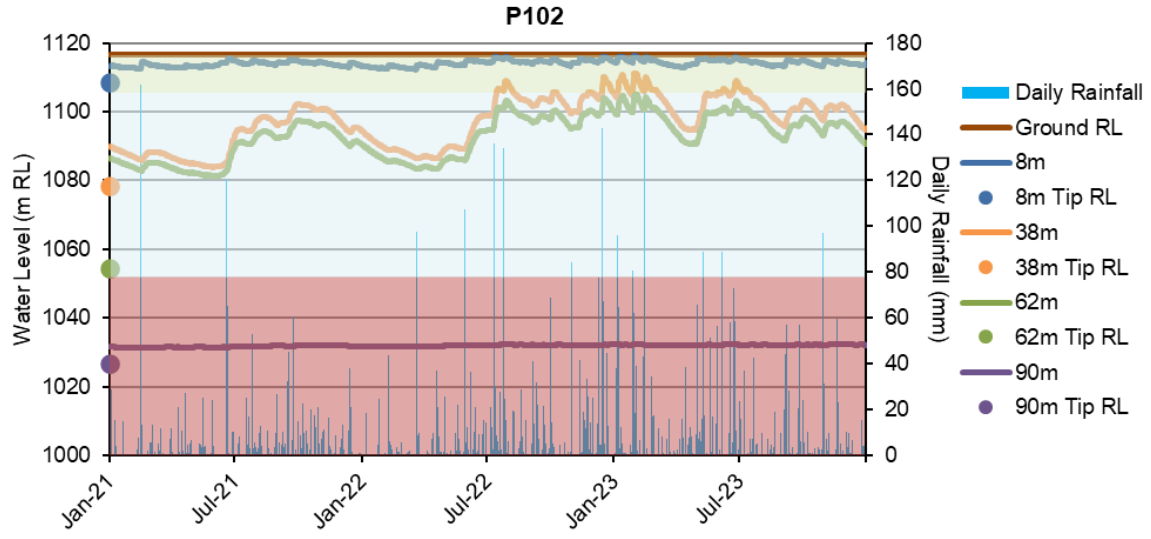


Figure 35. P102 vibrating wire piezometer.

Overall, through 2023, the measured groundwater levels have been stable and within historical ranges. Piezometric levels in the young volcanics have continued to show influence from rainfall. This is particularly evident at P100, P101 and P102, especially in January and February 2023 when Waihi experienced higher than usual rainfall (470mm in January and 430mm in February). This ongoing fluctuation does not appear to have any significant effect on ground surface settlement.

P101-4, an andesite piezometer, appears to have little water pressure (Figure 34). The tip is at 1037 mRL and at the end of the 2023 monitoring period the measured groundwater level was at 1038 mRL. During the year, the groundwater level at this location fluctuated between 1037.63 and 1042.83 mRL.

5.3.8 Private Wells

The private wells are bores which are mainly used for water supply. They show seasonal fluctuations in groundwater levels and these levels can also be influenced by landowners using the bore. The Wharry Rd, Whangamata Rd and Mataura Rd bores can no longer be accessed. Two such access restrictions were due to health and safety concerns and the other due to the landowner not allowing OGNZL access. There is no previous indication of any influence in the bores from mine dewatering (Figure 36).

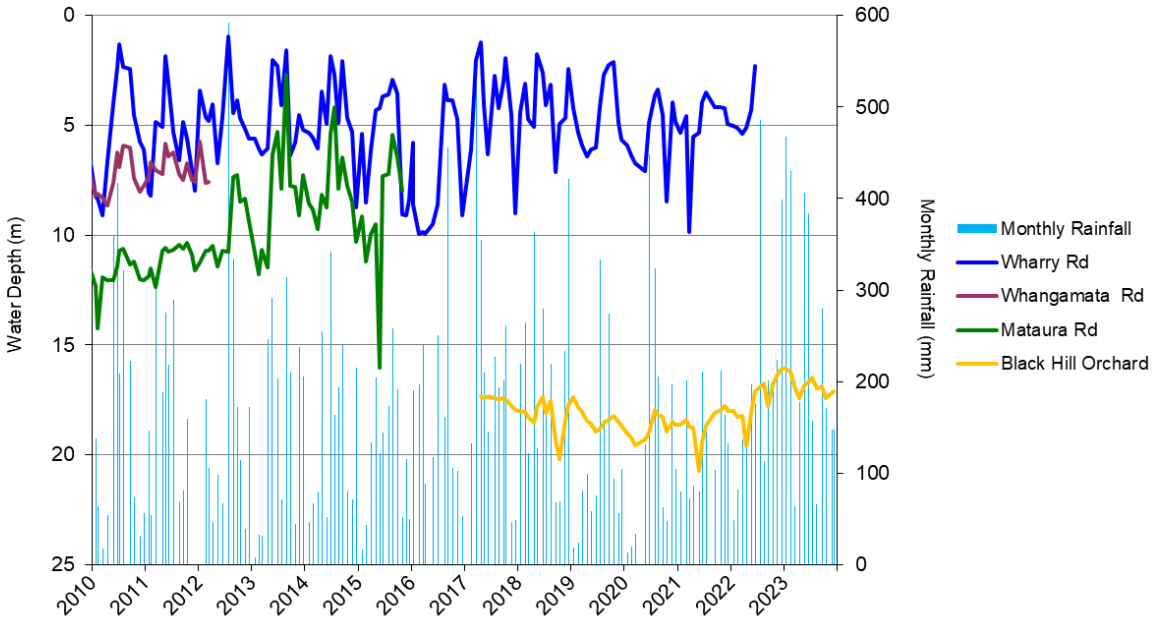


Figure 36. Private bore water levels.

6 SETTLEMENT MONITORING

Condition 13b of the Extended Martha Mine consent requires the identification of any environmentally important trends in settlement behaviour. Condition 13d of the same consent requires a comparison to be made between the settlement survey data and that predicted as part of the consent application.

A reassessment for the settlement prediction was conducted for the Trio Development Project (Engineering Geology, June 2010). This review assessed the effect of pumping from the Martha Pit to draw down the groundwater level progressively to 755mRL, which would also dewater the connected Trio system.

Another reassessment was conducted for the Correnso Underground project (Engineering Geology, 2012). The relevant report recommended new trigger levels for settlement based on additional depressurisation of the andesite layer.

Further reassessment was undertaken for Project Martha with dewatering to below 700 mRL authorised. New triggers were applied during the 2020 reporting period (Table 7).

A review of the settlement marker network was undertaken during 2019 by GWS Ltd. This resulted in the removal of erroneous and high-density settlement markers for settlement plotting and trigger assessments.

Seven settlements zones were defined around the Martha Mine pit in 1999, extending to the outskirts of Waihi. The zones were established based on the first ten years (pre-extension) of settlement history having regard to the then current knowledge of the thickness and composition of compressible materials (such as ash-soils, alluvium, sediments, and unconsolidated younger volcanic deposits) and the expected effect from Martha Mine dewatering. Table 7 provides the most recent update of the Settlement Zone trigger levels, approved in 2019 and applied following the commencement of Project Martha in 2020, to reflect the changed mining and dewatering conditions. Figure 37 shows the predicted settlement zones. These have also been updated with the commencement of Project Martha.

Table 7. Summary of predicted settlement zones and Project Martha trigger levels.

Zone	New Trigger Levels (mm) Project Martha (2020)
Settlement Zone 1	55
Settlement Zone 2	65
Settlement Zone 3	95
Settlement Zone 4	160
Settlement Zone 5	260
Settlement Zone 6	340
Settlement Zone 7	540

The settlement measured is an accumulation of all causes of settlement. Generally, this is considered to be the result of mine dewatering, but close to the mines and (in the case of Favona) overlying the mine areas, additional settlement may be the result of primary consolidation settlement (as opposed to reconsolidation settlement which is the process in the Martha groundwater system where historic dewatering resulted in groundwater levels dropping to lower elevations for a longer time period than is proposed for current mining activity). Nevertheless, it is the total settlement that is discussed in this report as settlement due to dewatering alone cannot be separated from other causes.

Comment is provided in relation to the predicted settlements given in Table 7 and these comments are expanded on where monitoring data show exceedance of the trigger values.

6.1 Method

The initial settlement survey network was established in 1980 during the exploration phase of the project and has been regularly monitored since December 1987. Over the course of the project, settlement survey marks have been added, removed or replaced, as required, to extend the network or to compensate for damaged sites. Figure 38 is a settlement contour map of raw, unadjusted survey data, that has been segregated from Figure 37 at the request of HDC. This allows easier interpretation of the contour lines.

Figure 39 shows the location of settlement marks monitored by OGNZL up to the end of 2023. Also, included on Figure 39 are the defined subsidence hazard zones related to historical underground mine stopes and shafts (IGNS, 2002). Figure 40 provides the settlement monitoring marks across the Favona Mine and shows the locations of the Favona Mine workings in relation to the marks. Figure 41 provides the marks identified as triggered during the November 2023 survey.

Settlement monitoring was undertaken in May/June and November/December 2023 across the settlement network surrounding Waihi Township (refer Appendix C) and also along the Favona network which is an extension of the Martha Mine survey network. Appendix B presents the two summary settlement monitoring reports. For simplicity this report refers to surveys as May and November 2023.

The raw data provided by the surveyors has been graphed and where changes in the record are apparent as a result of mark relocation or replacement, corrections have been applied using graphical projection so that total settlement over the life of mining can be assessed for each location. The correction process applied was as follows:

- Updating the time-history graph for all data from settlement markers with data up to 1/11/2023.
- Where changes in the time-history graph identified a datum change, a correction was arrived at by projecting the initial data visually on the graph to the time of the new datum and a correction calculated. A smooth settlement curve resulting after the correction was applied and similarity of curve shape to those of adjacent marks was taken as indicating an acceptable correction.
- Where marks were installed in May 1999, the previously determined settlement for that location from 1988 to 1999 was applied as a correction.
- Where marks were installed or changed other than in May 1999, the previously assessed settlement at the location as of May 1999 was used with a best fit trend line of settlement in time to correct the values to be consistent with the May 1999 value.
- For Favona marks, settlement values as at 1/12/2005 were assessed for each location and used to correct the new marks to account for settlement from 1988 to 2005.
- The corrected data has then been used to generate:
  - Settlement-time trend graphs for each zone.
  - Plans of total settlement.
  - Contours of total settlement.
  - Calculation of tilt.
  - Settlement-time trend graphs of specific areas.
- Where Favona development has affected settlement, a projection of the pre-Favona Mine settlement trend has been made as a means to estimate the current Martha Mine settlement and this settlement value has been subtracted from the total measured settlement to provide an estimate of the settlement due to the Favona Mine development.

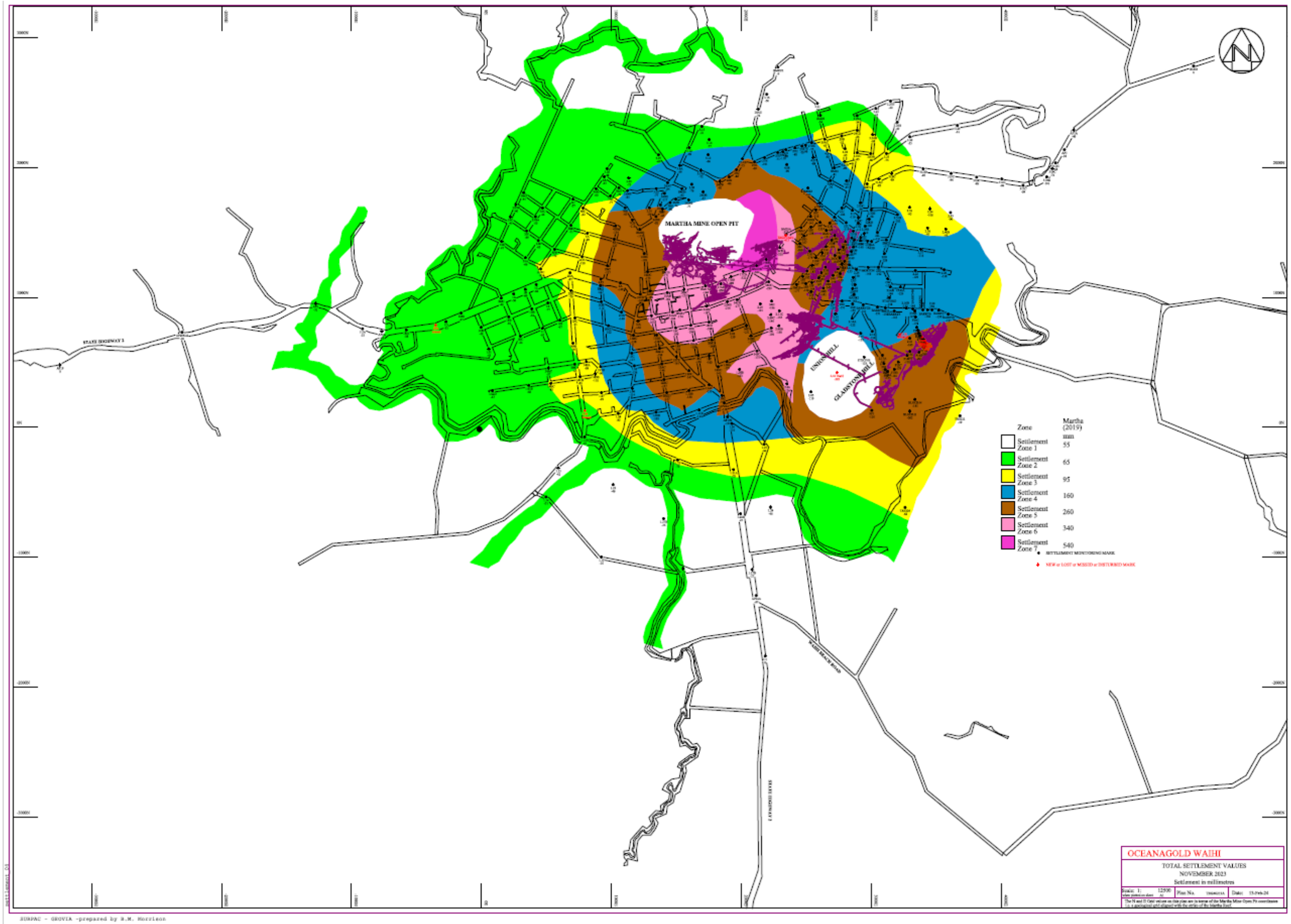


Figure 37. Total settlement zones – November 2023.

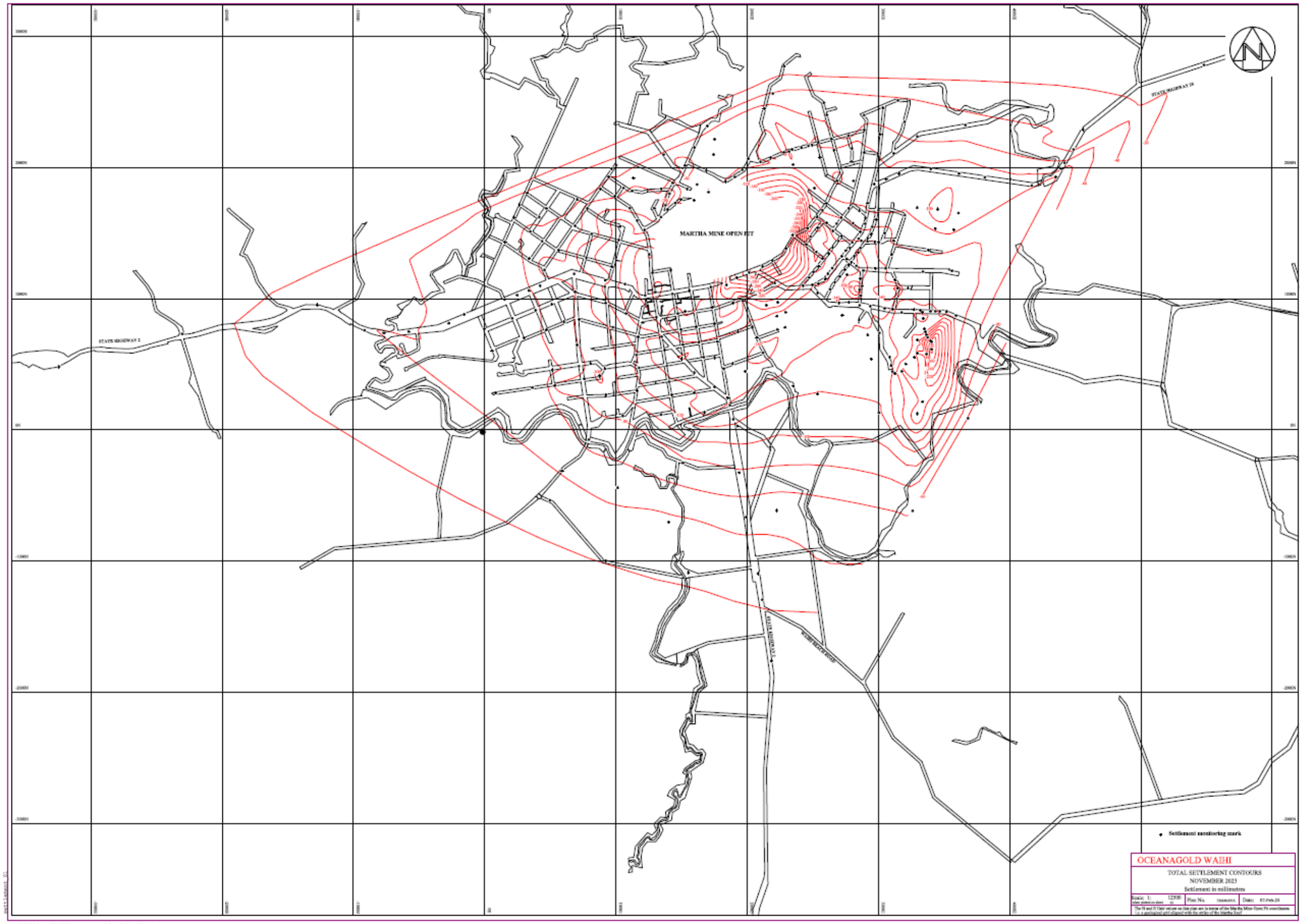


Figure 38. Total settlement contours – November 2023.

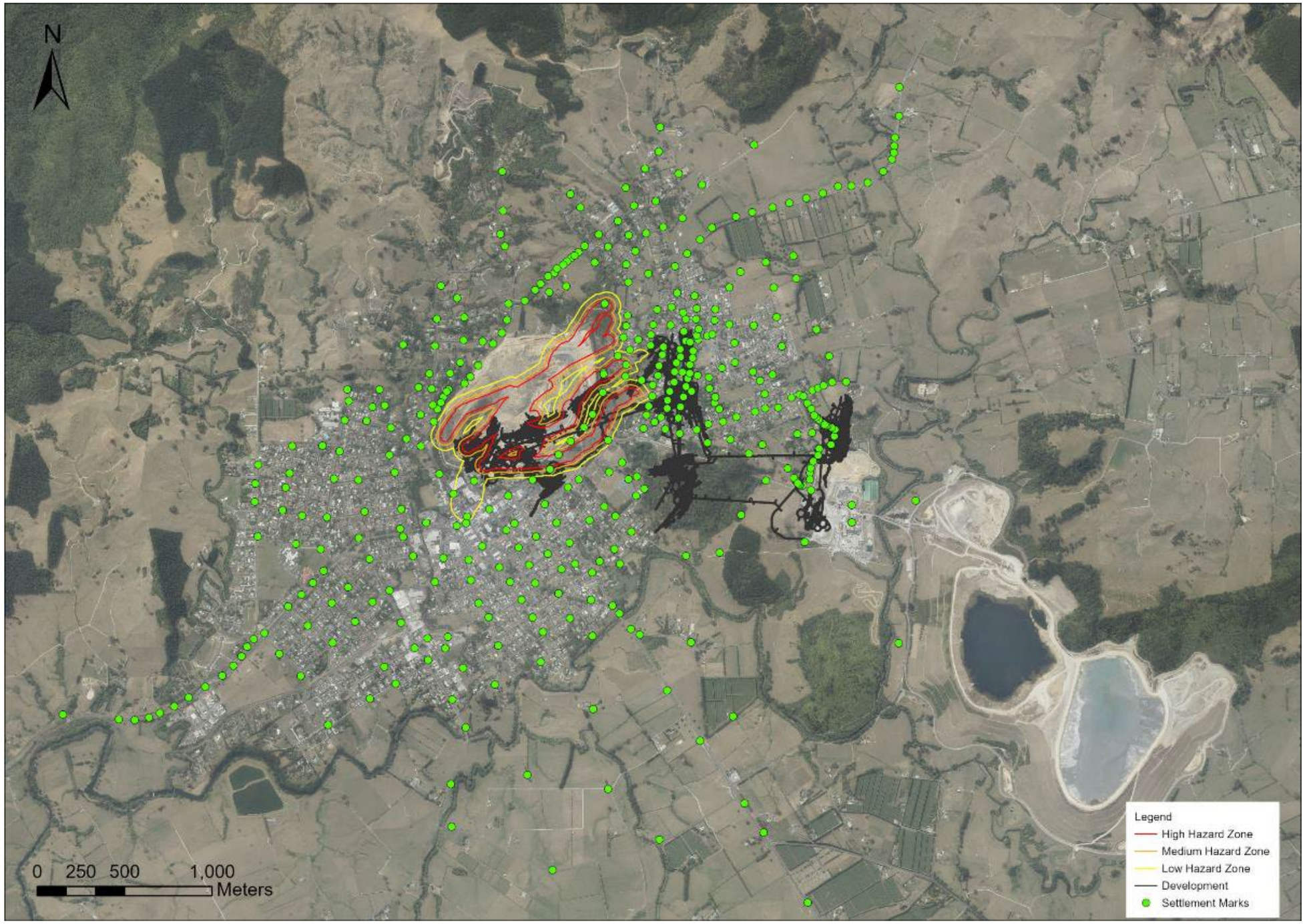


Figure 39. Settlement marker location plan, hazard zones, and recent underground activity.

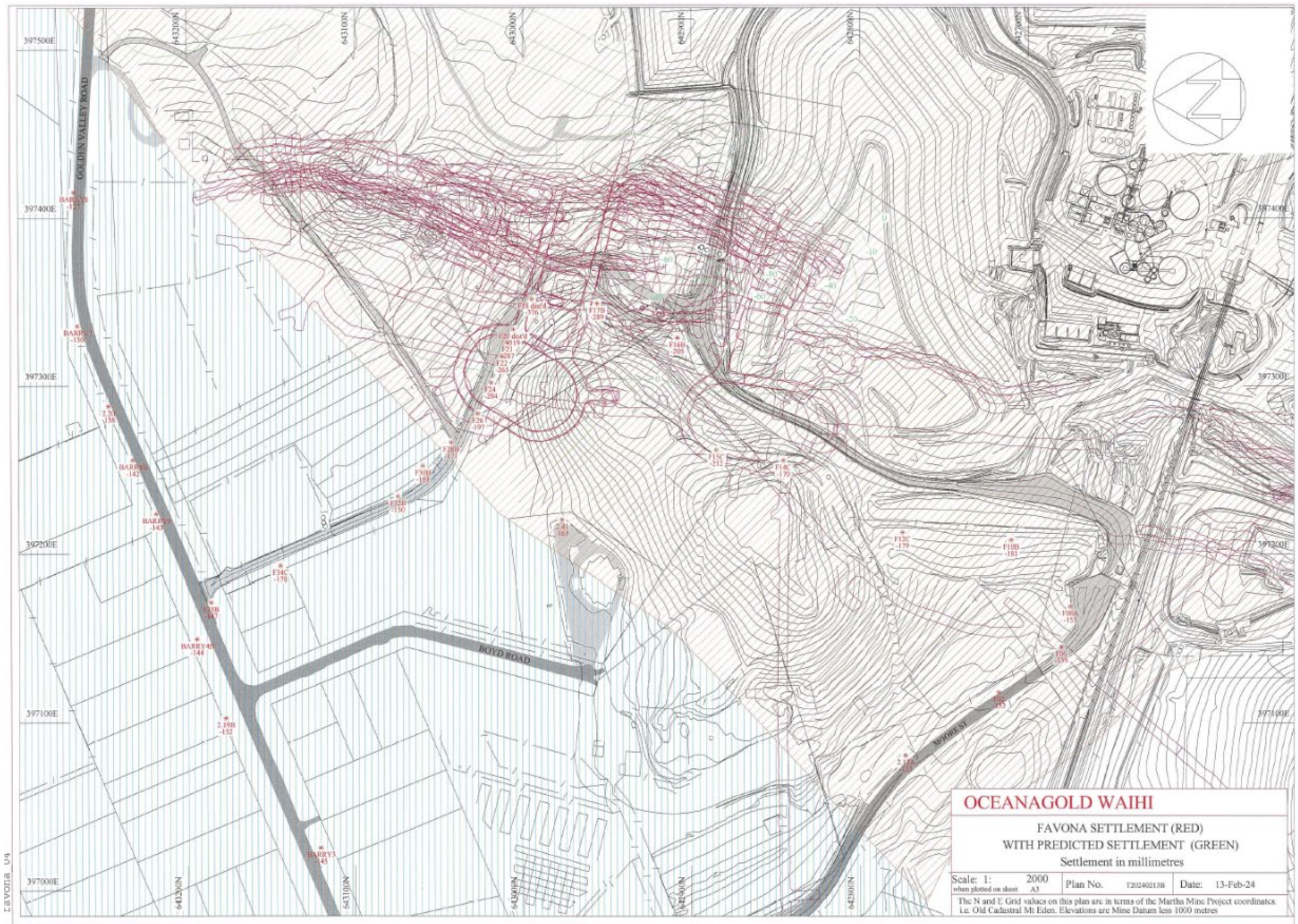


Figure 40. Favona settlement – November 2023.

Figure 41. Triggered settlement marks – November 2023.

6.2 Results

Appendix C presents plans showing the settlement mark locations, measured settlement values and inferred settlement contours.

Time-history plots of settlement survey data for each zone are presented in Appendix D. These plots also depict the zone settlement predictions (for the Martha Extended Project, Trio Development, Correnso Project and Project Martha) as horizontal lines on each set of graphs.

The projected trends and the maximum settlements are provided on the graphs in Appendix D. Key trends are described below.

95.8% (345/360) of the marks did not exceed the settlement trigger levels; 15 marks were triggered. This number is similar to 2022.

Figure 41 above shows the location of the ten settlement marks that are located beyond the influence of the Favona Underground that exceeded the trigger limits during the November 2023 survey. The other five marks that exceeded the trigger limits are located above the Favona Underground.

Some points in the time-history plots of settlement in Appendix D for May 2021 showed greater settlement compared to the general trends. This was due to a larger than normal survey mis-close associated with onboarding of new survey staff in May 2021. This was generally most notable to the north and east extents of the survey. The reason for this larger than normal mis-close was able to be identified and corrected for the November 2021 survey. The May 2021 survey data was reprocessed to remove the May 2021 mis-close. The November 2022 results follow the general settlement trends prior to the May 2022 survey.

A summary of the number of settlement survey marks that have been triggered within each of the settlement zones is presented below in Table 8. Further discussion regarding each of the triggered survey marks is provided in the following sections.

Table 8. Number of survey marks triggered in each settlement zone.

Zone	Triggered Marks
1	3
2	2
3	3
4	1
5	0
6	1
7	0
Favona	5
Total	**15**

6.2.1 ZONE 1 – Trigger 55mm

The Zone 1 time-history plot (Appendix D) shows three groupings, one showing a small but steady ongoing settlement after about 1999), another with little settlement until November 2015 and then a small ongoing settlement and another group with no settlement evident. To show these observations the marks for Zone 1 were re-plotted as groups namely:

- Zone 1 along Waihi-Whangamata Road has had a small steady ongoing settlement since 1999 which has reached between 15 and 60 mm (Figure 42)
- Zone 1 south of Waihi has had a small steady ongoing settlement since 1999 which has reached between 15 and 70 mm (Figure 43)
- Zone 1 west of Waihi has had a very small amount of settlement (less than 12 mm) up to 2015 following which the settlement rate increased to a small steady ongoing settlement which has reached between 10 to 20 mm (Figure 44)
- Zone 1 north of Waihi which has had no measurable settlement (Figure 45)

This grouping shows that the marks in Zone 1 with a slow ongoing settlement trend are located along the Waihi to Whangamata Road to the east of Waihi and to the south of Waihi. A steady increase in settlement rate from about 1999 is also be observed in most marks in Zones 2 to 6, suggesting that there is a small and widespread effect occurring at depth. Two of the three settlement marks in Zone 1 to the west show little settlement until 2015 and then a small steady on-going settlement showing the widespread effects at depth have reached these markers (Figure 44).

The above observations suggest the following:

- The widespread 10 to 50 mm settlement observed from about 1999 at many Zone 1 marks and also the increasing settlement in Zones 2 to 6 marks is a response to the ongoing dewatering of the deeper structures in the andesite rock body (fracture depressurisation) as a result of mine dewatering. This is a broad effect and has negligible influence on differential tilt between marks.

The stable water levels in the wells monitoring the deeper younger volcanic materials and the upper andesite layers (Figure 15) indicate that the observed settlement behaviour is not related to on-going consolidation of these materials at these locations as no on-going dewatering is evident at these locations.

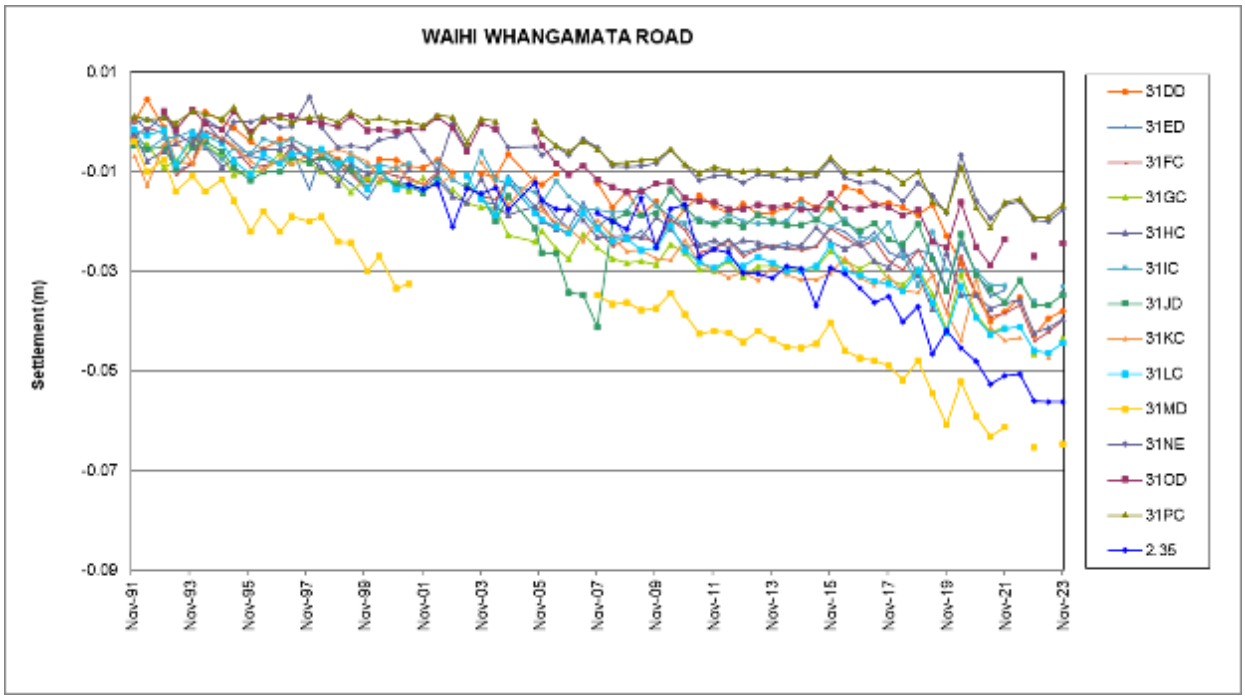


Figure 42. Zone 1 Waihi to Whangamata Road.

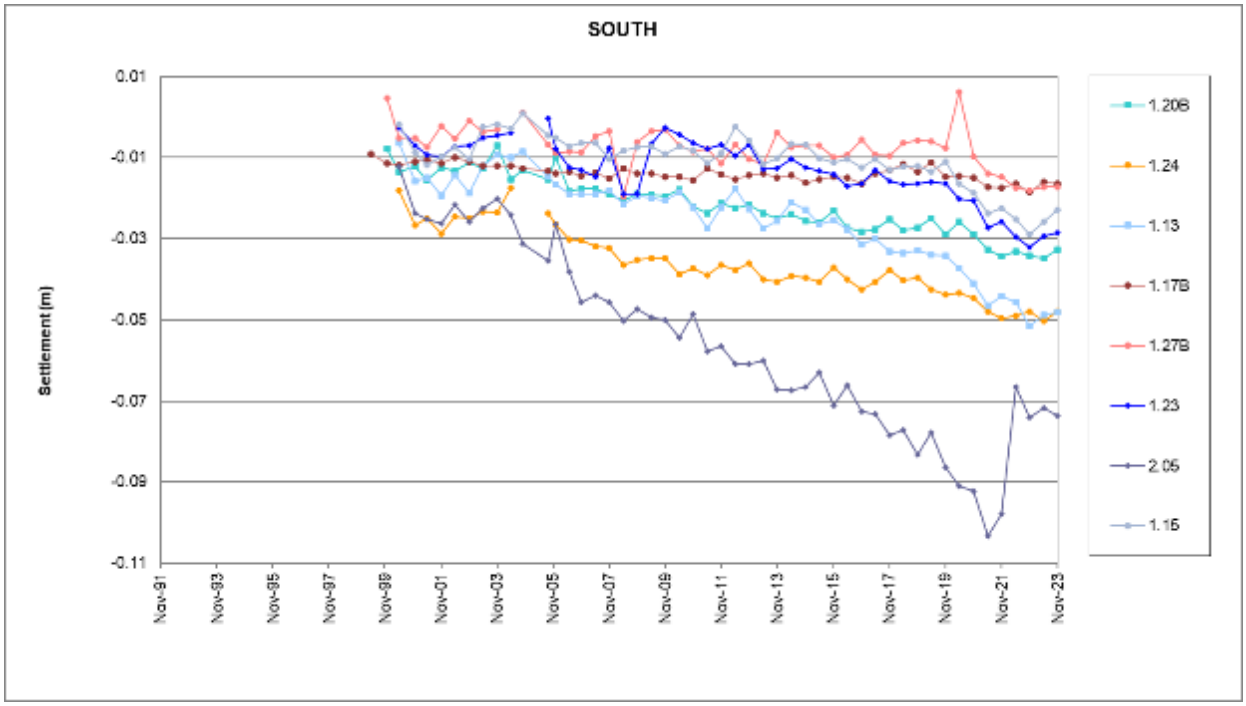


Figure 43. Zone 1 Waihi South.

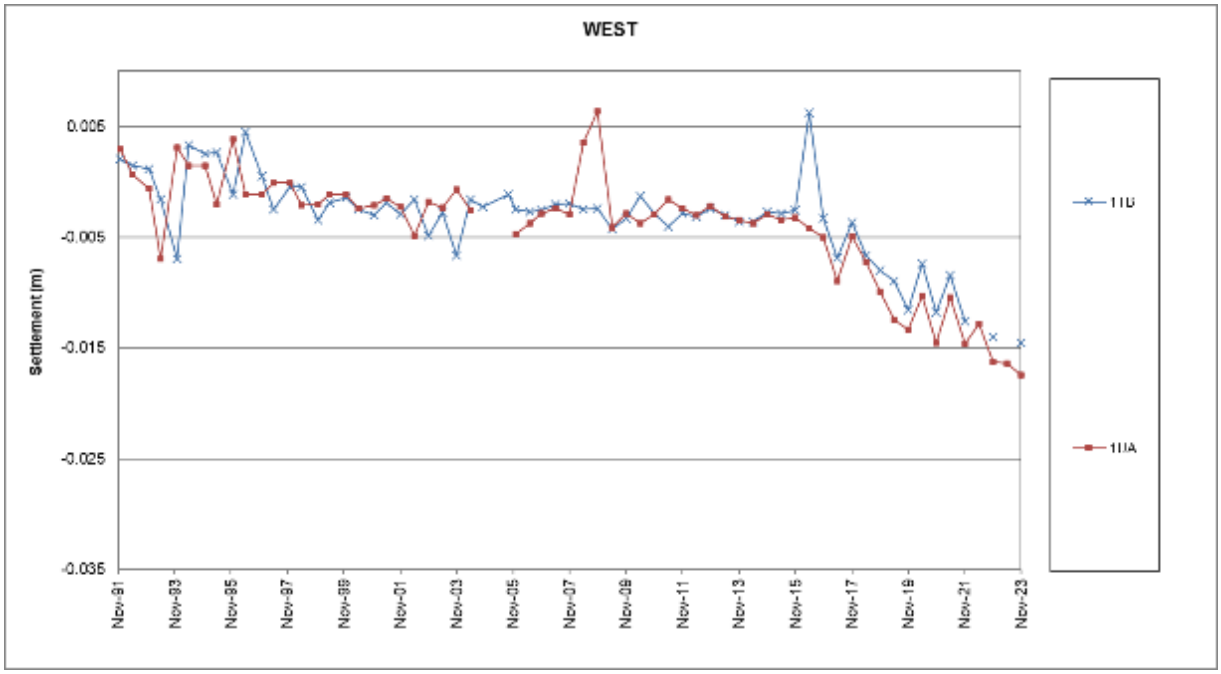


Figure 44. Zone 1 West of Waihi.

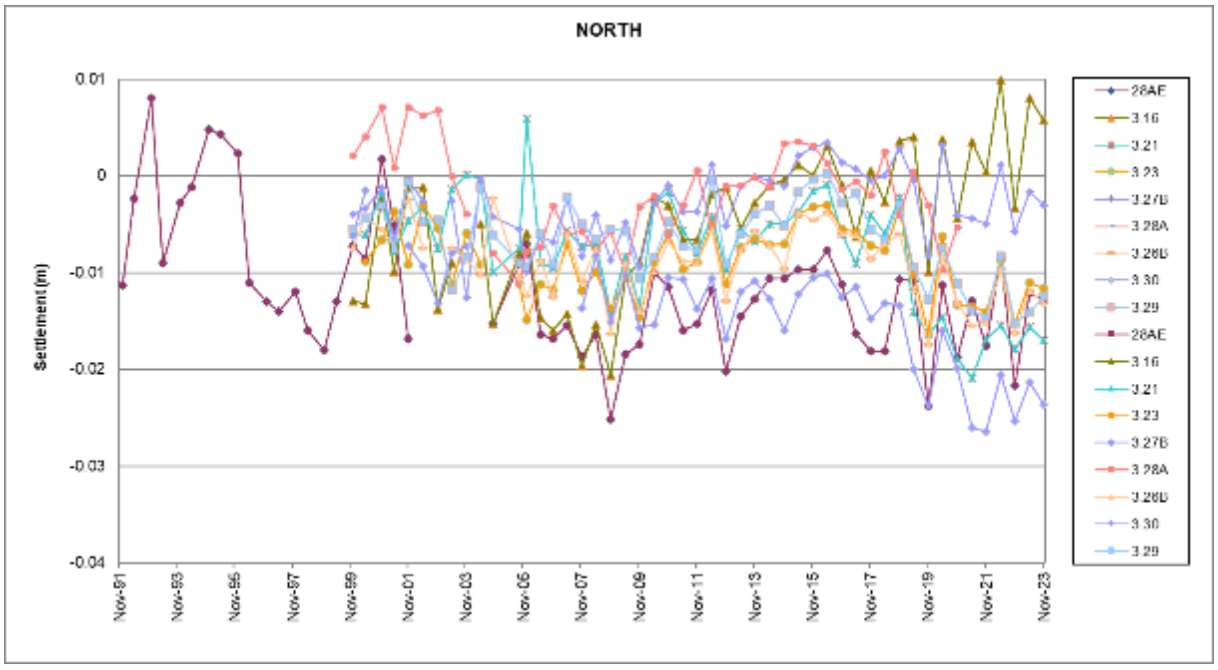


Figure 45. Zone 1 North of Waihi.

The monitoring results that exceed the trigger levels, as shown on the relevant Zone 1 time – history plots, are discussed below.

Three marks in Zone 1 showed settlement greater than the trigger levels: 2.05, 2.35, and 2.44

Mark 2.05 is near Winner Hill and was included in Zone 1 because it was an andesite outcrop. Dewatering of the andesite was originally thought to contribute less to settlements. Like other marks to the south of Waihi Mark 2.05 indicates ongoing settlement after 2003 due to deeper and more extensive dewatering of the andesite. Mark 2.05 is more representative of Zone 4 settlements.

Mark 2.35 is south of the Waihi to Whangamata Road and close to the Settlement Zone 3 boundary. The data suggests an acceleration of settlement after September 2005, however neighbouring marks

in Zone 3 have similar settlement values indicative of a general trend in this area. This mark is northeast of Correnso and is not in close proximity to underground mine activities.

Mark 2.44 has been investigated in the past and the cause has been attributed to some localised surficial slope movement. This mark is listed as disturbed by the surveyor.

6.2.2 ZONE 2 – Trigger 65mm

This settlement zone encompasses the western outskirts of Waihi township and some marks to the north and south of Waihi. The time-history plot for Settlement Zone 2 (Appendix D) shows all but two of the Zone 2 marks to be tracking less than the settlement trigger level. As with Zone 1 most of the marks have small settlements. Total settlements to date are generally between 10 and 75 mm with settlements of between 10 to 40 mm occurring since 1999. Movements exceeding trigger levels are discussed below.

On review, the settlement in Zone 2 which is occurring at Mark 1.04, Mark 1.02D, and Mark 1.03D has continued steadily and at an increased rate compared to other marks in Zone 2. This is assessed to be associated with ongoing dewatering for the Martha Underground (MUG) and likely shows the effect of the deep dewatering in the andesite. Piezometer P4, in the southern area of Waihi, indicates the overlying younger volcanics have not been dewatered. The settlements are relatively small, result in negligible tilt and are therefore not of concern at this point in time. Mark 1.12 continued to exceed the trigger limit by 10 mm in the November 2023 survey. Mark 1.12 will continue to be reviewed with subsequent monitoring surveys undertaken when the measured settlement exceeds the trigger level of 65mm.

Mark 1.04 is located in the southern region of Waihi, near the Ohinemuri river. This mark has been triggered previously. The settlement at this mark is assessed to be unrelated to mining activities due to its distance from mining works. It should be further noted that this mark is located near the river and likely upon alluvial soils which are often susceptible to moisture related shrink and swell. Further, this mark may indicate slow natural settlement or ground creep towards the watercourse which is indicated via the measurement of gradual settlement over time. This survey mark was unable to be surveyed in the November 2023 round as it was inaccessible on several attempts.

6.2.3 ZONE 3 – Trigger 95mm

This zone includes areas to the east, south and west of Waihi town.

Review of the time-history plot for Zone 3 shows, as with Zones 1 and 2, most marks display ongoing steady settlement. The measured total settlements are relatively small and generally between 20 and 90 mm with settlements since 1999 typically being between 10 and 50 mm. Tilts between adjacent marks are well within acceptable limits.

One mark (2CE) has moved more than the settlement trigger level for the zone. Mark 2CE is located to the west of Waihi township and has showed an increased rate of settlement compared to nearby marks between 1991 and 1995. Thereafter, it has settled at a similar rate to nearby marks. This settlement pattern is similar to point 2BC in Zone 5. This increase settlement rate in the early 1990's is associated with dewatering/depressurisation effects due to the development of Martha Pit. Steady ongoing settlements similar to the surrounding points indicates settlement associated with dewatering of the deeper andesite. This mark will continue to be reviewed, however, settlements are explainable and tilts are small, so not of concern.

Mark 1.07 is located in the southern region of Waihi. This mark has triggered in the past, and the observed settlement is not thought to be associated with mine dewatering. As with Mark 1.04 (in Zone 2) roadworks have occurred in this area and the mark is located near the Ohinemuri River where shrink/swell susceptible alluvial soils are likely to be present.

Mark 14DB is located near to Mark 1.07. This mark has also triggered in the past and the observed settlement is not thought to be related to mine dewatering. Roadworks have occurred in this area

and the mark is located near the Ohinemuri River where shrink/swell susceptible alluvial soils are likely to be present.

6.2.4 ZONE 4 – Trigger 160mm

The Zone 4 time-history plots (Appendix D) show relatively steady ongoing settlement since 1995 in response to mine dewatering. The measured total settlements are relatively small and are generally between 20 and 140 mm. Settlements since 1999 are generally between 10 and 80 mm. Tilts between adjacent marks are well within acceptable limits.

One mark, 23C, continued to exceeded the predicted maximum settlement for this zone in November 2023. This mark initially showed a sharp increase in settlement during the May 2020 survey. The settlement in the subsequent November 2020 survey was similar to nearby marks. This mark is located near a drain and may have been affected by the dry summer and autumn during 2019/2020 or was influenced by recent drainage works nearby. No visual evidence of settlement effects on surrounding land have been identified to date and nearby piezometers have not shown any unusual changes.

6.2.5 ZONE 5 – Trigger 260mm

The data for the Zone 5 marks is provided on the relevant time-history plot in Appendix D. These marks show a steady increase in settlement with time and total settlements are generally between 30 and 150 mm. Settlements since 1999 are generally between 15 and 85 mm.

No marks in Zone 5 that are located outside of the area over the Favona Underground exceeded the predicted maximum settlement for the zone.

6.2.6 ZONE 6 – Trigger 340mm

The settlement in this zone is shown on the relevant Zone 6 time-history plot in Appendix D. This settlement zone extends through the centre of the Waihi commercial area. The relevant settlement marks show steady ongoing settlement with time and total settlements are generally between 70 and 280 mm. Since 1999 the measured settlements in this zone have generally been between 50 and 190 mm.

One mark in this zone exceeded the maximum predicted settlement. This mark (mark BM20) has been noted as disturbed by the surveyor (Appendix B), however the settlement has been accumulated at a relatively constant rate. The larger settlements at BM20 (compared to the rest of Zone 6) are likely due to the local ground conditions and there is no private property in this area. This point will continue to be monitored and reviewed.

6.2.7 ZONE 7 – Trigger 540mm

The settlements which have been measured within Zone 7 are all less than the predicted maximum. (Zone 7 time-history plot, Appendix D).

Total settlements are about 300 mm. Settlements measured since 1999 are about 160 mm. Ongoing settlements are relatively constant and match the ongoing dewatering at depth within the andesite.

No new settlement trends are indicated by the latest monitoring results.

6.3 Favona Settlement

The measured settlement in the vicinity of the Favona Mine has a component of settlement due to Martha Mine dewatering as well as a component of settlement related to Favona Mine dewatering.

A separation of the measured total settlement into Martha and Favona settlement components has been undertaken by projecting the settlement evident before the commencement of the Favona Mine and accepting these projected settlements as Martha settlements. The difference between the

projected (Martha) settlement and total measured settlement has been taken as the Favona component of settlement.

Table 9 sets out the total settlement, the settlement attributed to Martha dewatering and the settlement attributed to Favona Mine dewatering, as assessed for the Favona Mine settlement markers.

Table 9. Separation of settlement – Favona marks – November 2023.

Mark	Measured Total Settlement. (mm)	Estimated Martha Settlement. (mm)	Estimated Favona Settlement. (mm)
F02	105	50	55
F04	110	44	66
F06	111	40	71
F08A	121	44	77
F10B	131	44	87
F12C	133	39	94
F14C	129	60	69
F15C	171	55	116
F16B	167	55	112
F17B	293	55	238
F18	375	49	326
F20	315	44	271
F21	284	43	241
F22	262	42	220
F24	224	42	182
F26	193	45	148
F28B	167	49	118
F30B	154	52	102
F32B	125	49	76
F34C	112	58	54
F35B	106	61	45

The largest measured settlement at Favona Mine occurs where the markers overlie mine workings (i.e. marks F16B to F26). The maximum predicted settlement over the workings from dewatering was assessed as 80 mm for earlier projects, with mine dewatering related settlement not extending into the urbanised area. The actual total settlement and the extent of settlement exceeded the predictions for the dewatering settlement. The difference between the predictions and measured settlement was assessed to reflect depressurisation and consolidation of the andesite rock body, which was not considered in the initial settlement predictions. Andesite rock was considered to be a stiff material with negligible consolidation characteristics, but the long-term settlement observed in response to Martha Mine dewatering (in Zones 1 to 6, discussed above) suggests that some minor consolidation of the deeper andesite rock is occurring, possibly as a response to fracture depressurisation. In addition, some further relaxation of the rock mass towards the mine workings may be occurring, and this may be providing further volume reduction of the andesite rock mass in the vicinity of the mine.

Another potential influence is that the Favona andesite has been undergoing primary consolidation, as current water level monitoring data suggests that the Favona system was not dewatered to the

same extent as the Martha groundwater system during historical mining in the early 1900's. Consolidation predictions for Favona were made based on Martha's "reconsolidation" dewatering data. The amount of primary consolidation is greater for the first time of dewatering compared to the second or subsequent times of dewatering. This is because the first cycle of dewatering results in pre-consolidation and an increase in the stiffness of the ground, and subsequent recovery of the groundwater levels does not result in full rebound of the ground surface to its original levels.

Settlement predictions for Project Martha have been updated for the zone encompassing Favona marks to reflect the effects outlined above. Five Favona marks exceeded the maximum predicted settlement in the November 2023 survey: F17B, F18, F20,F21 and F22. All are located on company owned land above active underground workings. Marks F18 and F20 are noted by the surveyor as being disturbed (Figure 40, Appendix B).

6.4 Trio Underground

The only anomalous result in the vicinity of Trio Underground has been apparent settlement at mark 2.44 (located on a farm track between Union and Black Hill) with pronounced acceleration since the May 2010 survey. This was investigated and determined to be related to a shallow, likely pre-existing surficial landslide. It is now noted by the surveyor as being disturbed. The mark will continue to be monitored on a biennial basis as per other survey marks but will not be included in any settlement profiling.

6.5 Summary

The analysis of the relevant survey data to the end of 2023 continues to indicate that current slow settlements associated with Martha Mine are likely to be related to dewatering of the deeper structures within the andesite rock mass. Groundwater monitoring data does not show any widespread or significant ongoing dewatering of alluvium, younger volcanic materials or the upper layers of the andesite rock body.

Settlement triggers include modification to Martha Mine Extended Pit associated with the cutback projects; the extended duration of dewatering at Martha Mine; assumptions made in the Favona settlement predictions (fracture depressurisation, secondary rather than primary consolidation); and localised natural, induced and historic effects.

The area around Martha Mine of greatest settlement is adjacent to the eastern pit wall where the weaker younger volcanic rocks are thickest and dewatering of this geological unit is greatest and most protracted. This is also an area that has historic underground workings which have not been backfilled.

The main area of noteworthy settlement at Favona overlies the underground workings. This area comprises Company owned farmland. Outside the Favona workings area the measured ground surface settlement is notably lower. The conditions giving rise to settlement at Favona differ from those in the Martha Groundwater System as the latter has been dewatered to a greater extent for a longer time than the current dewatering while the former has not been previously dewatered. While settlement has exceeded initial estimates at Favona, such estimates were based on Martha settlement data which was responding to reconsolidation rather than primary consolidation.

In relation to the Trio, Correnso and SUPA mines, these areas are located in the dewatered Martha Groundwater System and settlement (as described in this document) has already been developing in response to Martha Mine dewatering. Also, as these are linked to the Martha system, settlement will be based on additional consolidation and did not include settlement due to dewatering of the andesites.

7 TILT

As noted above, a full assessment and review of the Waihi settlement marker network and database was undertaken by GWS Limited in 2019. This review resulted in the removal of erroneous and high-density settlement marks and an updated settlement database with revised settlement marker corrections where appropriate.. Revised settlement marker corrections have been applied in this reporting period. It should also be noted that there is some crossover of marks between adjacent Mining Permit boundaries.

The settlement and tilt assessments have been grouped into six areas as follows:

- Favona
- Martha
- North Wall
- Correnso
- Correnso South, and
- SUPA.

The assessment of tilt between adjacent settlement marks is summarised in Table 10.

The current assessment of tilt between adjacent settlement marks is summarised below in Tables 10a to 10f. In the following tables an orange cell denotes the locations where tilt greater (steeper) than 1:1000 has been calculated and a green cell denotes a survey monitoring pin that is located above OceanaGold underground mine workings.

Table 10. Summary of Tilt calculations – November 2023 survey.

Table 10a: FAVONA

Mark	x	y	Distance (m)	Nov 2023 Δz (m)	Abs (m)	Δh (m)	Tilt (1:X)
F02	3097.60	490.00		-0.1044	0.1044		
F06	3107.08	445.21	45.78	-0.1110	0.1110	0.0066	6937
F10B	3176.88	446.75	69.82	-0.1319	0.1319	0.0209	3341
F12C	3207.32	503.82	64.69	-0.1337	0.1337	0.0018	35936
F14C	3275.29	551.31	82.91	-0.1299	0.1299	0.0038	21819
F15C	3297.17	585.32	40.44	-0.1718	0.1718	0.0419	965
F16B	3367.38	578.70	70.52	-0.1677	0.1677	0.0041	17200
F17B	3405.48	613.91	51.88	-0.2930	0.2930	0.1253	414
F18	3423.83	648.30	38.98	-0.3750	0.3750	0.0820	475
F21	3405.99	672.00	29.66	-0.2841	0.2841	0.0909	326
F24	3388.13	690.85	25.97	-0.2243	0.2243	0.0598	434
F32B	3348.78	769.1	87.59	-0.1259	0.1259	0.0984	890
F34C	3339.49	849.57	81.00	-0.1127	0.1127	0.0132	6137
F35B	3336.68	896.06	46.58	-0.1063	0.1063	0.0064	7278

Table 10b: MARTHA

Mark	x	y	Distance (m)	Nov 2023 Δz (m)	Abs (m)	Δh (m)	Tilt (1:X)
20BB	2533.26	1622.29		-0.1228	0.1228		
20AC	2461.04	1536.91	111.83	-0.1250	0.1250	0.0023	49233

BM20A	2345.50	1484.90	126.71	-0.2487	0.2487	0.1236	1025
20D	2482.07	1473.48	137.05	-0.1491	0.1491	0.0995	1377
19CB	2296.71	1381.40	206.97	-0.2914	0.2914	0.1423	1455
19BB	2191.56	1292.02	138.00	-0.3049	0.3049	0.0135	10226
BM19B	2117.17	1244.36	88.35	-0.3057	0.3057	0.0007	119836
17CB	2014.23	1201.01	111.70	-0.3094	0.3094	0.0037	30138
17BB	1919.52	1160.79	102.90	-0.2309	0.2309	0.0785	1311
17AB	1841.32	1104.80	96.18	-0.1989	0.1989	0.0320	3005
2.04B	1893.21	968.34	145.99	-0.1591	0.1591	0.0398	3669
34BE	1732.56	931.60	164.80	-0.1481	0.1481	0.0110	14987
BM17A	1724.44	1088.92	207.42	-0.1069	0.1069	0.0412	5031
10BC	1560.13	1062.92	216.74	-0.1354	0.1354	0.0285	7599
10AB	1430.61	1037.00	298.38	-0.1388	0.1388	0.0034	88228
BM16	1418.09	1218.03	210.32	-0.1351	0.1351	0.0037	56456
10DC	1279.04	1198.33	221.36	-0.1443	0.1443	0.0092	24046
16BC	1252.81	1336.47	203.34	-0.1392	0.1392	0.0051	40169
BM9B	1220.25	1523.29	330.23	-0.0788	0.0788	0.0604	5470

Table 10c: NORTH WALL

Mark	x	y	Distance (m)	Nov 2023 Δz (m)	Abs (m)	Δh (m)	Tilt (1:X)
27AB	2009.08	2064.33		-0.0057	0.0057		
26Q	1963.00	1982.71	93.73	-0.0278	0.0278	0.0220	4252
26PB	1834.84	1893.11	156.38	-0.0453	0.0453	0.0175	8931
26OB	1706.93	1812.27	151.31	-0.0006	0.0006	0.0447	3388
26NC	1641.16	1772.40	228.22	-0.0405	0.0405	0.0399	5723
26MB	1593.46	1750.66	122.11	-0.0423	0.0423	0.0128	9532
26JB	1495.71	1756.55	93.74	-0.0343	0.0343	0.0021	45179
BM26	1542.45	1837.81	100.98	-0.0322	0.0322	0.0101	10009
3.09	1618.51	1870.17	217.54	-0.0295	0.0295	0.0289	7524

Table 10d: CORRENSO

Mark	x	y	Distance (m)	Nov 2023 Δz (m)	Abs (m)	Δh (m)	Tilt (1:X)
25E	2472.35	1162.01		-0.1600	0.1600		N/A
25B	2497.67	1105.83	61.62	-0.1313	0.1313	0.0287	2145
25I	2537.20	1045.04	72.51	-0.1233	0.1233	0.0080	9052
24H	2630.70	1072.28	97.39	-0.1164	0.1164	0.0069	14150
24B	2667.67	1126.40	65.54	-0.1204	0.1204	0.0040	16571
24G	2705.96	1170.46	58.38	-0.1303	0.1303	0.0099	5884
24L	2761.67	1181.33	56.76	-0.1302	0.1302	0.0001	696664
24AC	2743.58	1218.90	41.70	-0.1322	0.1322	0.0020	20943
24F	2772.80	1257.27	48.23	-0.1262	0.1262	0.0060	8005
BM24	2794.55	1279.36	31.00	-0.1159	0.1159	0.0103	3015
24E	2758.43	1303.23	43.29	-0.1219	0.1219	0.0060	7187
24DC	2718.29	1323.13	44.80	-0.1191	0.1191	0.0028	15936
24I	2692.57	1269.71	59.29	-0.1294	0.1294	0.0103	5736
25H	2648.48	1232.96	57.40	-0.1345	0.1345	0.0050	11384

25CB	2615.91	1190.50	53.51	-0.1349	0.1349	0.0004	128838
25G	2594.60	1149.42	46.29	-0.1369	0.1369	0.0020	23489
25F	2542.53	1116.24	61.74	-0.1387	0.1387	0.0019	33235
25B	2497.67	1105.83	46.05	-0.1313	0.1313	0.0074	6207
BM25	2424.91	1100.25	72.97	-0.1477	0.1477	0.0164	4451
25E	2472.35	1162.01	77.88	-0.1600	0.1600	0.0123	6311
25A	2505.13	1203.77	53.09	-0.1578	0.1578	0.0023	23340
25D	2547.05	1248.02	60.95	-0.1582	0.1582	0.0005	125924
21DC	2573.96	1304.15	62.25	-0.1449	0.1449	0.0133	4682
21N	2623.25	1342.44	62.41	-0.1328	0.1328	0.0122	5136
21C	2651.57	1389.82	55.20	-0.1179	0.1179	0.0149	3700
21M	2694.90	1439.65	66.03	-0.1072	0.1072	0.0107	6184
21BC	2719.27	1477.80	45.27	-0.0913	0.0913	0.0159	2849
21EB	2799.95	1429.09	94.24	-0.0926	0.0926	0.0013	74827
24K	2783.89	1387.72	44.38	-0.1090	0.1090	0.0164	2703
24J	2749.39	1365.76	40.89	-0.1107	0.1107	0.0017	23863
24DC	2718.29	1323.13	52.77	-0.1191	0.1191	0.0084	6283
22F	2815.91	1325.41	97.65	-0.1198	0.1198	0.0007	145959
22C	2846.39	1352.54	40.80	-0.1372	0.1372	0.0175	2335
22GB	2862.88	1387.97	39.08	-0.1125	0.1125	0.0248	1577
22BC	2916.75	1435.77	72.02	-0.0976	0.0976	0.0149	4830
22I	2918.98	1461.37	25.69	-0.0942	0.0942	0.0034	7616
22H	2869.25	1441.80	53.44	-0.0844	0.0844	0.0098	5450
21P	2849.17	1456.90	25.13	-0.0827	0.0827	0.0017	15223
21FB	2861.65	1512.21	56.70	-0.0655	0.0655	0.0172	3291
21Q	2899.60	1571.32	70.24	-0.0663	0.0663	0.0008	89814
21GC	2901.12	1614.05	42.76	-0.0691	0.0691	0.0028	15329
22KB	2981.80	1603.49	81.37	-0.0593	0.0593	0.0098	8299
2.29B	2953.39	1548.17	62.19	-0.0879	0.0879	0.0287	2169
22J	2944.47	1489.76	59.09	-0.0762	0.0762	0.0117	5054
22I	2918.98	1461.37	38.16	-0.0942	0.0942	0.0179	2127
22H	2869.25	1441.80	53.44	-0.0844	0.0844	0.0098	5450
21EB	2799.95	1429.09	70.46	-0.0926	0.0926	0.0082	8596
21BC	2719.27	1477.80	94.24	-0.0913	0.0913	0.0013	74827
BM21	2654.80	1515.40	74.63	-0.0999	0.0999	0.0086	8652
20F	2605.79	1575.98	77.92	-0.1100	0.1100	0.0101	7704
20E	2535.65	1542.67	77.65	-0.1663	0.1663	0.0562	1380
21C	2651.57	1389.82	191.83	-0.1179	0.1179	0.0484	3962

Table 10e: CORRENSO SOUTH

Mark	x	y	Distance (m)	Nov 2023 Δz (m)	Abs (m)	Δh (m)	Tilt (1:X)
23F	2700.77	968.79		-0.1134	0.1134		
2.13	2725.42	874.95	97.03	-0.0686	0.0686	0.0448	2165
23E	2774.82	972.51	74.15	-0.1183	0.1183	0.0049	14980
2.14A	2853.28	838.67	132.91	-0.0631	0.0631	0.0055	24186
23B	2856.49	949.79	84.77	-0.1208	0.1208	0.0025	34451
BANK1	2866.21	1023.25	74.10	-0.1084	0.1084	0.0124	5992
23C	2856.14	1068.01	45.88	-0.1730	0.1730	0.0646	711

2.25	2874.51	1097.26	34.54	-0.1159	0.1159	0.0571	605
23D	2861.42	1154.89	59.09	-0.1228	0.1228	0.0069	8543
2.24	2885.91	1215.47	65.35	-0.1275	0.1275	0.0047	13945
MATAURA 1	2831.84	1250.81	64.60	-0.1140	0.1140	0.0135	4800
BM24	2794.55	1279.36	46.96	-0.1159	0.1159	0.0018	25453

Table 10f: SUPA

Mark	x	y	Distance (m)	Nov 2023 Δz (m)	Abs (m)	Δh (m)	Tilt (1:X)
BM25	2424.91	1100.25		-0.1477	0.1477		
34H	2233.59	970.56	231.14	-0.1245	0.1245	0.0232	9955
2.10	2143.92	950.39	91.91	-0.0912	0.0912	0.0333	2764
34CB	1967.74	983.20	179.21	-0.1524	0.1524	0.0611	2931
34GC	2211.33	1119.52	279.14	-0.2108	0.2108	0.0584	4777
19BB	2191.56	1292.02	173.63	-0.3049	0.3049	0.0941	1844
19CB	2296.71	1381.40	138.00	-0.2914	0.2914	0.0135	10226
21O	2527.37	1356.34	232.01	-0.1470	0.1470	0.1444	1607
20C	2450.61	1413.86	95.92	-0.1723	0.1723	0.0253	3793
20D	2482.07	1473.48	67.41	-0.1491	0.1491	0.0232	2910
BM20A	2345.50	1484.90	137.05	-0.2487	0.2487	0.0995	1377

Table Key:

Monitoring mark located above mine workings.
Tilt greater than 1:1000 observed.

7.1 Favona

The locations surveyed in 2023 with tilt values between adjacent marks steeper than the 1:1000 criterion are highlighted in Table 10 above. The locations of the marks in relation to the Favona mine workings are shown in Figure 46 and Figure 47 below.

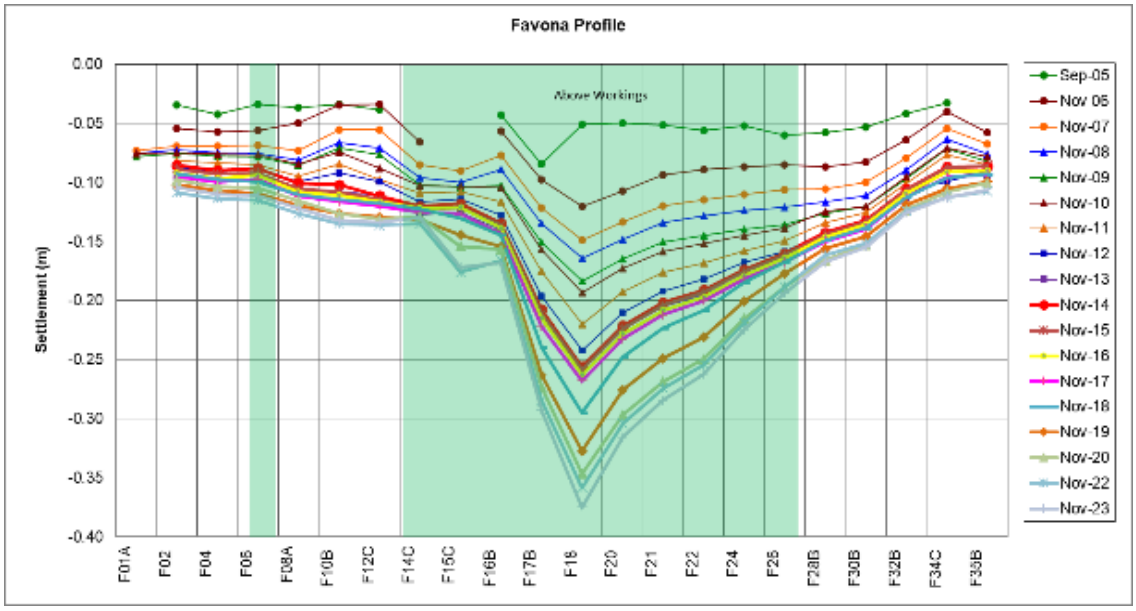


Figure 46. Favona settlement profile.

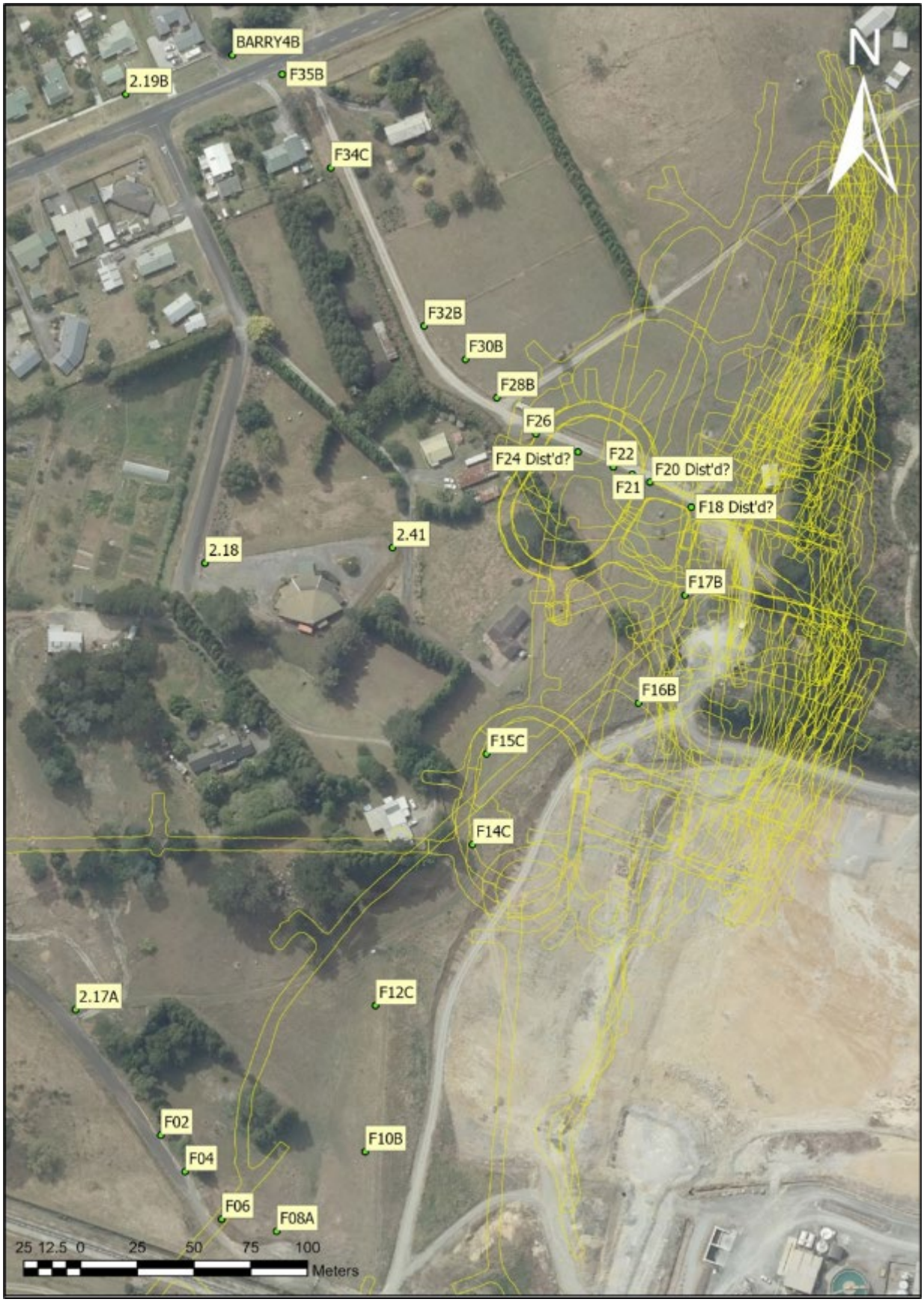


Figure 47. Favona settlement marks and workings.

Discussion – Favona Tilt

This area comprises farmland that is owned by the company. The footprint of this area is over 100m south of any non-company residences.

The tilt in this area has changed little since 2005, with small increases in tilt as the dewatered underground workings adjust compared to the adjacent land.

Tilt values greater than 1:1000 was previously assessed at six locations (F14C/F15C, F16B/F17B, F17B/F18, F18/F21, F21/F24 and F24/F32B). These are all located over or near underground workings.

The monitoring results for the survey marks above the Favona workings indicate no new tilt measurements in excess of 1:1000 since the May 2023 survey.

All Favona marks showed more settlement than the May 2023 survey, continuing the trend of slow settlement developing over time at this location.

Monitoring will continue, and this will determine any anomalous results that need to be addressed.

Note 1: The Favona tilt is calculated from the total settlement at each mark, without separation of any Martha effect. While the calculated tilt may not precisely reflect the tilt due to Favona alone, the discrepancy is considered to be minor.

Note 2: Not all Favona settlement markers are included in the tilt calculations due to some being too close to one another. The minimum distance between the marks which are included in the tilt calculations is 25m.

7.2 Martha/North Wall Tilt

No tilt calculations greater than 1:1000 have been identified in the Martha/North Wall area during the November 2023 survey.

Although no tilts have been identified in Slevin Park, the area is swampy, historically infilled with poor material and has a previous history of slumping/subsidence. Therefore, close monitoring of this area will continue. We understand that HDC is also undertaking regular monitoring of this area.

From November 2022 additional Martha marks have been added to the tilt calculations to extend this analysis in line with the mine expansion in this area.

7.3 Correnso

Tilt greater than 1:1000 was previously identified in the Correnso South area at two locations and remain apparent in the Nov 2023 survey. These tilts occur between marks 23C/2.25 and 23C/BANK (Figure 48). The above tilts are due to a sharp increase in the settlement of mark 23C which was initially measured during the May 2020 survey. The rate of settlement that has been recorded at Mark 23C in subsequent survey monitoring rounds is similar to nearby marks. Mark 23C is noted by the surveyor as being near a watercourse. As such, this mark may have been influenced by improved drainage nearby or may have been disturbed.

7.4 SUPA

No tilts greater than the 1:1000 trigger have been identified to date in the SUPA area.

Figure 48. Correnso tilts and underground workings.

7.5 Historic comparisons

The latest measurements at all survey marks are compared with their three previous survey readings to assess any trends are summarised below in Table 11. In the following tables an orange cell denotes the locations where tilt greater (steeper) than 1:1000 has been calculated and a green cell denotes a survey monitoring pin that is located above OceanaGold underground mine workings.

It should be noted that the tilt assessments are sensitive to the separation distance between the markers. Large, potentially misleading tilt numbers can sometimes be generated if the relevant marks are close together. Additionally, marks can be reviewed which can result in revised corrections. This will modify the tilt calculation.

Historic comparisons for Favona marks have not been included in the following tables prior to the May 2021 reporting period due to the large number of Favona marks which were removed from tilt calculations following the November 2020 survey event, as agreed by Hauraki District and Waikato Regional Councils.

Table 11. Comparison of historic tilt calculations – May 2022 to November 2023.

Table 11a: FAVONA

Mark	May 22 (1:X)	Nov 22 (1:X)	May 23 (1:X)	Nov 23 (1:X)
F02	N/A	N/A	N/A	N/A
F06	7346	7230	7230	6937
F10B	3324	3526	3035	3341
F12C	21626	46502	20927	35936
F14C	22016	71101	42171	21819
F15C	988	981	967	965
F16B	8791	7037	9133	17200
F17B	440	437	446	414
F18	530	528	462	475
F21	368	352	332	326
F24	474	468	446	434
F32B	936	924	901	890
F34C	9156	7015	6561	6137
F35B	5293	9133	6560	7278

Table 11b: MATHA

Mark	May 22 (1:X)	Nov 22 (1:X)	May 23 (1:X)	Nov 23 (1:X)
20BB	N/A	N/A	N/A	N/A
20AC	30459	81543	87956	49233
BM20A	1074	1045	1038	1025
20D	1496	1354	1359	1377
19CB	1547	1433	1430	1455
19BB	10619	10957	10077	10226
BM19B	1408494	115836	336285	119836
17CB	25938	46420	74159	30138
17BB	1251	1287	1287	1311
17AB	2923	3293	3063	3005
2.04B	*	8387	3793	3669
34BE	*	4878	17354	14987
BM17A	1315	1319	4788	5031
10BC	*	7366	7391	7599
10AB	*	68094	69684	88228
BM16	*	28711	36735	56456
10DC	*	14851	18438	24046
16BC	*	38642	30987	40169
BM9B	*	5756	5657	5470

* Tilt calculations added in November 2022 assessment due to mine expansion.

Table 11c: NORTH WALL

Mark	May 22 (1:X)	Nov 22 (1:X)	May 23 (1:X)	Nov 23 (1:X)
27AB	N/A	N/A	N/A	N/A
26Q	3931	4139	4103	4252
26PB	8830	9086	8183	8931
26OB	3912	3169	3336	3388
26NC	5705	5638	5213	5723
26MB	9314	8972	15837	9532
26JB	17122	29526	51364	45179
BM26	10422	10009	28136	10009
3.09	10197	7524	8362	7524

Table 11d: CORRENSO

Mark	May 22 (1:X)	Nov 22 (1:X)	May 23 (1:X)	Nov 23 (1:X)
25E	N/A	N/A	N/A	N/A
25B	2305	2340	2238	2145
25I	9919	7545	7705	9052
24H	119177	110320	32651	14150
24B	24684	11006	15049	16571
24G	6131	5826	5549	5884
24L	33754	15847	21166	696664
24AC	18201	11612	11000	20943
24F	7747	9057	8890	8005
BM24	3137	3413	3137	3015
24E	7434	7982	8132	7187
24DC	4387	6676	10638	15936
24I	4619	7868	5699	5736
25H	14561	6881	10296	11384
25CB	3491021	289758	631972	128838
25G	31475	60073	69033	23489
25F	31537	64471	31537	33235
25B	7651	6379	5815	6207
BM25	4710	4899	4771	4451
25E	6929	6808	6363	6311
25A	26886	68538	24413	23340
25D	158714	47468	214594	125924
21DC	5661	4903	5189	4682
21N	5699	4442	6400	5136
21C	3224	5102	3187	3700
21M	4828	4625	5209	6184
21BC	3283	3512	3191	2849

21EB	53565	50682	21133	74827
24K	2623	2623	3036	2703
24J	23863	7736	15069	23863
24DC	7762	3717	6681	6283
22F	14642	19652	35266	145959
22C	2507	2507	2507	2335
22GB	1438	1465	1454	1577
22BC	4998	4963	4929	4830
22I	4528	3684	8359	7616
22H	7120	10073	10073	5450
21P	33472	7976	7976	15223
21FB	2762	3253	3253	3291
21Q	89814	120674	120674	89814
21GC	16513	14303	14303	15329
22KB	8662	7531	7531	8299
2.29B	2325	2139	2139	2169
22J	5242	5798	5798	5054
22I	2364	3307	3223	2127
22H	7120	20512	7120	5450
21EB	11015	11015	6910	8596
21BC	53565	50682	21133	74827
BM21	9073	8754	8178	8652
20F	6540	8366	8190	7704
20E	1434	1437	1398	1380
21C	4097	4289	4054	3962

Table 11e: CORRENSO SOUTH

Mark	**May 22 (1:X)**	**Nov 22 (1:X)**	**May 23 (1:X)**	**Nov 23 (1:X)**
23F	N/A	N/A	N/A	N/A
2.13	1102	2229	2179	2165
23E	17445	18309	12462	14980
2.14A	37875	16648	27244	24186
23B	22670	22542	19440	34451
BANK1	4984	4853	5422	5992
23C	691	639	679	711
2.25	625	621	611	605
23D	17816	20979	12800	8543
2.24	8847	6889	8286	13945
MATAURA1	5738	5638	5270	4800
BM24	17108	22964	20026	25453

Table 11f: SUPA

Mark	May 22 (1:X)	Nov 22 (1:X)	May 23 (1:X)	Nov 23 (1:X)
BM25	N/A	N/A	N/A	N/A
34H	11210	9828	9912	9955
2.10	13938	1442	2381	2764
34C	1946	1182	2784	2931
34GC	61201	97984	4635	4777
19BB	1926	1870	1825	1844
19CB	10619	10957	10077	10226
21O	1729	1637	1579	1607
20C	4032	6487	4751	3793
20D	3056	3861	3732	2910
BM20A	1499	1354	1359	1377

Table Key:

Monitoring mark located above mine workings.
Tilt greater than 1:1000 observed.

No anomalous trends were identified. Some marks have shown an overall trend of increasing tilt; however, none are currently of concern.

8 COMPLAINTS

The company maintains a complaints database in accordance with consent condition 13f.

There were no complaints received during 2023 in relation to dewatering or settlement.

Two other property damage complaints/concerns were made during the year, one complaint in relation to impacts of blast vibration, and one was a perceived concern of settlement. As a result, both properties were inspected to determine likely sources. No evidence was found of land deformation as a consequence of mining activities.

9 CONTINGENCY ACTIONS AND FUTURE IMPACTS

No consent or management plan settlement trigger has been activated.

10 UNDERGROUND WATER QUALITY

Underground dewatering water is sampled at the Water Treatment Plant. This is a combination of underground water from the Favona, Trio, Correnso, SUPA, and Martha Mine workings, and treated service water, but it gives a general indication of the underground water quality. Additionally, Environmental staff endeavour to collect quarterly water samples from four locations underground.

The only backfilled mine workings that are considered near its final closure state is the Favona underground mine. Separate sampling of Correnso and Favona underground water from sumps at the

lowest accessible points in each mine began during 2018. Sampling from the two Martha Underground bores, PC1 and PC2, began in 2021.

During the reporting period, results from the composite underground dewatering had stable pH and EC values averaging 5.7 units and 249 mS/m respectively. Sulphate values averaged 1610 g/m^3, iron averaged 2.1 g/m^3 and manganese 12.5 g/m^3. Other metal concentrations were low (Appendix E).

Underground sites were sampled six times in 2023. These included:

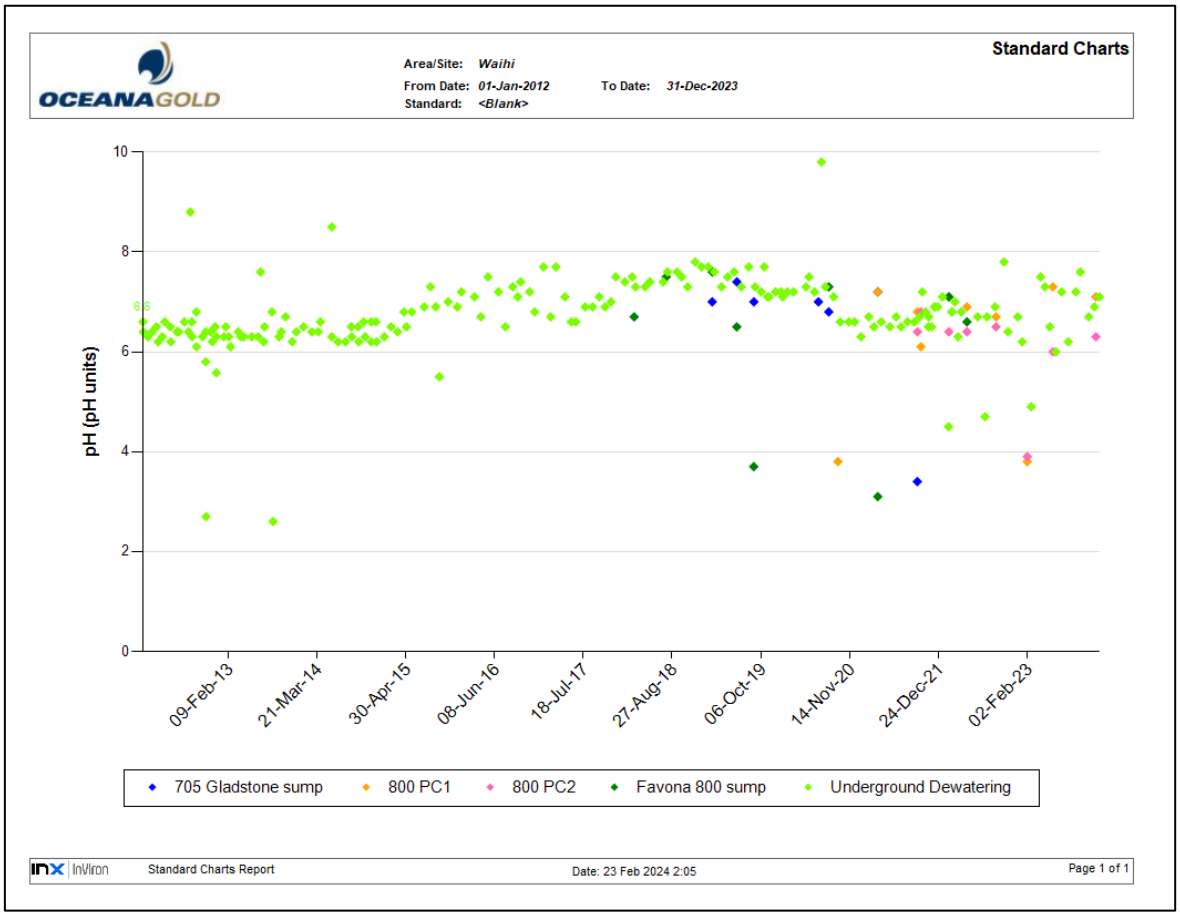
- 800 level PC1 bore x3
- 800 level PC2 bore x3

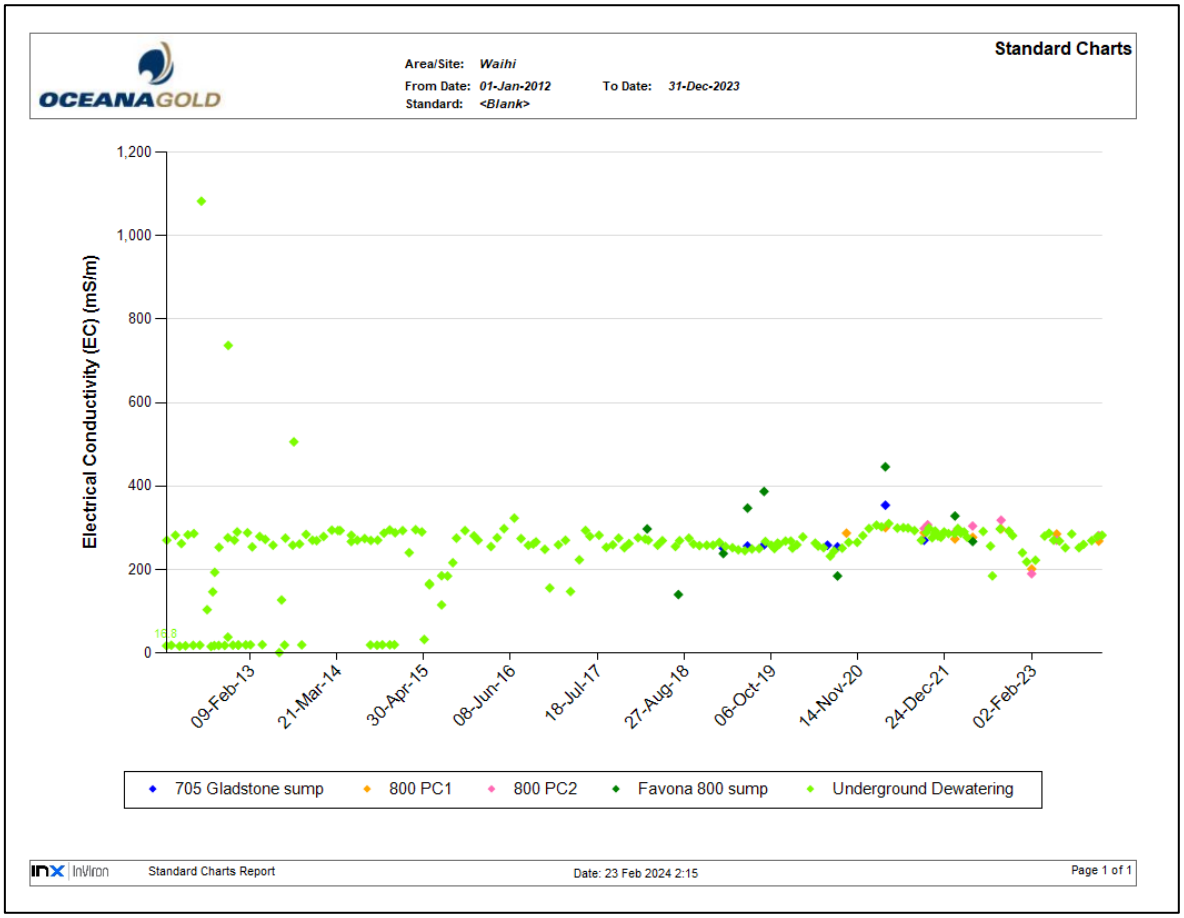
The 705 level Correnso and 800 level Favona sites were not able to be accessed for sampling in 2023. The composite underground mine water was sampled monthly throughout the period.

Figure 49 to Figure 54 show water quality results and Piper Diagrams for the various types of underground water. All water types have a similar make up of cation and anions. UG dewatering and Correnso and at times Favona are calcium sulphate waters, while PC01 and at times Favona, are calcium magnesium sulphate waters.

While elevated levels of some metals are noted, all underground water is currently pumped to the Water Treatment Plant.

Figure 54 displays a Piper diagram for treated water. Treated water is used as service water underground, as discussed in Section 4. Treated water quality is extremely consistent as it needs to comply with water quality parameters prior to river discharge. In 2023 service water made up 6% of the dewatering volume total and is unlikely to have any effect on groundwater quality. Water quality results are provided in Appendix E.


Standard Charts
Area/Site: Waihi
From Date: 01-Jan-2012
To Date: 31-Dec-2023
Standard: <Blank>
pH (pH units)
10
8
6
4
2
0
6.6
09-Feb-13
21-Mar-14
30-Apr-15
08-Jun-16
18-Jul-17
27-Aug-18
06-Oct-19
14-Nov-20
24-Dec-21
02-Feb-23
705 Gladstone sump
800 PC1
800 PC2
Favona 800 sump
Underground Dewatering
InVIron
Standard Charts Report
Date: 23 Feb 2024 2:05
Page 1 of 1


Standard Charts
Area/Site: Waihi
From Date: 01-Jan-2012
To Date: 31-Dec-2023
Standard: <Blank>
Electrical Conductivity (EC) (mS/m)
1,200
1,000
800
600
400
200
0
16.8
09-Feb-13
21-Mar-14
30-Apr-15
08-Jun-16
18-Jul-17
27-Aug-18
06-Oct-19
14-Nov-20
24-Dec-21
02-Feb-23
705 Gladstone sump
800 PC1
800 PC2
Favona 800 sump
Underground Dewatering
InVIron
Standard Charts Report
Date: 23 Feb 2024 2:15
Page 1 of 1

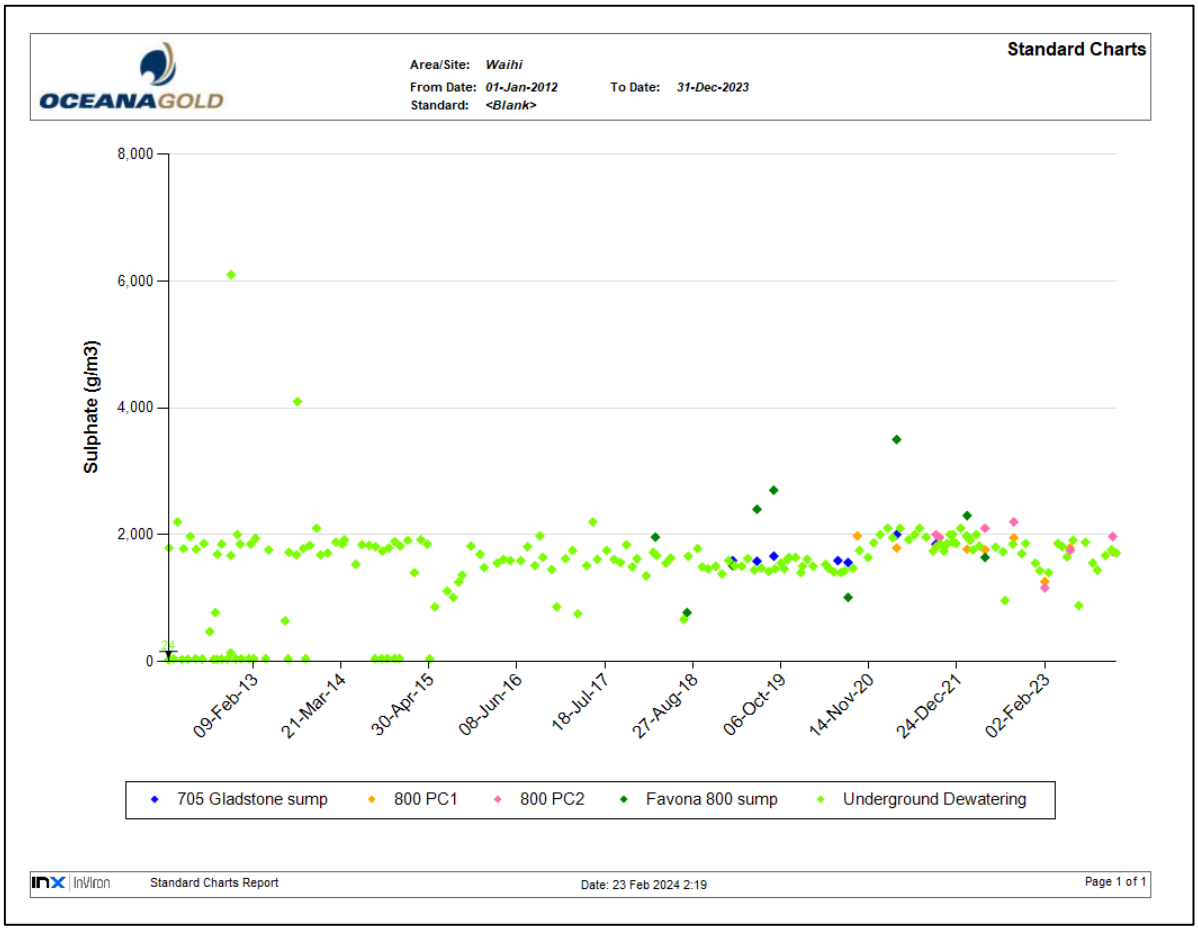


Figure 49. Underground sample sites – summaries of key chemistry. A) pH, B) EC, C) Sulphate.

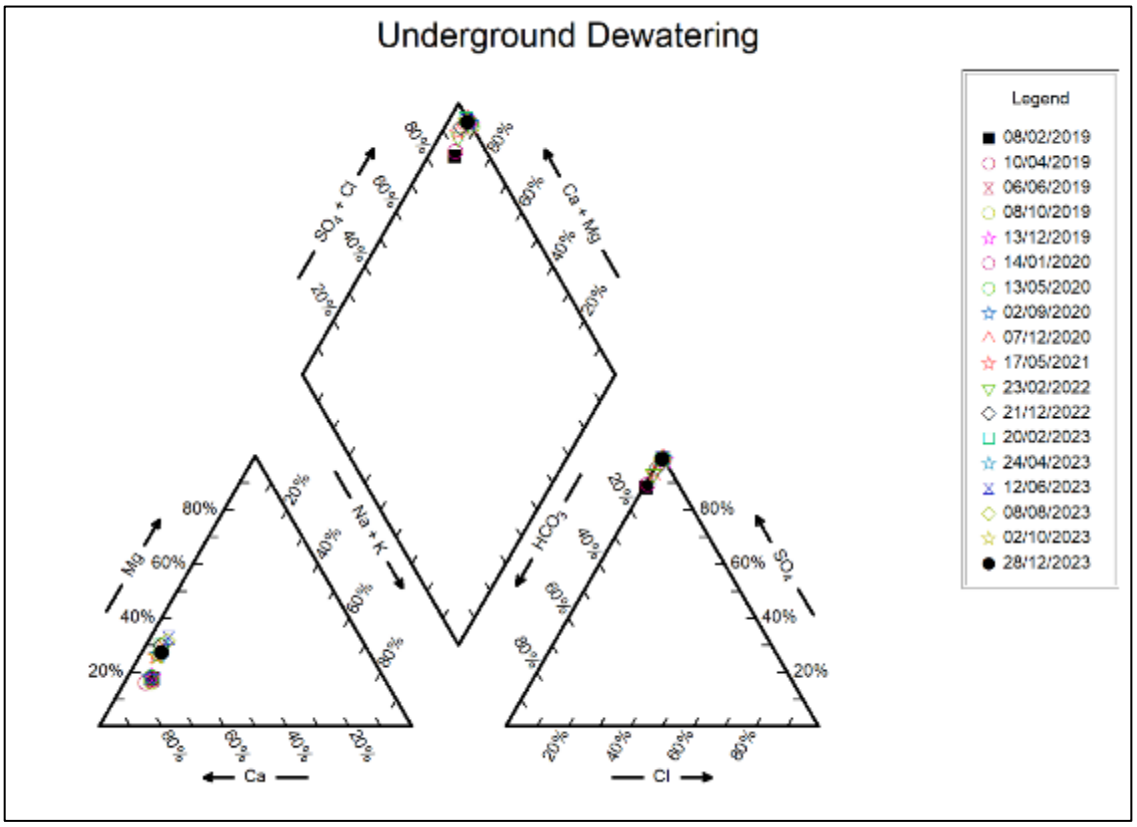


Figure 50. Martha Underground dewatering piper diagram.

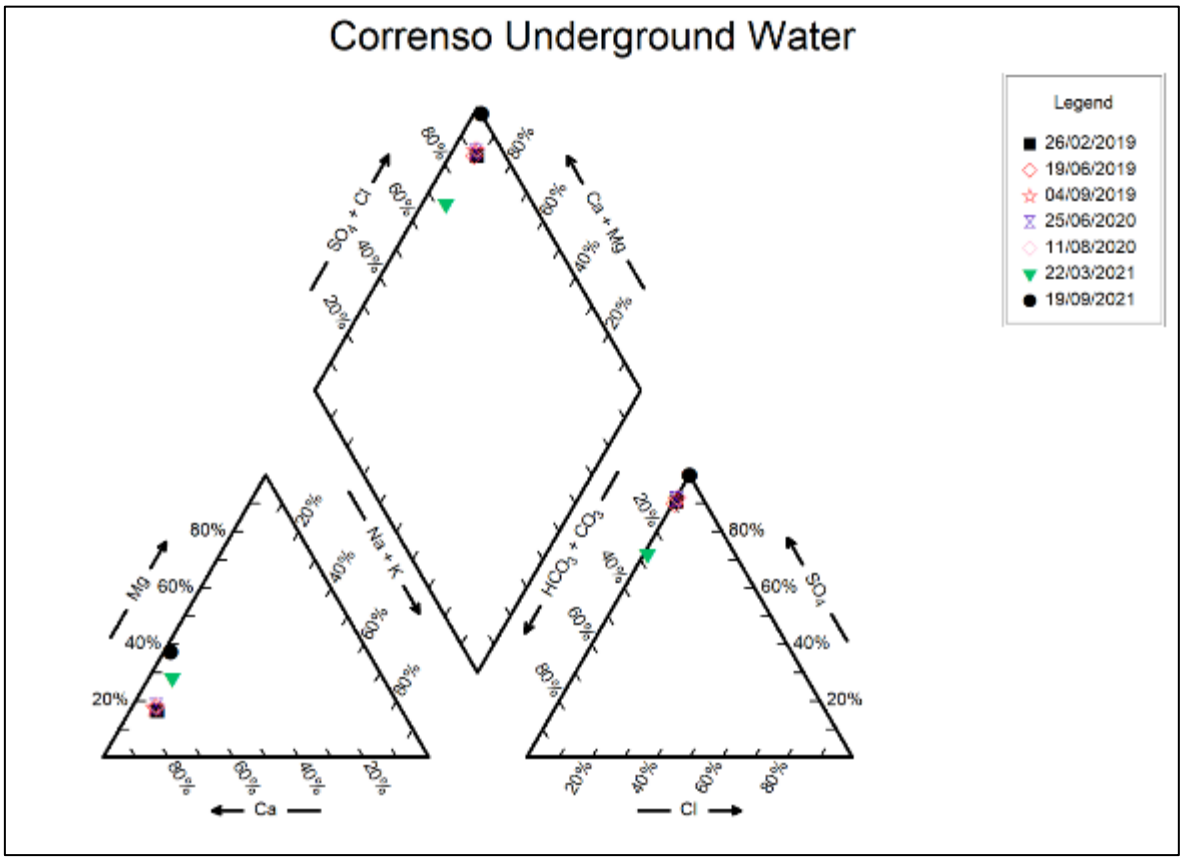


Figure 51. Correnso Underground piper trilinear diagram.

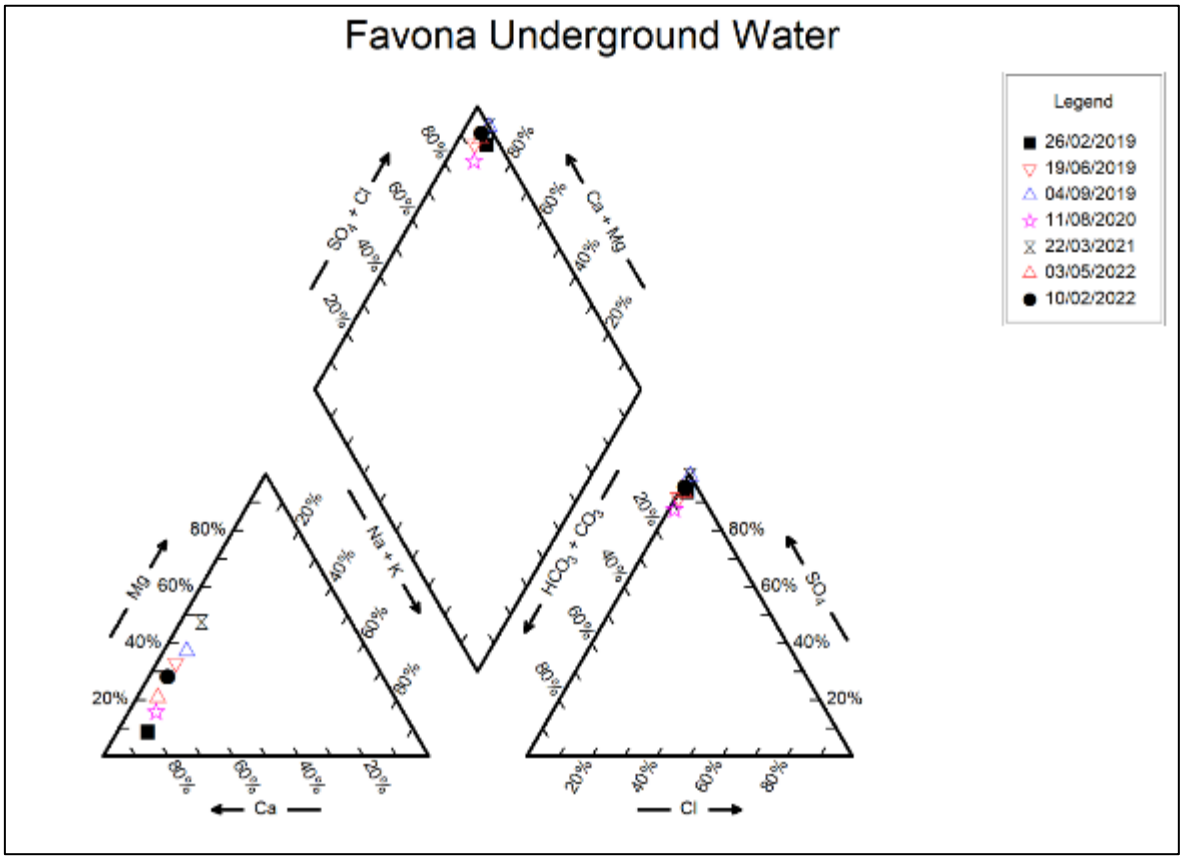


Figure 52. Favona Underground piper trilinear diagram.

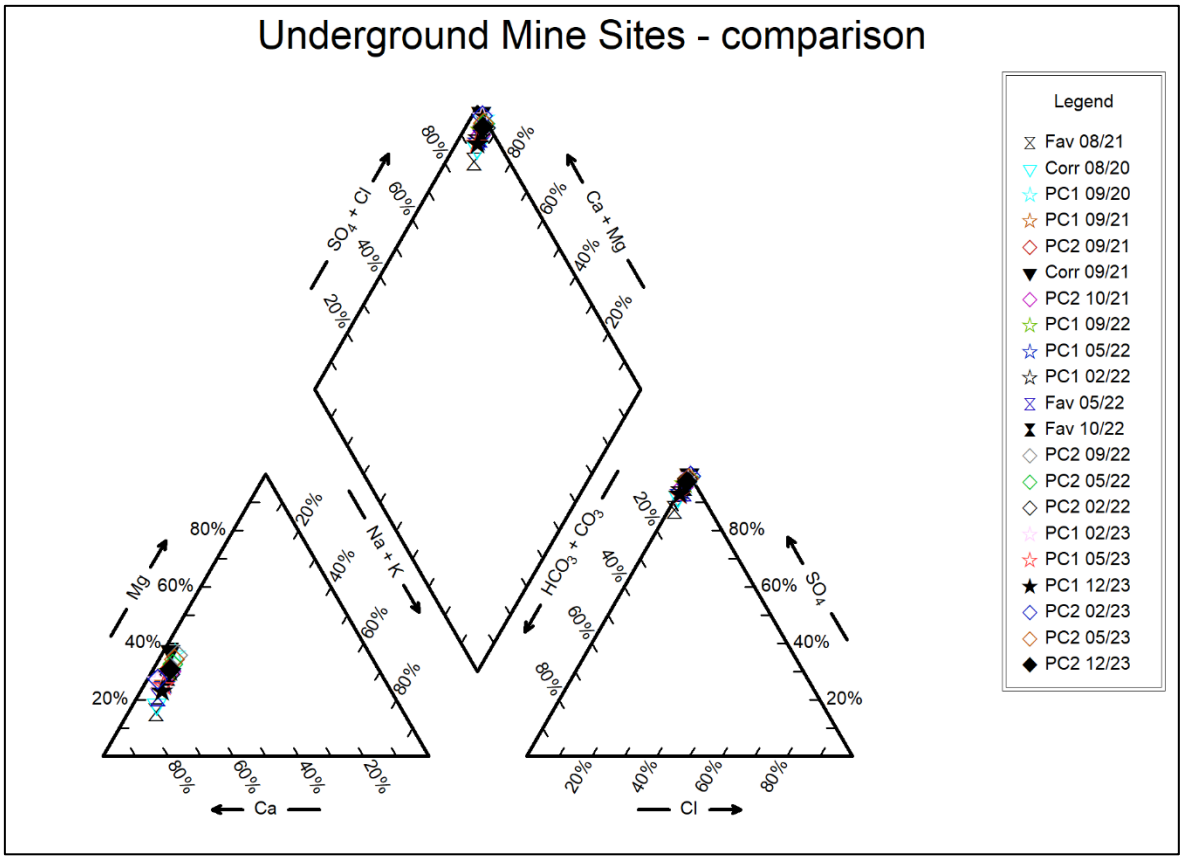


Figure 53. Underground comparison water piper trilinear diagram.

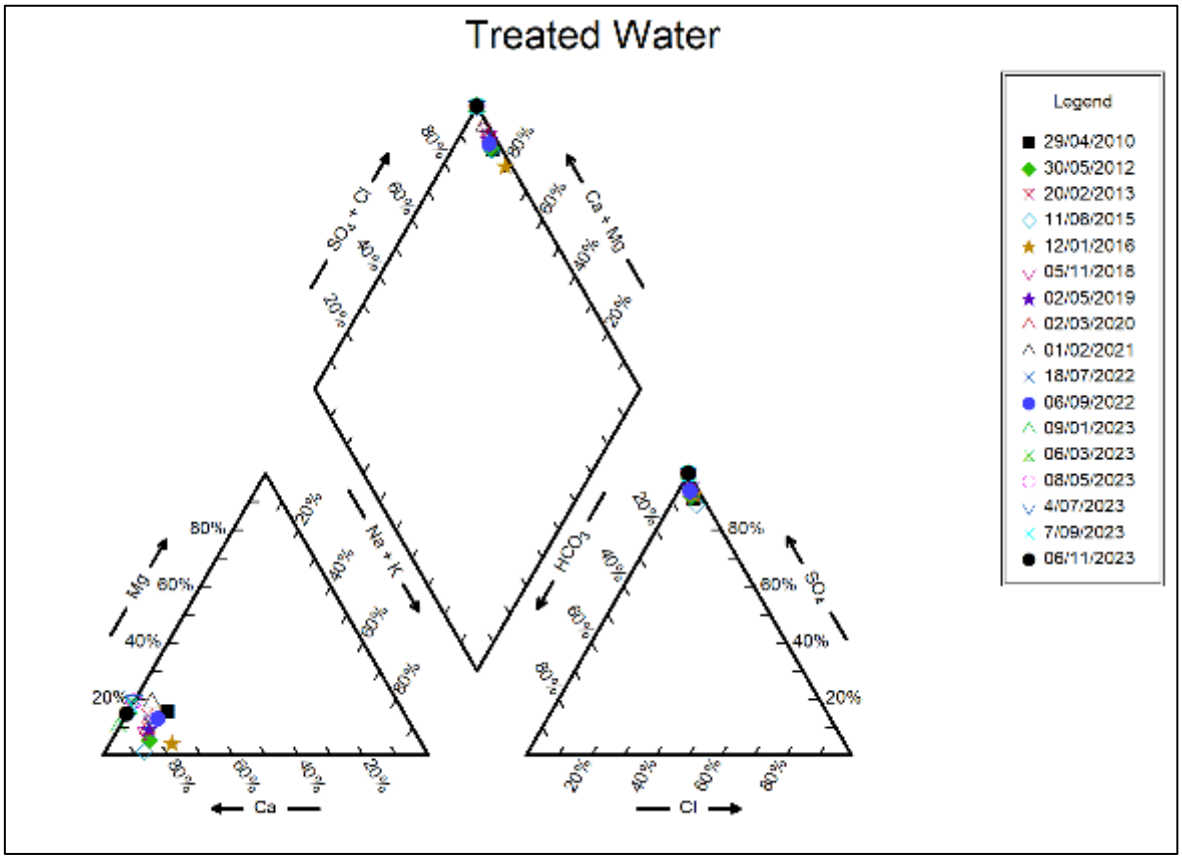


Figure 54. Treated water piper trilinear diagram.

11 FUTURE DEWATERING PREDICTIONS

During the 2021 peer review process it was identified that future dewatering predictions should be included in this report. As a result of this recommendation, OGNZL commissioned GWS Ltd to assess the pumped groundwater volume predictions.

The key dewatering dates are currently expected to be as follows:

- 26/04/2025 dewater to 527 mRL.
- 01/11/2027 dewater to 500 mRL.

GWS Ltd assessed that an increased pumped water volume will be required to dewater and lower the deep groundwater level in the MUG area to 500 mRL. It was estimated that the pumped groundwater volume would need to increase from approximately 4,800 m^3/d to approximately 7,000 m^3/d to achieve this level of drawdown. It was further estimated that a pumped groundwater volume of around 6,000 m^3/d would be required to hold the groundwater level at this target elevation.

The above estimates were validated by comparing to historic mine pumping rates.

12 IMPROVEMENT ACTIVITIES

Works that have been undertaken at the site during 2023 to improve environmental monitoring performance include:

- Review of the Martha piezometer network to assess effectiveness.
- Installation of two new piezometers in the Project Martha area with telemetry (P122 & P123).

- Piezometers P110, P111, P112, & P114 in the Project Martha area upgraded to telemetry monitoring.
- Installation of a VW piezometer in the Martha Underground Mine to 472 mRL.
- Remodel of MUG Dewatering rate work scope approved.

Proposed improvement activities to be undertaken in 2024 include:

- Develop a closure related groundwater quality baseline monitoring program and commence sampling.
- Further review of the Martha piezometer network to assess effectiveness.
- Predict dewatering impacts post closure.

13 PEER REVIEW RECOMMENDATIONS 2023

This section summarises the peer review recommendations from the previous annual reporting period and how they have been or are going to be addressed in this report (Table 12).

Table 12. 2023 peer review recommendations and actions.

	Recommendation	**Action**
8.2 2022	Document any substantial or anomalous water inflows, or wet ground conditions along with the structural geology during the driving of the three declines that are planned to access deeper ore bodies for Project Martha	Section 3.2.4
8.3	The Peer Reviewer recommends other locations for piezometers and standpipes as proposed by GWS Ltd in the Waihi piezometer network review memorandum be installed:	
	a) One standpipe piezometer in the alluvium to replace WC203-4 / WC206-3	OGL to investigate.
	b) One multilevel piezometer located to the southwest of the Martha Pit along strike of the Martha vein system where there is an absence of groundwater monitoring infrastructure.	OGL query the necessity. HDC geotechnical reviewer in agreement.
	c) One multilevel piezometer in the andesite north of the Martha Pit.	OGL query the necessity. HDC geotechnical reviewer in agreement.
8.6	Peer Reviewer recommends a second VWP installed underground at Empire orebody to track dewatering below the base of PC1 pump.	Underground team still planning location
8.10	Peer Reviewer recommends a further multilevel VWP be installed approximately 300m further to the northwest of P123 along Symonds St.	OGL query the necessity. HDC geotechnical reviewer in agreement.
8.15	Although not stipulated within consent conditions, the Peer Reviewer recommends one to two hydrogeological sections are included in the D&S report in Section 3 for the next reporting period.	Appendix F
8.16	The Peer Reviewer requested the following information to meet outstanding Consent conditions in the previous yearly	

	review and these items were not addressed in the 2022 D&S report but have been initiated as work in progress by OGNZL.	
	Project Martha Consent 139551 within Groundwater Take Permit section - Condition 6 - Monitoring of the shallow and deep aquifers part (b) requires “comment on the chemistry in shallow and deep aquifers”. This monitoring program and data needs to be included in the five yearly reports to be issued to Waikato Regional Council as set out in Condition 6.	Section 5.3.5
	The DW&S reporting conditions in various Consents, e.g. Project Martha Consent 139551 Condition 22 (c) include the phrase “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”.	WWLA assessing in 2024.
8.17	The Peer Reviewer requests this sampling of P76D, P76I, P77D and P77I to take place (if not already done so) as a component of the baseline groundwater chemistry sampling program	Sampling attempted but piezometers too narrow and/or too deep. Reassess during 2024.
8.18	Recommendation: An assessment of dewatering rates and drawdown with a groundwater numerical groundwater model to provide more reliable predictions than the analytical assessment methods used in the past, with timing for deliverance at the end of 2024/2025. The numerical groundwater model also can be used for assessing closure predictions of groundwater level recovery, groundwater flow pathways (water chemistry mixing implications), surface-groundwater interaction and residual impacts for Rehabilitation and Closure Planning.	WWLA commissioned to conduct the work Q3 2024.

14 RESOURCE CONSENT EVALUATION

Comments on compliance with all conditions of the Martha, Favona, Trio, Correnso and Project Martha consents, including any reasons for non-compliance or difficulties in achieving conformance with the consent conditions, are summarised below in Table 13. In reading the following table it should be noted that the Correnso/Golden Link take 124860 has been superseded by Project Martha Water Permit 139551.

Table 13. Favona, Trio, Correnso, SUPA, Project Martha consent condition compliance assessment.

Description	Consent (Condition)	Compliance	Comment
Favona Dewatering and Settlement Plan	**109742 - 109746**		
Favona groundwater take	109742 (3)	Full	Favona discharge plumbed into main dewatering line, new meter installed on Favona line.
Divert and discharge ground and surface water (farm run-off and intercepted groundwater) from around the (Favona) project area.	109743	Full	Non-mine run-off has been diverted to natural drainage.
Discharge waste rock and ore onto land in temporary surface stockpiles and to discharge seepage from the temporary stockpiles into ground.	109744	Full	Stockpile area design & construction. Water quality monitoring in manholes and shallow bores (the subject of a separate report – *Favona Water Quality Monitoring Annual Report*.
Discharge 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.	109745	Full	Favona back-filling completed. Dewatering being maintained
Discharge treated mine water from the Martha Mine Water Treatment Plant to ground in association with flooding the underground mine on completion of the project.	109746	Full	Favona Water Quality Monitoring Annual Report
109742 – 109746 **Schedule 2**			
Water Management Plan	(1)	Full	Environmental Material Risk Management Plan – Water, December 2023
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	(2)	Full	Dewatering and Settlement Monitoring Plan, June 2023

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.	(2)	Full	Defined in this document. c) Reported annually in Favona Water Quality Monitoring Report d) Combined dewatering sample taken monthly
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.	(2)	Full	Section 5 Stockpile water quality bores agreed in Nov 2006
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.	(2)	Full	Consent activated following approval of Plan. Combined plan, approved by WRC, May 2023
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.	(2)	Full	No inconsistency identified
In the event that a tilt greater than 1 in 1000 occurs between any two network monitoring locations, 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:	(3)	Full	Section 7 Correspondence in Tilt Reports
a) explain the cause of the non-conformance,	(3)	Full	Section 7
b) agree with the Council on the appropriate settlement contingency measures to be implemented as described,	(3)	Full	Propose ongoing monitoring
c) implement settlement contingency measures as appropriate,	(3)	Full	Not considered necessary as on company owned farmland
d) advise the Council on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.	(3)	Full	Propose ongoing monitoring
The report shall include at least the following information:	(4)	Full	
a) volume of groundwater abstracted	(4)	Full	Section 4
b) data from monitoring undertaken during the previous year including groundwater contour plans	(4)	Full	Section 5
c) an interpretation and analysis of the monitoring data, in particular any change in the groundwater profile over	(4)	Full	Section 5 & 9

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.	(4)	Full	WWLA & OGNZL staff
d) any contingency actions that may have been taken during the year.	(4)	Full	Section 9
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.	(4)	Full	This section
Trio Dewatering and Settlement Plan - General conditions	**121416 - 121418, 121446 & 121447**		
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	Schedule 1 (5)	Full	Combined plan Approved by WRC May 2023
The monitoring regime shall be designed to assess the effects of: i) dewatering on the regional groundwater system, ii) dewatering on settlement; iii) the discharge of degraded-quality water from the backfilled and flooded workings on groundwater quality.	Schedule 1 (5)	Full	Defined in plan iii) No significant flooded workings as yet
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.	Schedule 1 (5)	Full	Defined in approved Plan
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.	Schedule 1 (5)	Full	Consent activated following approval of Plan Jul 2014
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.	Schedule 1 (5)	Full	No inconsistency identified
Dewatering and Settlement Monitoring Report. The Report shall, as a minimum, provide the following information:	Schedule 1 (6)	Full	
i) volume of groundwater abstracted	Schedule 1 (6)	Full	Section 4

ii) data from monitoring undertaken during the previous year including groundwater contour plans	Schedule 1 (6)	Full	Section 5
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.	Schedule 1 (6)	Full	Section 5 & 9
This analysis shall be undertaken by a party appropriately experienced and qualified to assess the information.	Schedule 1 (6)	Full	WWLA & OGNZL staff
iv) any contingency actions that may have been taken during the year.	Schedule 1 (6)	Full	Section 9
v) 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.	Schedule 1 (6)	Full	This section
Monitoring - Tilt:	Schedule 1 (7)	Full	
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:	Schedule 1 (7)	Full	Section 7
i) explain the cause of the non-conformance,	Schedule 1 (7)	Full	Section 9
ii) agree with the Councils on the appropriate settlement contingency measures to be implemented,	Schedule 1 (7)	Full	Propose ongoing monitoring
iii) implement settlement contingency measures as appropriate,	Schedule 1 (7)	Full	Not considered necessary
iv) advise the Councils on the steps the consent holder proposes to take in order to prevent any further occurrence of the situation.	Schedule 1 (7)	Full	Propose ongoing monitoring
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:	Schedule 1 (7)	Full	
a) The volume of groundwater abstracted;	Schedule 1 (7)	Full	Section 4
b) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;	Schedule 1 (7)	Full	Section 5

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;	Schedule 1 (7)	Full	Annual Report reviewed by WWLA and Engineering Geology
d) Any contingency actions that may have been taken during the year; and	Schedule 1 (7)	Full	Section 9
e) Comment on compliance with Conditions 27 to 34 of this consent including any reasons for non-compliance or difficulties in achieving conformance with the conditions of consent.	Schedule 1 (7)	Full	This section
Golden Link Project Area Groundwater Take – General conditions	**124860**		
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.	(4)	Full	Section 4
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.	(5)	Full Full Full	Latest plan June 2023 Defined in plan iii) No significant flooded workings as yet Defined in plan

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 Corrensa 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.	(6)	Full Full Full Full Full	Plan June 2023 Section 4 Section 5 Section 5 & 9 Section 9 Section 12
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,	(7)	Full	Section 7 Section 9

(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.			Propose ongoing monitoring Not considered necessary Propose ongoing monitoring
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.	(8) (9)	Partial Full	Pit sampling limited, dewatering sampled monthly. Favona and Correnso Underground WQ measured separately. Underground dewatering from Project Martha bores commenced.
Project Martha – Common Conditions	**202.2018.00000857.001**		
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 their 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	(14) (15)	Full	Dewatering and Settlement Monitoring Plan approved June 2023 (Conditions 14-18)

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: a. Dewatering on the regional groundwater system; and b. Dewatering on settlement.	(16)		
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.	(17)		
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.	(18)		
19. In the event that a tilt greater than 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	(19)	Full	Notification of tilts greater than 1:1000 provided in Tilt Report No non-conformances

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.	(20)		
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:	(22)	Full	
a. The volume of groundwater abstracted;		Full	Section 4
b. The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;		Full	Section 5
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;		Full	Sections 5, 6 and 9
d. Any contingency actions that may have been taken during the year; and		Full	Section 9
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.		Full	This section
f. The report shall be forwarded in a form acceptable to the Councils.			
Project Martha Groundwater take permit **Dewatering Level** 1. The exercise of this consent shall not result in groundwater lowering to a level below 500mRL. **MONITORING**	**139551** (1)	Full	Groundwater level not lowered below 500 mRL.

2. 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.	(2)	Full	Abstraction volumes reported to Council via Hyquest
3. 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.	(3)	Full	As above.
4. 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.	(4)	Full	Appendix E
OTHER WATER USERS			
5. 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.	(5)	N/A	
MONITORING OF THE SHALLOW AND DEEP AQUIFERS			
6. 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 (d) Provide details of any wetland areas and any other known aquatic ecological values	(6)	Full	Provided to Waikato Regional Council in June 2019

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.			

15 CONCLUSIONS

Monitoring of the groundwater levels and dewatering, ground surface settlement, ground surface tilt, and water quality in and around the Martha, Favona, Trio, Correnso, SUPA and Project Martha operations was undertaken by OGNZL during 2023 in accordance with the consent conditions and the approved monitoring plan.

By the end of 2023 the underground groundwater levels had been lowered to a maximum depth of approximately 662 mRL.

Groundwater levels remained stable in the Martha area during 2023, following expected trends with an increase in piezometric levels in response to heavy rainfall in the first half of the year. No triggers were breached during the monitoring period. Two new Project Martha piezometers were installed in 2022/23 (P122 & P123). These have now stabilised with consistent water levels in all piezometer tips for P123 and the upper young volcanic piezometer tip for P122. The deeper three tips appear to be dry. Monitoring of these will continue into 2024.

At Favona the underground water level was maintained at around 800 mRL. As observed in previous years, this dewatering has maintained a steep but localised depression of the groundwater (contour pattern) along the NE-SW trending vein structure. Water levels in the young volcanic materials and overlying alluvium have not responded to the significant dewatering of the underlying vein-hosting andesite. Minor or no response has been seen in wells monitoring the upper layers of the andesite rock body. Response is only evident in deeper wells constructed in the andesite rock mass that intercept structures connected to the vein systems.

Settlement monitoring, to assess any ground surface movement effects from groundwater changes, was conducted by OGNZL in May/June and November/December 2023. These settlement survey results indicated that 95.8% (345/360) of marks graphed were within the predicted settlement ranges, based on the Project Martha predicted settlement. Of the greater-than-predicted settlements, five were above or near the Favona Underground Mine. The other ten exceedances are generally associated with sites that are considered to be affected by unstable ground or soil creep due to proximity to stream banks or drains. At all these locations no visible effects were noted nearby, and shallow piezometers have not shown any abnormal changes.

A general settlement rate across Waihi town of 10 to 75 mm over the period from 1999 to present has been measured by the monitoring network. This is considered to be a response to ongoing dewatering of structures within the deeper andesite of the Martha groundwater system. No widespread ongoing dewatering effects were observed in the young volcanic or upper andesite rock that would give rise to such widespread settlement.

Settlement continues to be observed in marks near and overlying the Favona Mine, although the total amount of settlement is similar to previous years. The deep monitoring wells connected to the Favona vein system are the only wells showing dewatering changes consistent with this settlement, indicating the settlement is likely to be a response to dewatering of the deeper structures of the Favona vein system and/or to changes in the rock mass volume associated with mining at Favona. Tilt is also apparent between marks near and overlying the Favona Mine which is occurring on farmland owned by OGNZL (and therefore is not expected to be an issue).

Some elevated trace metal results were measured during laboratory testing of underground water samples during the 2023 monitoring period. However, this is expected, and all underground water is currently collected and treated.

16 REFERENCES

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Appendix A Relevant Consent Conditions

Extract from conditions of Waikato Regional Council Resource Consents 109742 to 109746, pertaining to Dewatering and Settlement:

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.

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.

Extract from conditions of Hauraki District Council Resource Consent 97/98-105, pertaining to Dewatering and Settlement:

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, 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 Mining Licence 32 2388, pertaining to Dewatering and Settlement:

Dewatering

11. (a) The licensee shall prepare a Dewatering and Settlement Monitoring Plan. The purpose of this Plan is to monitor and assess the effects of dewatering associated with the extended project 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 commencement of the extended project.

(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 the commencement of the extended project.

(iv) Details of the survey of facilities in the Waihi township considered by the licensee 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 the commencement of the extended project.

(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 licensee as being potentially "at risk" of damage from ground settlement caused by mine dewatering.

(vi) A dewatering contingency plan that describes the steps the licensee 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 licensee 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 these conditions and the provisions of the Dewatering and Settlement Monitoring Plan, these conditions shall prevail.

(b) The Dewatering and Settlement Monitoring Plan shall be submitted to the Minister for approval at least one month prior to the commencement of the extended project. The licensee shall review and update (as necessary) the Plan and shall provide promptly such updated Plan to the Minister annually for approval.

(c) If in the opinion of the Minister the dewatering adversely affects land or facilities, then the licensee shall at its own cost be responsible for reinstating the facilities to an equivalent standard to the reasonable satisfaction of the Minister.

(d) The licensee shall measure and record the daily volume of water abstracted from the pit.

(e) The licensee shall undertake monthly water level monitoring of the piezometer network in accordance with the Dewatering and Settlement Monitoring Plan.

(f) The licensee 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) the licensee shall notify the Minister, in writing, within 20 working days of receiving the results of the monitoring. The licensee shall then:

- Explain the cause of the non-conformance;
- Agree with the Minister on the appropriate settlement contingency measures to be implemented as described;
- Implement settlement contingency measures as appropriate;
- Advise the Minister on the steps the licensee proposes to take in order to prevent any further occurrence of the situation.

(h) The licensee shall provide to the Minister 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 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 licensee 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);
- 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 Minister.

Extract from conditions of Hauraki District Council Resource Consent 202.2012 (Correnso), as pertaining to Dewatering and Settlement:

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.

Dewatering and Settlement Monitoring Report

35 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 27 to 34 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.

Extract from conditions of Waikato Regional Council Resource Consent 124860, pertaining to Dewatering and Settlement:

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.

Extract from conditions of Waikato Regional Council Resource Consent 124861, pertaining to Dewatering and Settlement:

Groundwater Monitoring

5. Piezometers shall be installed at sites to be approved by the Waikato Regional Council for the purpose of monitoring changes in groundwater arising from the exercise of this consent. The groundwater monitoring system shall be detailed in the dewatering and Settlement Monitoring Plan, prepared pursuant to condition 5 of consent number 124860.

Extract from common conditions of Hauraki District Council and Waikato Regional Council Resource Consent for Project Martha (202.2018), as pertaining to Dewatering and Settlement:

Dewatering and Settlement Monitoring Plan

11 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.

12 Two months prior to dewatering below 700 m RL (mine datum), the consent holder shall prepare, and submit to the Councils for their 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.

13 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:

a. Dewatering on the regional groundwater system; and

b. Dewatering on settlement.

14 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.

15 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.

16 In the event that a tilt greater than 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;

16.1.1

b. Propose appropriate settlement contingency measures to the Councils and the timing of implementation thereof by the consent holder;

16.1.2

c. Implement settlement contingency measures as appropriate within the agreed time limit; and

16.1.3

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

17 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.

18 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

19 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;

16.1.4

h) The data from monitoring undertaken during the previous year, including groundwater contour plans (derived from the data) in respect of the piezometer network;

16.1.5

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;

16.1.6

j) Any contingency actions that may have been taken during the year; and

16.1.7

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.

16.1.8

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

Appendix B Surveyor Reports

• MEMORANDUM

TO: **MARK BURROUGHS**

FROM: **BRUCE MORRISON**

DATE: **11TH JULY 2023**

SUBJECT: **GROUND SETTLEMENT MONITORING -MAY 2023**

Introduction

This report outlines the results from the May 2023 Ground Settlement Monitoring Survey.

Field Method

The settlement monitoring marks were levelled during May 2023,and June 2023 for OceanaGold by myself utilising an experienced contractor,Nigel Neame, and an experienced *Kauri Gold* assistant under my supervision.

Equipment used for this 'May 2023' event was the LEICA DNA03 electronic digital level (SN330350) paired with the **new** LEICA 3 section 4.05 metre fibreglass bar coded GKNL4F staff. To minimise 'windage', the staff was typically used in 2 section 'mode'. The level was serviced and check calibrated by the supplier in March 2023. A field calibration check was carried out by myself before commencing this event and the check result was satisfactory.

A summary of the above framework 'misclosures' for the last thirty-three events is tabulated below.

Event	West –East misclose (mm)	North –South misclose (mm)
	AP2 > 34BE > AP1	34BE > AP6
May 2007	+2.4	+6.4
Nov 2007	+2.7	+3.1
May 2008	+13.2	+4.0
Nov 2008	-8.1	+7.3
May2009	+8.8	+3.7
Nov 2009	-5.8	+2.0
May 2010	-8.1	+4.3
Nov 2010	-0.6	+6.4
May 2011	+2.0	+2.7
Nov 2011	+6.9	+6.5
May 2012	+4.1	+6.7
Nov 2012	+23.3	+5.3
May 2013	+2.7	+9.5
Nov 2013	-0.9	+4.5
May 2014	-1.1	+11.5
Nov 2014	-2.6	+7.0
May 2015	+1.6	+6.3
Nov 2015	-8.0	+10.3
May 2016	+9.2	+12.2
	AP20 No 2 >AP2 > 34BE > AP1	34BE > AP6
Nov 2016	+14.2	+3.6
	AP19 >AP2 > 34BE > AP1	34BE > AP6
May 2017	+1.0	+0.4
Nov 2017	-10.2	-0.5
May 2018	+6.4	+4.0
Nov 2018	-11.1	+3.6
	AP19 >AP2 > 34BE > AP1>BUH5	34BE > AP6
May 2019	See page 2	See page 2

	AP19 >AP2 > 34BE > AP1>BUH5	34BE > AP6
May 2019	-7.9	-6.9
	AP19 >AP2 > 34BE > AP1>BUH5	34BE > AP24A> 34BE
Nov 2019	+0.3	-1.3
	AP19 >AP2 > 34BE > AP1>BUH5	34BE > AP24A> C1
May 2020	-5.5	-1.7
Nov 2020	-3.2	-2.5
May2021	-38.7	-9.2
Nov 2021	-0.8	+1.7
May2022	+10.6	+2.3
Nov2022	+30.7	+9.7
May 2023	+14.1	+10.7

Extending Levelling

This levelling event included LINZ benchmarks AP2, AP20 No 2, AP19, (to the west of Waihi), AP1 and BUH5 (to the east of Waihi). AP24 a.k.a control mark AP6 (south of Waihi) and AP25 have been lost to road works. AP24A and C1 have been established as a replacement for the lost AP6 control mark in this vicinity. AP2 and AP20 No 2 have now been 'unfixed' and AP19 is the fixed benchmark west of Waihi. The 'fixed' elevation value for AP19 was deduced from LINZ data comparing the relative levels of AP19, AP2, AP20 No2, and AP24 dating back to the year 1990. East of Waihi, AP1 is now 'unfixed, and there has never been any LINZ data for this mark although AP1 appears to be constructed to the same specifications as AP19 and AP26. The R.L. for the 'new' fixed eastern control mark (BUH5) was the mean value from two close values (relative to AP19) levelled in May 2021 and Nov 2021.

Photographs

The order of levelling of the monitoring points has now been fixed. This has been achieved by photographing all of the settlement points and placing them in 22 albums –generally in the order the points are to be levelled. This will achieve repeatable error distribution and should therefore give better results. I believe **all** the marks now have accurate GPS fixes. In the future, this should make the task of locating these marks easier if the marks are covered over by re-seal etc, or quickly confirm if the marks have definitely been 'lost' to street maintenance etc.

I recommend continuing these 'maintenance' details before or during the next levelling event.

Adjustments

Disturbed marks BM20 and 2.44 are excluded from the settlement contouring- as are marks F18, F20, and F24. All the above marks are excluded from the settlement contouring. Mark 1PA was missed owing to a road gravel heap over it.

New marks 1.10B and 3.24B have been established. A 'previous history' will be deduced for settlement purposes for the next levelling event.

Results

Two A1 plans are attached -one (T20230712A) is colour coded by seven zones as identified in the 'Settlement and Groundwater Monitoring Plan. The original Zone boundaries and 'trigger' settlement values have been modified to match *Engineering Geology Ltd* Drawing No. 8332-Fig 16.

The second A1 plan "Total Settlement Contours" (T20230712B) shows the contours (in 20 millimetre intervals) deduced from the settlement marks. The locations of these settlement marks are shown with black 'stars'.

The first A1 plan "Total Settlement Values" (T20230712A) shows the location, station I.D., and total settlement value in millimetres for each mark.

The Settlement and Groundwater Monitoring Plan identifies gradients steeper than 1:1000 to be cause for concern. BM20 has been a large mover in the past and has been identified in past surveys as being placed on shrinking material. There are no buildings in this area anymore. I understand (from Mark Halloran) BM20A was placed near BM20 with a 'foot' bedded in firm ground. Significant differential settlement (1:120) is now occurring between BM20A and BM20 –sufficient to decide to omit BM20 from the settlement 'contour' calculation.

These contours represent the total negative (–ve) movement (or settlement) around Waihi since monitoring began.

The closest contours (omitting disturbed marks) are between marks 20AC and BM20A. The distance between these marks using GPS measurements, calculates at 126.706 metres, and show 0.1858 metres of relative vertical movement to give a gradient of 1:682. The distance between marks BM20A and 20D using

GPS measurements, calculates at 137.047 metres, and shows 0.1685 metres of relative vertical movement to give a gradient of 1:813. The distance between marks 20C and BM20A, when checked by GPS measurements, calculates at 126.865 metres, and show 0.1413 metres of relative vertical movement to give a gradient of 1:898.
Some cracks are visible in the sealed pavements in this area of closest contours.

Table 1 (pages 3 -11) lists all the marks used for this settlement levelling event with the marks sorted first by Zone and then by settlement value. Marks that record 'exceedences' in terms of zone predictions (for Martha (2019) are highlighted with colour and have comments attached. All marks that 'exceeded' in Table 1 were analysed further and field inspections were conducted where required.

The comments included below attempt to explain the probable reason for 'excess' movement. The comments are *Dist'd* for BM20 in Zone 6. For Zone4, 4 of the 5 marks are near Zone 5. For Zone 3, 8 of the 9 marks are located near Zone 4 or Zone 5. For Zone 2, 13 of the 15 marks are located near Zone 3 or Zone 4. For Zone 1, 2.44 is *Dist'd,* 11 of 14 other marks are located near Zone 2 or Zone 3.

The 'Favona' marks were installed for monitoring the effects of dewatering in the original underground mine area. The underlying original 'Martha' zone was Zone 3 but the Favona marks were never given zone exceedence parameters in terms of the original Martha zones. The Favona marks all report significant settlement. Note marks F18, F20, and F24 are tentatively labelled as 'Dist'd' and not used for contouring the settlement.
The five extra 'Favona' settlement marks are again shown on the plan. These are FP1, BLOCK-S, BLOCK-N, TRIG 22, and TRIG 24. The settlements for these marks have generally been deduced relative to original reduced levels measured around the year 1987 –although FP1 (at the Favona portal) was established about the year 2000. The underlying zone for the Favona marks is now Zone 5 Martha (2019).
I understand that Time-History plots for all survey marks grouped by zone will be produced by other persons in accordance with the "Settlement and Groundwater Monitoring Plan 31 July 2005"

Bruce Morrison
Registered Professional Surveyor

Table 1. Total Movement

	Zone	station i.d.	SURVEY DATE	X	Y	TOTAL Z	SETTLEMENT May-23	Comments
1	Zone7	BM19B	1/05/2023	2117.17	1244.355	35.5235	-0.3439	
1	Zone7	19BB	1/05/2023	2191.56	1292.02	35.5189	-0.3400	
1	Zone7	17CB	1/05/2023	2014.23	1201.01	35.4555	-0.3213	
3	Zone6	BM20	1/05/2023	2342.50	1476.25	35.5703	-0.41	Dist'd
1	Zone6	BM20A	1/05/2023	2345.50	1484.901	35.7446	-0.3337	
1	Zone6	19CB	1/05/2023	2296.71	1381.40	34.9111	-0.3200	
1	Zone6	17BB	1/05/2023	1919.52	1160.787	37.3476	-0.2853	
1	Zone6	17AB	1/05/2023	1841.32	1104.802	36.8702	-0.2497	
1	Zone6	34GC	1/05/2023	2211.33	1119.517	32.1241	-0.2291	
1	Zone6	2.04B	1/05/2023	1893.21	968.34	29.0782	-0.2136	
1	Zone6	18EE	1/05/2023	1750.73	809.328	23.4249	-0.1965	
1	Zone6	34H	1/05/2023	2233.59	970.561	32.1527	-0.1961	
1	Zone6	18C	1/05/2023	1494.95	767.193	27.4592	-0.1957	

1	Zone6	18IB	1/05/2023	1611.19	784.79	25.8226	-0.194
1	Zone6	34AD	1/05/2023	1470.88	886.92	29.7545	-0.194
1	Zone6	2.10	1/05/2023	2143.92	950.387	30.2809	-0.1924
1	Zone6	34BE	1/05/2023	1732.56	931.603	28.3222	-0.1856
1	Zone6	10BC	1/05/2023	1560.13	1062.92	38.0963	-0.1762
1	Zone6	BM34	1/05/2023	1528.38	903.297	30.3101	-0.175
1	Zone6	34FC	1/05/2023	2120.79	587.93	19.0337	-0.1740
1	Zone6	34CB	1/05/2023	1967.74	983.20	30.0326	-0.1731
1	Zone6	10AB	1/05/2023	1430.61	1036.998	34.9913	-0.1698
1	Zone6	11AC	1/05/2023	1308.26	859.51	29.3306	-0.1689
1	Zone6	BM17A	1/05/2023	1724.44	1088.92	40.028	-0.1639
1	Zone6	2.08B	1/05/2023	2289.75	782.64	24.5285	-0.1613
1	Zone6	2.11C	1/05/2023	2292.35	896.99	26.6108	-0.1593
1	Zone6	18AB	1/05/2023	1632.39	667.733	22.1344	-0.1592
1	Zone6	1.28B	1/05/2023	1987.03	447.706	12.0928	-0.1526
1	Zone6	2.09C	1/05/2023	2228.35	868.63	28.6386	-0.1503
1	Zone6	34I	1/05/2023	2229.55	765.53	28.459	-0.1446
1	Zone6	2.06	1/05/2023	2351.95	334.473	11.2791	-0.1236
1	Zone5	A10B	1/05/2023	1298.62	1049.614	30.6796	-0.1956
1	Zone5	20C	1/05/2023	2450.61	1413.86	36.3157	-0.1924
1	Zone5	20E	1/05/2023	2535.65	1542.672	37.0745	-0.1882
1	Zone5	21DC	1/05/2023	2573.96	1304.152	37.7525	-0.1879
1	Zone5	25D	1/05/2023	2547.05	1248.02	36.8558	-0.1856
1	Zone5	16BC	1/05/2023	1252.81	1336.473	39.4483	-0.1815
1	Zone5	25A	1/05/2023	2505.13	1203.768	35.9288	-0.1806
1	Zone5	25E	1/05/2023	2472.35	1162.013	34.7644	-0.1788
1	Zone5	BM25	1/05/2023	2424.91	1100.253	33.4725	-0.1762
1	Zone5	BM16	1/05/2023	1418.09	1218.03	46.4276	-0.176
1	Zone5	21O	1/05/2023	2527.37	1356.342	36.0028	-0.1738
1	Zone5	10DC	1/05/2023	1279.04	1198.33	35.2936	-0.1730
1	Zone5	21N	1/05/2023	2623.25	1342.435	38.2809	-0.1699
1	Zone5	25H	1/05/2023	2648.48	1232.956	38.9092	-0.1678
1	Zone5	25CB	1/05/2023	2615.91	1190.496	38.2849	-0.1676
1	Zone5	25G	1/05/2023	2594.60	1149.415	37.5778	-0.1672
1	Zone5	2.41	1/05/2023	3296.32	685.398	46.2524	-0.1667
1	Zone5	10CB	1/05/2023	1222.46	1025.86	29.77	-0.1663
1	Zone5	25F	1/05/2023	2542.53	1116.24	35.9884	-0.1653
1	Zone5	20D	1/05/2023	2482.07	1473.478	36.5535	-0.1652
1	Zone5	34EB	1/05/2023	2073.93	705.952	24.6307	-0.1613
1	Zone5	25B	1/05/2023	2497.67	1105.828	34.8189	-0.161
1	Zone5	2.03	1/05/2023	1930.08	745.943	22.5859	-0.1603
1	Zone5	12CE	1/05/2023	1499.92	543.077	20.9776	-0.1596
1	Zone5	13AC	1/05/2023	1751.98	327.376	18.5878	-0.1594

1	Zone5	18F	1/05/2023	1752.28	551.027	17.3238	-0.1581
1	Zone5	BM12	1/05/2023	1370.27	607.735	23.952	-0.1571
1	Zone5	24DC	1/05/2023	2718.29	1323.13	39.6266	-0.1560
1	Zone5	18G	1/05/2023	1669.05	554.602	18.4682	-0.1556
1	Zone5	18B	1/05/2023	1510.36	650.578	23.5544	-0.1551
1	Zone5	34D	1/05/2023	2038.90	783.431	25.3369	-0.1534
1	Zone5	21C	1/05/2023	2651.57	1389.816	38.4604	-0.1531
1	Zone5	2A	1/05/2023	1069.03	1111.858	23.7946	-0.1528
1	Zone5	1.28A	1/05/2023	1888.26	505.887	13.2048	-0.1514
1	Zone5	21EB	1/05/2023	2799.95	1429.087	41.6256	-0.1502
1	Zone5	24L	1/05/2023	2761.67	1181.326	39.3188	-0.1502
1	Zone5	24K	1/05/2023	2783.89	1387.719	40.6098	-0.1495
1	Zone5	BM18	1/05/2023	1771.96	674.528	19.4239	-0.1487
1	Zone5	25I	1/05/2023	2537.20	1045.036	34.682	-0.1486
1	Zone5	20AC	1/05/2023	2461.04	1536.905	37.0137	-0.1479
1	Zone5	13BC	1/05/2023	1850.36	246.587	13.716	-0.1469
1	Zone5	24J	1/05/2023	2749.39	1365.756	40.2264	-0.1468
1	Zone5	12DC	1/05/2023	1596.95	435.491	19.9597	-0.1467
1	Zone5	22F	1/05/2023	2815.91	1325.407	40.2256	-0.1461
1	Zone5	15A	1/05/2023	1204.79	818.863	28.7674	-0.1449
1	Zone5	12AC	1/05/2023	1388.32	488.888	19.042	-0.1448
1	Zone5	24AC	1/05/2023	2743.58	1218.9	40.0823	-0.144
1	Zone5	18HC	1/05/2023	1821.52	466.47	14.8847	-0.1439
1	Zone5	20BB	1/05/2023	2533.26	1622.291	37.87	-0.1434
1	Zone5	24E	1/05/2023	2758.43	1303.234	40.3566	-0.1432
1	Zone5	24F	1/05/2023	2772.80	1257.274	40.1216	-0.1431
1	Zone5	BM24	1/05/2023	2794.55	1279.361	40.3924	-0.1425
1	Zone5	AP22A	1/05/2023	1868.44	188.565	12.4012	-0.1407
1	Zone5	21M	1/05/2023	2694.90	1439.648	39.1786	-0.1395
1	Zone5	15BC	1/05/2023	1169.90	708.855	26.3287	-0.1394
1	Zone5	BM13	1/05/2023	1426.61	269.34	13.5687	-0.1371
1	Zone5	24G	1/05/2023	2705.96	1170.464	39.7931	-0.137
1	Zone5	4DB	1/05/2023	1033.26	1550.66	32.2449	-0.1358
1	Zone5	11BB	1/05/2023	1348.57	710.57	26.9261	-0.1357
1	Zone5	12BC	1/05/2023	1405.27	368.295	14.9142	-0.1348
1	Zone5	24B	1/05/2023	2667.67	1126.40	39.3737	-0.1340
1	Zone5	20F	1/05/2023	2605.79	1575.98	37.5673	-0.1325
1	Zone5	BM21	1/05/2023	2654.80	1515.397	39.4223	-0.1322
1	Zone5	21BC	1/05/2023	2719.27	1477.799	41.2661	-0.1304
1	Zone5	21K	1/05/2023	2681.11	1572.207	39.9972	-0.1288
1	Zone5	24H	1/05/2023	2630.70	1072.279	36.1505	-0.1286
1	Zone5	2.17A	1/05/2023	3085.76	555.866	36.9051	-0.1279
1	Zone5	4B	1/05/2023	1021.54	1448.629	31.2493	-0.1274

1	Zone5	2BC	1/05/2023	970.20	1241.898	30.3806	-0.1273	
1	Zone5	30C	1/05/2023	2573.54	1675.395	38.4378	-0.1192	
1	Zone5	BM9B	1/05/2023	1220.25	1523.285	34.7468	-0.115	
1	Zone5	7CB	1/05/2023	1161.74	1597.63	30.607	-0.1134	
1	Zone5	AP3	1/05/2023	918.94	1140.59	26.0629	-0.1124	
1	Zone5	26R	1/05/2023	1905.59	1927.165	71.3514	-0.0923	
1	Zone5	26Q	1/05/2023	1963.00	1982.711	73.6694	-0.0911	
1	Zone5	26PB	1/05/2023	1834.84	1893.106	67.9396	-0.0911	
1	Zone5	26F	1/05/2023	1392.77	1680.261	43.8598	-0.0848	
3	Zone5	1.10B	1/05/2023	1597.98	284.28	16.779	new mark	
1	Zone4	23C	1/05/2023	2856.14	1068.014	37.547	-0.2138	Nr Zone 5
1	Zone4	23AB	1/05/2023	3145.42	1078.732	37.1889	-0.1826	?
1	Zone4	22C	1/05/2023	2846.39	1352.544	40.308	-0.1668	Nr Zone 5
1	Zone4	2.24	1/05/2023	2885.91	1215.469	41.2756	-0.1649	Nr Zone 5
1	Zone4	23D	1/05/2023	2861.42	1154.885	38.8544	-0.16	Nr Zone 5
1	Zone4	BANK1	1/05/2023	2866.21	1023.248	37.7949	-0.1583	
1	Zone4	2.25	1/05/2023	2874.51	1097.261	37.9769	-0.1536	
1	Zone4	2.19B	1/05/2023	3270.21	916.063	38.5581	-0.1529	
1	Zone4	23B	1/05/2023	2856.49	949.794	38.7463	-0.1523	
1	Zone4	BARRY1	1/05/2023	3047.74	926.576	38.1145	-0.1517	
1	Zone4	22GB	1/05/2023	2862.88	1387.968	40.8381	-0.1516	
1	Zone4	MATAURA1	1/05/2023	2831.84	1250.806	41.0618	-0.1504	
1	Zone4	2.14A	1/05/2023	2853.28	838.669	41.3157	-0.1498	
1	Zone4	MORTON	1/05/2023	2975.42	1231.913	40.7115	-0.1466	
1	Zone4	2.18	1/05/2023	3218.04	712.756	44.5436	-0.1465	
1	Zone4	BARRY3	1/05/2023	3176.85	895.991	37.6874	-0.146	
1	Zone4	BARRY4B	1/05/2023	3320.16	912.693	38.8877	-0.1451	
1	Zone4	22E	1/05/2023	3055.20	1231.504	40.7814	-0.1447	
1	Zone4	BARRY5	1/05/2023	3397.59	904.647	40.9906	-0.1439	
1	Zone4	2HB	1/05/2023	1078.24	886.849	24.3859	-0.1436	
1	Zone4	1.11B	1/05/2023	1675.83	133.622	9.0204	-0.1431	
1	Zone4	2.23	1/05/2023	3560.02	1212.795	36.6345	-0.1425	
1	Zone4	BARRY6	1/05/2023	3432.52	904.356	42.4764	-0.1424	
1	Zone4	23E	1/05/2023	2774.82	972.514	37.7143	-0.1404	
1	Zone4	BM23	1/05/2023	3107.42	921.049	38.0891	-0.1403	
1	Zone4	BARRY2B	1/05/2023	2937.67	943.59	38.5559	-0.1388	
1	Zone4	2.20	1/05/2023	3467.69	904.56	43.7837	-0.1386	
1	Zone4	STAFORD	1/05/2023	3139.86	998.179	37.317	-0.1374	
1	Zone4	22BC	1/05/2023	2916.75	1435.773	42.1009	-0.1369	
1	Zone4	22M	1/05/2023	2973.44	1434.656	41.6694	-0.1361	
1	Zone4	2.22	1/05/2023	3339.13	1206.603	40.3485	-0.1353	
1	Zone4	22H	1/05/2023	2869.25	1441.796	41.6184	-0.1347	
1	Zone4	2.16	1/05/2023	3007.62	739.64	33.5939	-0.1346	
1	Zone4	22I	1/05/2023	2918.98	1461.367	41.915	-0.1342	

1	Zone4	21P	1/05/2023	2849.17	1456.9	41.8495	-0.1337
1	Zone4	AP100	1/05/2023	1893.80	81.27	11.7774	-0.1329
1	Zone4	GW	1/05/2023	3128.83	1140.936	38.5397	-0.1324
1	Zone4	2.15	1/05/2023	2918.94	723.52	38.3657	-0.1323
1	Zone4	22L	1/05/2023	3047.70	1499.876	40.9912	-0.1317
1	Zone4	22D	1/05/2023	3100.02	1335.441	41.4485	-0.1312
1	Zone4	BARRY7	1/05/2023	3518.87	901.897	43.6123	-0.1307
1	Zone4	BM2	1/05/2023	915.74	1091.799	24.8246	-0.1297
1	Zone4	22A	1/05/2023	3003.28	1429.77	41.6428	-0.1292
1	Zone4	CUBA	1/05/2023	3224.32	1079.177	35.8262	-0.1278
1	Zone4	BARRY8	1/05/2023	3592.28	871.451	37.9356	-0.1273
1	Zone4	2.13	1/05/2023	2725.42	874.951	47.2154	-0.1272
1	Zone4	1.05	1/05/2023	1176.96	473.454	21.8145	-0.1262
1	Zone4	22J	1/05/2023	2944.47	1489.763	42.4227	-0.1249
1	Zone4	21FB	1/05/2023	2861.65	1512.211	42.6479	-0.1246
1	Zone4	27KB	1/05/2023	2320.23	2120.21	63.3285	-0.1245
1	Zone4	26BE	1/05/2023	1408.78	1800.553	38.81	-0.1214
1	Zone4	BM22	1/05/2023	3115.79	1442.952	40.6167	-0.1206
1	Zone4	21AC	1/05/2023	2716.64	1617.767	39.6895	-0.1205
1	Zone4	23F	1/05/2023	2700.77	968.793	36.6628	-0.1203
1	Zone4	21L	1/05/2023	2806.79	1575.074	43.0843	-0.1198
1	Zone4	1.26	1/05/2023	1926.81	30.053	15.09	-0.1195
1	Zone4	2.27	1/05/2023	3379.40	1371.48	37.754	-0.1187
1	Zone4	2.29B	1/05/2023	2953.39	1548.172	42.5873	-0.1182
1	Zone4	2GB	1/05/2023	922.38	967.661	22.6713	-0.1177
1	Zone4	15C	1/05/2023	1156.82	571.077	24.2057	-0.1173
1	Zone4	21I	1/05/2023	2854.70	1668.793	41.6396	-0.1147
1	Zone4	21Q	1/05/2023	2899.60	1571.317	43.1263	-0.1138
1	Zone4	26CE	1/05/2023	1377.77	1711.891	40.5951	-0.1137
1	Zone4	30BB	1/05/2023	2604.86	1726.496	41.5446	-0.1132
1	Zone4	1.06	1/05/2023	1159.34	302.26	17.2187	-0.1125
1	Zone4	22KB	1/05/2023	2981.80	1603.49	42.8483	-0.1106
1	Zone4	27N	1/05/2023	2179.57	2075.985	71.9102	-0.1094
1	Zone4	SM822	1/05/2023	2512.91	1841.132	41.4531	-0.1085
1	Zone4	21GC	1/05/2023	2901.12	1614.054	43.4422	-0.1076
1	Zone4	1.09B	1/05/2023	1344.14	117.48	9.9198	-0.1065
1	Zone4	21J	1/05/2023	2773.44	1688.923	39.9619	-0.1058
1	Zone4	27E	1/05/2023	2494.09	2171.622	50.3403	-0.1055
1	Zone4	2.31B	1/05/2023	3201.23	1637.289	42.0901	-0.1051
1	Zone4	4.08	1/05/2023	2350.64	2022.32	73.2108	-0.1044
1	Zone4	BM15	1/05/2023	976.94	783.004	20.5152	-0.1042
1	Zone4	2.30B	1/05/2023	3000.35	1672.941	43.1693	-0.1005
1	Zone4	21HC	1/05/2023	2916.84	1728.842	42.8807	-0.0979
1	Zone4	4.07	1/05/2023	2554.47	2079.24	45.0451	-0.0968
1	Zone4	7BB	1/05/2023	1105.69	1689.902	35.9357	-0.0964
1	Zone4	27H	1/05/2023	2413.27	2149.76	57.0244	-0.0946
1	Zone4	27J	1/05/2023	2344.14	2136.138	62.1304	-0.094
1	Zone4	26AE	1/05/2023	1432.47	1883.479	37.5485	-0.0894

1	Zone4	3.04B	1/05/2023	1123.76	1821.498	39.279	-0.0892	
1	Zone4	4.05	1/05/2023	2809.68	1897.68	40.6147	-0.0889	
1	Zone4	3.01	1/05/2023	1291.95	1690.334	37.2967	-0.0879	
1	Zone4	27F	1/05/2023	2466.48	2164.026	52.3168	-0.0863	
1	Zone4	BM30	1/05/2023	2715.36	1996.207	44.0818	-0.0852	
1	Zone4	3.11A	1/05/2023	1786.17	1929.216	62.1458	-0.0843	
1	Zone4	27AB	1/05/2023	2009.08	2064.334	73.4781	-0.082	
1	Zone4	3.02	1/05/2023	1344.87	1837.735	34.9407	-0.0819	
1	Zone4	3.09	1/05/2023	1618.51	1870.174	51.9183	-0.0805	
1	Zone4	30AB	1/05/2023	2685.64	1898.443	46.2318	-0.0804	
1	Zone4	26H	1/05/2023	1452.90	1729.593	49.9642	-0.0799	
1	Zone4	3.10A	1/05/2023	1689.03	1978.29	53.4329	-0.0783	
1	Zone4	27L	1/05/2023	2280.24	2115.405	65.8381	-0.0779	
1	Zone4	27DC	1/05/2023	2541.24	2190.709	48.1853	-0.0774	
1	Zone4	26MB	1/05/2023	1593.46	1750.66	58.9732	-0.0769	
1	Zone4	27O	1/05/2023	2101.57	2042.821	75.0235	-0.0748	
1	Zone4	26JB	1/05/2023	1495.71	1756.55	53.7326	-0.0748	
1	Zone4	3.13	1/05/2023	1744.89	2097.49	53.7604	-0.0733	
1	Zone4	BM26	1/05/2023	1542.45	1837.805	45.4213	-0.0708	
1	Zone4	1.12B	1/05/2023	794.14	-73.01	11.0394	-0.0653	
1	Zone4	26OB	1/05/2023	1706.93	1812.27	67.1774	-0.0651	
1	Zone4	3.6A	1/05/2023	1526.28	2015.739	38.9165	-0.0541	
1	Zone3	2CE	1/05/2023	774.75	1313.191	34.6054	-0.1228	Nr Zone 5
1	Zone3	14DB	1/05/2023	876.99	411.215	15.1453	-0.1085	Nr Zone 4
1	Zone3	2.34	1/05/2023	3452.45	1683.502	37.7051	-0.1079	Nr Zone 4
1	Zone3	2.36	1/05/2023	3433.14	1534.879	35.9168	-0.099	Nr Zone 4
1	Zone3	2.40B	1/05/2023	3572.85	1526.452	33.1431	-0.0986	Nr Zone 4
1	Zone3	2.33	1/05/2023	3294.51	1691.952	40.297	-0.0981	Nr Zone4
1	Zone3	1.25	1/05/2023	2175.94	-129.105	20.0517	-0.0978	Nr Zone4
1	Zone3	4.02	1/05/2023	2797.90	2143.571	45.755	-0.0973	Nr Zone 4
1	Zone3	A33C	1/05/2023	456.03	1219.226	35.8471	-0.0957	Nr 2CE above
1	Zone3	1.07	1/05/2023	924.43	267.487	12.4903	-0.0939	
1	Zone3	BM31	1/05/2023	2967.04	1873.475	43.2754	-0.0934	
1	Zone3	4EC	1/05/2023	782.01	1687.78	41.12	-0.0928	
1	Zone3	2FC	1/05/2023	720.33	843.055	23.917	-0.0923	
1	Zone3	4A	1/05/2023	815.01	1494.15	40.6839	-0.0921	
1	Zone3	4.03B	1/05/2023	2794.90	2044.783	43.792	-0.0916	
1	Zone3	31BC	1/05/2023	3159.33	1954.857	45.4938	-0.0916	
1	Zone3	15DB	1/05/2023	917.56	466.148	15.5903	-0.0905	
1	Zone3	14EA	1/05/2023	808.56	504.72	17.0811	-0.0887	
1	Zone3	2DA	1/05/2023	682.15	1189.579	35.8029	-0.0872	
1	Zone3	4.04	1/05/2023	2662.60	2131.765	45.9115	-0.0863	
1	Zone3	4.01C	1/05/2023	2891.78	2113.146	47.2953	-0.0862	
1	Zone3	31AC	1/05/2023	3059.04	1910.63	44.0602	-0.0859	
1	Zone3	14CB	1/05/2023	759.10	389.77	18.8104	-0.0853	
1	Zone3	14BC	1/05/2023	535.45	340.672	20.9029	-0.0829	
1	Zone3	2EB	1/05/2023	689.02	1054.621	29.2529	-0.0829	
1	Zone3	29DB	1/05/2023	2996.63	2106.664	47.8009	-0.0822	

1	Zone3	1.21A	1/05/2023	1939.94	-325.504	19.6504	-0.0812	
1	Zone3	1.08	1/05/2023	1052.91	107.17	16.5176	-0.0800	
1	Zone3	14FB	1/05/2023	705.60	649.144	20.1425	-0.0781	
1	Zone3	3.25	1/05/2023	3116.90	2107.056	49.8075	-0.078	
1	Zone3	1.22	1/05/2023	1510.00	-249.925	15.8577	-0.0755	
1	Zone3	29CE	1/05/2023	2891.84	2285.59	51.5652	-0.0685	
1	Zone3	29AC	1/05/2023	2641.62	2218.071	48.5116	-0.0677	
1	Zone3	29B	1/05/2023	2772.84	2242.217	49.9963	-0.0536	
3	Zone3	3.24B	1/05/2023	3012.46	2251.58	51.9889	new mark	
1	Zone2	3.14	1/05/2023	1752.75	2214.32	48.742	-0.0905	Nr Zone 4
1	Zone2	1K	1/05/2023	511.74	957.174	29.5912	-0.0815	Nr Zone 3
1	Zone2	3.03	1/05/2023	1134.46	1917.237	39.3382	-0.0808	Nr Zone 4
1	Zone2	7AC	1/05/2023	994.54	1781.823	43.5166	-0.0794	Nr Zone 3
1	Zone2	BM4	1/05/2023	689.21	1555.547	42.2694	-0.0741	Nr Zone 3
1	Zone2	BM7	1/05/2023	1057.32	1843.069	44.106	-0.0741	Nr Zone 4
1	Zone2	3.12	1/05/2023	1599.68	2152.411	40.2594	-0.0739	Nr Zone 4
1	Zone2	4FB	1/05/2023	562.51	1370.97	39.3635	-0.0698	Nr Zone 3
1	Zone2	1JB	1/05/2023	604.79	822.761	26.4038	-0.069	Nr Zone 3
1	Zone2	33A	1/05/2023	338.15	1303.893	36.7144	-0.0687	Nr Zone 3
1	Zone2	33F	1/05/2023	347.95	1511.678	42.0394	-0.0685	Nr 4FB above
1	Zone2	3.07	1/05/2023	1362.08	2096.818	48.0377	-0.0684	Nr Zone 4
1	Zone2	1C	1/05/2023	421.48	1098.886	34.7841	-0.0679	Nr Zone 3
1	Zone2	6A	1/05/2023	946.43	1928.115	47.5038	-0.0673	Nr Zone 4
1	Zone2	33E	1/05/2023	437.71	1437.524	40.9813	-0.0658	Nr 4FB above
1	Zone2	1.04	1/05/2023	795.98	129.359	12.7936	-0.0649	
1	Zone2	1I	1/05/2023	468.34	761.228	27.2659	-0.0645	
1	Zone2	BM14	1/05/2023	718.16	485.955	19.8256	-0.0639	
1	Zone2	1B	1/05/2023	337.50	1062.935	33.9965	-0.0632	
1	Zone2	BM6	1/05/2023	881.86	1837.081	46.2258	-0.062	
1	Zone2	33DB	1/05/2023	265.40	1714.719	46.3615	-0.0612	
1	Zone2	14AC	1/05/2023	515.17	457.622	24.0153	-0.0587	
1	Zone2	5C	1/05/2023	705.43	1754.71	45.162	-0.0585	
1	Zone2	3.22A	1/05/2023	2891.15	2398.649	56.6523	-0.0575	
1	Zone2	BM29	1/05/2023	2608.80	2400.756	55.9567	-0.0563	
1	Zone2	3.15	1/05/2023	1696.24	2315.821	39.0965	-0.0561	
1	Zone2	1FB	1/05/2023	210.46	850.78	29.8237	-0.0557	
1	Zone2	33GA	1/05/2023	415.95	1621.638	45.3465	-0.0552	
1	Zone2	1EB	1/05/2023	388.60	912.09	30.4259	-0.0542	
1	Zone2	1A	1/05/2023	249.92	1026.38	33.3253	-0.0528	
1	Zone2	1O	1/05/2023	-271.35	814.183	22.7071	-0.0526	
1	Zone2	1HC	1/05/2023	299.70	702.8	27.0386	-0.0524	
1	Zone2	3.05	1/05/2023	966.29	1990.771	47.1812	-0.0495	
1	Zone2	33B	1/05/2023	156.88	1430.804	34.4076	-0.0495	
1	Zone2	1.02D	1/05/2023	85.42	283.30	18.6505	-0.0492	
1	Zone2	1GB	1/05/2023	-2.87	769.74	29.2865	-0.0491	
1	Zone2	1.03B	1/05/2023	365.55	323.37	19.3777	-0.0489	
1	Zone2	BM1	1/05/2023	152.75	994.869	32.7683	-0.0489	
1	Zone2	33C	1/05/2023	222.53	1621.24	44.4057	-0.0474	

1	Zone2	1ME	1/05/2023	-155.40	879.887	26.0972	-0.0472	
1	Zone2	5AC	1/05/2023	470.30	1688.454	47.034	-0.047	
1	Zone2	1.01	1/05/2023	56.47	604.075	25.4443	-0.0433	
1	Zone2	BM5	1/05/2023	325.93	1806.47	47.8052	-0.0429	
1	Zone2	1RA	1/05/2023	-579.06	750.356	16.7298	-0.0395	
1	Zone2	1.14	1/05/2023	496.74	-535.095	8.4354	-0.0318	
1	Zone2	AP2	1/05/2023	-1276.40	954.13	5.7662	-0.0316	
1	Zone2	1.16	1/05/2023	1552.97	-1086.27	18.3543	-0.0218	
3	Zone2	1PA	1/05/2023	-351.51	787.24	missed	missed	
3	Zone1	2.44	1/05/2023	2734.64	421.025	27.2497	-0.5784	Dist'd
1	Zone1	2.05	1/05/2023	2535.68	272.682	20.7637	-0.1173	Nr Zone 3
1	Zone1	31NE	1/05/2023	4349.43	1927.421	33.3251	-0.1042	?
1	Zone1	31FC	1/05/2023	3614.22	1954.15	43.4015	-0.1023	Nr Zone 3
1	Zone1	31LC	1/05/2023	4168.53	1862.106	32.0668	-0.1011	Nr Zone 3
1	Zone1	2.35	1/05/2023	3609.80	1652.681	34.0864	-0.0997	Nr Zone 3
1	Zone1	31JD	1/05/2023	4005.65	1911.423	35.5323	-0.0926	Nr Zone 3
1	Zone1	31HC	1/05/2023	3810.83	1924.654	40.3046	-0.0915	Nr Zone 3
1	Zone1	31DD	1/05/2023	3400.43	1989.83	46.6729	-0.0898	Nr Zone 3
1	Zone1	28AE	1/05/2023	2128.26	2448.76	85.9013	-0.0842	Nr Zone 2
1	Zone1	31PC	1/05/2023	4393.52	1991.662	37.7082	-0.0751	?
1	Zone1	31QC	1/05/2023	4417.71	2035.374	39.6053	-0.0726	?
1	Zone1	3.30	1/05/2023	3296.29	2235.94	50.3701	-0.0584	Nr Zone 2
1	Zone1	3.16	1/05/2023	2195.60	2563.08	95.5984	-0.0576	Nr 28AE above
1	Zone1	3.21	1/05/2023	2585.77	2493.38	64.9213	-0.0563	Nr Zone 2
1	Zone1	3.26B	1/05/2023	3200.09	2347.92	55.4066	-0.0535	
1	Zone1	3.29	1/05/2023	3662.64	2323.533	44.9047	-0.0521	
1	Zone1	1.20B	1/05/2023	1995.49	-664.09	22.0231	-0.0505	
1	Zone1	3.23	1/05/2023	3035.80	2453.651	59.6128	-0.0502	
1	Zone1	1.24	1/05/2023	2225.16	-613.228	16.6855	-0.0488	
1	Zone1	3.27B	1/05/2023	3148.37	2510.53	60.2695	-0.0482	
1	Zone1	AP2A	1/05/2023	-766.18	738.51	12.3082	-0.0434	
1	Zone1	1.23	1/05/2023	1013.01	-440.769	13.2619	-0.0429	
1	Zone1	1.13	1/05/2023	591.36	-310.80	7.0503	-0.0407	
1	Zone1	AP1A	1/05/2023	4557.10	2288.33	42.4597	-0.0383	
1	Zone1	AP1	1/05/2023	4486.29	2137.01	41.3565	-0.0357	
1	Zone1	1UA	1/05/2023	-914.75	759.054	8.723	-0.0334	
1	Zone1	1.27B	1/05/2023	1401.56	-701.57	15.3264	-0.032	
1	Zone1	1.17B	1/05/2023	2082.20	-1093.92	25.5774	-0.0272	
1	Zone 1	AP24A	1/05/2023	2114.57	-1292.93	28.0483	-0.0268	
1	Zone1	1.15	1/05/2023	923.35	-995.41	14.3444	-0.0250	
1	Zone1	AP20No2	1/05/2023	-2303.63	731.69	20.1858	-0.0233	
1	Zone1	BM28/2	1/05/2023	2282.46	2770.684	101.8809	-0.0125	
1	Zone1	AP19	1/05/2023	-3242.58	480.68	-6.5213	0.0000	control
1	Zone1	BUH5	1/05/2023	5480.15	2780.649	52.7029	0	control
1	Zone1	C1	1/05/2023	2183.23	-1759.33	32.8139	0	control
3	Favona	F18	1/05/2023	3423.83	648.3	39.9613	-0.3736	Dist'd?
3	Favona	F20	1/05/2023	3411.70	665.722	40.8898	-0.3183	Dist'd?
1	Favona	F21	1/05/2023	3405.99	671.998	40.7309	-0.2864	

3	Favona	F24	1/05/2023	3388.13	690.846	40.6065	-0.286	Dist'd?
1	Favona	F22	1/05/2023	3399.79	678.393	40.6748	-0.2663	
1	Favona	F15C	1/05/2023	3297.17	585.319	57.3003	-0.2157	
1	Favona	F16B	1/05/2023	3367.38	578.696	46.3604	-0.2091	
1	Favona	BLOCK-S	1/05/2023	3295.82	124.324	24.8083	-0.2048	
1	Favona	F26	1/05/2023	3374.47	705.541	40.5719	-0.2004	
1	Favona	F17B	1/05/2023	3405.48	613.912	43.9533	-0.2894	
1	Favona	BLOCK-N	1/05/2023	3336.45	215.694	24.276	-0.1881	
1	Favona	F10B	1/05/2023	3176.88	446.75	49.2458	-0.1867	
1	Favona	F12C	1/05/2023	3207.32	503.824	53.4707	-0.1864	
1	Favona	F34C	1/05/2023	3339.49	849.569	40.1631	-0.1791	
1	Favona	F14C	1/05/2023	3275.29	551.312	60.6336	-0.1789	
1	Favona	F28B	1/05/2023	3365.21	727.17	40.4923	-0.1747	
1	Favona	F30B	1/05/2023	3359.36	748.26	40.6788	-0.1644	
1	Favona	F08A	1/05/2023	3126.97	430.49	42.7222	-0.1593	
1	Favona	F32B	1/05/2023	3348.78	769.103	40.8435	-0.1532	
1	Favona	F35B	1/05/2023	3336.68	896.063	39.752	-0.1471	
1	Favona	F06	1/05/2023	3107.08	445.21	40.4792	-0.1424	
1	Favona	F04	1/05/2023	3100.96	470.88	38.699	-0.1387	
1	Favona	ITXCIVB	1/05/2023	2943.85	542.17	32.5907	-0.1363	
1	Favona	F02	1/05/2023	3097.60	490	38.1777	-0.136	
1	Favona	FP1	1/05/2023	3004.15	131.25	45.3928	-0.1194	
1	Favona	TRIG 24	1/05/2023	3260.76	-615.678	25.6547	-0.0738	
1	Favona	TRIG 22	1/05/2023	3681.97	89.358	26.1279	-0.062	

1. MEMORANDUM

TO: **MARK BURROUGHS**

FROM: **BRUCE MORRISON**

DATE: **6TH FEBRUARY 2024**

SUBJECT: **GROUND SETTLEMENT MONITORING -NOVEMBER 2024**

Introduction

This report outlines the results from the November 2023 Ground Settlement Monitoring Survey.

Field Method

The settlement monitoring marks were levelled during November 2023, and December 2023 for OceanaGold by myself utilising a surveyor Jason Kerr, and an experienced *Kauri Gold* assistant under my supervision.

Equipment used for this 'November 2023' event was the LEICA DNA03 electronic digital level (SN330350) paired with the **new** LEICA 3 section 4.05 metre fibreglass bar coded GKNL4F staff. To minimise 'windage', the staff was typically used in 2 section 'mode'. The level was serviced and check calibrated by the supplier in March 2023. A field calibration check was carried out by myself before commencing this event and the check result was satisfactory.

A summary of the above framework 'misclosures' for the last thirty-five events is tabulated below.

Event	West –East misclose (mm)	North –South misclose (mm)
	AP2 > 34BE > AP1	34BE > AP6
May 2007	+2.4	+6.4
Nov 2007	+2.7	+3.1
May 2008	+13.2	+4.0
Nov 2008	-8.1	+7.3
May2009	+8.8	+3.7
Nov 2009	-5.8	+2.0
May 2010	-8.1	+4.3
Nov 2010	-0.6	+6.4
May 2011	+2.0	+2.7
Nov 2011	+6.9	+6.5
May 2012	+4.1	+6.7
Nov 2012	+23.3	+5.3
May 2013	+2.7	+9.5
Nov 2013	-0.9	+4.5
May 2014	-1.1	+11.5
Nov 2014	-2.6	+7.0
May 2015	+1.6	+6.3
Nov 2015	-8.0	+10.3
May 2016	+9.2	+12.2
	AP20 No 2 >AP2 > 34BE > AP1	34BE > AP6
Nov 2016	+14.2	+3.6
	AP19 >AP2 > 34BE > AP1	34BE > AP6
May 2017	+1.0	+0.4
Nov 2017	-10.2	-0.5
May 2018	+6.4	+4.0
Nov 2018	-11.1	+3.6
	AP19 >AP2 > 34BE > AP1>BUH5	34BE > AP6
May 2019	See page 2	See page 2

	AP19 >AP2 > 34BE > AP1>BUH5	34BE > AP6
May 2019	-7.9	-6.9
	AP19 >AP2 > 34BE > AP1>BUH5	34BE > AP24A> 34BE
Nov 2019	+0.3	-1.3
	AP19 >AP2 > 34BE > AP1>BUH5	34BE > AP24A> C1
May 2020	-5.5	-1.7
Nov 2020	-3.2	-2.5
May2021	-38.7	-9.2
Nov 2021	-0.8	+1.7
May2022	+10.6	+2.3
Nov2022	+30.7	+9.7
May 2023	+14.1	+10.7
Nov 2023	+14.4	+10.2

Extending Levelling

This levelling event included LINZ benchmarks AP2, AP20 No 2, AP19, (to the west of Waihi), AP1 and BUH5 (to the east of Waihi). AP24 a.k.a control mark AP6 (south of Waihi) and AP25 have been lost to road works. AP24A and C1 have been established as a replacement for the lost AP6 control mark in this vicinity. AP2 and AP20 No 2 have now been 'unfixed' and AP19 is the fixed benchmark west of Waihi. The 'fixed' elevation value for AP19 was deduced from LINZ data comparing the relative levels of AP19, AP2, AP20 No2, and AP24 dating back to the year 1990. East of Waihi, AP1 is now 'unfixed, and there has never been any LINZ data for this mark although AP1 appears to be constructed to the same specifications as AP19 and AP26. The R.L. for the 'new' fixed eastern control mark (BUH5) was the mean value from two close values (relative to AP19) levelled in May 2021 and Nov 2021.

Photographs

The order of levelling of the monitoring points has now been fixed. This has been achieved by photographing all of the settlement points and placing them in 22 albums –generally in the order the points are to be levelled. This will achieve repeatable error distribution and should therefore give better results. I believe **all** the marks now have accurate GPS fixes. In the future, this should make the task of locating these marks easier if the marks are covered over by re-seal etc, or quickly confirm if the marks have definitely been 'lost' to street maintenance etc.

I recommend continuing these 'maintenance' details before or during the next levelling event.

Adjustments

Disturbed marks BM20 and 2.44 are excluded from the settlement contouring- as are marks F18, F20, and F24. All the above marks are excluded from the settlement contouring. Mark 1PA was again missed owing to a road gravel heap over it. Mark 1.04 was missed as it was under a parked car the many times we checked at this location.

Mark 2.18 was missed as it was under a large pile of tree prunings at the time of the survey.

'New' marks 1.10B and 3.24B are included. 'Previous histories' have been deduced for settlement purposes for this levelling event.

Results

Two A1 plans are attached -one (T20240213A) is colour coded by seven zones as identified in the 'Settlement and Groundwater Monitoring Plan. The original Zone boundaries and 'trigger' settlement values have been modified to match *Engineering Geology Ltd* Drawing No. 8332-Fig 16.

The second A1 plan "Total Settlement Contours" (T20240207A) shows the contours (in 20 millimetre intervals) deduced from the settlement marks. The locations of these settlement marks are shown with black 'stars'.

The first A1 plan "Total Settlement Values" (T20240213A) shows the location, station I.D., and total settlement value in millimetres for each mark.

The Settlement and Groundwater Monitoring Plan identifies gradients steeper than 1:1000 to be cause for concern. BM20 has been a large mover in the past and has been identified in past surveys as being placed on shrinking material. There are no buildings in this area anymore. I understand (from Mark Halloran) BM20A was placed near BM20 with a 'foot' bedded in firm ground. Significant differential settlement (1:117) is now occurring between BM20A and BM20 –sufficient to decide to omit BM20 from the settlement 'contour' calculation.

These contours represent the total negative (–ve) movement (or settlement) around Waihi since monitoring began.

The closest contours (omitting disturbed marks) are between marks 20AC and BM20A. The distance between these marks using GPS measurements, calculates at 126.706 metres, and show 0.1888 metres of relative vertical movement to give a gradient of 1:671. The distance between marks BM20A and 20D using GPS measurements, calculates at 137.047 metres, and shows 0.1670 metres of relative vertical movement to give a gradient of 1:820. The distance between marks 20C and BM20A, when checked by GPS measurements, calculates at 126.865 metres, and show 0.1345 metres of relative vertical movement to give a gradient of 1:943.
Some cracks are visible in the sealed pavements in this area of closest contours.

Table 1 (pages 3 -11) lists all the marks used for this settlement levelling event with the marks sorted first by Zone and then by settlement value. Marks that record 'exceedences' in terms of zone predictions (for Martha (2019) are highlighted with colour and have comments attached. All marks that 'exceeded' in Table 1 were analysed further and field inspections were conducted where required.

The comments included below attempt to explain the probable reason for 'excess' movement. The comments are *Dist'd* for BM20 in Zone 6. For Zone4, 4 of the 5 marks are near Zone 5. For Zone 3, 8 of the 9 marks are located near Zone 4 or Zone 5. For Zone 2, 13 of the 15 marks are located near Zone 3 or Zone 4. For Zone 1, 2.44 is *Dist'd,* 11 of 14 other marks are located near Zone 2 or Zone 3.

The 'Favona' marks were installed for monitoring the effects of dewatering in the original underground mine area. The underlying original 'Martha' zone was Zone 3 but the Favona marks were never given zone exceedence parameters in terms of the original Martha zones. The Favona marks all report significant settlement. Note marks F18, F20, and F24 are tentatively labelled as 'Dist'd' and not used for contouring the settlement.
The five extra 'Favona' settlement marks are again shown on the plan. These are FP1, BLOCK-S, BLOCK-N, TRIG 22, and TRIG 24. The settlements for these marks have generally been deduced relative to original reduced levels measured around the year 1987 –although FP1 (at the Favona portal) was established about the year 2000. The underlying zone for the Favona marks is now Zone 5 Martha (2019).
I understand that Time-History plots for all survey marks grouped by zone will be produced by other persons in accordance with the "Settlement and Groundwater Monitoring Plan 31 July 2005"

Bruce Morrison
Registered Professional Surveyor

Table 1. Total Movement

	Zone	station i.d.	SURVEY DATE	X	Y	TOTAL Z	SETTLEMENT Nov-23	Comments
1	Zone7	BM19B	1/11/2023	2117.17	1244.355	35.5218	-0.3442	
1	Zone7	19BB	1/11/2023	2191.56	1292.022	35.5182	-0.3396	
1	Zone7	17CB	1/11/2023	2014.23	1201.01	35.4516	-0.322	
3	Zone6	BM20	1/11/2023	2342.50	1476.25	35.5682	-0.4126	Dist'd
1	Zone6	BM20A	1/11/2023	2345.50	1484.901	35.7425	-0.3347	
1	Zone6	19CB	1/11/2023	2296.71	1381.4	34.9102	-0.3197	
1	Zone6	17BB	1/11/2023	1919.52	1160.787	37.3422	-0.2888	
1	Zone6	17AB	1/11/2023	1841.32	1104.802	36.8654	-0.2499	
1	Zone6	34GC	1/11/2023	2211.33	1119.517	32.1224	-0.2294	
1	Zone6	2.04B	1/11/2023	1893.21	968.34	29.0747	-0.2161	

1	Zone6	18C	1/11/2023	1494.95	767.193	27.4564	-0.1985
1	Zone6	18EE	1/11/2023	1750.73	809.328	23.4237	-0.1977
1	Zone6	18IB	1/11/2023	1611.19	784.79	25.8192	-0.1962
1	Zone6	34H	1/11/2023	2233.59	970.561	32.1513	-0.1958
1	Zone6	34AD	1/11/2023	1470.88	886.92	29.753	-0.1938
1	Zone6	2.10	1/11/2023	2143.92	950.387	30.2777	-0.1912
1	Zone6	34BE	1/11/2023	1732.56	931.603	28.3202	-0.1865
1	Zone6	34CB	1/11/2023	1967.74	983.202	30.0291	-0.1774
1	Zone6	10BC	1/11/2023	1560.13	1062.92	38.093	-0.1746
1	Zone6	BM34	1/11/2023	1528.38	903.297	30.3088	-0.1743
1	Zone6	34FC	1/11/2023	2120.79	587.931	19.0334	-0.1726
1	Zone6	11AC	1/11/2023	1308.26	859.512	29.3303	-0.1666
1	Zone6	BM17A	1/11/2023	1724.44	1088.919	40.0239	-0.1643
1	Zone6	10AB	1/11/2023	1430.61	1036.998	34.9889	-0.1641
1	Zone6	18AB	1/11/2023	1632.39	667.733	22.1322	-0.1592
1	Zone6	2.08B	1/11/2023	2289.75	782.64	24.5286	-0.1578
1	Zone6	2.11C	1/11/2023	2292.35	896.99	26.6107	-0.153
1	Zone6	1.28B	1/11/2023	1987.03	447.706	12.0921	-0.1528
1	Zone6	2.09C	1/11/2023	2228.35	868.63	28.6381	-0.1458
1	Zone6	34I	1/11/2023	2229.55	765.534	28.4597	-0.1385
1	Zone6	2.06	1/11/2023	2351.95	334.473	11.2757	-0.126
1	Zone5	20C	1/11/2023	2450.61	1413.86	36.3072	-0.2002
1	Zone5	A10B	1/11/2023	1298.62	1049.614	30.6782	-0.1886
1	Zone5	20E	1/11/2023	2535.65	1542.672	37.0732	-0.1876
1	Zone5	21DC	1/11/2023	2573.96	1304.152	37.7523	-0.1874
1	Zone5	25D	1/11/2023	2547.05	1248.02	36.8543	-0.1865
1	Zone5	25A	1/11/2023	2505.13	1203.768	35.9275	-0.1823
1	Zone5	16BC	1/11/2023	1252.81	1336.47	39.4452	-0.1823
1	Zone5	25E	1/11/2023	2472.35	1162.013	34.763	-0.1805
1	Zone5	BM25	1/11/2023	2424.91	1100.253	33.4712	-0.1769
1	Zone5	21O	1/11/2023	2527.37	1356.342	35.9994	-0.1764
1	Zone5	10DC	1/11/2023	1279.04	1198.326	35.292	-0.1731
1	Zone5	BM16	1/11/2023	1418.09	1218.03	46.4232	-0.1712
1	Zone5	21N	1/11/2023	2623.25	1342.435	38.2798	-0.1692
1	Zone5	20D	1/11/2023	2482.07	1473.478	36.5501	-0.1673
1	Zone5	10CB	1/11/2023	1222.46	1025.855	29.7656	-0.1665
1	Zone5	25G	1/11/2023	2594.60	1149.415	37.578	-0.1665
1	Zone5	25CB	1/11/2023	2615.91	1190.496	38.2864	-0.1649
1	Zone5	2.41	1/11/2023	3296.32	685.398	46.2517	-0.1647
1	Zone5	25H	1/11/2023	2648.48	1232.956	38.9112	-0.1645
1	Zone5	25F	1/11/2023	2542.53	1116.24	35.9887	-0.1642
1	Zone5	12CE	1/11/2023	1499.92	543.077	20.974	-0.1614
1	Zone5	18F	1/11/2023	1752.28	551.027	17.3215	-0.1596

1	Zone5	13AC	1/11/2023	1751.98	327.376	18.5859	-0.159
1	Zone5	24L	1/11/2023	2761.67	1181.326	39.3195	-0.1587
1	Zone5	2.03	1/11/2023	1930.08	745.943	22.5847	-0.1587
1	Zone5	25B	1/11/2023	2497.67	1105.828	34.8187	-0.1583
1	Zone5	BM12	1/11/2023	1370.27	607.735	23.9486	-0.1581
1	Zone5	34EB	1/11/2023	2073.93	705.952	24.6311	-0.1565
1	Zone5	18G	1/11/2023	1669.05	554.602	18.4666	-0.1562
1	Zone5	18B	1/11/2023	1510.36	650.578	23.5529	-0.1541
1	Zone5	24DC	1/11/2023	2718.29	1323.127	39.628	-0.1528
1	Zone5	25I	1/11/2023	2537.20	1045.036	34.6804	-0.1523
1	Zone5	21C	1/11/2023	2651.57	1389.816	38.4602	-0.152
1	Zone5	1.28A	1/11/2023	1888.26	505.887	13.2036	-0.1519
1	Zone5	34D	1/11/2023	2038.90	783.431	25.3354	-0.1507
1	Zone5	24AC	1/11/2023	2743.58	1218.90	40.0848	-0.1506
1	Zone5	2A	1/11/2023	1069.03	1111.858	23.7935	-0.1493
1	Zone5	24F	1/11/2023	2772.80	1257.274	40.1247	-0.149
1	Zone5	24E	1/11/2023	2758.43	1303.234	40.3594	-0.1487
1	Zone5	22F	1/11/2023	2815.91	1325.407	40.2291	-0.1484
1	Zone5	BM18	1/11/2023	1771.96	674.528	19.4222	-0.1482
1	Zone5	BM24	1/11/2023	2794.55	1279.361	40.3959	-0.1472
1	Zone5	24K	1/11/2023	2783.89	1387.719	40.6107	-0.1472
1	Zone5	12DC	1/11/2023	1596.95	435.491	19.9584	-0.1471
1	Zone5	13BC	1/11/2023	1850.36	246.587	13.7144	-0.1466
1	Zone5	24G	1/11/2023	2705.96	1170.464	39.7964	-0.1464
1	Zone5	20AC	1/11/2023	2461.04	1536.905	37.0132	-0.1459
1	Zone5	12AC	1/11/2023	1388.32	488.888	19.0394	-0.1457
1	Zone5	21EB	1/11/2023	2799.95	1429.087	41.6283	-0.1453
1	Zone5	24B	1/11/2023	2667.67	1126.399	39.3764	-0.1449
1	Zone5	18HC	1/11/2023	1821.52	466.47	14.883	-0.1449
1	Zone5	24J	1/11/2023	2749.39	1365.756	40.2282	-0.1429
1	Zone5	15A	1/11/2023	1204.79	818.863	28.7671	-0.1416
1	Zone5	24H	1/11/2023	2630.70	1072.279	36.1528	-0.141
1	Zone5	20BB	1/11/2023	2533.26	1622.291	37.8705	-0.1406
1	Zone5	21M	1/11/2023	2694.90	1439.648	39.1764	-0.1391
1	Zone5	11BB	1/11/2023	1348.57	710.573	26.9206	-0.1383
1	Zone5	1.10B	1/11/2023	1597.98	284.28	16.7763	-0.1379
1	Zone5	AP22A	1/11/2023	1868.44	188.565	12.4012	-0.1378
1	Zone5	15BC	1/11/2023	1169.90	708.855	26.3274	-0.1375
1	Zone5	12BC	1/11/2023	1405.27	368.295	14.9108	-0.1369
1	Zone5	BM13	1/11/2023	1426.61	269.34	13.5683	-0.1368
1	Zone5	20F	1/11/2023	2605.79	1575.98	37.5667	-0.1349
1	Zone5	4DB	1/11/2023	1033.26	1550.66	32.2438	-0.134
1	Zone5	BM21	1/11/2023	2654.80	1515.397	39.4223	-0.1311

1	Zone5	21BC	1/11/2023	2719.27	1477.799	41.2656	-0.1293	
1	Zone5	21K	1/11/2023	2681.11	1572.207	39.9972	-0.1281	
1	Zone5	4B	1/11/2023	1021.54	1448.629	31.2474	-0.127	
1	Zone5	2.17A	1/11/2023	3085.76	555.866	36.9028	-0.1267	
1	Zone5	2BC	1/11/2023	970.20	1241.898	30.3795	-0.1265	
1	Zone5	30C	1/11/2023	2573.54	1675.395	38.4383	-0.1156	
1	Zone5	BM9B	1/11/2023	1220.25	1523.285	34.7457	-0.1117	
1	Zone5	7CB	1/11/2023	1161.74	1597.63	30.606	-0.1098	
1	Zone5	AP3	1/11/2023	918.94	1140.585	26.0623	-0.108	
1	Zone5	26EE	1/11/2023	1343.86	1621.819	44.29	-0.0919	
1	Zone5	26F	1/11/2023	1392.77	1680.261	43.8549	-0.085	
1	Zone5	26R	1/11/2023	1905.59	1927.17	71.3531	-0.0821	
1	Zone5	26Q	1/11/2023	1963.00	1982.711	73.6694	-0.0817	
1	Zone5	26PB	1/11/2023	1834.84	1893.106	67.9412	-0.0814	
1	Zone4	23C	1/11/2023	2856.14	1068.014	37.5473	-0.2188	Nr Zone 5
1	Zone4	23AB	1/11/2023	3145.42	1078.732	37.1874	-0.1844	?
1	Zone4	2.24	1/11/2023	2885.91	1215.469	41.2774	-0.1696	Nr Zone 5
1	Zone4	22C	1/11/2023	2846.39	1352.544	40.3103	-0.169	Nr Zone 5
1	Zone4	23D	1/11/2023	2861.42	1154.885	38.853	-0.1639	Nr Zone 5
1	Zone4	BANK1	1/11/2023	2866.21	1023.248	37.7922	-0.1621	Nr Zone 5
1	Zone4	2.25	1/11/2023	2874.51	1097.261	37.9778	-0.1574	
1	Zone4	22GB	1/11/2023	2862.88	1387.968	40.8383	-0.1559	
1	Zone4	23B	1/11/2023	2856.49	949.794	38.7449	-0.1552	
1	Zone4	MATAURA1	1/11/2023	2831.84	1250.806	41.0648	-0.155	
1	Zone4	2.19B	1/11/2023	3270.21	916.063	38.5566	-0.1523	
1	Zone4	2.14A	1/11/2023	2853.28	838.669	41.3157	-0.1519	
1	Zone4	BARRY1	1/11/2023	3047.74	926.576	38.1139	-0.1509	
1	Zone4	23E	1/11/2023	2774.82	972.514	37.711	-0.1505	
1	Zone4	MORTON	1/11/2023	2975.42	1231.913	40.712	-0.1477	
1	Zone4	BARRY3	1/11/2023	3176.85	895.991	37.6856	-0.145	
1	Zone4	2.13	1/11/2023	2725.42	874.951	47.2114	-0.1445	
1	Zone4	BARRY4B	1/11/2023	3320.16	912.693	38.8862	-0.1444	
1	Zone4	1.11B	1/11/2023	1675.83	133.622	9.0187	-0.1443	
1	Zone4	BARRY5	1/11/2023	3397.59	904.647	40.9894	-0.143	
1	Zone4	22E	1/11/2023	3055.20	1231.504	40.7813	-0.1422	
1	Zone4	BARRY6	1/11/2023	3432.52	904.356	42.4752	-0.1421	
1	Zone4	22M	1/11/2023	2973.44	1434.656	41.6642	-0.1418	
1	Zone4	BARRY2B	1/11/2023	2937.67	943.59	38.5561	-0.1412	
1	Zone4	22BC	1/11/2023	2916.75	1435.773	42.1014	-0.1404	
1	Zone4	2HB	1/11/2023	1078.24	886.849	24.3858	-0.1395	
1	Zone4	23F	1/11/2023	2700.77	968.793	36.6585	-0.1391	
1	Zone4	BM23	1/11/2023	3107.42	921.049	38.0888	-0.1383	
1	Zone4	2.23	1/11/2023	3560.02	1212.795	36.6345	-0.138	
1	Zone4	2.20	1/11/2023	3467.69	904.56	43.7832	-0.1379	
1	Zone4	22H	1/11/2023	2869.25	1441.796	41.6191	-0.1377	
1	Zone4	STAFORD	1/11/2023	3139.86	998.179	37.3166	-0.1376	
1	Zone4	22I	1/11/2023	2918.98	1461.367	41.9134	-0.1358	

1	Zone4	2.16	1/11/2023	3007.62	739.64	33.5942	-0.1336
1	Zone4	21P	1/11/2023	2849.17	1456.9	41.8502	-0.1331
1	Zone4	GW	1/11/2023	3128.83	1140.936	38.5374	-0.132
1	Zone4	2.15	1/11/2023	2918.94	723.52	38.3651	-0.1318
1	Zone4	22L	1/11/2023	3047.70	1499.876	40.9907	-0.131
1	Zone4	BARRY7	1/11/2023	3518.87	901.897	43.6109	-0.1304
1	Zone4	AP100	1/11/2023	1893.80	81.273	11.7774	-0.1304
1	Zone4	2.22	1/11/2023	3339.13	1206.603	40.3491	-0.1287
1	Zone4	CUBA	1/11/2023	3224.32	1079.177	35.8246	-0.1286
1	Zone4	22A	1/11/2023	3003.28	1429.771	41.6443	-0.1284
1	Zone4	22D	1/11/2023	3100.02	1335.441	41.4486	-0.1275
1	Zone4	BARRY8	1/11/2023	3592.28	871.451	37.9343	-0.1274
1	Zone4	BM2	1/11/2023	915.74	1091.799	24.8239	-0.1266
1	Zone4	1.05	1/11/2023	1176.96	473.454	21.8131	-0.1263
1	Zone4	22J	1/11/2023	2944.47	1489.763	42.4237	-0.126
1	Zone4	21FB	1/11/2023	2861.65	1512.211	42.648	-0.1223
1	Zone4	21L	1/11/2023	2806.79	1575.074	43.0845	-0.1193
1	Zone4	21AC	1/11/2023	2716.64	1617.767	39.6898	-0.1192
1	Zone4	2.29B	1/11/2023	2953.39	1548.172	42.5876	-0.1192
1	Zone4	27KB	1/11/2023	2320.23	2120.206	63.3275	-0.1181
1	Zone4	15C	1/11/2023	1156.82	571.077	24.2044	-0.1172
1	Zone4	BM22	1/11/2023	3115.79	1442.95	40.6174	-0.1168
1	Zone4	26BE	1/11/2023	1408.78	1800.553	38.8095	-0.1166
1	Zone4	2.27	1/11/2023	3379.40	1371.481	37.7542	-0.1164
1	Zone4	1.26	1/11/2023	1926.81	30.053	15.0912	-0.1156
1	Zone4	2GB	1/11/2023	922.38	967.66	22.6704	-0.1151
1	Zone4	1.06	1/11/2023	1159.34	302.262	17.2172	-0.1139
1	Zone4	21Q	1/11/2023	2899.60	1571.317	43.1266	-0.1106
1	Zone4	21I	1/11/2023	2854.70	1668.793	41.6422	-0.1103
1	Zone4	30BB	1/11/2023	2604.86	1726.496	41.5463	-0.1086
1	Zone4	22KB	1/11/2023	2981.80	1603.49	42.8483	-0.1084
1	Zone4	26CE	1/11/2023	1377.77	1711.891	40.5953	-0.1083
1	Zone4	1.09B	1/11/2023	1344.14	117.48	9.9202	-0.1049
1	Zone4	21J	1/11/2023	2773.44	1688.923	39.9627	-0.104
1	Zone4	21GC	1/11/2023	2901.12	1614.054	43.4429	-0.1039
1	Zone4	SM822	1/11/2023	2512.91	1841.132	41.4551	-0.103
1	Zone4	2.31B	1/11/2023	3201.23	1637.289	42.0916	-0.1017
1	Zone4	BM15	1/11/2023	976.94	783.004	20.5149	-0.1016
1	Zone4	27N	1/11/2023	2179.57	2075.985	71.9093	-0.1013
1	Zone4	27E	1/11/2023	2494.09	2171.622	50.339	-0.0992
1	Zone4	2.30B	1/11/2023	3000.35	1672.941	43.1695	-0.0981
1	Zone4	4.08	1/11/2023	2350.64	2022.324	73.2096	-0.0975
1	Zone4	21HC	1/11/2023	2916.84	1728.842	42.8804	-0.0956
1	Zone4	7BB	1/11/2023	1105.69	1689.90	35.9348	-0.0925
1	Zone4	27H	1/11/2023	2413.27	2149.76	57.0223	-0.0882
1	Zone4	27J	1/11/2023	2344.14	2136.138	62.128	-0.0879
1	Zone4	4.07	1/11/2023	2554.47	2079.237	45.0452	-0.0879
1	Zone4	4.05	1/11/2023	2809.68	1897.682	40.6149	-0.0865

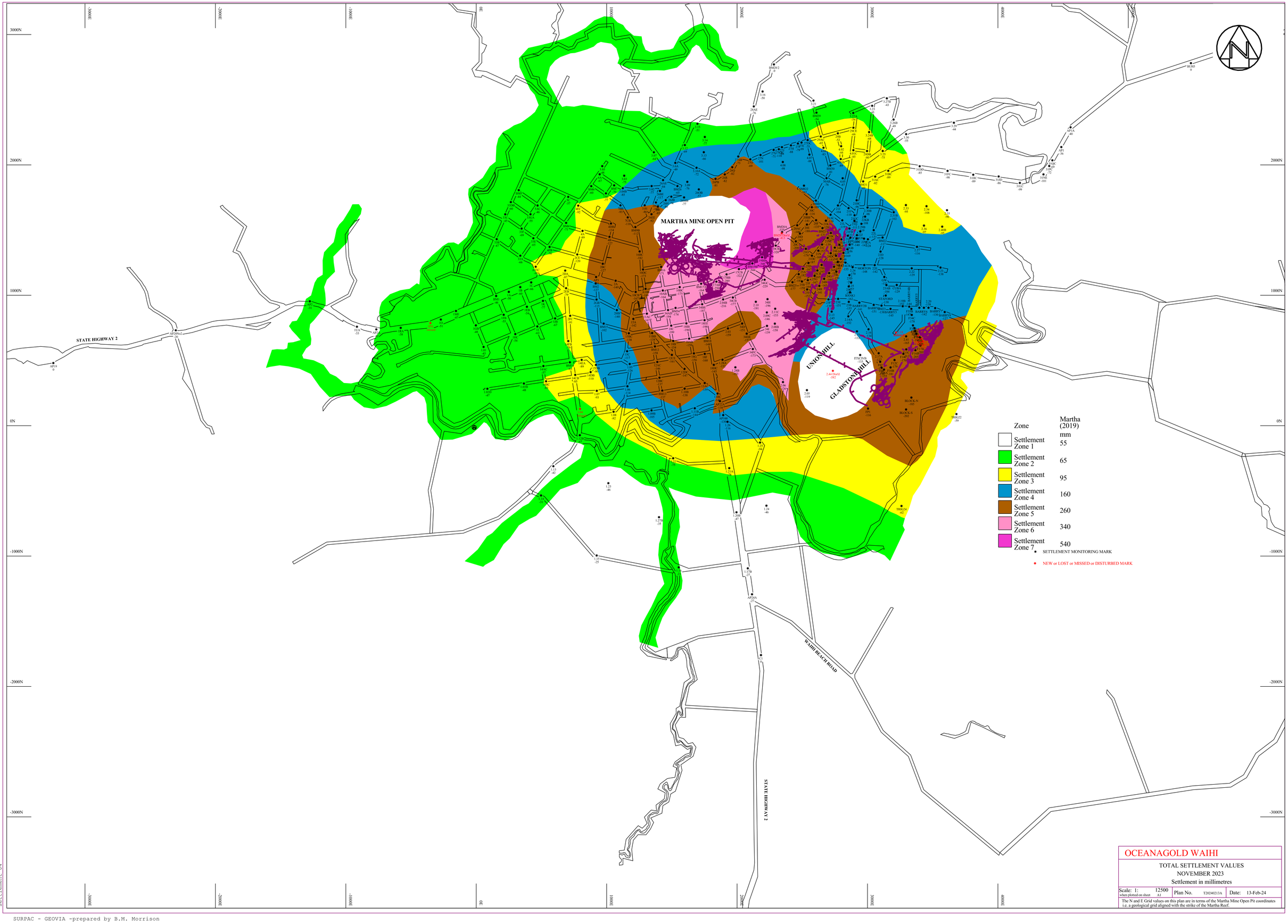
	1	Zone4	3.01	1/11/2023	1291.95	1690.334	37.2933	-0.0862	
	1	Zone4	3.04B	1/11/2023	1123.76	1821.498	39.2795	-0.0854	
	1	Zone4	26AE	1/11/2023	1432.47	1883.479	37.5485	-0.0843	
	1	Zone4	BM30	1/11/2023	2715.36	1996.21	44.0831	-0.0805	
	1	Zone4	26H	1/11/2023	1452.90	1729.593	49.9589	-0.0799	
	1	Zone4	27F	1/11/2023	2466.48	2164.026	52.3159	-0.079	
	1	Zone4	3.02	1/11/2023	1344.87	1837.735	34.9401	-0.0771	
	1	Zone4	26MB	1/11/2023	1593.46	1750.663	58.9661	-0.077	
1		Zone4	3.11A	1/11/2023	1786.17	1929.216	62.1464	-0.0757	
	1	Zone4	3.09	1/11/2023	1618.51	1870.174	51.9163	-0.0757	
	1	Zone4	30AB	1/11/2023	2685.64	1898.443	46.2331	-0.0755	
	1	Zone4	27DC	1/11/2023	2541.24	2190.709	48.185	-0.0745	
	1	Zone4	26JB	1/11/2023	1495.71	1756.55	53.7281	-0.0743	
	1	Zone4	27AB	1/11/2023	2009.08	2064.334	73.4773	-0.0733	
	1	Zone4	3.10A	1/11/2023	1689.03	1978.29	53.4328	-0.0716	
	1	Zone4	27L	1/11/2023	2280.24	2115.405	65.8367	-0.0712	
	1	Zone4	27O	1/11/2023	2101.57	2042.821	75.0215	-0.069	
	1	Zone4	1.12B	1/11/2023	794.14	-73.01	11.0378	-0.0669	
	1	Zone4	3.13	1/11/2023	1744.89	2097.492	53.7587	-0.0659	
	1	Zone4	BM26	1/11/2023	1542.45	1837.81	45.4207	-0.0654	
	1	Zone4	26OB	1/11/2023	1706.93	1812.27	67.1783	-0.0565	
	1	Zone4	3.6A	1/11/2023	1526.28	2015.739	38.9166	-0.049	
	3	Zone 4	2.18	1/11/2023	3218.04	712.76	missed	missed	
	1	Zone3	2CE	1/11/2023	774.75	1313.191	34.6064	-0.1195	Nr Zone 5
	1	Zone3	14DB	1/11/2023	876.99	411.215	15.1443	-0.1095	Nr Zone 4
	1	Zone3	2.34	1/11/2023	3452.45	1683.502	37.7058	-0.1075	Nr Zone 4
	1	Zone3	2.36	1/11/2023	3433.14	1534.879	35.9178	-0.0974	Nr Zone 4
	1	Zone3	4.02	1/11/2023	2797.90	2143.57	45.7542	-0.0949	
	1	Zone3	2.40B	1/11/2023	3572.85	1526.452	33.1452	-0.0949	
	1	Zone3	2.33	1/11/2023	3294.51	1691.952	40.2984	-0.0945	
	1	Zone3	A33C	1/11/2023	456.03	1219.226	35.8454	-0.0945	
	1	Zone3	1.25	1/11/2023	2175.94	-129.105	20.0517	-0.0943	
	1	Zone3	1.07	1/11/2023	924.43	267.487	12.4911	-0.0925	
	1	Zone3	4EC	1/11/2023	782.01	1687.78	41.1179	-0.0918	
	1	Zone3	2FC	1/11/2023	720.33	843.055	23.9158	-0.0907	
	1	Zone3	15DB	1/11/2023	917.56	466.148	15.5903	-0.0897	
	1	Zone3	BM31	1/11/2023	2967.04	1873.48	43.2761	-0.0894	
	1	Zone3	4.03B	1/11/2023	2794.90	2044.783	43.7918	-0.0891	
	1	Zone3	4A	1/11/2023	815.01	1494.154	40.6835	-0.0889	
	1	Zone3	14EA	1/11/2023	808.56	504.72	17.0803	-0.0885	
	1	Zone3	31BC	1/11/2023	3159.33	1954.857	45.494	-0.0885	
	1	Zone3	2DA	1/11/2023	682.15	1189.58	35.8018	-0.0868	
	1	Zone3	14CB	1/11/2023	759.10	389.766	18.8104	-0.0854	
	1	Zone3	4.01C	1/11/2023	2891.78	2113.146	47.293	-0.0851	
	1	Zone3	4.04	1/11/2023	2662.60	2131.765	45.9119	-0.0833	
	1	Zone3	14BC	1/11/2023	535.45	340.672	20.9024	-0.0831	
	1	Zone3	31AC	1/11/2023	3059.04	1910.629	44.0606	-0.0819	
	1	Zone3	1.08	1/11/2023	1052.91	107.171	16.5172	-0.0816	

1	Zone3	29DB	1/11/2023	2996.63	2106.664	47.799	-0.0799	
1	Zone3	2EB	1/11/2023	689.02	1054.621	29.2528	-0.0792	
1	Zone3	14FB	1/11/2023	705.60	649.144	20.1409	-0.0785	
1	Zone3	1.21A	1/11/2023	1939.94	-325.504	19.6515	-0.0782	
1	Zone3	1.22	1/11/2023	1510.00	-249.925	15.8574	-0.0754	
1	Zone3	3.25	1/11/2023	3116.90	2107.056	49.8069	-0.0745	
1	Zone3	3.24B	1/11/2023	3012.46	2251.58	51.9875	-0.0680	
1	Zone3	29CE	1/11/2023	2891.84	2285.59	51.5633	-0.0663	
1	Zone3	29AC	1/11/2023	2641.62	2218.071	48.5106	-0.0653	
1	Zone3	29B	1/11/2023	2772.84	2242.217	49.9944	-0.0523	
1	Zone2	1K	1/11/2023	511.74	957.174	29.5918	-0.0772	Nr Zone 3
1	Zone2	7AC	1/11/2023	994.54	1781.82	43.5152	-0.0767	Nr Zone 3
1	Zone2	3.14	1/11/2023	1752.75	2214.323	48.7501	-0.0765	Nr Zone 4
1	Zone2	3.03	1/11/2023	1134.46	1917.24	39.3396	-0.0753	Nr Zone 4
1	Zone2	BM4	1/11/2023	689.21	1555.547	42.2694	-0.0713	Nr Zone 3
1	Zone2	4FB	1/11/2023	562.51	1370.97	39.3627	-0.0704	Nr Zone 3
1	Zone2	BM7	1/11/2023	1057.32	1843.069	44.1066	-0.0698	Nr Zone 4
1	Zone2	3.12	1/11/2023	1599.68	2152.411	40.2585	-0.0693	Nr Zone 4
1	Zone2	33F	1/11/2023	347.95	1511.678	42.0396	-0.0689	Nr 4FB above
1	Zone2	1JB	1/11/2023	604.79	822.76	26.4033	-0.0669	Nr Zone 3
1	Zone2	6A	1/11/2023	946.43	1928.115	47.5015	-0.0665	Nr Zone 4
1	Zone2	33A	1/11/2023	338.15	1303.89	36.7128	-0.0658	Nr Zone 3
1	Zone2	1C	1/11/2023	421.48	1098.886	34.783	-0.0656	Nr Zone 3
1	Zone2	33E	1/11/2023	437.71	1437.52	40.9809	-0.0654	Nr 4FB above
1	Zone2	3.07	1/11/2023	1362.08	2096.818	48.0357	-0.0635	
1	Zone2	1I	1/11/2023	468.34	761.228	27.266	-0.063	
1	Zone2	BM14	1/11/2023	718.16	485.955	19.825	-0.0626	
1	Zone2	1B	1/11/2023	337.50	1062.935	33.9971	-0.0601	
1	Zone2	33DB	1/11/2023	265.40	1714.719	46.3587	-0.0597	
1	Zone2	BM6	1/11/2023	881.86	1837.08	46.2241	-0.0595	
1	Zone2	14AC	1/11/2023	515.17	457.622	24.0159	-0.0572	
1	Zone2	5C	1/11/2023	705.43	1754.71	45.1601	-0.0569	
1	Zone2	1FB	1/11/2023	210.46	850.779	29.8225	-0.055	
1	Zone2	33GA	1/11/2023	415.95	1621.638	45.3459	-0.0546	
1	Zone2	1EB	1/11/2023	388.60	912.09	30.4248	-0.0541	
1	Zone2	3.22A	1/11/2023	2891.15	2398.649	56.6509	-0.0538	
1	Zone2	BM29	1/11/2023	2608.80	2400.76	55.9549	-0.0535	
1	Zone2	1HC	1/11/2023	299.70	702.8	27.0374	-0.0535	
1	Zone2	3.15	1/11/2023	1696.24	2315.821	39.0966	-0.0514	
1	Zone2	1O	1/11/2023	-271.35	814.183	22.7069	-0.0508	
1	Zone2	1A	1/11/2023	249.92	1026.38	33.3258	-0.0499	
1	Zone2	1GB	1/11/2023	-2.87	769.742	29.2863	-0.0484	
1	Zone2	3.05	1/11/2023	966.29	1990.771	47.1843	-0.0481	
1	Zone2	1.03B	1/11/2023	365.55	323.37	19.3772	-0.048	
1	Zone2	1.02D	1/11/2023	85.42	283.3	18.6508	-0.0472	
1	Zone2	33B	1/11/2023	156.88	1430.804	34.4058	-0.0472	
1	Zone2	1ME	1/11/2023	-155.40	879.887	26.0964	-0.0468	
1	Zone2	5AC	1/11/2023	470.30	1688.45	47.0314	-0.0464	

1	Zone2	BM1	1/11/2023	152.75	994.869	32.7688	-0.0458	
1	Zone2	33C	1/11/2023	222.53	1621.241	44.4033	-0.0448	
1	Zone2	BM5	1/11/2023	325.93	1806.47	47.8011	-0.0443	
1	Zone2	1.01	1/11/2023	56.47	604.075	25.4444	-0.0425	
1	Zone2	1RA	1/11/2023	-579.06	750.356	16.7303	-0.0375	
1	Zone2	1.14	1/11/2023	496.74	-535.095	8.4386	-0.031	
1	Zone2	AP2	1/11/2023	-1276.40	954.13	5.7653	-0.0307	
1	Zone2	1.16	1/11/2023	1552.97	-1086.27	18.3548	-0.0232	
3	Zone2	1.04	1/11/2023	795.98	129..36	missed	missed	
3	Zone2	1PA	1/11/2023	-351.51	787.24	missed	missed	
3	Zone1	2.44	1/11/2023	2734.64	421.025	27.247	-0.5817	Dist'd
1	Zone1	2.05	1/11/2023	2535.68	272.682	20.7607	-0.1194	Nr Zone 3
1	Zone1	31NE	1/11/2023	4349.43	1927.421	33.3275	-0.1011	?
1	Zone1	31LC	1/11/2023	4168.53	1862.11	32.0688	-0.0988	Nr Zone 3
1	Zone1	31FC	1/11/2023	3614.22	1954.151	43.4038	-0.0983	Nr Zone 3
1	Zone1	2.35	1/11/2023	3609.80	1652.681	34.0898	-0.0959	Nr Zone 3
1	Zone1	31HC	1/11/2023	3810.83	1924.65	40.3063	-0.0892	Nr Zone 3
1	Zone1	31JD	1/11/2023	4005.65	1911.42	35.5344	-0.0861	Nr Zone 3
1	Zone1	31DD	1/11/2023	3400.43	1989.833	46.6745	-0.0854	Nr Zone 3
1	Zone1	28AE	1/11/2023	2128.26	2448.76	85.9006	-0.0757	Nr Zone 2
1	Zone1	31PC	1/11/2023	4393.52	1991.662	37.7108	-0.0719	?
1	Zone1	31QC	1/11/2023	4417.71	2035.374	39.607	-0.0687	?
1	Zone1	3.21	1/11/2023	2585.77	2493.375	64.9199	-0.0563	Nr Zone 2
1	Zone1	3.30	1/11/2023	3296.29	2235.94	50.3677	-0.055	
1	Zone1	3.16	1/11/2023	2195.60	2563.077	95.5961	-0.0504	
1	Zone1	3.26B	1/11/2023	3200.09	2347.92	55.4053	-0.0492	
1	Zone1	1.20B	1/11/2023	1995.49	-664.093	22.0253	-0.0472	
1	Zone1	1.23	1/11/2023	1013.01	-440.769	13.2626	-0.046	
1	Zone1	1.24	1/11/2023	2225.16	-613.228	16.6877	-0.0459	
1	Zone1	3.23	1/11/2023	3035.80	2453.651	59.6122	-0.0454	
1	Zone1	3.29	1/11/2023	3662.64	2323.533	44.9063	-0.0442	
1	Zone1	3.27B	1/11/2023	3148.37	2510.53	60.2682	-0.0434	
1	Zone1	AP2A	1/11/2023	-766.18	738.506	12.3076	-0.0421	
1	Zone1	1.13	1/11/2023	591.36	-310.797	7.0509	-0.0416	
1	Zone1	AP1A	1/11/2023	4557.10	2288.33	42.4603	-0.0397	
1	Zone1	AP1	1/11/2023	4486.29	2137.008	41.3563	-0.0362	
1	Zone1	1.27B	1/11/2023	1401.56	-701.57	15.3264	-0.0347	
1	Zone1	1UA	1/11/2023	-914.75	759.054	8.7221	-0.0325	
1	Zone1	1.17B	1/11/2023	2082.20	-1093.92	25.5768	-0.0268	
1	Zone1	AP24A	1/11/2023	2114.57	-1292.93	28.0484	-0.0268	
1	Zone1	1.15	1/11/2023	923.35	-995.413	14.3473	-0.0247	
1	Zone1	AP20No2	1/11/2023	-2303.63	731.69	20.1851	-0.0201	
1	Zone1	BM28/2	1/11/2023	2282.46	2770.684	101.8766	-0.0091	
1	Zone1	AP19	1/11/2023	-3242.58	480.68	-6.5213	0	Control
1	Zone1	BUH5	1/11/2023	5480.15	2780.649	52.7029	0	Control
1	Zone1	C1	1/11/2023	2183.23	-1759.33	32.8139	0	Control
3	Favona	F18	1/11/2023	3423.83	648.3	39.9554	-0.376	dist'd?
3	Favona	F20	1/11/2023	3411.70	665.722	40.8851	-0.319	dist'd?

1	Favona	F17B	1/11/2023	3405.48	613.912	43.9508	-0.2887	
1	Favona	F21	1/11/2023	3405.99	671.998	40.7267	-0.2866	
3	Favona	F24	1/11/2023	3388.13	690.846	40.6038	-0.2841	dist'd?
1	Favona	F22	1/11/2023	3399.79	678.393	40.6712	-0.2652	
1	Favona	F15C	1/11/2023	3297.17	585.319	57.3047	-0.2118	
1	Favona	F16B	1/11/2023	3367.38	578.696	46.3612	-0.2048	
1	Favona	BLOCK-S	1/11/2023	3295.82	124.324	24.8104	-0.2016	
1	Favona	F26	1/11/2023	3374.47	705.541	40.5686	-0.1973	
1	Favona	BLOCK-N	1/11/2023	3336.45	215.694	24.2778	-0.1852	
1	Favona	F10B	1/11/2023	3176.88	446.75	49.2472	-0.1809	
1	Favona	F12C	1/11/2023	3207.32	503.824	53.4734	-0.1794	
1	Favona	F34C	1/11/2023	3339.49	849.569	40.1624	-0.1781	
1	Favona	F28B	1/11/2023	3365.21	727.17	40.4888	-0.1709	
1	Favona	F14C	1/11/2023	3275.29	551.312	60.6381	-0.1697	
1	Favona	F30B	1/11/2023	3359.36	748.26	40.6766	-0.1609	
1	Favona	F08A	1/11/2023	3126.97	430.49	42.7223	-0.1552	
1	Favona	F32B	1/11/2023	3348.78	769.103	40.842	-0.15	
1	Favona	F35B	1/11/2023	3336.68	896.063	39.7506	-0.1466	
1	Favona	F06	1/11/2023	3107.08	445.21	40.4785	-0.1393	
1	Favona	ITXCIVB	1/11/2023	2943.85	542.17	32.5893	-0.1334	
1	Favona	F02	1/11/2023	3097.60	490	38.1773	-0.1334	
1	Favona	FP1	1/11/2023	3004.15	131.25	45.3935	-0.1155	
1	Favona	TRIG 24	1/11/2023	3260.76	-615.678	25.6677	-0.0623	
1	Favona	TRIG 22	1/11/2023	3681.97	89.358	26.1307	-0.0593	

Appendix C Plans of Settlement Marks & Contours



OCEANAGOLD WAIHI

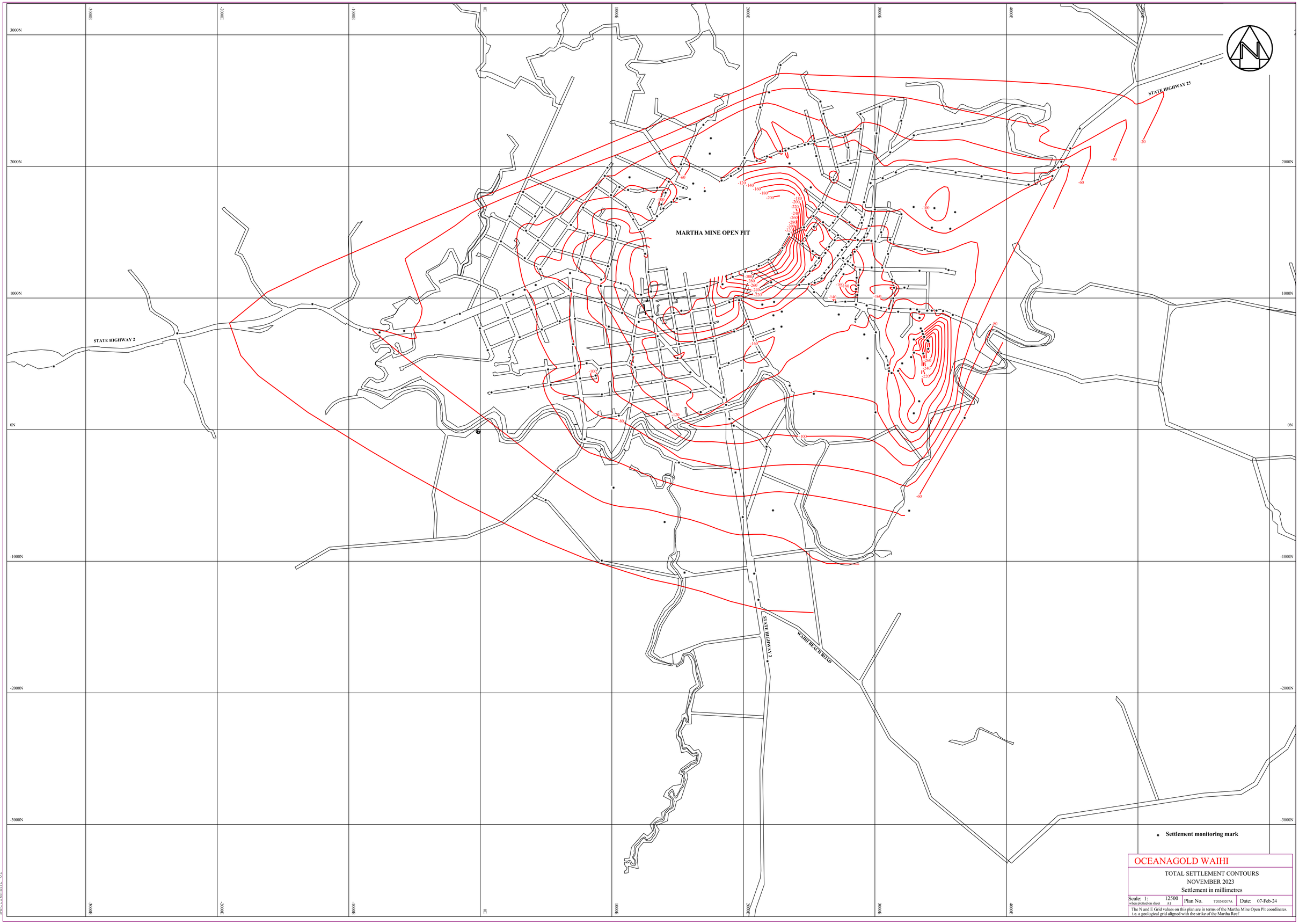
TOTAL SETTLEMENT VALUES
NOVEMBER 2023
Settlement in millimetres

Scale: 1: 12500 (when plotted on sheet A1)	Plan No. T20240213A	Date: 13-Feb-24

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.

settlement 04

SURPAC - GEOVIA -prepared by B.M. Morrison



OCEANAGOLD WAIHI

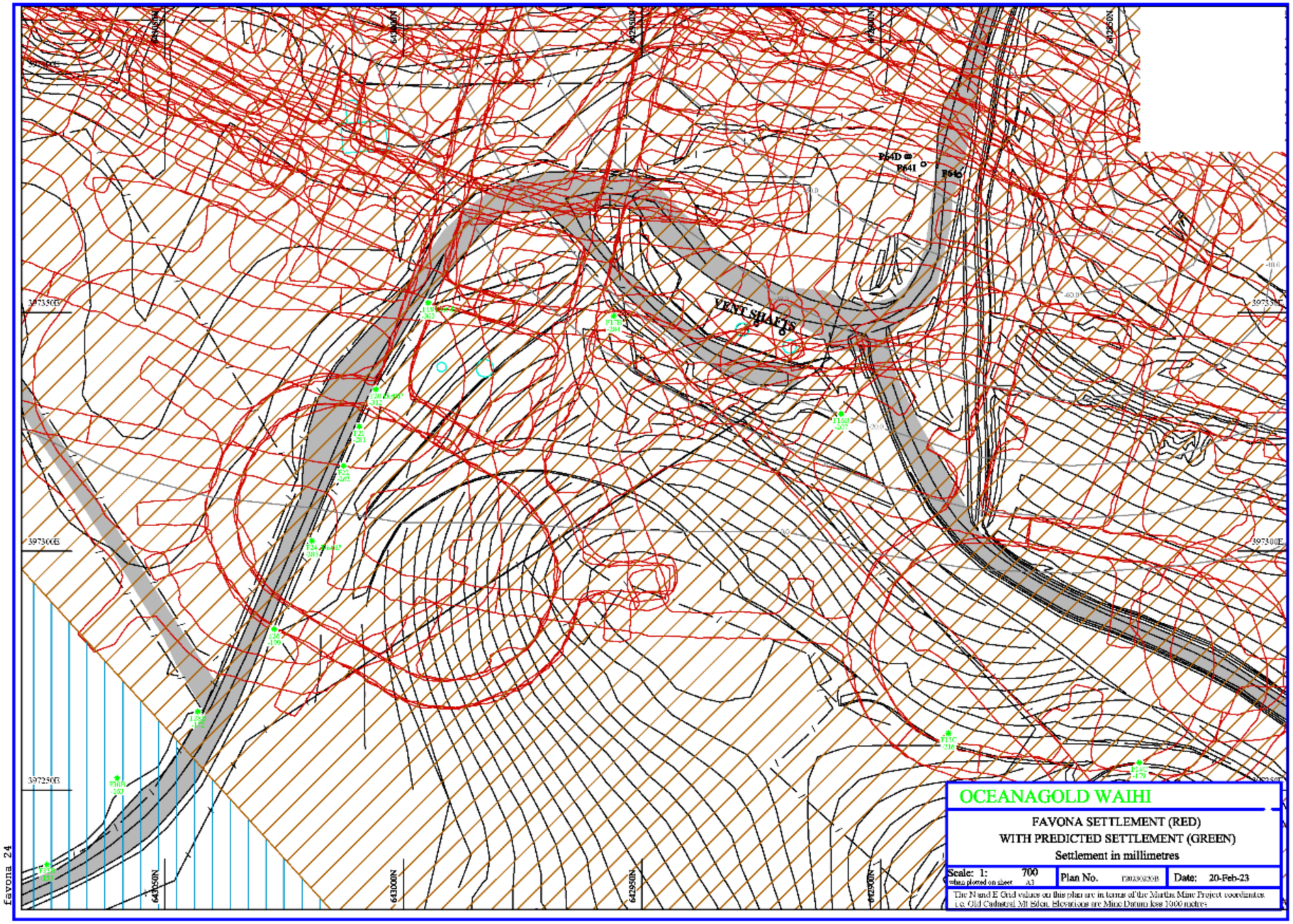
TOTAL SETTLEMENT CONTOURS
NOVEMBER 2023
Settlement in millimetres

Scale: 1: 12500 when plotted on sheet A1	Plan No. T20240207A	Date: 07-Feb-24

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

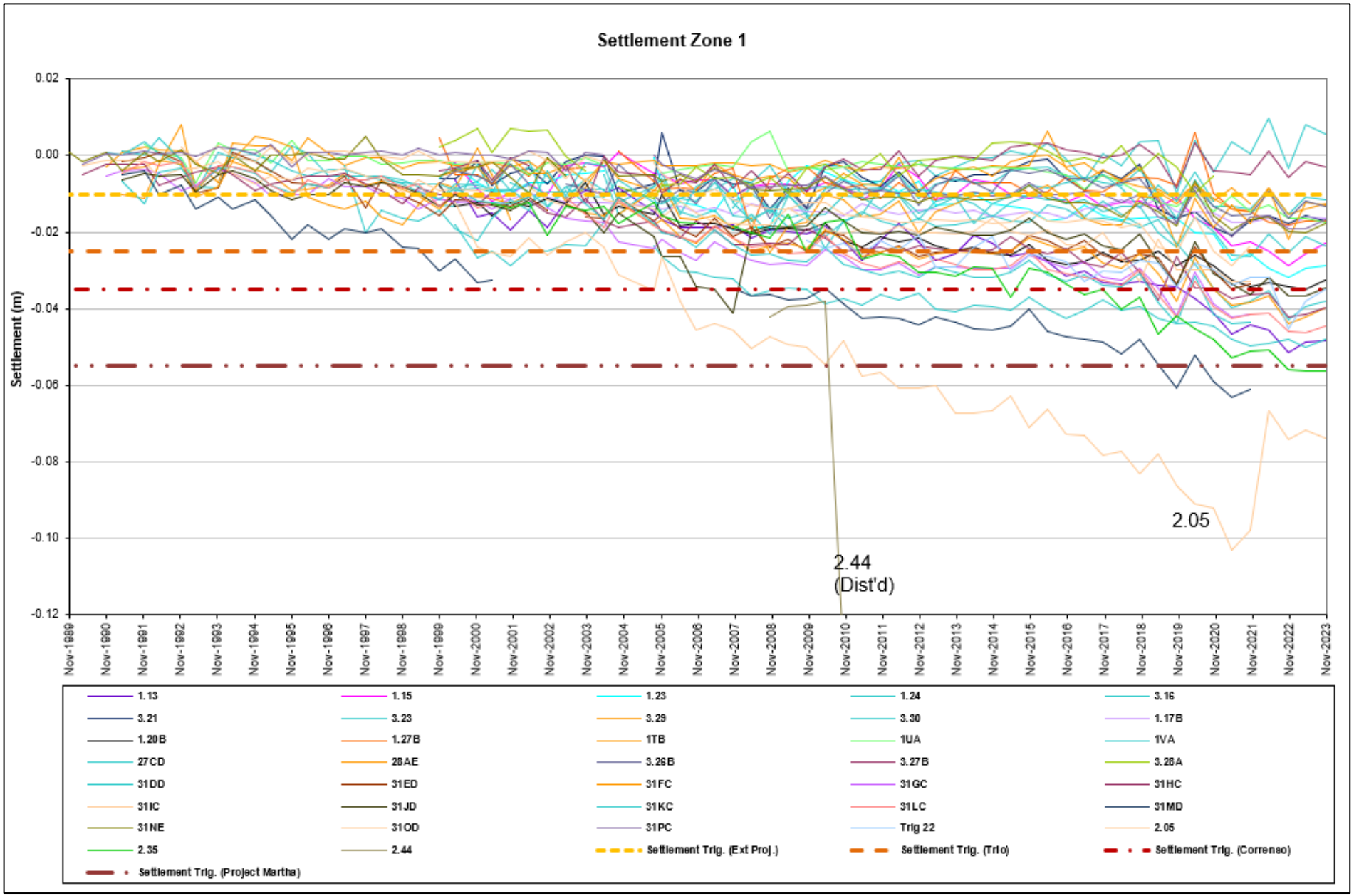
settlement_01

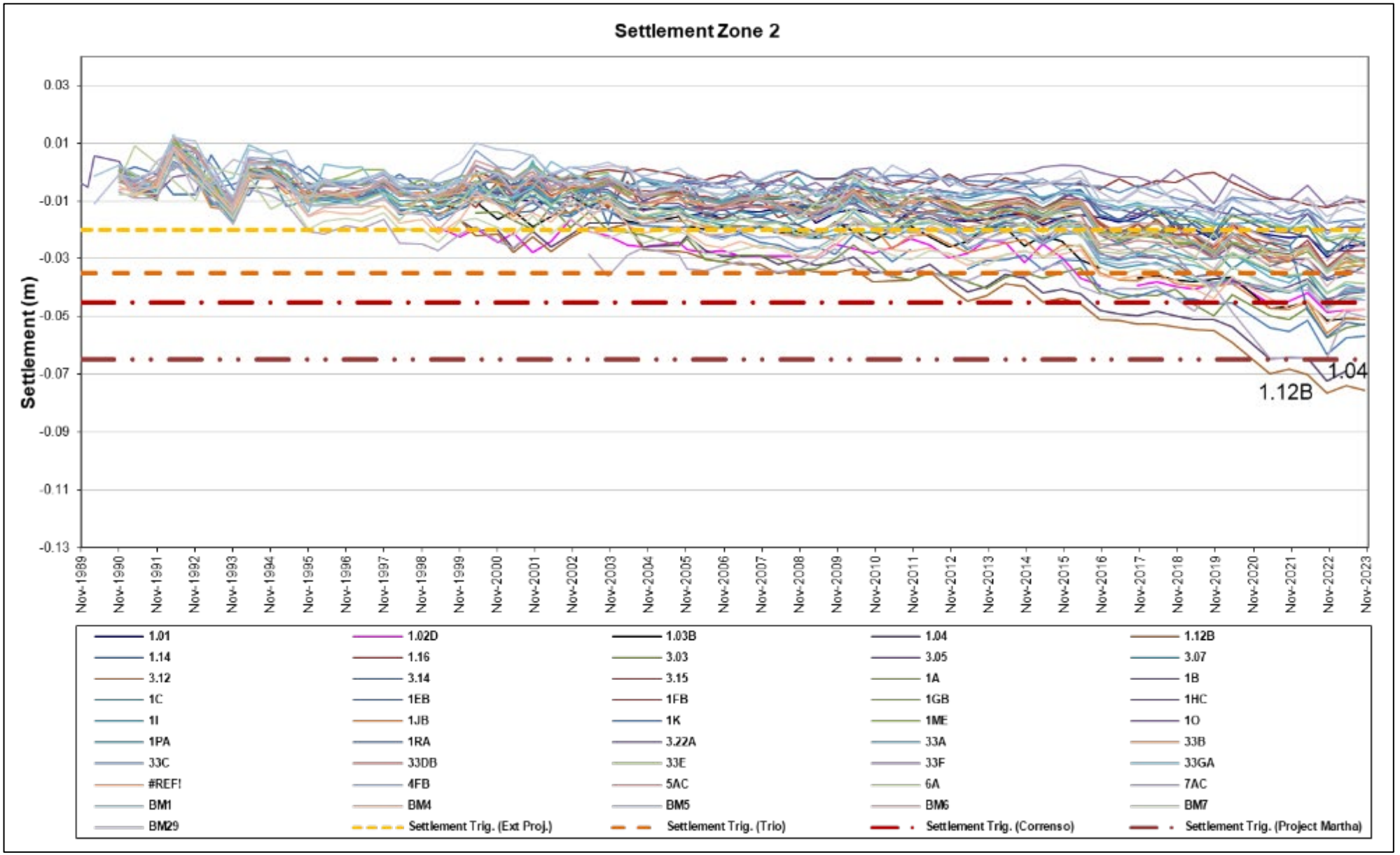
SURPAC - GEOVIA -prepared by B.M. Morrison

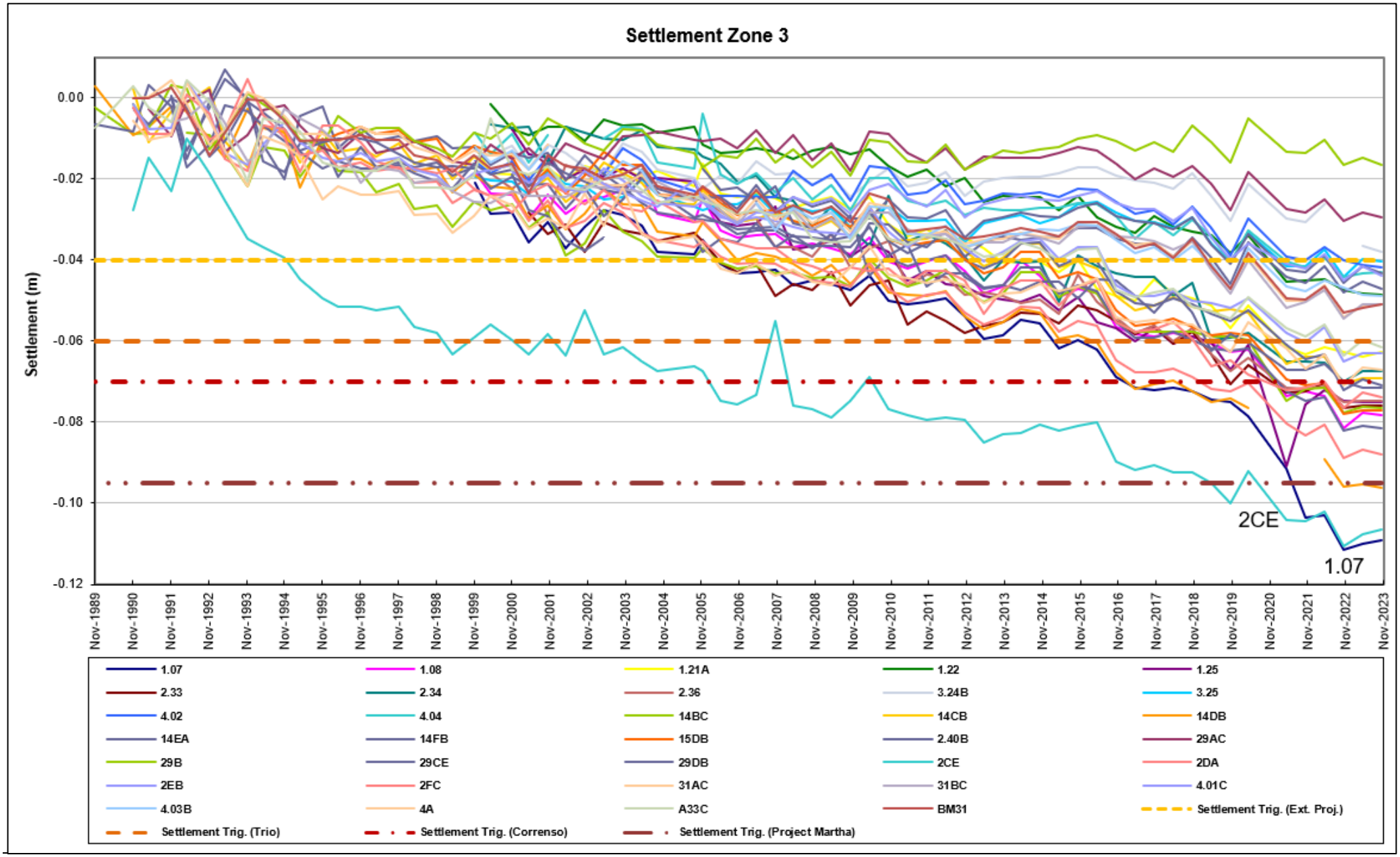


SURPAC - GEOVIA -prepared by B.M. Morrison

Appendix D Trend Plots of Settlement Zones


Settlement Zone 1
Settlement (m)
0.02
0.00
-0.02
-0.04
-0.06
-0.08
-0.10
-0.12
2.05
2.44
(Dist'd)
Nov-1989
Nov-1990
Nov-1991
Nov-1992
Nov-1993
Nov-1994
Nov-1995
Nov-1996
Nov-1997
Nov-1998
Nov-1999
Nov-2000
Nov-2001
Nov-2002
Nov-2003
Nov-2004
Nov-2005
Nov-2006
Nov-2007
Nov-2008
Nov-2009
Nov-2010
Nov-2011
Nov-2012
Nov-2013
Nov-2014
Nov-2015
Nov-2016
Nov-2017
Nov-2018
Nov-2019
Nov-2020
Nov-2021
Nov-2022
Nov-2023
1.13
1.15
1.23
1.24
3.16
3.21
3.23
3.29
3.30
1.17B
1.20B
1.27B
1TB
1UA
1VA
27CD
28AE
3.26B
3.27B
3.28A
31DD
31ED
31FC
31GC
31HC
31IC
31JD
31KC
31LC
31MD
31NE
31OD
31PC
Trig 22
2.05
2.35
2.44
Settlement Trig. (Ext Proj.)
Settlement Trig. (Trio)
Settlement Trig. (Correnso)
Settlement Trig. (Project Martha)


Settlement Zone 2
Settlement (m)
0.03
0.01
-0.01
-0.03
-0.05
-0.07
-0.09
-0.11
-0.13
1.04
1.12B
Nov-1989
Nov-1990
Nov-1991
Nov-1992
Nov-1993
Nov-1994
Nov-1995
Nov-1996
Nov-1997
Nov-1998
Nov-1999
Nov-2000
Nov-2001
Nov-2002
Nov-2003
Nov-2004
Nov-2005
Nov-2006
Nov-2007
Nov-2008
Nov-2009
Nov-2010
Nov-2011
Nov-2012
Nov-2013
Nov-2014
Nov-2015
Nov-2016
Nov-2017
Nov-2018
Nov-2019
Nov-2020
Nov-2021
Nov-2022
Nov-2023
1.01
1.02D
1.03B
1.04
1.12B
1.14
1.16
3.03
3.05
3.07
3.12
3.14
3.15
1A
1B
1C
1EB
1FB
1GB
1HC
1I
1JB
1K
1ME
1O
1PA
1RA
3.22A
33A
33B
33C
33DB
33E
33F
33GA
#REF!
4FB
5AC
6A
7AC
BM1
BM4
BM5
BM6
BM7
BM29
Settlement Trig. (Ext Proj.)
Settlement Trig. (Trio)
Settlement Trig. (Correnso)
Settlement Trig. (Project Martha)


Settlement Zone 3
Settlement (m)
0.00
-0.02
-0.04
-0.06
-0.08
-0.10
-0.12
2CE
1.07
Nov-1989
Nov-1990
Nov-1991
Nov-1992
Nov-1993
Nov-1994
Nov-1995
Nov-1996
Nov-1997
Nov-1998
Nov-1999
Nov-2000
Nov-2001
Nov-2002
Nov-2003
Nov-2004
Nov-2005
Nov-2006
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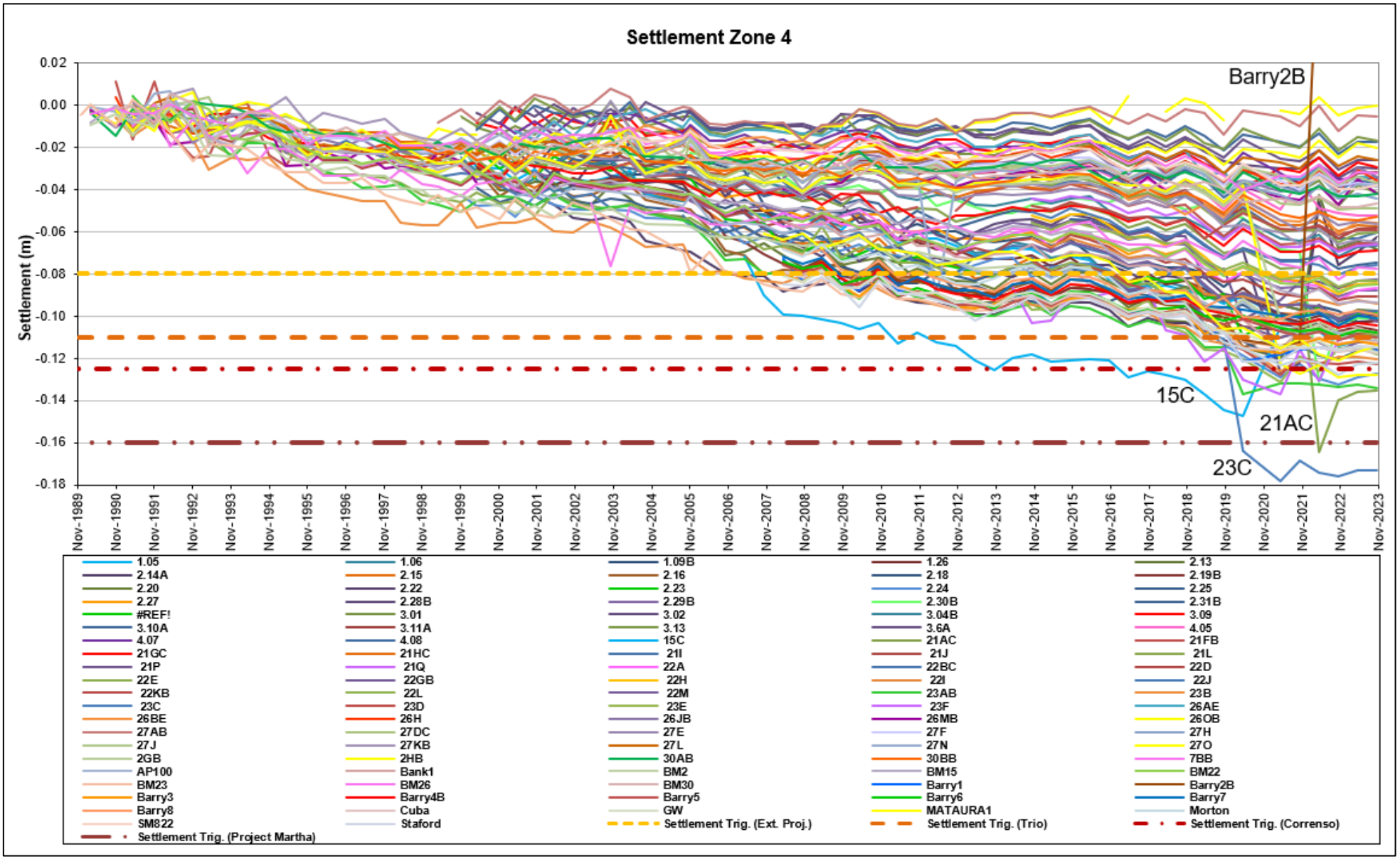
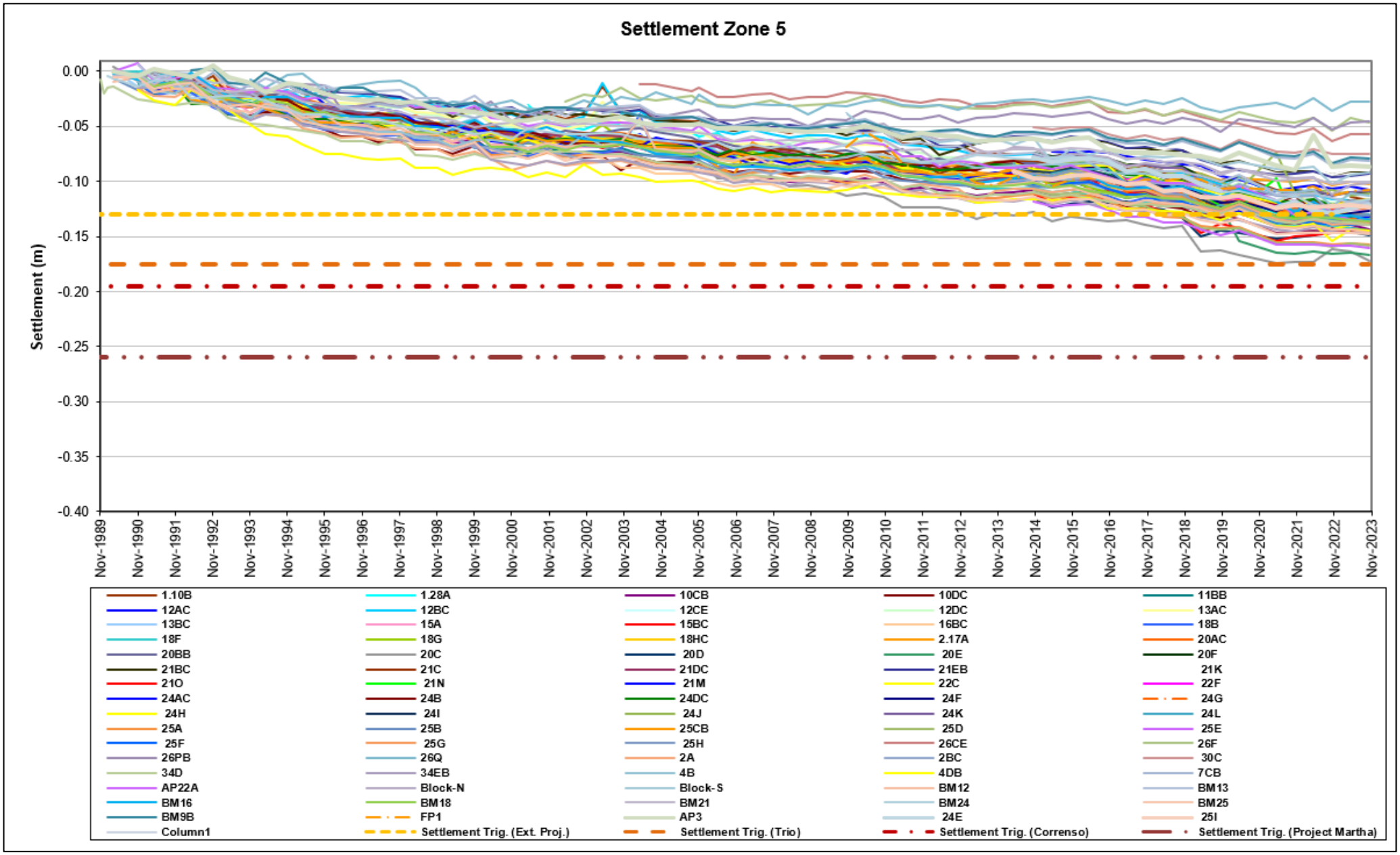
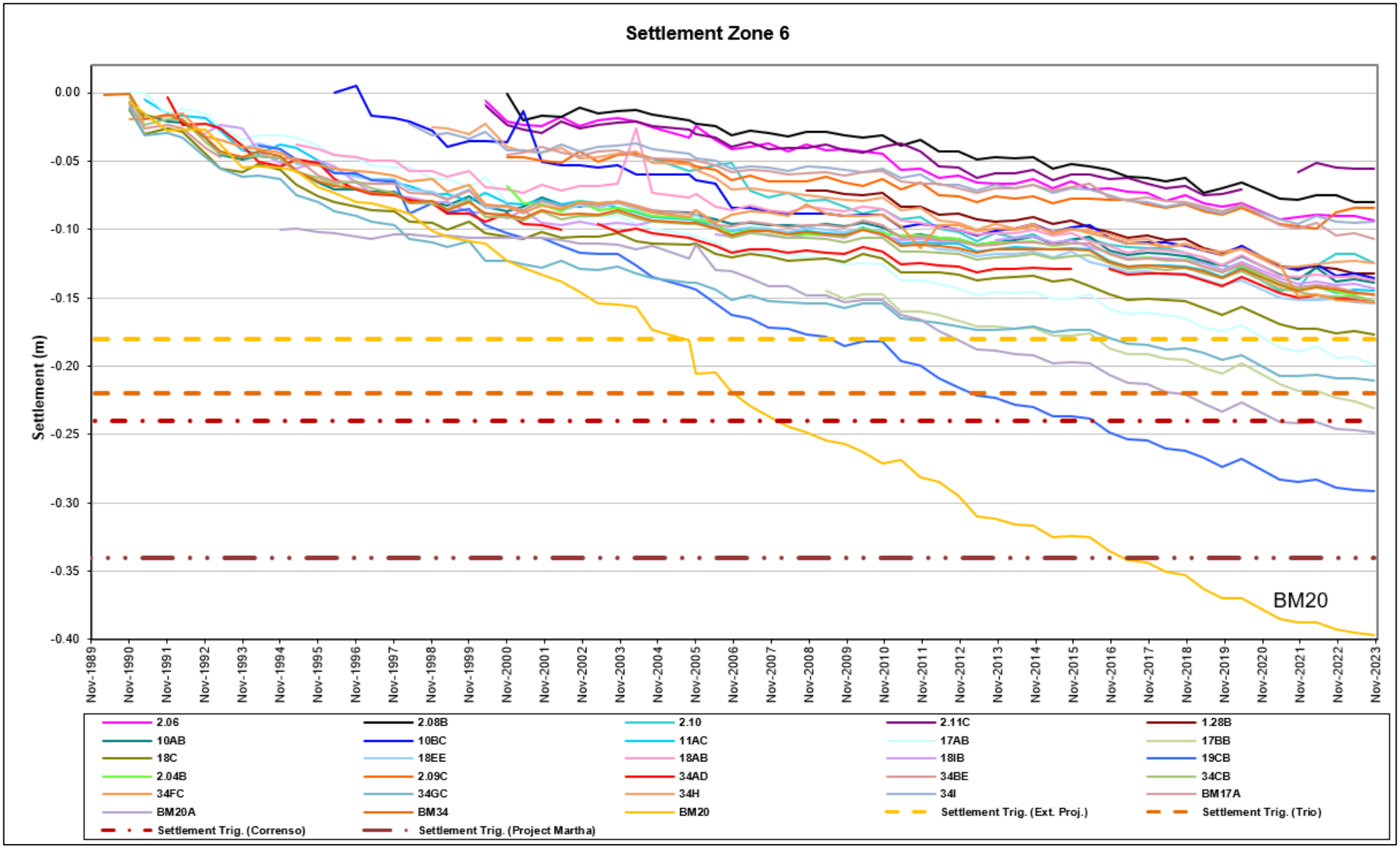
Nov-2010
Nov-2011
Nov-2012
Nov-2013
Nov-2014
Nov-2015
Nov-2016
Nov-2017
Nov-2018
Nov-2019
Nov-2020
Nov-2021
Nov-2022
Nov-2023
1.07
1.08
1.21A
1.22
1.25
2.33
2.34
2.36
3.24B
3.25
4.02
4.04
14BC
14CB
14DB
14EA
14FB
15DB
2.40B
29AC
29B
29CE
29DB
2CE
2DA
2EB
2FC
31AC
31BC
4.01C
4.03B
4A
A33C
BM31
Settlement Trig. (Ext. Proj.)
Settlement Trig. (Trio)
Settlement Trig. (Correnso)
Settlement Trig. (Project Martha)



NB Barry2B not yet corrected


Settlement Zone 5
Settlement (m)
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
Nov-1989
Nov-1990
Nov-1991
Nov-1992
Nov-1993
Nov-1994
Nov-1995
Nov-1996
Nov-1997
Nov-1998
Nov-1999
Nov-2000
Nov-2001
Nov-2002
Nov-2003
Nov-2004
Nov-2005
Nov-2006
Nov-2007
Nov-2008
Nov-2009
Nov-2010
Nov-2011
Nov-2012
Nov-2013
Nov-2014
Nov-2015
Nov-2016
Nov-2017
Nov-2018
Nov-2019
Nov-2020
Nov-2021
Nov-2022
Nov-2023
1.10B
1.28A
10CB
10DC
11BB
12AC
12BC
12CE
12DC
13AC
13BC
15A
15BC
16BC
18B
18F
18G
18HC
2.17A
20AC
20BB
20C
20D
20E
20F
21BC
21C
21DC
21EB
21K
21O
21N
21M
22C
22F
24AC
24B
24DC
24F
24G
24H
24I
24J
24K
24L
25A
25B
25CB
25D
25E
25F
25G
25H
26CE
26F
26PB
26Q
2A
2BC
30C
34D
34EB
4B
4DB
7CB
AP22A
Block-N
Block-S
BM12
BM13
BM16
BM18
BM21
BM24
BM25
BM9B
FP1
AP3
24E
25I
Column1
Settlement Trig. (Ext. Proj.)
Settlement Trig. (Trio)
Settlement Trig. (Correnso)
Settlement Trig. (Project Martha)


Settlement Zone 6
Settlement (m)
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
Nov-1989
Nov-1990
Nov-1991
Nov-1992
Nov-1993
Nov-1994
Nov-1995
Nov-1996
Nov-1997
Nov-1998
Nov-1999
Nov-2000
Nov-2001
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Nov-2004
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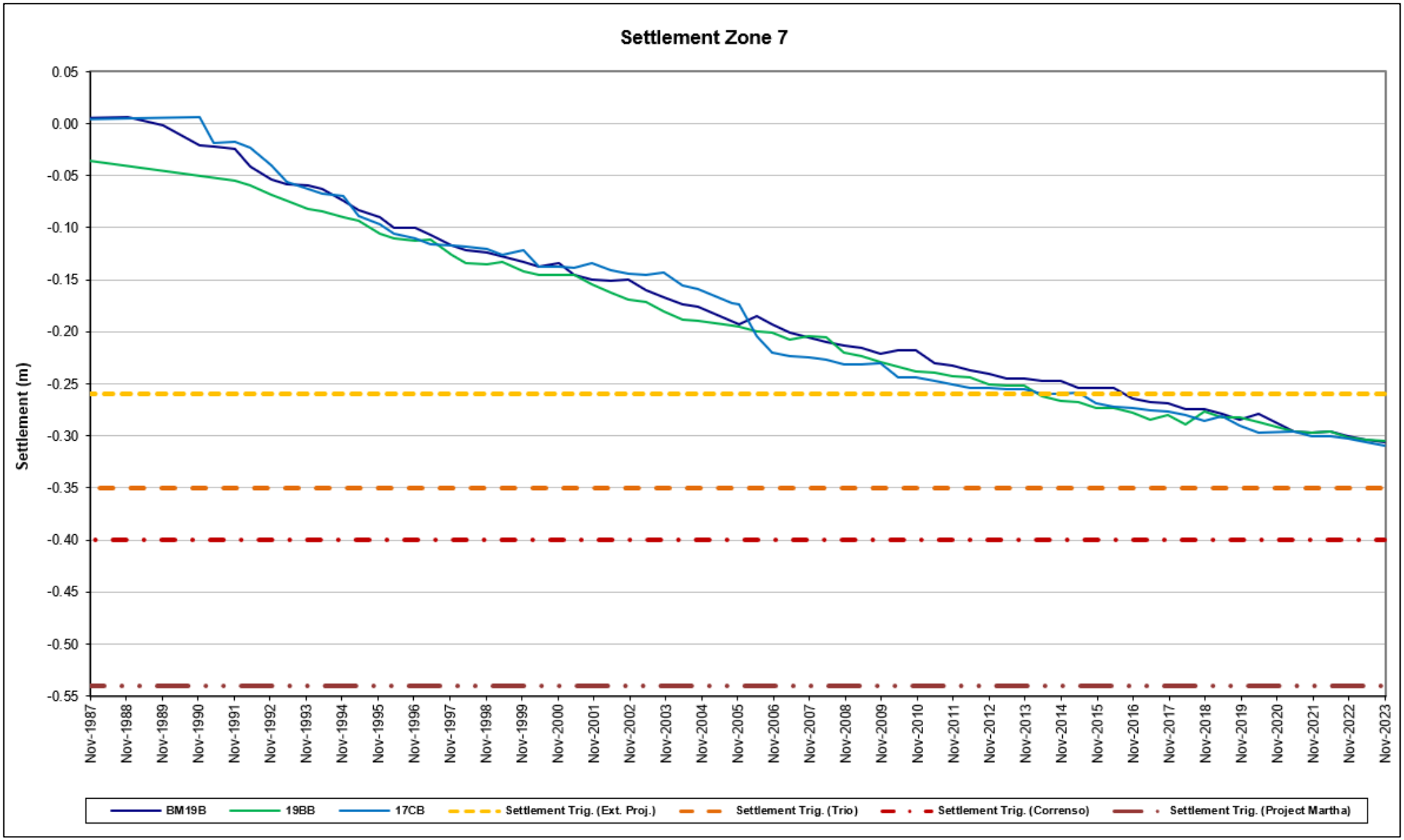
Nov-2010
Nov-2011
Nov-2012
Nov-2013
Nov-2014
Nov-2015
Nov-2016
Nov-2017
Nov-2018
Nov-2019
Nov-2020
Nov-2021
Nov-2022
Nov-2023
BM20
2.06
2.08B
2.10
2.11C
1.28B
10AB
10BC
11AC
17AB
17BB
18C
18EE
18AB
18IB
19CB
2.04B
2.09C
34AD
34BE
34CB
34FC
34GC
34H
34I
BM17A
BM20A
BM34
BM20
Settlement Trig. (Ext. Proj.)
Settlement Trig. (Trio)
Settlement Trig. (Correnso)
Settlement Trig. (Project Martha)


Settlement Zone 7
Settlement (m)
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
-0.45
-0.50
-0.55
Nov-1987
Nov-1988
Nov-1989
Nov-1990
Nov-1991
Nov-1992
Nov-1993
Nov-1994
Nov-1995
Nov-1996
Nov-1997
Nov-1998
Nov-1999
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Nov-2005
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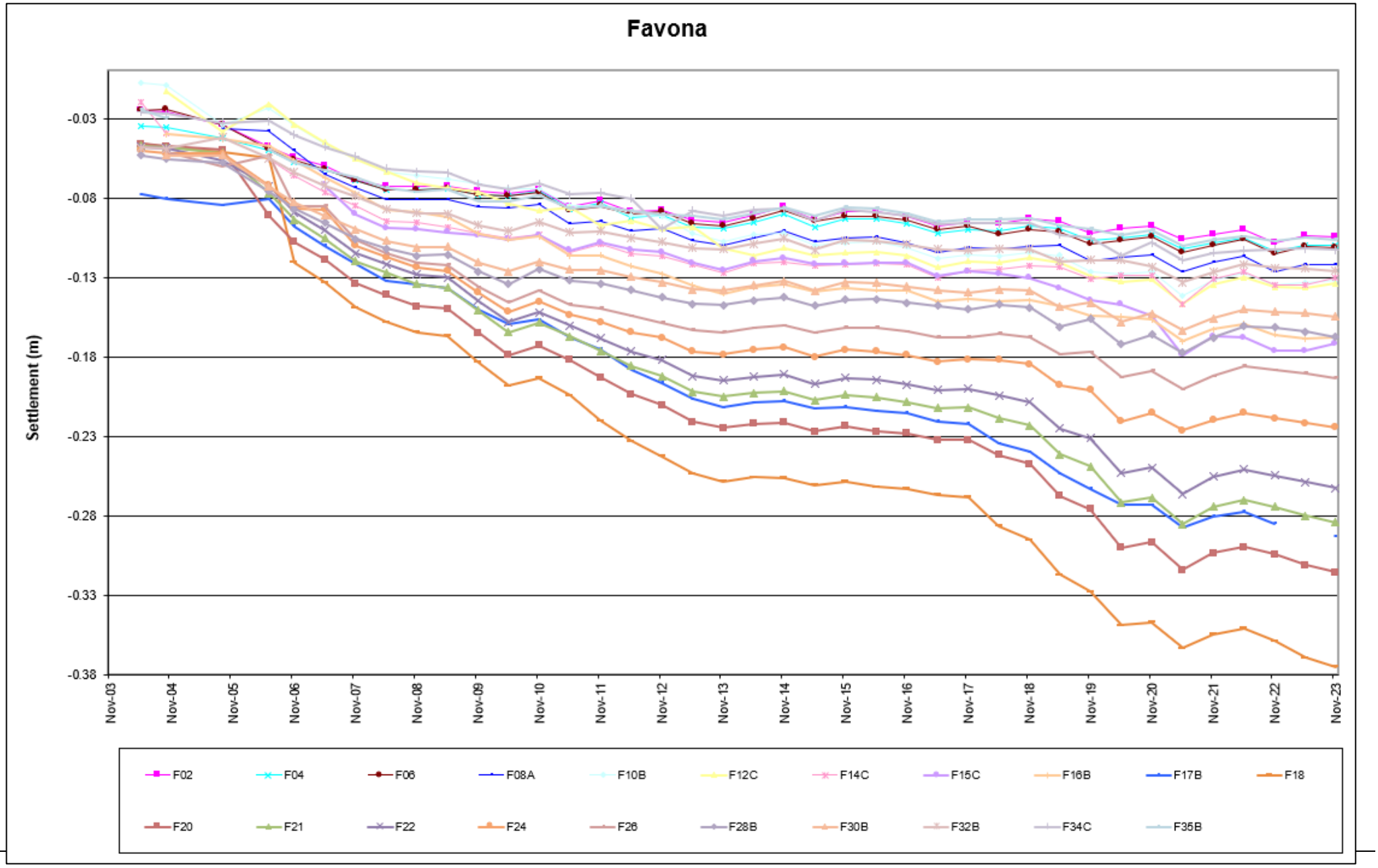
Nov-2009
Nov-2010
Nov-2011
Nov-2012
Nov-2013
Nov-2014
Nov-2015
Nov-2016
Nov-2017
Nov-2018
Nov-2019
Nov-2020
Nov-2021
Nov-2022
Nov-2023
BM19B
19BB
17CB
Settlement Trig. (Ext. Proj.)
Settlement Trig. (Trio)
Settlement Trig. (Correnso)
Settlement Trig. (Project Martha)


Favona
Settlement (m)
-0.03
-0.08
-0.13
-0.18
-0.23
-0.28
-0.33
-0.38
Nov-03
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F16B
F17B
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F28B
F30B
F32B
F34C
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Appendix E Water Quality Results 2023

Pit/Underground Dewatering Water Quality Results & Treated Water Quality Results 2023

Date	Data Point	FLS Comments	FLS EC (mS/m)	FLS pH	FLS Temp	Acidity (pH 3.7)	Alk-Bicarb	Alk-T	AlS	SbS	AsS
10/01/2023	Underground Dewatering		237.8	5.9	23.1	1	44	44	0.068	0.002	0.001
20/02/2023	Underground Dewatering		236.8	4.9	24.9	1	3	3	3.800	0.001	0.002
4/04/2023	Underground Dewatering	Airlocks in pipe	319.7	6.4	26.4	1	87	87	0.024	0.002	0.005
24/04/2023	Underground Dewatering		301.3	6.6	27.6	1	166	166	0.022	0.002	0.003
16/05/2023	Underground Dewatering		273.0	6.2		1	87	87	0.047	0.002	0.002
12/06/2023	Underground Dewatering		284.4	6.9	22.8	1	44	44	1.040	0.002	0.002
9/07/2023	Underground Dewatering		162.7	4.7	20.3	1	166	166	0.034	0.001	0.002
8/08/2023	Underground Dewatering		301.3	5.9	22.5	1	58	58	0.370	0.001	0.002
11/09/2023	Underground Dewatering		268.5	6.7	24.3	1	102	102	0.041	0.002	0.003
2/10/2023	Underground Dewatering		271.1	6.9	25.5	1	197	198	0.047	0.004	0.004
9/11/2023	Underground Dewatering		253.9	6.3	27.3	1	110	110	0.028	0.002	0.003
6/12/2023	Underground Dewatering		309.4	6.6	27.0	1	126	126	0.024	0.003	0.004
28/12/2023	Underground Dewatering		290.7	7.0	27.2	1	161	161	0.020	0.002	0.007

Date	Data Point	Bicarb	CdS	CaSO	COD	Cl	CrS	Cr6col	CoS	CuS	CNTOT	EC (mS/m)	NH3	AuS	Hard	FeA
10/01/2023	Underground Dewatering	54	0.0065	420	50	9	0.001	0.01	0.112	0.015	0.02	218	0.00026	0.0006	1430	14.9
20/02/2023	Underground Dewatering	4	0.0210	370	15	9	0.001	0.01	0.138	0.196	0.02	222	0.00003	0.0006	1340	7.7
4/04/2023	Underground Dewatering	106	0.0052	530	79	11	0.003	0.01	0.044	0.003	0.02	280	0.00210	0.0006	1900	11.6
24/04/2023	Underground Dewatering	200	0.0038	540	27	13	0.001	0.01	0.035	0.002	0.02	287	0.00122	0.0006	1880	12.6
16/05/2023	Underground Dewatering	106	0.0049	470	38	11	0.001	0.01	0.050	0.006	0.02	270	0.00073	0.0006	1670	7.1
12/06/2023	Underground Dewatering	54	0.0064	450	12	12	0.001	0.01	0.114	0.039	0.02	268	0.00019	0.0006	1730	24.0
9/07/2023	Underground Dewatering	200	0.0020	280	6	10	0.001	0.01	0.026	0.004	0.02	252	0.00160	0.0006	1010	0.2
8/08/2023	Underground Dewatering	70	0.0034	460	6	12	0.001	0.01	0.073	0.009	0.02	285	0.00007	0.0006	1740	15.9
11/09/2023	Underground Dewatering	124	0.0033	460	6	11	0.001	0.01	0.027	0.015	0.02	252	0.00099	0.0006	1580	2.1
2/10/2023	Underground Dewatering	240	0.0023	500	280	12	0.001	0.01	0.028	0.002	0.02	260	0.01100	0.0006	1720	22.0
9/11/2023	Underground Dewatering	134	0.0026	490	6	10	0.001	0.01	0.021	0.014	0.02	269	0.00081	0.0006	1690	1.7
6/12/2023	Underground Dewatering	154	0.0017	520	54	13	0.001	0.01	0.020	0.001	0.02	279	0.00076	0.0006	1790	4.7
28/12/2023	Underground Dewatering	196	0.0011	520	8	11	0.001	0.01	0.014	0.019	0.02	282	0.02300	0.0012	1830	5.8

Date	Data Point	FeT	PbS	MgSO	MnS	HgA	HgT	NiS	NO3-N	NOxN	NO2-N	NH4N	pH	PTO	KSO	DRP	SeS
10/01/2023	Underground Dewatering	117.0	0.0016	94	11.5	0.00008	0.00210	0.280	2.3	2.5	0.22	0.67	6.2	0.19	7.8	0.004	0.001
20/02/2023	Underground Dewatering	30.0	0.0780	102	12.4	0.00008	0.00027	0.320	4.4	4.6	0.22	1.52	4.9	0.16	9.9	0.004	0.002
4/04/2023	Underground Dewatering	43.0	0.0014	140	15.0	0.00008	0.00026	0.117	1.1	1.2	0.12	0.33	7.5	0.04	10.6	0.004	0.005
24/04/2023	Underground Dewatering	63.0	0.0003	127	13.2	0.00008	0.00058	0.082	1.6	1.8	0.17	0.30	7.3	0.82	11.3	0.004	0.002
16/05/2023	Underground Dewatering	51.0	0.0005	120	12.9	0.00008	0.00100	0.119	2.4	2.6	0.21	0.91	6.5	0.29	10.1	0.004	0.002
12/06/2023	Underground Dewatering	49.0	0.0042	144	13.4	0.00008	0.00031	0.189	2.6	2.8	0.21	0.90	6.0	0.71	10.9	0.004	0.002
9/07/2023	Underground Dewatering	0.6	0.0002	74	6.5	0.00008	0.00008	0.069	2.1	2.4	0.23	0.43	7.2	0.41	6.9	0.004	0.002
8/08/2023	Underground Dewatering	31.0	0.0012	141	12.5	0.00008	0.00021	0.127	0.9	1.0	0.10	0.21	6.2	0.26	11.5	0.040	0.002
11/09/2023	Underground Dewatering	12.7	0.0065	107	9.7	0.00008	0.00012	0.063	1.3	1.4	0.12	0.27	7.2	0.06	9.3	0.004	0.002
2/10/2023	Underground Dewatering	290.0	0.0005	114	10.4	0.00008	0.00168	0.067	3.1	3.5	0.40	1.33	7.6	1.42	11.0	0.040	0.002
9/11/2023	Underground Dewatering	7.3	0.0043	112	9.1	0.00008	0.00008	0.051	2.2	2.3	0.10	0.78	6.7	0.14	10.0	0.004	0.002
6/12/2023	Underground Dewatering	41.0	0.0012	121	10.7	0.00008	0.00038	0.043	2.5	2.9	0.40	0.45	6.9	0.69	12.0	0.004	0.001
28/12/2023	Underground Dewatering	40.0	0.0007	130	10.6	0.00008	0.00029	0.031	10.8	10.9	0.17	8.00	7.1	0.29	11.0	0.004	0.002

Date	Data Point	SeT	SI	AgS	NaSO	SO4	Sum Anion	Sum Cation	TKN	TSS	CNWAD	ZnS
10/01/2023	Underground Dewatering	0.003	37	0.0001	22	1430	31	30	0.96	3600	0.02	2.8
20/02/2023	Underground Dewatering	0.011	41	0.0002	27	1400	30	29	1.73	980	0.02	9.5
4/04/2023	Underground Dewatering	0.002	35	0.0005	43	1860	41	41	0.74	1230	0.02	3.4
24/04/2023	Underground Dewatering	0.003	37	0.0002	48	1810	41	41	1.51	1970	0.02	1.6
16/05/2023	Underground Dewatering	0.002	37	0.0002	41	1650	37	36	1.63	1830	0.02	1.9
12/06/2023	Underground Dewatering	0.002	42	0.0002	44	1910	41	37	1.23	1610	0.02	3.3
9/07/2023	Underground Dewatering	0.002	34	0.0002	24	880	22	22	0.38	2400	0.02	0.8
8/08/2023	Underground Dewatering	0.002	42	0.0002	46	1880	41	38	0.45	860	0.02	2.1
11/09/2023	Underground Dewatering	0.002	33	0.0002	44	1550	35	34	0.43	240	0.02	1.2
2/10/2023	Underground Dewatering	0.005	32	0.0002	43	1440	35	37	4.10	5700	0.02	0.4
9/11/2023	Underground Dewatering	0.002	36	0.0002	45	1670	37	36	1.19	310	0.02	0.9
6/12/2023	Underground Dewatering	0.002	35	0.0001	51	1760	40	39	1.31	990	0.02	0.6
28/12/2023	Underground Dewatering	0.002	36	0.0002	51	1710	40	40	8.20	1000	0.02	0.5

Date	Data Point	FLS Comments	FLS EC (mS/m)	FLS pH	FLS Temp	SbA	SbS	AsA	CdA	CaSO	Cr6col	CuA	EC (mS/m)	NH3	Hard	FeA	PbA	MgSO
4/01/2023	Treated Water Discharge		281.0	9.2	22.7	0.0087	0.0091											
9/01/2023	Treated Water Discharge		192.7	8.8	23.2	0.0064		0.001	0.00005	350	0.01	0.005	171	0.09	980	0.03	0.0001	23
16/01/2023	Treated Water Discharge		233.7	9.0	23.8	0.0034	0.0034											
22/01/2023	Treated Water Discharge		262.0	9.0	25.2	0.0037	0.0037											
31/01/2023	Treated Water Discharge		125.7	9.0	21.1	0.0016	0.0016											
8/02/2023	Treated Water Discharge		216.6	9.0	23.9	0.0040		0.002	0.00010	400	0.01	0.012	205	0.30	1220	0.04	0.0002	55
13/02/2023	Treated Water Discharge		207.8	8.9	19.8	0.0040	0.0036											
20/02/2023	Treated Water Discharge		205.9	9.0	23.3	0.0046	0.0045											
27/02/2023	Treated Water Discharge		183.0	8.8	21.8	0.0040	0.0040											
6/03/2023	Treated Water Discharge		224.0	8.9	22.7	0.0048		0.002	0.00010	430	0.01	0.011	209	0.37	1290	0.04	0.0002	55
12/03/2023	Treated Water Discharge		237.2	9.0	22.7	0.0053	0.0056											
20/03/2023	Treated Water Discharge		250.5	8.8	23.3	0.0062	0.0050											
27/03/2023	Treated Water Discharge		244.8	8.8	23.4	0.0063	0.0066											
3/04/2023	Treated Water Discharge		276.9	8.8	23.1	0.0073	0.0076											
11/04/2023	Treated Water Discharge		245.0	8.7	23.7	0.0075		0.002	0.00010	450	0.01	0.012	229	0.15	1370	0.04	0.0002	59
17/04/2023	Treated Water Discharge		217.2	8.8	20.8	0.0057	0.0054											
24/04/2023	Treated Water Discharge		246.4	8.8	21.7	0.0071	0.0070											
2/05/2023	Treated Water Discharge	High rainfall event, pond levels up	177.2	7.6	21.7	0.0031	0.0031											
8/05/2023	Treated Water Discharge		204.3	8.8	21.6	0.0047		0.001	0.00005	370	0.01	0.009	194	0.33	1150	0.02	0.0001	53
15/05/2023	Treated Water Discharge		203.7	8.9	18.6	0.0049	0.0048											
22/05/2023	Treated Water Discharge		211.1	8.7	18.7	0.0060	0.0059											
1/06/2023	Treated Water Discharge		222.8	8.7	20.1	0.0050		0.002	0.00010	380	0.01	0.016	216	0.42	1150	0.04	0.0002	51
7/06/2023	Treated Water Discharge		169.4	9.1	17.5	0.0035	0.0038											
12/06/2023	Treated Water Discharge		223.8	10.0	17.6	0.0062	0.0063											
20/06/2023	Treated Water Discharge		188.0	9.4	18.8	0.0057	0.0061											
26/06/2023	Treated Water Discharge		158.2	9.6	18.2	0.0035	0.0038											
4/07/2023	Treated Water Discharge		153.3	9.3	15.1	0.0022		0.001	0.00005	280	0.01	0.003	157	0.17	870	0.04	0.0001	41
10/07/2023	Treated Water Discharge		203.5	9.5	17.6	0.0061	0.0062											
17/07/2023	Treated Water Discharge		229.0	9.3	17.7	0.0075	0.0074											
24/07/2023	Treated Water Discharge		213.4	9.4	19.0	0.0060	0.0062											
1/08/2023	Treated Water Discharge		215.8	9.3	17.6	0.0080		0.002	0.00010	390	0.01	0.031	212	0.47	1140	0.05	0.0002	41
7/08/2023	Treated Water Discharge		247.4	9.3	19.3	0.0069	0.0072											
14/08/2023	Treated Water Discharge		246.7	9.3	19.8	0.0068	0.0068											
21/08/2023	Treated Water Discharge		249.5	9.5	18.0	0.0066	0.0071											
28/08/2023	Treated Water Discharge		254.6	9.4	19.7	0.0070	0.0077											
7/09/2023	Treated Water Discharge		187.8	9.4	19.8	0.0043		0.002	0.00010	300	0.01	0.015	181	0.27	920	0.04	0.0002	39
11/09/2023	Treated Water Discharge		236.8	9.3	20.9	0.0076	0.0076											
18/09/2023	Treated Water Discharge		243.4	9.1	18.9	0.0090	0.0100											
26/09/2023	Treated Water Discharge		18.4	9.2	19.0	0.0051	0.0046											
2/10/2023	Treated Water Discharge		271.0	9.2	19.9	0.0059		0.002	0.00010	330	0.01	0.039	227	0.21	1010	0.06	0.0002	44
12/10/2023	Treated Water Discharge		281.0	8.9	20.5	0.0058	0.0067											
16/10/2023	Treated Water Discharge		261.5	8.9	23.3	0.0057	0.0056											
24/10/2023	Treated Water Discharge		242.6	8.8	22.6	0.0060	0.0066											
2/11/2023	Treated Water Discharge		178.8	9.2	20.6	0.0052	0.0054											
6/11/2023	Treated Water Discharge		223.3	8.9	23.0	0.0086		0.0013	0.00005	470	0.01	0.032	237	0.22	1370	0.04	0.00013	49
14/11/2023	Treated Water Discharge		286.4	9.1	23.5	0.0125	0.0126											
20/11/2023	Treated Water Discharge		177.0	9.2	21.1	0.0052	0.0049											
27/11/2023	Treated Water Discharge		247.7	9.2	21.5	0.0080	0.0076											
4/12/2023	Treated Water Discharge		275.3	9.1	23.7	0.0108		0.002	0.00010	510	0.01	0.034	257	0.45	1530	0.04	0.0004	60
11/12/2023	Treated Water Discharge		286.0	9.1	24.6	0.0112	0.0109											
18/12/2023	Treated Water Discharge	Algae growth starting, less than $1m^2$ at sample end	26.4	8.9	24.6	0.0050	0.0054											
27/12/2023	Treated Water Discharge		26.9	8.8	27.7	0.0104	0.0104											

Date	Data Point	MnA	HgA	NiA	NO3-N	NOxN	NO2-N	NH4N	pH	PTO	DRP	SeA	SeS	AgA	SO4	TSS	CNWAD	ZnA
4/01/2023	Treated Water Discharge								8.9			0.006	0.007			3		
9/01/2023	Treated Water Discharge	0.007	0.00008	0.0018	22.0	22.0	0.64	1.33	8.5	0.013	0.004	0.006		0.0003	860	3	0.02	0.001
16/01/2023	Treated Water Discharge								9.2			0.002	0.002			3		
22/01/2023	Treated Water Discharge								8.7			0.003	0.003			3		
31/01/2023	Treated Water Discharge								8.7			0.001	0.001			5		
8/02/2023	Treated Water Discharge	0.030	0.00008	0.0019	15.5	16.0	0.51	1.10	9.2	0.002	0.004	0.003		0.0002	1180	3	0.02	0.012
13/02/2023	Treated Water Discharge								8.8			0.020	0.003			3		
20/02/2023	Treated Water Discharge								9.2			0.003	0.003			3		
27/02/2023	Treated Water Discharge								9.2			0.003	0.003			3		
6/03/2023	Treated Water Discharge	0.026	0.00008	0.0018	5.5	6.2	0.70	1.26	9.2	0.006	0.004	0.004		0.0002	1240	3	0.02	0.008
12/03/2023	Treated Water Discharge								8.6			0.004	0.004			3		
20/03/2023	Treated Water Discharge								9.0			0.005	0.020			3		
27/03/2023	Treated Water Discharge								9.0			0.005	0.005			3		
3/04/2023	Treated Water Discharge								9.0			0.007	0.007			4		
11/04/2023	Treated Water Discharge	0.012	0.00008	0.0013	3.9	4.8	0.98	1.50	8.7	0.004	0.004	0.007		0.0002	1420	3	0.02	0.003
17/04/2023	Treated Water Discharge								8.8			0.005	0.005			3		
24/04/2023	Treated Water Discharge								8.6			0.008	0.008			3		
2/05/2023	Treated Water Discharge								9.1			0.004	0.004			4		
8/05/2023	Treated Water Discharge	0.016	0.00008	0.0009	5.5	6.1	0.62	1.15	9.2	0.010	0.004	0.007		0.0001	1090	3	0.02	0.002
15/05/2023	Treated Water Discharge								9.2			0.007	0.007			3		
22/05/2023	Treated Water Discharge								8.9			0.008	0.008			3		
1/06/2023	Treated Water Discharge	0.016	0.00008	0.0011	10.4	11.0	0.68	1.52	9.2	0.009	0.004	0.007		0.0002	1250	3	0.02	0.003
7/06/2023	Treated Water Discharge								9.1			0.005	0.005			3		
12/06/2023	Treated Water Discharge								9.0			0.009	0.009			3		
20/06/2023	Treated Water Discharge								9.1			0.008	0.008			3		
26/06/2023	Treated Water Discharge								9.3			0.004	0.005			3		
4/07/2023	Treated Water Discharge	0.029	0.00008	0.0014	5.1	5.3	0.22	0.73	9.1	0.004	0.004	0.002		0.0001	820	3	0.02	0.008
10/07/2023	Treated Water Discharge								8.9			0.008	0.008			3		
17/07/2023	Treated Water Discharge								9.1			0.009	0.009			3		
24/07/2023	Treated Water Discharge								9.1			0.008	0.008			3		
1/08/2023	Treated Water Discharge	0.015	0.00008	0.0030	5.3	6.0	0.74	2.70	8.9	0.018	0.040	0.011		0.0002	1170	6	0.02	0.005
7/08/2023	Treated Water Discharge								8.9			0.009	0.009			5		
14/08/2023	Treated Water Discharge								8.8			0.007	0.008			3		
21/08/2023	Treated Water Discharge								9.3			0.009	0.009			4		
28/08/2023	Treated Water Discharge								9.1			0.010	0.010			3		
7/09/2023	Treated Water Discharge	0.019	0.00008	0.0016	6.8	7.2	0.45	1.67	8.9	0.009	0.004	0.006		0.0003	990	4	0.02	0.005
11/09/2023	Treated Water Discharge								9.1			0.012	0.012			3		
18/09/2023	Treated Water Discharge								9.0			0.016	0.017			5		
26/09/2023	Treated Water Discharge								9.1			0.008	0.007			3		
2/10/2023	Treated Water Discharge	0.019	0.00008	0.0055	7.7	8.5	0.80	1.55	8.8	0.009	0.040	0.010		0.0004	1210	3	0.03	0.008
12/10/2023	Treated Water Discharge								8.9			0.008	0.008			3		
16/10/2023	Treated Water Discharge								8.8			0.010	0.010			3		
24/10/2023	Treated Water Discharge								8.5			0.008	0.009			3		
2/11/2023	Treated Water Discharge								9.0			0.007	0.008			3		
6/11/2023	Treated Water Discharge	0.011	0.00008	0.0049	9.5	10.4	0.90	2.30	8.7	0.007	0.004	0.012		0.0002	1370	3	0.02	0.003
14/11/2023	Treated Water Discharge								8.8			0.015	0.015			3		
20/11/2023	Treated Water Discharge								9.2			0.005	0.004			3		
27/11/2023	Treated Water Discharge								8.9			0.008	0.008			3		
4/12/2023	Treated Water Discharge	0.013	0.00008	0.0031	8.1	9.1	1.01	2.80	8.9	0.012	0.004	0.011		0.0002	1560	3	0.02	0.003
11/12/2023	Treated Water Discharge								8.6			0.010	0.010			3		
18/12/2023	Treated Water Discharge								7.4			0.005	0.005			3		
27/12/2023	Treated Water Discharge								8.9			0.011	0.010			3		

Appendix F Conceptual Hydrogeologic Sections

At the request of the independent peer review panel for OGL's Waihi gold mining operation, the following presents three conceptual hydrogeologic sections at key locations though Waihi. Figures 1 and 2 show the section locations relative to the interpreted groundwater flow systems. It has been proposed that these sections are updated and included in the annual dewatering and settlement compliance report. Figures 3 to 8 below show the details of the sections, and a brief discussion is provided for each.

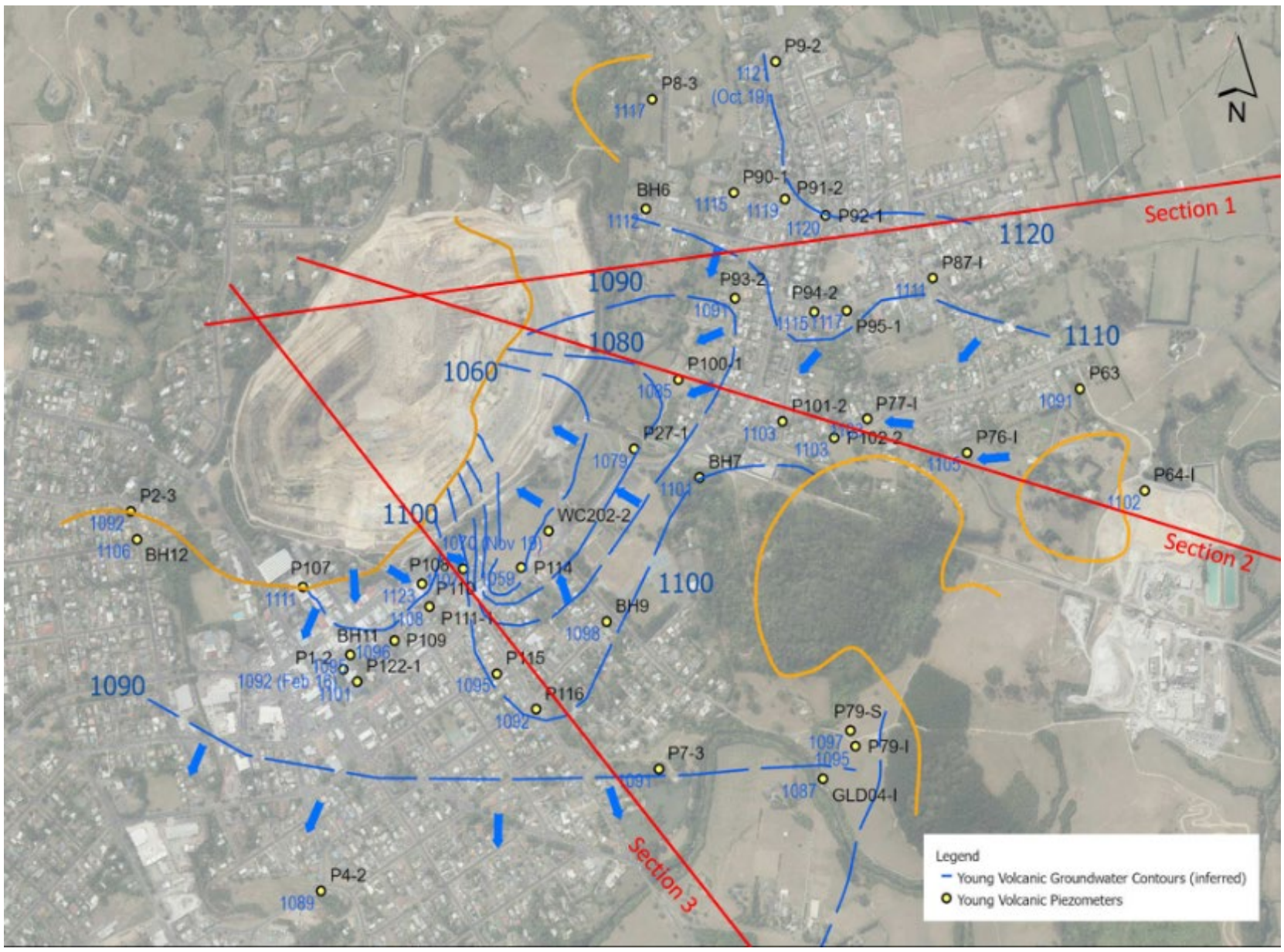

Figure 1 Section Line Locations Relative to Young Volcanics Interpreted Piezometric Surface

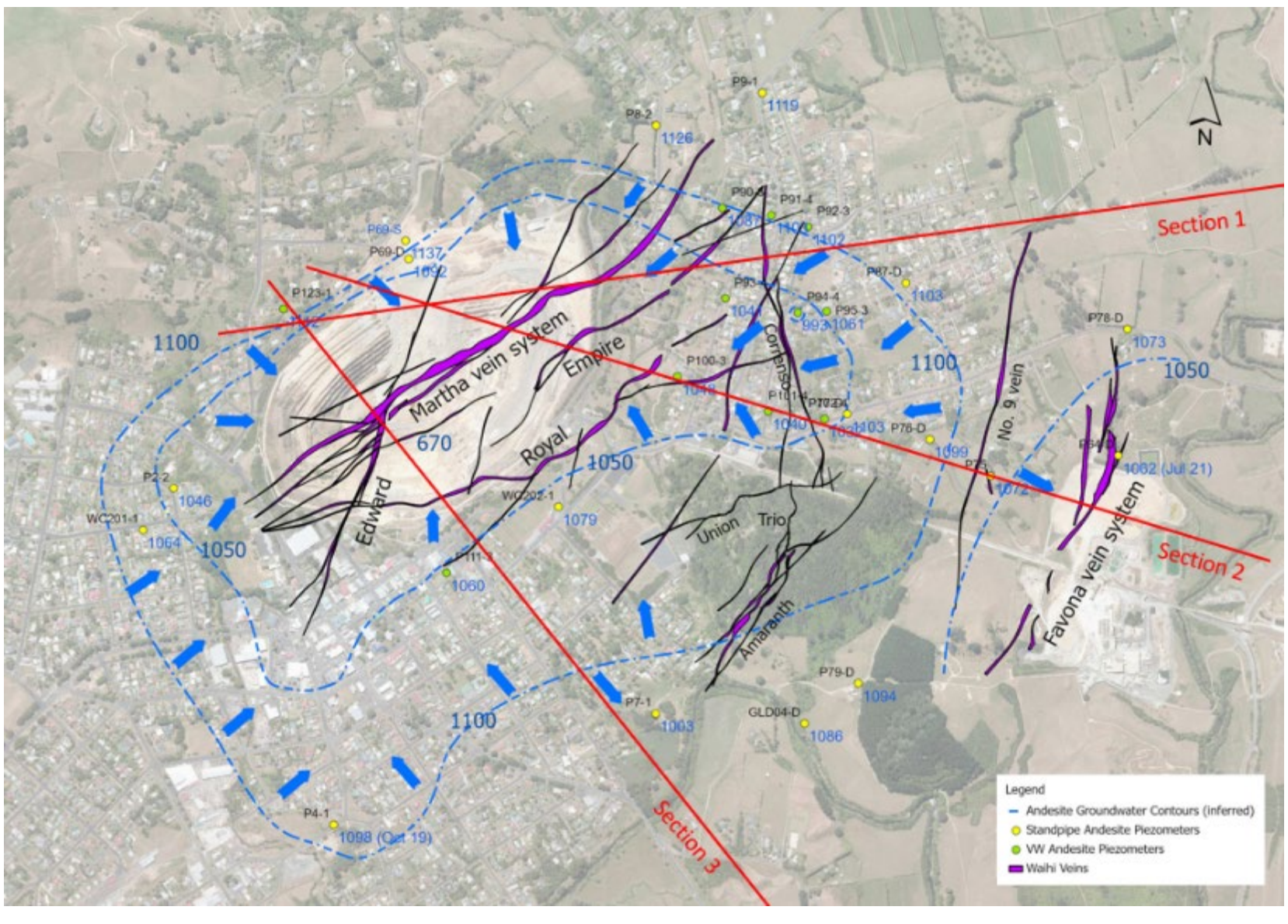

Figure 2 Section Line Locations Relative to Andesite Interpreted Piezometric Surface

Section 1 - P90 Series

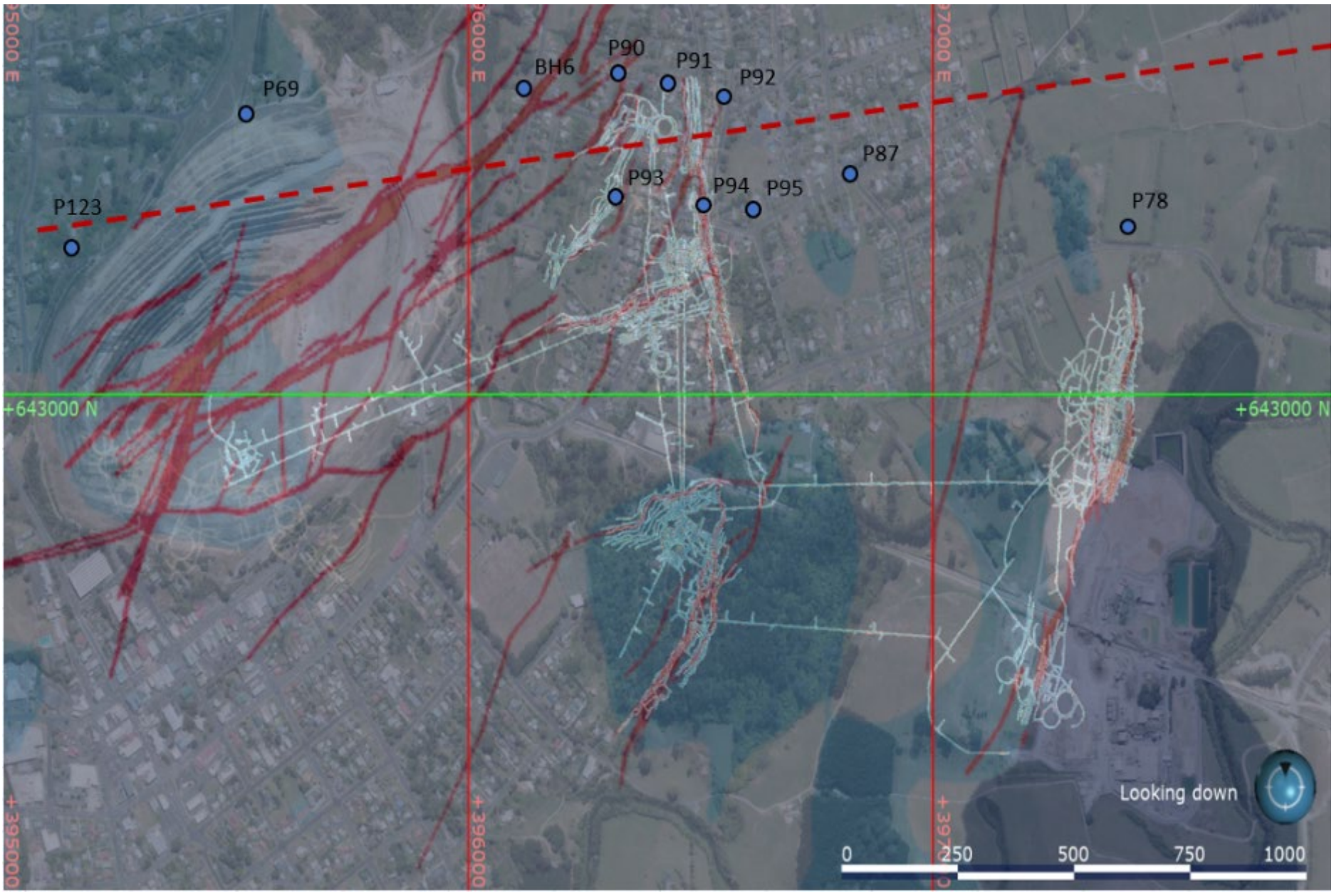

Figure 3 Section 1 P90 Series Section Location – Vein Systems and Underground Workings Shown

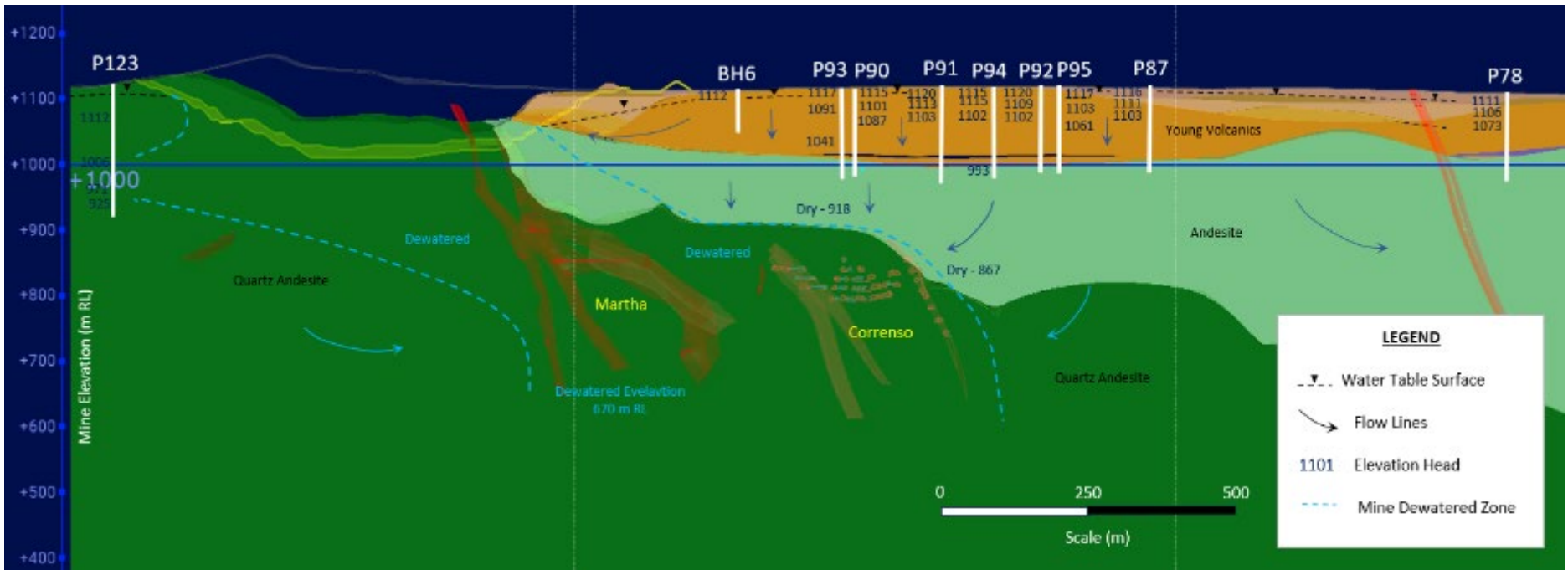

Figure 4 Section 1 P90 Series Conceptual Hydrogeologic Section

Description

The P90 series piezometers were constructed through Waihi East for the purpose of monitoring effects associated with underground mining of the Correnso and Martha ore bodies. The section shows a sequence of young volcanic materials some 100 m in thickness that overlie post mineralisation andesite that thickens to the east. The groundwater flow direction is oblique to the section orientation with most flow coming out of the plane (as shown in Figures 1 and 2) with some flow paths moving towards the Martha Pit.

The section illustrates that there is a dewatered zone in the Andesite host rock that extends from the Correnso underground workings to the Martha Pit. This dewatered zone exists within the Quartz Andesite with some limited propagation up into the overlying post-mineralization Andesite. The installation of an additional andesite piezometer P123 has shown a depressurised zone exists, extending out to the northwest behind the pit wall.

A permanent water table is observed within the Young Volcanic units that are perched over the post-minealization Andesite due to low permeability materials at the contact of the two geologic units. Vertically downward hydraulic gradient are noted to occur that increases locally where under drainage effects occur due to underground dewatering. The groundwater flow directions are illustrated in Figure 4 with some groundwater being lost to the underground to the west and further east flowing away from the Martha Pit. Some shallow groundwater within the Young Volcanics discharges near the edge of the pit.

Section 2 – P100 Series

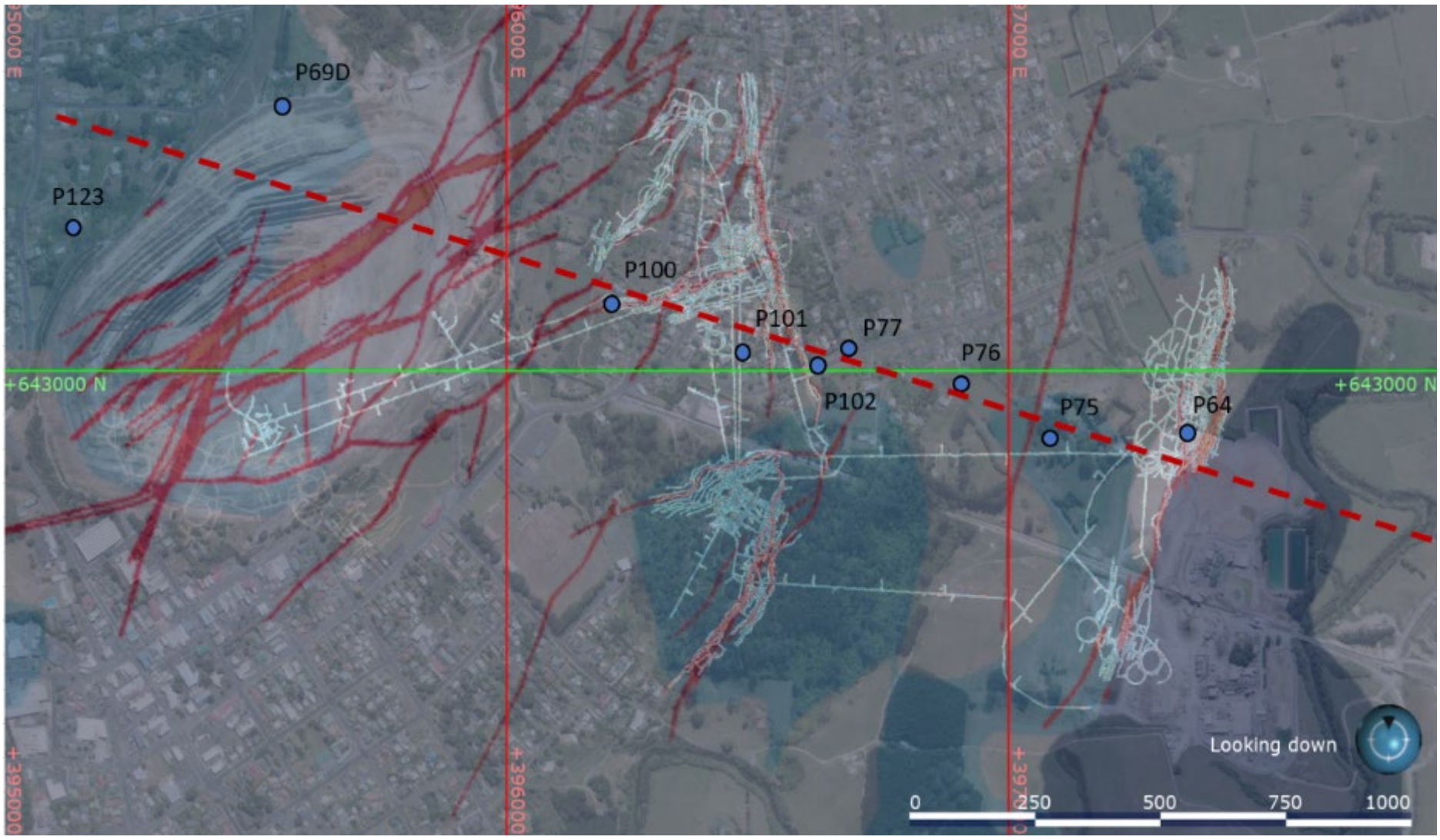

Figure 5 Section 2 P100 Series Section Location – Vein Systems and Underground Workings Shown

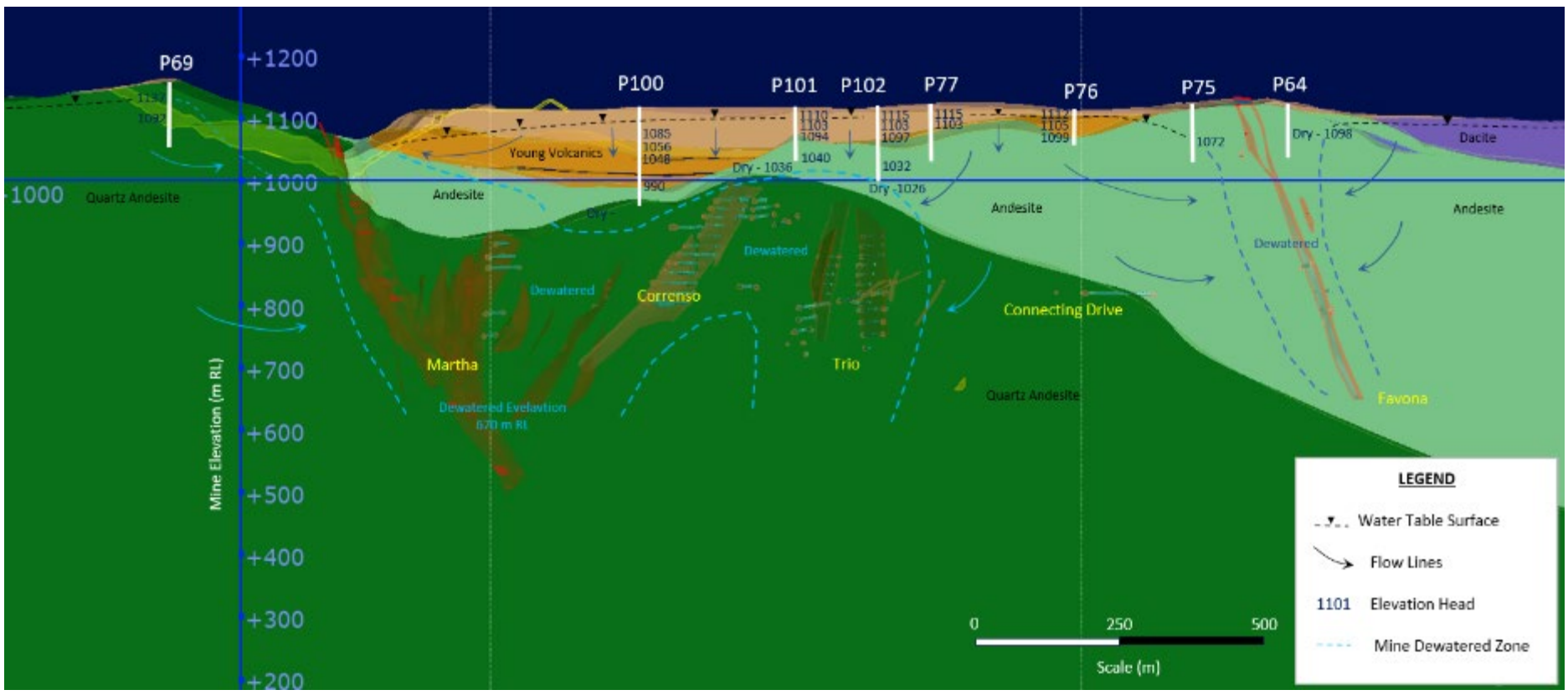

Figure 6 Section 2 P100 Series Conceptual Hydrogeologic Section

Description

The P100 series piezometers were constructed through Waihi for the purpose of monitoring effects associated with underground mining of the Correnso, Trio and Favona ore bodies. The section shows a sequence of young volcanic materials some 150 m in maximum thickness that thins to the east towards Union Hill. These deposits overly post mineralisation andesite that thickens to the east. The groundwater flow direction is oblique to parallel to the section orientation with most of the flow moving towards the Martha Pit in the west or Favona in the east.

The section illustrates that there is a dewatered zone that extends between the Martha, Correnso and Trio underground workings in the Andesite host rock. The dewatered zone is limited in its eastern extent and does not propagate out to Favona which has its own localised dewatered zone. The low permeability rockmass between the zones creates this separation. An access drive physically connects Favona to the other ore bodies and a localised dewatered zone exists around it. A groundwater divide exists between the Favona and Trio with groundwater flowing either west towards Trio/Correnso or east towards Favona.

A permanent water table is observed within the Young Volcanic units that are perched over the post-mineralization Andesite due to low permeability materials at the contact of the two geologic units. A vertically downward hydraulic gradient is noted to be present that increases locally where under drainage effects occur due to underground dewatering. Some shallow groundwater within the Young Volcanics discharges near the edge of the pit.

Section 3 – P110 Series

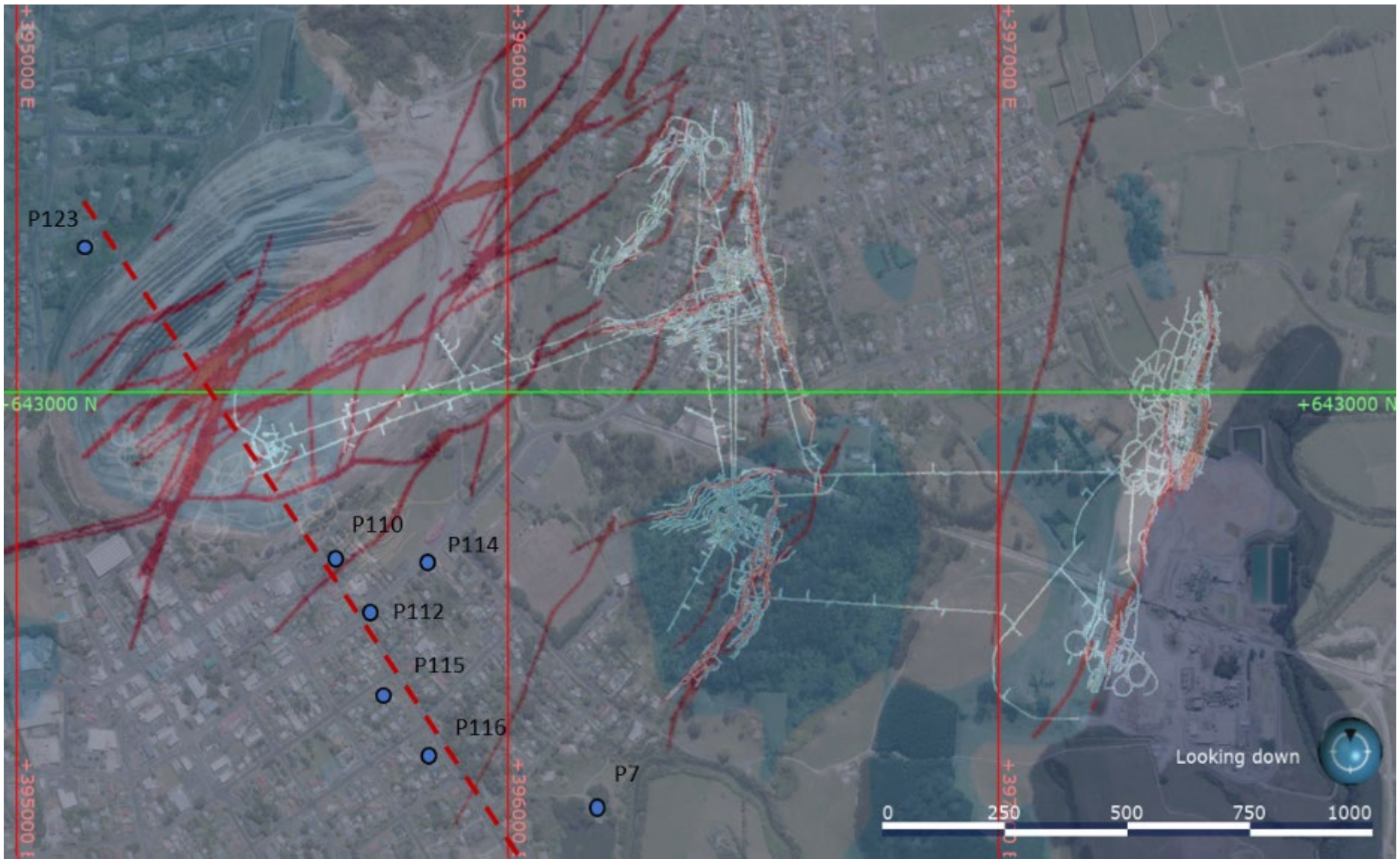

Figure 7 Section 3 P110 Series Section Location – Vein Systems and Underground Workings Shown

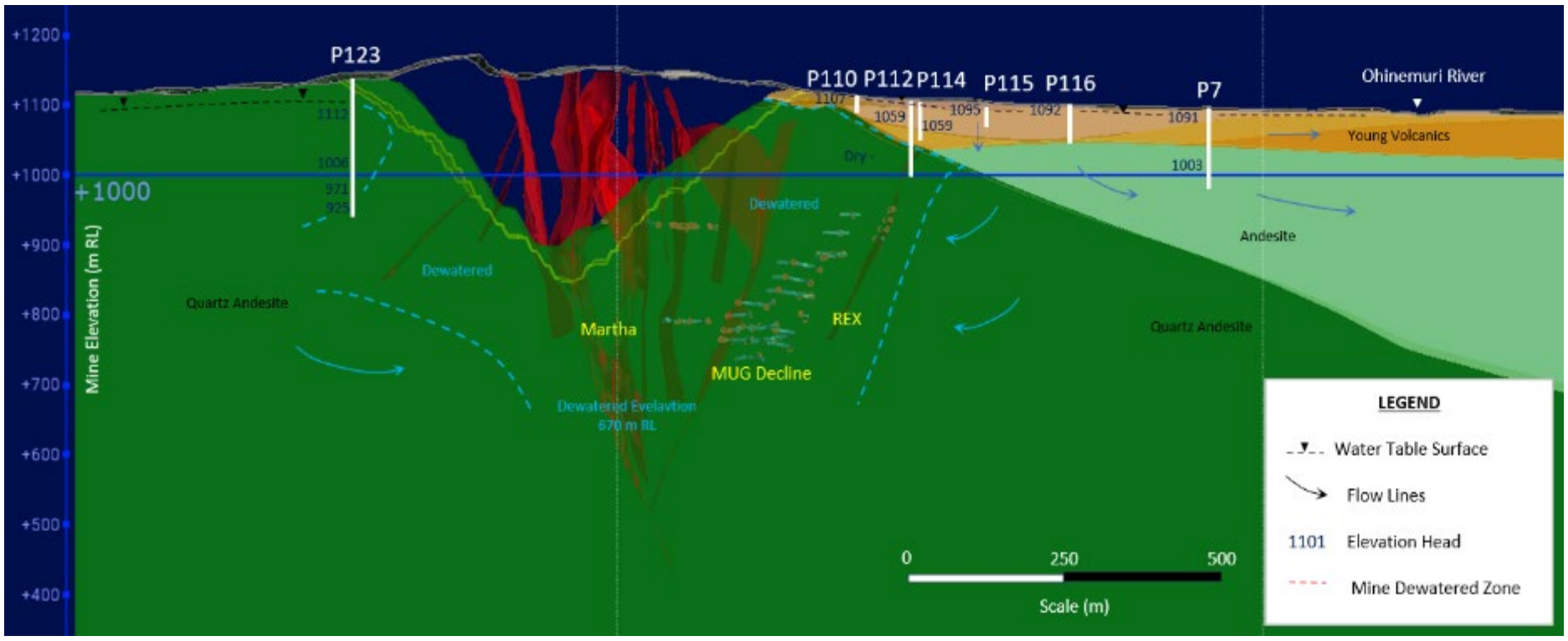

Figure 8 Section 3 P110 Series Conceptual Hydrogeologic Section

Description

The P110 series piezometers were constructed through Waihi for the purpose of monitoring effects associated with the Martha Pit and underground mine. The section shows a sequence of young volcanic materials up to 80 m in thickness overlying post-mineralization Andesite which thickens considerably to the east. The groundwater flow direction is parallel to the section orientation.

A dewatered zone exists around the Maratha Pit and the decline that is being advanced to allow the underground mining of the Martha ore body. The dewatering extends out to include the Rex and Royal vein systems via crosscutting structures. Groundwater flow towards the dewatered zone in the mineralised host rock to the north. There is a groundwater divide between P115 and P116 where groundwater in the post-mineralization Andesite flows to the south. The installation of an additional andesite piezometer P123 has shown a depressurised zone exists, extending out to the northwest behind the pit wall.

A permanent water table is observed within the Young Volcanic units that are perched over the host Andesite and post-mineralization Andesite due to low permeability materials at the contact of the two geologic units. Vertically downward hydraulic gradients are noted to be present that increases locally where under drainage effects occur due to underground dewatering. Shallow groundwater within the Young Volcanics flows to the south down gradient where it discharges into the Ohinemuri River.