

## Monthly Report on Filled/Unfilled Stopes and Seismic Monitoring

Hauraki District Council Land Use Consent 202.2018 (Project Martha) requires monthly reporting of void and stope volumes, seismic and rock movement monitoring and reporting relating to safeguards around proximities to historic workings (Condition 75). Additionally, Condition 75 requires reporting of the volume of fill used to fill historic unfilled voids.

Hauraki District Council Land Use Consents 202.2012 (Correnso) and 202.2016 (SUPA) have similar requirements for reporting stope volumes and filled stopes, and for seismic and rock movement monitoring. Stopping and backfilling in Correnso/SUPA was completed in January 2023 and only some backfilling of development drives remains. Refer to previous monthly reports for Correnso/SUPA data.

Refer to Appendix A for full transcripts.

### **Filled/Unfilled Stopes (Martha Underground)**

The main mining method used in Martha Underground is a combination of Modified Avoca Narrow Vein Stopping, Transverse Remnant Stope Mining along with limited floor benching and overhand cut and fill mining. The table below uses survey data for the scanned void volume (m<sup>3</sup>) as the defining measure of volumes for voids and backfill. Where a void is partially filled, an estimate is given of the percentage filled at the end of the month. The volumes are reported for each stope so the state of the voids can be tracked monthly. As a void is created (by stope blasting, mining historic backfill or encountering historic voids), bogged and scanned, the status would appear as 'Open' with the relevant void volume, and once a void is backfilled, the status changes to 'Filled' and will be removed from the table after two months.

At the end of February, 15,181 m<sup>3</sup> of stopes were open in Martha Underground.

Date Scanned	Stope	Stope Type	Fill Type	Status	Scanned Void (m <sup>3</sup> )	Notes
Sep-23	EMW-008-FDR-3-16 P1	Historic Stope	CRF	Open	3166	1
Nov-23	EDW-011-ODR-6-02 P4-6	Virgin	RF	Open	1064	2
Dec-23	EDW-018-FDR-2-01-10,12,14	Historic Fill	TBD	Open	5280	
Dec-23	EDW-016-FDR-7-20	Virgin	Mix	Filled	4921	
Dec-23	EMW-009-FDR-3-08 P1	Historic Stope	CRF	Filled	1428	
Dec-23	EMW-011-FDR-2-17/19 P1	Historic Stope	CRF	Filled	5737	
Jan-24	EDW-021-ODR-7	Virgin	CRF	Open	1814	
Jan-24	RYE-017-ODR-1-01-1	Virgin	RF	Filling (80%)	6300	
Jan-24	EDW-021-ODR-2 P1	Virgin	RF	Filling (80%)	7461	
Jan-24	RYE-020-ODR-4-FB	Virgin	CRF	Filled	349	
Jan-24	EMW-011-FDR-2-21 P1	Historic Stope	CRF	Filled	2214	
Feb-24	EMW-009-FDR-3-16 P1	Historic Stope	CRF	Filling (60%)	737	3
Feb-24	EMW-011-FDR-2-15	Historic Stope	CRF	Filled	3222	
Feb-24	EMW-012-FDR-2-19 P1	Historic Stope	RF	Filled	487	
Feb-24	RYE-020-ODR-4 P1	Virgin	RF	Filling (80%)	4048	
TBD	EMW-009-FDR-3-10	Historic Stope	CRF	Bogging		4
TBD	EMW-011-FDR-3-04	Historic Stope	CRF	Bogging		4
TBD	RYE-016-ODR-4-CROWN	Virgin	TBD	Open		4

Refer to Appendix B for code translations.

Notes:

1. Failed stope.
2. Stope bridged in front.
3. Filled as much as possible (around 60%), remaining void to be filled with adjacent stope.
4. No scanned void volume yet as stope is still being bogged.

## **Seismic & Geotechnical Monitoring**

### **Underground Seismic Monitoring System**

The purpose of the seismic system is to monitor seismic rock mass response to mining activity in and around active mining areas. The current seismic system is able to record events at least as small as ML = -3.0 in the identified critical areas. The agreed critical magnitude is ML = -0.5.

Anomalous seismic behaviour of the closure pillar that must be reported to the HDC is defined as:

- Event magnitudes exceeding ML = -0.5.
- An increase in released seismic energy that does not subside after two weeks.

Underground seismic sensor locations, coordinates and sensor details are highlighted in Table 1, Figure 1 and Figure 2.

**Table 1: Seismic sensor locations and details.**

Name	East	North	RL	Type	Location
<b>S2</b>	396513.4	643183.4	798.9	Uni-axial	823 COR SP1
<b>S6</b>	396397.3	643275.1	831.2	Uni-axial	844 SP
<b>S7</b>	396484.8	643260.4	940.7	Uni-axial	942 COR ACC
<b>S9</b>	396422.8	643249.3	883.9	Tri-axial	882 COR DEC
<b>S10</b>	396494.3	643130.9	932.7	Uni-axial	972 RAD
<b>S21</b>	395321.9	642792.6	951.3	Uni-axial	EDW 007 SAC
<b>S22</b>	396039.3	643121.9	917.7	Tri-axial	920 EMP DEC ACC
<b>S23</b>	395618.9	642743.9	887.5	Tri-axial	ROW 11 DEC/INC
<b>S24</b>	395903.4	642787.0	917.3	Uni-axial	REX ACC SP3
<b>S25</b>	395721.0	642944.2	782.5	Tri-axial	800 SP5
<b>S26</b>	395528.3	642859.5	792.8	Tri-axial	EDW 800 - RB DOWN

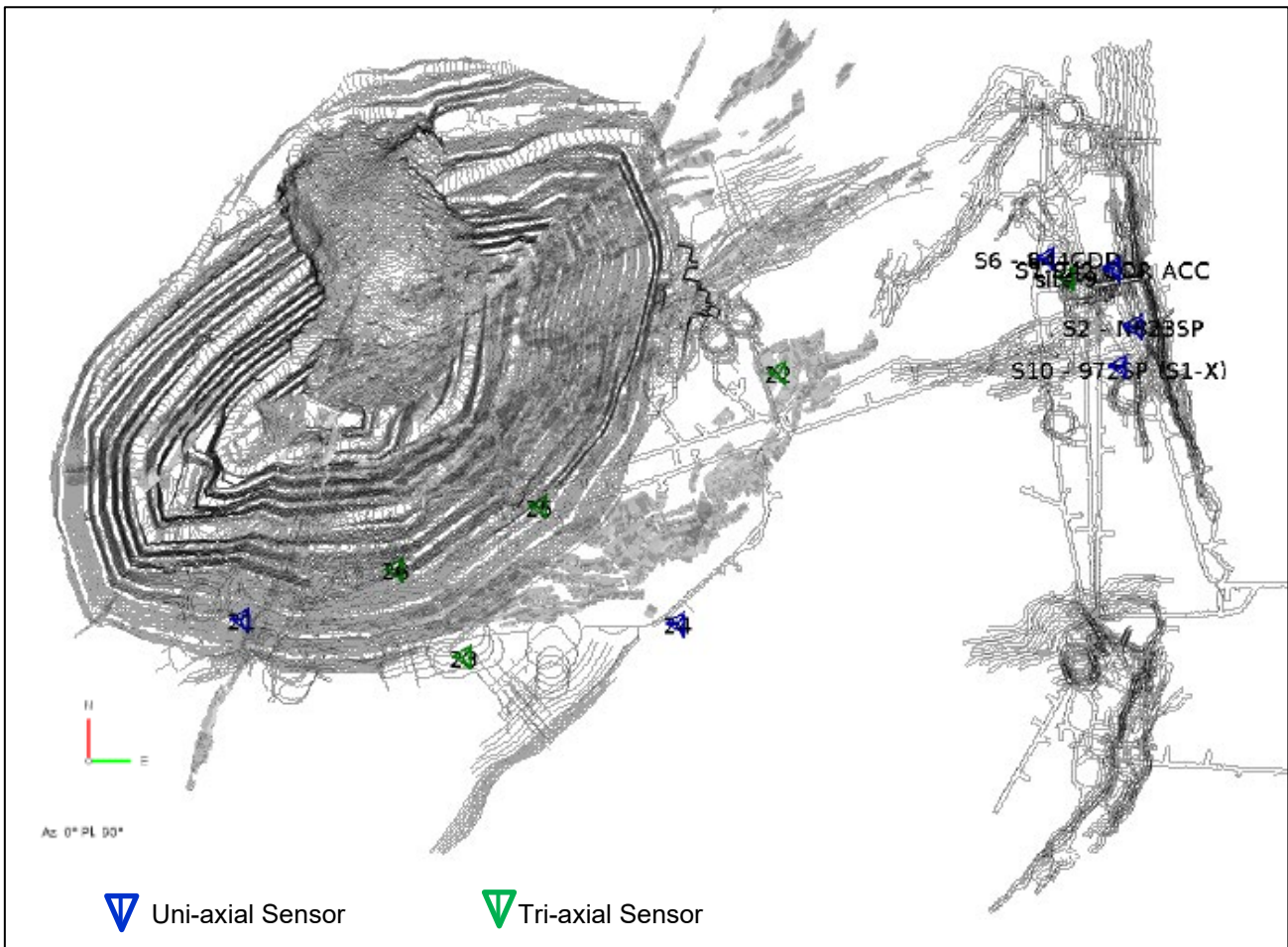


Figure 1: Plan view micro-seismic sensor locations.

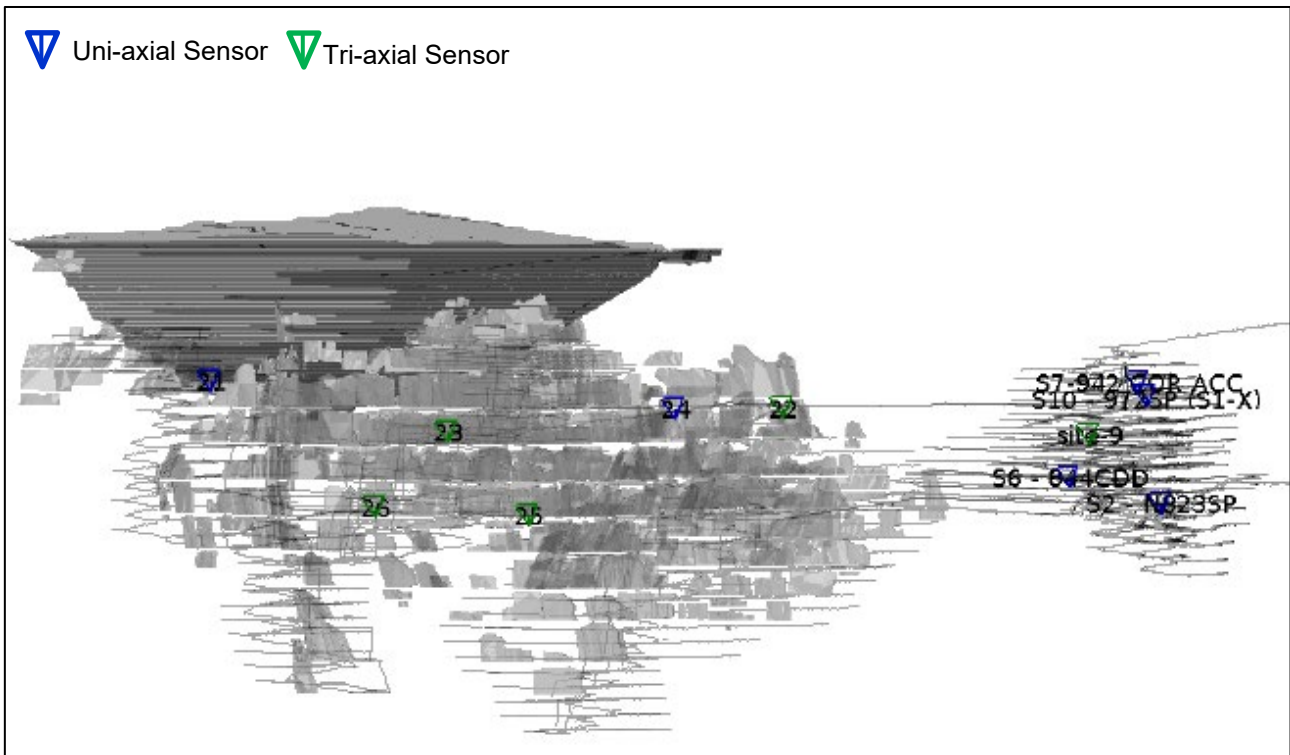
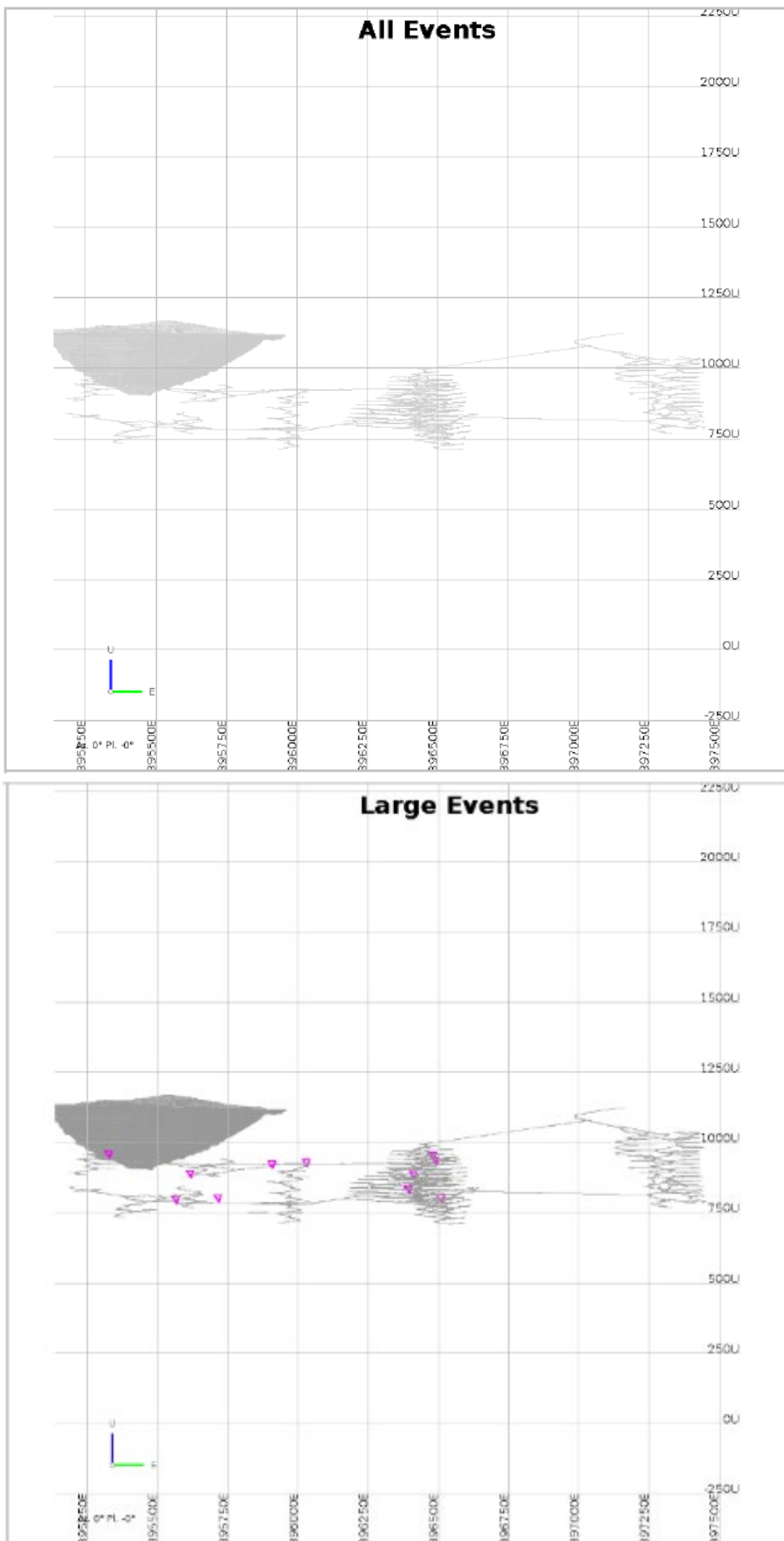
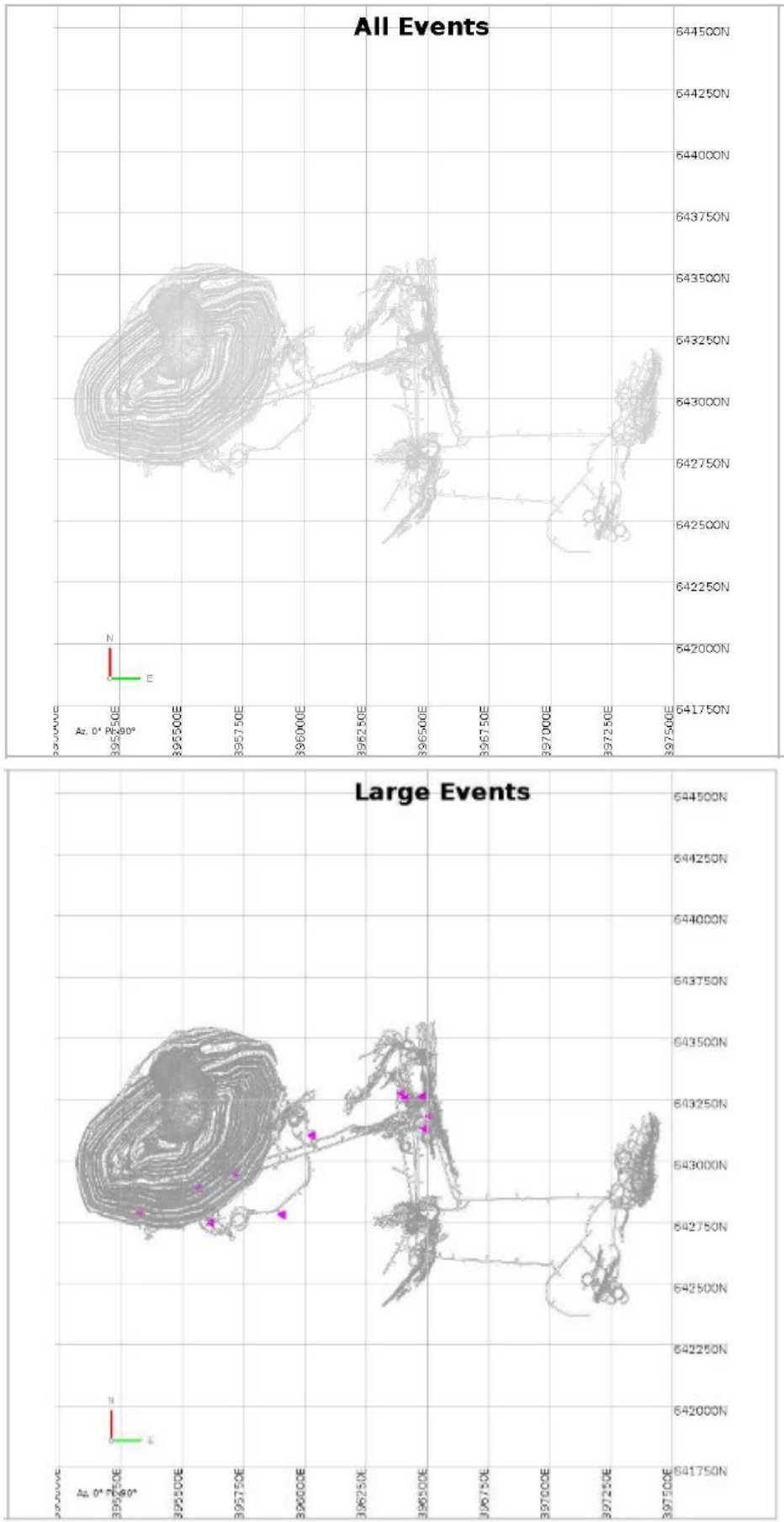


Figure 2: Section view north showing distribution and location of sensors.



**Figure 3: Section View North highlighting locations of triggered events & reportable large events. (> M-0.5 - None) during February 2024.**



**Figure 4: Plan View** showing location of triggered events & reportable large events. (> M-0.5 - None) during **February 2024**.

Results:

Events which had been originally classified as genuine have since been rejected by the seismologist. As a result, there were no recorded seismic events in February. All event locations are highlighted above in Figure 3 & Figure 4.

Number of expert processed events: total (21), normal (0), rejected (20), blasts (1), other (0).

Seismologist Comments:

The health of the seismic system was excellent throughout the month.

Interpretation and/or mitigation required:

None. 180 Day Event History vs Cumulative Potency is summarised below in Figure 5.



**Figure 5: 180 Day Event History vs Cumulative Potency.**

### Extensometer Monitoring

Three extensometers installed from the surface above the REX mining area monitor crown stability and deformation. Extensometer collar locations and monthly results are highlighted in Figure 6, 7, & 8 below:



Figure 6: Extensometer Collar Location Plan.

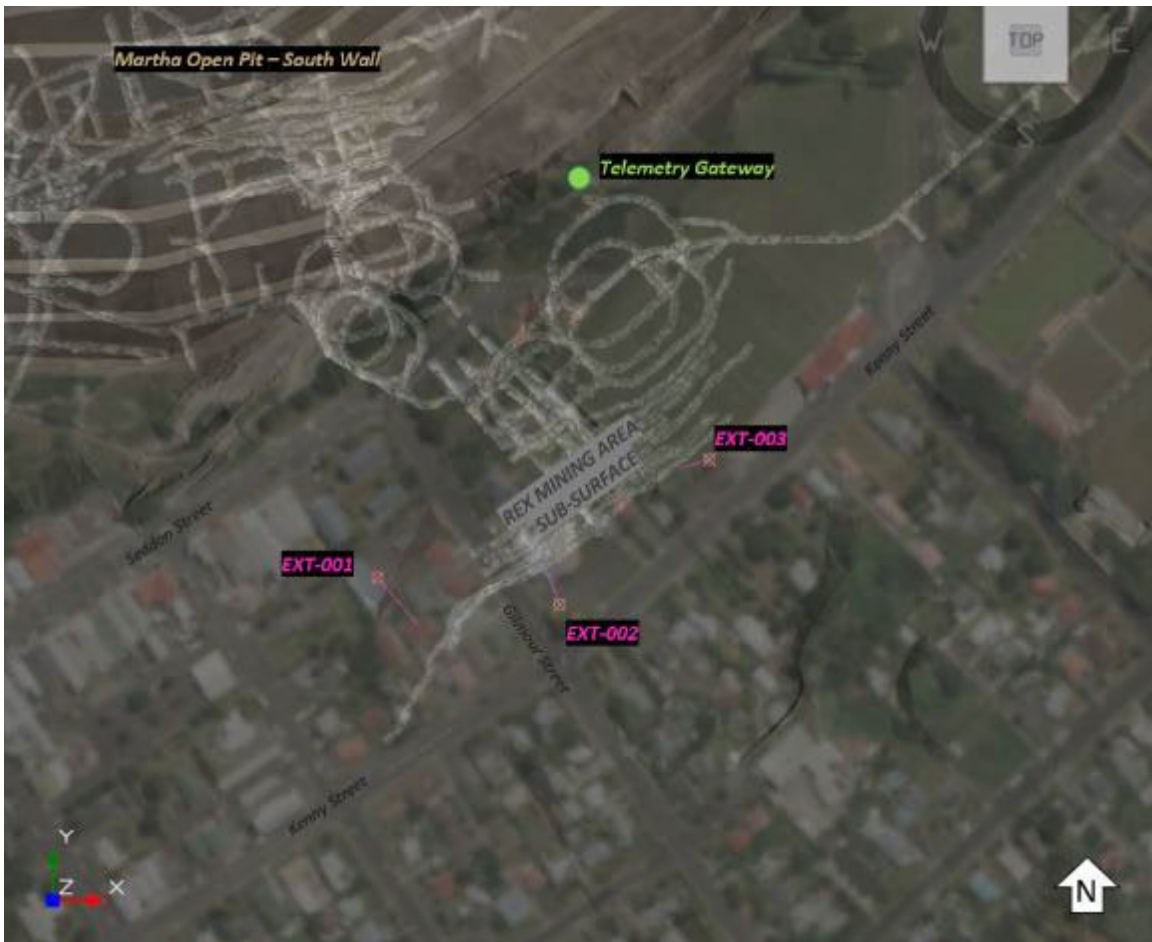


Figure 7: Extensometer Location Plan – spatial relationship to REX underground mining area.

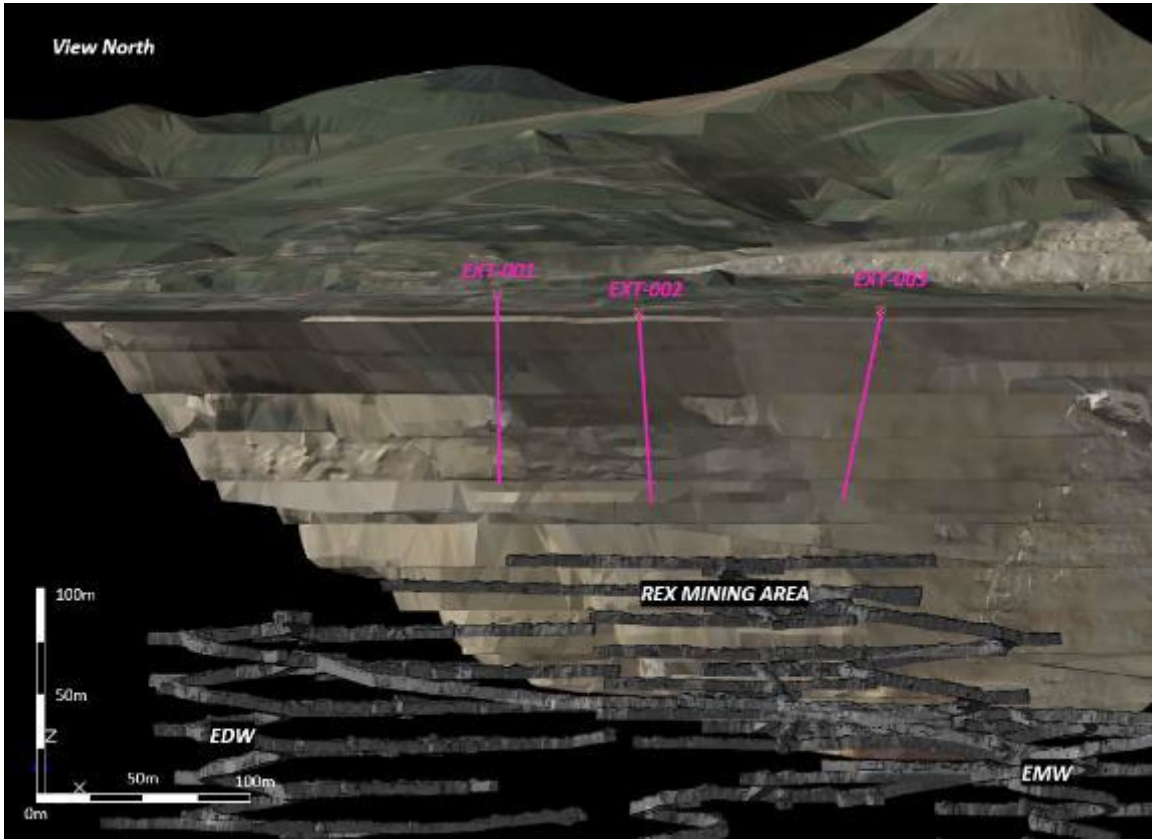


Figure 8: Cross-Section View North – highlighting REX extensometers.



## Extensometer Results & Data:

Extensometer data for February 2024 has been summarised in Figure 9 below.

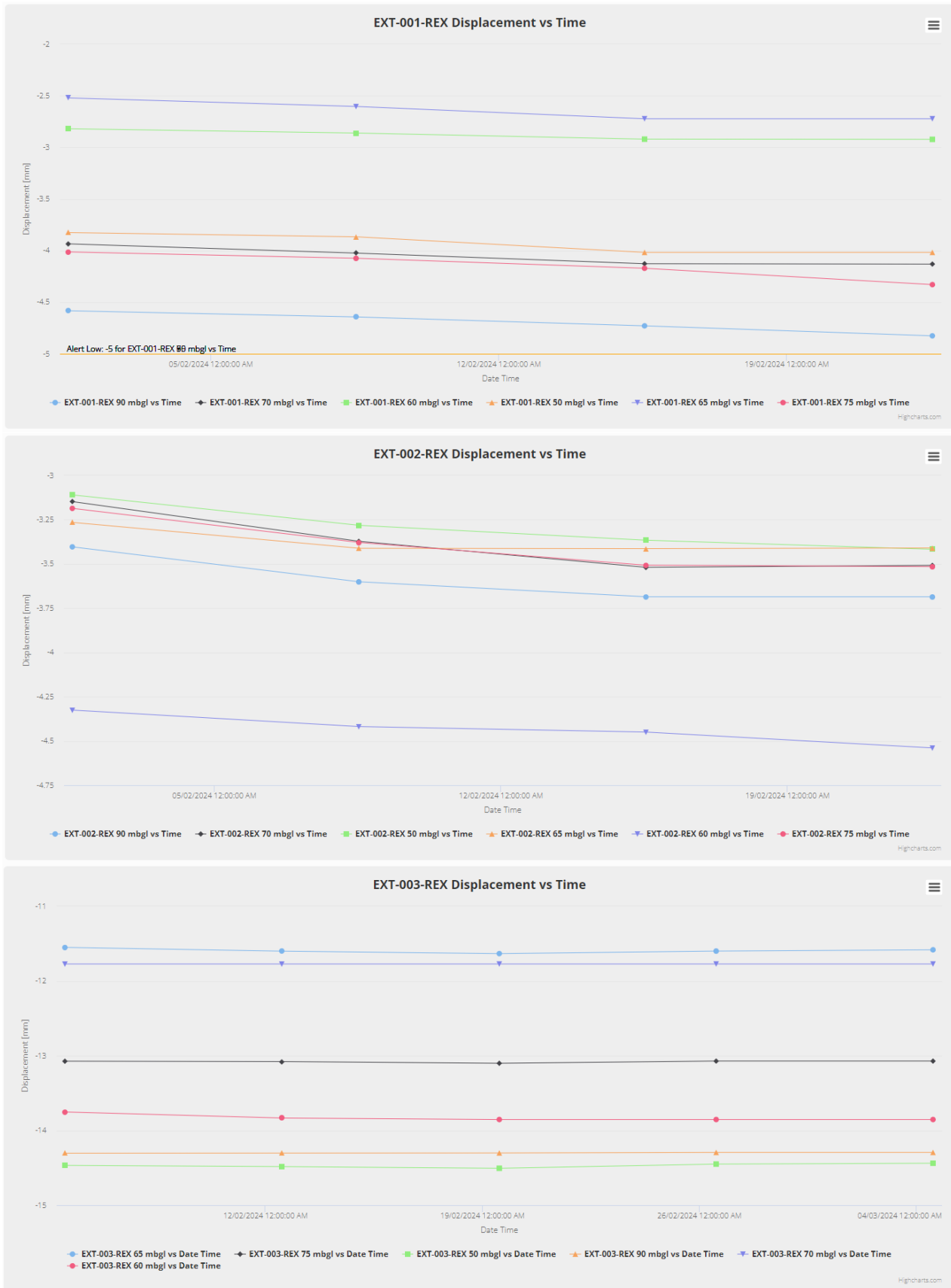


Figure 9: Displacement vs Time for REX Extensometers – February 2024.

### **Slough Meter Monitoring**

Slough meters have been installed to monitor historic voids/pillars in the Rex Access which traverses over previously mined historic Royal stopes.

Slough meters are configured to monitor the full horizontal extent of the modern development over the north-dipping historic stopes.

All slough anchors indicate no change to historic void cavity or pillar currently being monitored in the REX Access.

### **Short Term Operational Monitoring**

Various visual indicator type monitoring devices are installed as and when required to monitor short term mining scenarios. These indicator devices include but are not limited to 'Clock-its', 'Rock-its', 'Bucket' indicator instruments.

Short term devices are primarily installed where modern development traverses historical drives and voids to allow monitoring of pillars and void crowns for short term operational safety in relation to potential void propagation prior to production being completed.

Two clock-its and bucket-monitor are currently installed in the 800 Edward Incline to monitor the pillar above a historical drive and Stopes located approximately 10 m below the current Incline. There has been no change in these visual indicator devices.

### **Probe Drilling (SUPA Consent RC-202.2016 c.20a)**

Probe drilling for Correnso/SUPA is now complete. Reporting of probe drilling meters is not required by Project Martha Consent RC-202.2018 but is reported here for continuity.

### **Probe Drilling for the Month (Project Martha)**

Total probe drilling for February 2024: 2,416 m

## **APPENDIX A – CONSENT CONDITIONS**

### **HDC LAND USE CONSENT No. RC-202.2012 (Correnso)**

#### 26 Reporting on Filled/Unfilled Stopes and Seismic Monitoring

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

### **HDC LAND USE CONSENT No. RC-202.2016 (SUPA)**

#### 20 Reporting on Filled/Unfilled Stopes and Seismic Monitoring

- a) The consent holder shall report to the Council on a monthly basis on the total stope volume and volume of filled stopes for that month for each mining method employed. This shall include volume of voids created, the volume of fill in voids that have been created and the volume of fill in surveyed unfilled historic voids. each stope mined during the month where adjacent to an unfilled historic stope void. The report shall be delivered on or before no later than 10 working days after the end of the calendar month covered.
- b) The consent holder shall report to the Council on a monthly basis detailing any anomalous results from the seismic monitoring and rock movement monitoring required by Condition 23. The report shall be delivered on or before the end of the calendar month covered.

### **HDC LAND USE CONSENT No. RC-202.2018 (Project Martha)**

75. The consent holder shall report to the Council on a monthly basis on the total stope volume and volume of filled stopes for that month for each mining method employed. This shall include the volume of voids created, the volume of fill in voids that have been created and the volume of fill in surveyed unfilled historic voids (including the volume of fill up to 30 m below the toe of the Phase 4 Cutback). The report shall be in a form acceptable to the Council and the data shall be for the situation as at the 20th day of the reporting month. The report shall be delivered no later than 10 working days after the end of the calendar month covered.

The consent holder shall report to the Council on a monthly basis detailing any anomalous results from the seismic monitoring and rock movement monitoring required by Condition 71. The report shall also report against the stand-off distances specified within the Void Management Plan required by Condition 72 (where applicable). The report shall be delivered no later than 10 working days after the end of the calendar month covered.

*Note: Mining statistics are already recorded on a calendar month basis. For practicality and consistency, it was agreed that the reporting above would be for monitoring during the calendar months and the situation at the end of the month, with the report to be delivered on or before the 10th of the following month.*

## APPENDIX B – CODE TRANSLATIONS

Code	Translation
<b>Stope Code</b> EDW-016-FDR-7-20	'Vein' - 'Mining level' - 'Stope type' - 'Stope length progression'
<b>Vein</b> EDW RYE EMW REX  <b>Mining Level</b>  <b>Stope Type</b> ODR FDR	Edward Royal East Empire West Rex  Sequential stoping levels (increasing with depth)  Ore Drive Fill Drive
<b>Fill Type</b> CRF RF	Cemented Rock Fill Rock Fill