November 3, 2015

MOUNT POLLEY MINE

Tailings Storage Facility Detailed Design to Elevation 970 m

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REPORT

Reference Number: 1413803-074-R-Rev0-3000

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Executive Summary

Mount Polley Mining Corporation (MPMC) has retained Golder Associates Ltd. (Golder) to complete the detailed design for the raise of the existing tailings storage facility (TSF) at the Mount Polley Mine to an elevation of 970 m.

Mining operations at the Mount Polley Mine were suspended following a breach of the TSF Perimeter Embankment at Corner 1 on August 4, 2014. No tailings have been deposited in the TSF since the breach. MPMC resumed restricted operations in August of 2015, with the tailings being deposited within Springer Pit. MPMC wishes to restart full operations in 2016.

This report presents the detailed design for the raise of the TSF to El. 970 m to provide tailings capacity for an estimated 4 years (based on the current MPMC mine plan). The detailed design has incorporated best applicable technology (BAT) and best applicable practice (BAP), as recommended by the Independent Expert Engineering Investigation and Review Panel (IEERP) following the breach. Incorporation of BAT and BAP includes: limiting the water stored on the TSF; promoting unsaturated conditions in the tailing; and, to the extent possible, achieving dilatant conditions throughout the tailings deposit.

The report includes:

- characterization of the foundation conditions within the area around the TSF;
- tailings deposition schedule and management of water within the TSF;
- detailed design of the embankments, including drawings and material specifications;
- recommended construction sequence and estimated construction schedule for the TSF embankments;
- stability and seepage analyses; and
- estimated material quantities.

A feasibility design for the raises of the TSF necessary to support an additional 6 years of mine life (10 year total) has been prepared in conjunction with this detailed design report. The feasibility design is presented under a separate cover.

Study Limitations

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1.0 INTRODUCTION

Mount Polley Mining Corporation (MPMC) has retained Golder Associates Ltd. (Golder) to complete the detailed design for the raise of the existing tailings storage facility (TSF) at the Mount Polley Mine to an elevation of 970 m.

Mining operations at the Mount Polley Mine were suspended following a breach of the TSF Perimeter Embankment at Corner 1 on August 4, 2014. No tailings have been deposited in the TSF since the breach. MPMC resumed restricted operations in August of 2015, with the tailings being deposited within Springer Pit. MPMC intends to restart full operations in 2016. The current mine plan has 4 years of future mining. Mining may be extended for an additional 6 years (10 years total) subject to commodity prices. A feasibility level design of the TSF for a 10 year mine life has been prepared and issued under separate cover (Golder 2015a).

This report presents the detailed design for the construction of the Corner 1 Perimeter Embankment to an elevation of 970 m and the raise of the remaining embankments by approximately 2 m to a crest elevation of 970 m. The following are included in this report:

- characterization of the foundation soils;
- initial tailings deposition strategy to restore a uniform tailings surface with the pond location at the centre of the facility;
- water management of the TSF during initial operation;
- design of the Corner 1 Perimeter Embankment;
- design of the TSF raise to elevation 970 m;
- material specifications;
- construction sequence and estimated construction schedule;
- stability and seepage analyses;
- estimate of construction quantities;
- quality control and quality assurance requirements; and
- closure and reclamation plan.

Design Drawings for the Corner 1 Perimeter Embankment and TSF Raise to elevation 970 m are provided in Appendix A, and the construction technical specification is provided in Appendix B.

2.0 BACKGROUND

The Mount Polley Mine is a copper and gold mine operated by MPMC. The site is located 56 km northeast of Williams Lake, British Columbia. Mount Polley began production in 1997 and operated until October 2001, when operations were suspended for economic reasons. In March 2005, the mine restarted production and it had been in continuous operation up to the time of the breach. Ore was crushed and processed by selective flotation to produce a copper-gold concentrate. The mill throughput rate was approximately 6 to 8 million tonnes per year.

An overview of the mine site is shown in Figure 1. The mine is located between Polley Lake and Bootjack Lake. The TSF is located about 3 km southeast of the mill. The TSF includes one embankment that is approximately 4.8 km in length. The embankment is subdivided into three sections; referred to as the Main Embankment, Perimeter Embankment and South Embankment. The embankment has incorporated a staged expansion design utilizing modified centerline and centerline construction methods. During operations, prior to the breach, contact water flowed or was pumped to the TSF and was recycled to the mill as process water. The embankment raise construction to a crest elevation of about 967 m was completed in November 2013. The 2013 construction is documented by AMEC (2014). At the time of the failure on August 4, 2014 placement of fill on the embankments to raise the crest to an elevation of 970 m was nearing completion.

Figure 1: Mount Polley Mine Site (Image obtained from Google Earth Pro, image date 8/9/2014)

On August 4, 2014, a breach of the Perimeter Embankment of the TSF occurred, at Corner 1 near station 4+300, releasing tailings, water and embankment materials to the downstream environment. These materials entered Hazeltine Creek, Polley Lake, and Quesnel Lake.

The 2015 Freshet Management Embankment (Freshet Embankment) was constructed to elevation of 950 m through the breach area. The Freshet Embankment was designed and constructed to allow capture and temporary storage of the 2015 freshet flows, so that the water could be managed after the peak inflows have reduced. The construction of a buttress along the Perimeter Embankment was also completed, as part of the 2015 Freshet Management (Golder 2015e). The December 17, 2014 amendment of Permit M-200 allows operation of the TSF for water management for a period of one year from the date of the permit amendment and requires a permit amendment prior to the 2016 freshet to address requirements for longer term use.

A buttress design has been completed for the TSF embankments to provide the design factor of safety (FoS) for phreatic levels up to elevation 967 m (Golder 2015c). Additional buttressing is required along the Perimeter and Main Embankment. The October 22, 2015 amendment of Permit M-200 allows construction of this buttress along the Main and Perimeter Embankments, but specifically excludes use of the tailings storage facility for tailings deposition.

The layout of the TSF as of May 2015 is shown in Drawing 2 in Appendix A.

3.0 DESIGN CRITERIA

The design criteria are summarised in Table 1. The design basis is included in Appendix C and provides an explanation of the design criteria, including the following:

- climate data;
- embankment consequence classification;
- seismicity;
- minimum factors of safety for slope stability; and
- freeboard.

Table 1: Design Criteria

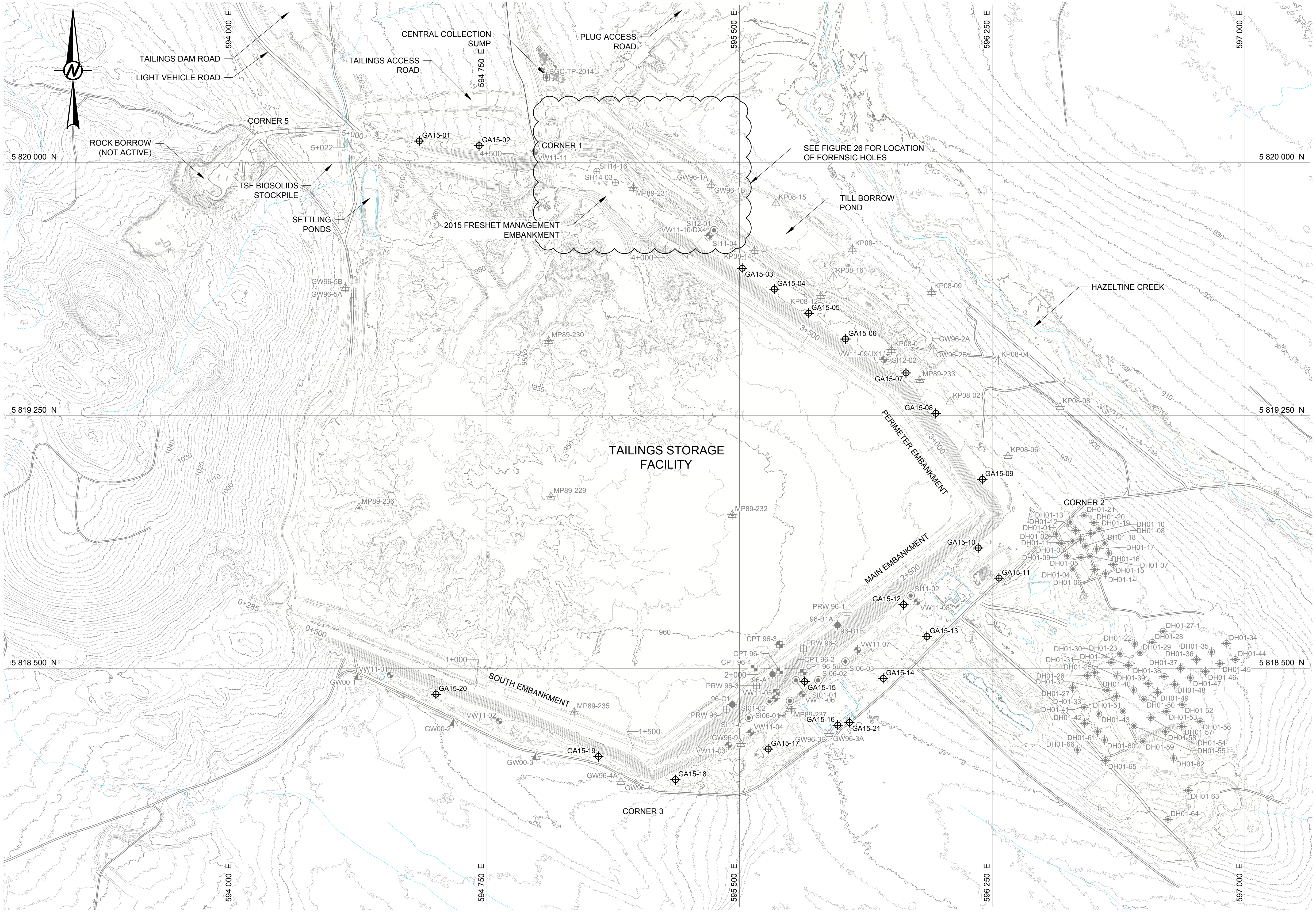
Design Criteria		Value	Source / Comment
General			
Tailings Storage Facility Capacity	970 m Crest Elevation	34 million tonnes	At 1.35 tonnes / m^3 Additional to existing tailings in TSF
Dam Classification		Significant	Refer to Appendix C
Minimum Factor of Safety	Static (End of construction)	1.5	CDA (2013), *Mines Act* Permit M-200
	Pseudo-static	1.0	
Peak Ground Acceleration (PGA)		0.096 g	1:1,000 year return period
TSF Water Management			
Inflow Design Flood (IDF)	Operations	PMF	1 in 1,000 year return period recommended by CDA (2013)
	Closure	PMF	CDA (2013)
Catchment Area for IDF	External Catchment Area	0.62 Mm^2	From direct run-off
	TSF Catchment	2.29 Mm^2	At elevation 970 m
Freeboard	Normal	0.2 m	Refer to Appendix C
	Minimum	1.1 m	Incorporates wave run-up, wind set-up, and IDF (Appendix C)
Beach Width	Minimum during normal operating conditions	100 m	Portion of beach above operating pond level
Operating Pond Storage Volume	Low operating water level (LOWL)	1 million m^3	Provided by MPMC. Minimum pond depth of 3 m at barge location
	Normal operating water level (NOWL)	1.5 million m^3	Based on maintaining a minimum beach width
Tailings Characteristics			
Disposal Method	Conventional (unthickened) slurry		
Nominal Tailings Production Rate		22,000 tonnes/day	Mine plan provided by MPMC. The plan includes 4 million tonnes of tailings to be moved from Springer Pit to the TSF. Refer to Appendix C
Tailings in Place Dry Density	Future Deposited Tailings	1.35 tonnes/m^3	Assumed by Golder 1.36 tonnes/ m^3 in Knight Piesold (2005)
Solids Concentration	% by Weight	35 %	Provided by MPMC
Deposition Angle	Average Beach Slope	1.0 %	Based on May 27, 2015 drone survey

4.0 FOUNDATION CHARACTERIZATION

Foundation characterization of the TSF includes the geotechnical characterization of the breach area and Perimeter Embankment presented in Golder (2015b); and Main and South Embankments presented in Golder (2015c). The geotechnical information reviewed included:

- Knight Piesold (KP) investigation programs:
  - test pit and condemnation drilling in 1989 and 1995 (KP 1995, KP 1996);
  - air rotary drilling (with SPT tests) and monitoring well installation (KP 1997a);
  - percussion drilling, including SPT and piezometer installation in 2001 and 2006, along the Main and South Embankments;
  - solid stem auger drilling and Cone Penetration Testing (CPT), including pressure relief well installation (KP 1997b). The CPT data has been used in particular to assist in characterizing the glaciolacustrine soils along the Main Embankment; and
  - sonic drilling in 2008 along the Perimeter Embankment to investigate a potential borrow area (KP 2009).
- AMEC investigation programs which consisted of:
  - percussion drilling for foundation characterization and slope inclinometer installations in 2011 (AMEC 2012); and
  - sonic drilling for foundation characterization and piezometer installation in 2011 (AMEC 2012).
- Independent Expert Engineering Investigation and Review Panel Report (IEERP 2015);
- Geotechnical Investigation and Laboratory Testing carried out by Klohn Crippen Berger (KCB 2015a, 2015b);
- Golder geotechnical investigation (Golder 2015f) which consisted of:
  - sonic hole drilling with field vane shear testing and Shelby tube sampling;
  - vibrating wire piezometer and inclinometer installation; and
  - laboratory testing.

A layout of the TSF with the location of the boreholes from the investigations listed above is shown in Figure 2.



LEGEND

GA15-21	2015 BOREHOLE LOCATIONS (GOLDER)
BGC-TP-2014	2014 TEST PIT (BGC-GOLDER)
SH14-16	SHAPE ACCEL ARRAY (GOLDER, 2014)
MP89-230	CONDEMNATION HOLES / PIEZOMETER INSTALLATION (KP, 1989)
96-A1	SOLID AUGER, SPT, PIEZOMETER INSTALLATION (KP / R.E. GRAHAM ENG., 1996)
CPT 96-1	CPT (KP / CONETEC 1996)
PRW 96-1	SOLID STEM AUGER, PRESSURE RELIEF WELL (KP, 1996)
GW 96-1	AIR ROTARY, SPT, MONITORING WELL INSTALLATION (KP, 1996)
GW00-1	ODEX, SPT, PIEZOMETER INSTALLATION (KP, 2000)
DH01-01	BORROW PROGRAM (KP, 2001)
KP08-01	SONIC DRILLING, SPT, BORROW PROGRAM (KP, 2008)
	EXISTING SONIC DRILLING, SI INSTALLATION (2001, 2006, 2011 AND 2012)
	SONIC DRILLING, VW, PIEZOMETER INSTALLATION (AMEC, 2011)
4+400	SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 2 m MINOR AND 10 m MAJOR.
4. DATA FROM GEOTECHNICAL INVESTIGATION FOLLOWING BREACH NOT SHOWN FOR CLARITY, EXCEPT FOR SAA INSTALLATION LOCATIONS.

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
2. TOPOGRAPHY FROM MPMC, FILE NAMES: "10cm contours full tailings.dxf" AND "10cm Hazeltine 3 Reprocessed.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
3. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

NOT FOR CONSTRUCTION

0 200 400
1:6,000 METRES

CLIENT
MOUNT POLLEY MINING CORPORATION

PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-11-02
PREPARED	JY
DESIGN	GJ
REVIEW	AJH
APPROVED	TLE

TITLE
SITE INVESTIGATION PLAN

PROJECT No.	PHASE/DOC.#	Rev.	FIGURE
1413803	3000/074	0	2

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25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

4.1 Foundation Characterization at Corner 1

The generalized stratigraphic units at Corner 1 are presented in Table 2 and shown in Figure 3. The breach was located within the Corner 1 area approximately at station 4+300. The Upper Glaciolacustrine Unit (named the Upper GLU or UGLU by the IEERP) has been identified as the soil layer through which the undrained failure developed and was the focus of the IEERP and KCB investigations and as such, the characterization of the UGLU is presented in more detail than for the other soil units.

Table 2: General Stratigraphy at Corner 1

Unit	Description	Source
Upper Till	Clay and Sand, some silt, trace to some gravel, low plasticity, firm to hard.	Laboratory test results from KCB[a] and IEERP Report[b].
Upper Glaciolacustrine Unit	Clay, some silt, trace sand, intermediate to high plasticity, firm to stiff. Fine sand and silt present in thin layers.	Laboratory test results from KCB and IEERP Report.
Middle Till / Lower Basal Till	Sandy Clay, some gravel, low to intermediate plasticity, very stiff to hard.	Laboratory test results from KCB and IEERP Report.
Lower Glaciolacustrine Unit	Clay, some silt, some sand, intermediate plasticity, very stiff to hard.	Laboratory test results from KCB, IEERP Report and Golder[c].
Glaciofluvial Units	Generally Sand, fine to coarse, trace gravel, some silt, compact to very dense. Wide range of fines content, from none to about 90% low plasticity fines.	Laboratory test results from KCB and Golder; IEERP Report field descriptions.
Lower Till	Sandy Silt to Silty Sand, some gravel, low to intermediate plasticity, hard.	Field descriptions and laboratory test results from KCB.
Bedrock	Highly weathered volcanic conglomerate and sedimentary rock.	Field descriptions from KCB.

a) Klohn Crippen Berger (2015a,b).

b) IEERP (2015).

c) Golder Associates (2015b).

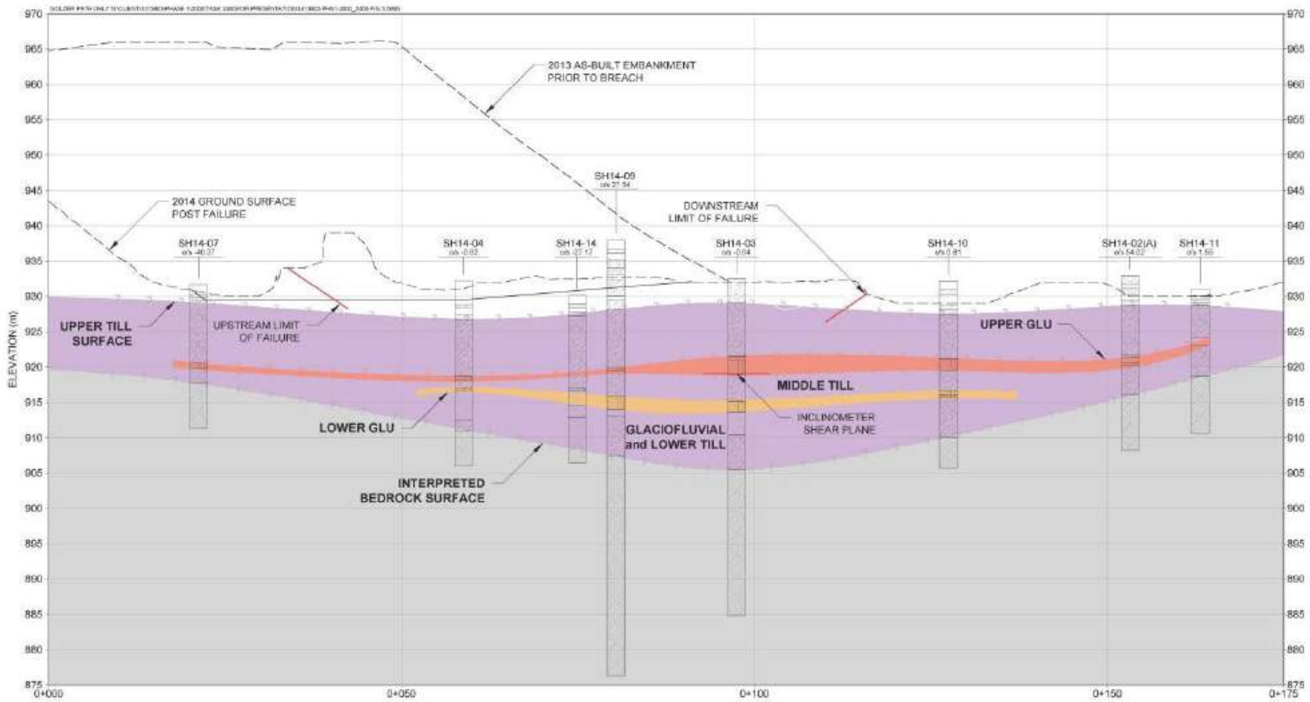


Figure 3: Typical Soil Stratigraphy at Corner 1

Information of the key units encountered at Corner 1 is provided below.

4.1.1 Upper Till

The upper till consists of clay and sand, some silt, trace gravel, with low to medium plasticity and consistency from firm to hard. Effective friction angles were estimated from triaxial tests performed on undisturbed samples at about 34 degrees (KCB 2015b). Results from pressure meter testing indicate that the friction angle from the upper till at Corner 1 ranges between 36 and 48 degrees, with an average of about 40 degrees. Within Corner 1 the upper till has a remaining thickness of between 6 m and 10 m.

4.1.2 Upper Glaciolacustrine Unit

The UGLU consists of clay, some silt, trace sand, with intermediate to high plasticity, and is firm to stiff. The maximum thickness of the UGLU at Corner 1 area is about 3 m as indicated from the geotechnical site investigation carried out by the IEERP (IEERP 2015). Average water content of the UGLU is 34%. Figure 4 presents the results of the clay content (%<2μm), water content and Plasticity Chart for the UGLU reported by the IEERP and KCB.

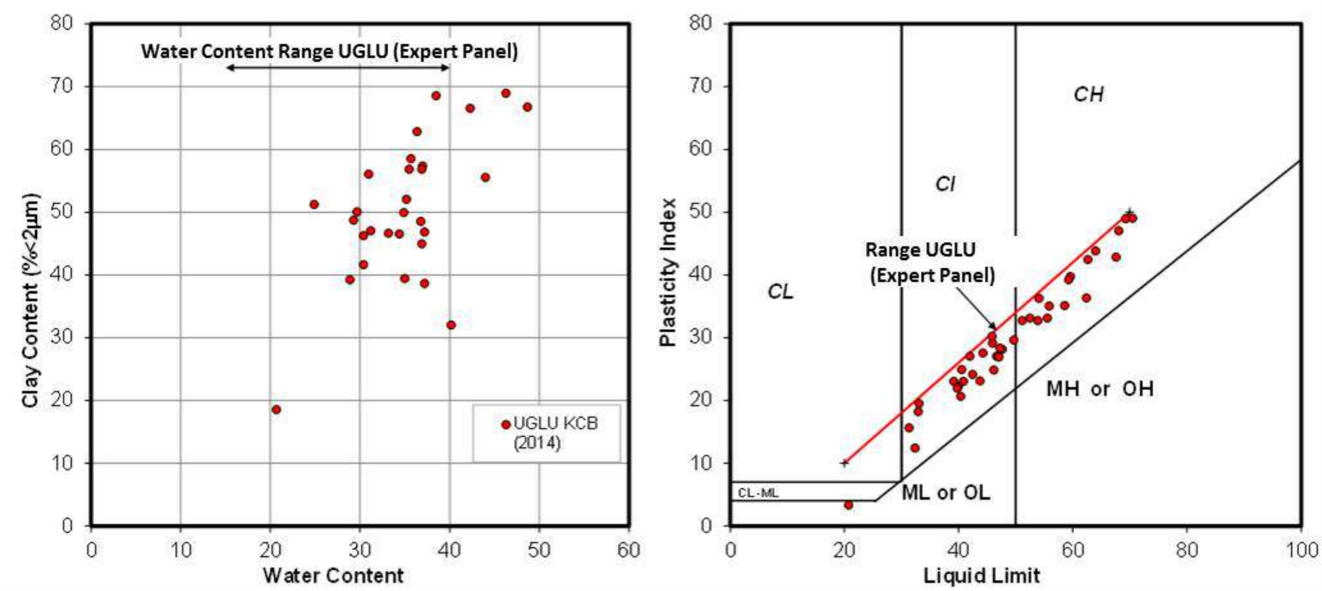


Figure 4: Index Properties of the UGLU (as reported in IEERP (2015) and KCB (2015b))

Results from laboratory testing showed that the UGLU has a preconsolidation pressure, σ'_p, of about 400 kPa. Figure 5 presents the results of laboratory consolidation tests carried out on specimens from the UGLU unit, reported by the IEERP and KCB. Estimated hydraulic conductivity from consolidation tests was about $5x10^{-10}$ m/s for stresses between 100 kPa and 800 kPa, and a coefficient of consolidation (c_v) of about $5x10^{-7}$ m^2/s. The coefficient of consolidation estimated from pore pressure response in the field following rockfill placement (using piezometer VST14-03) was $6x10^{-7}$ m^2/s.

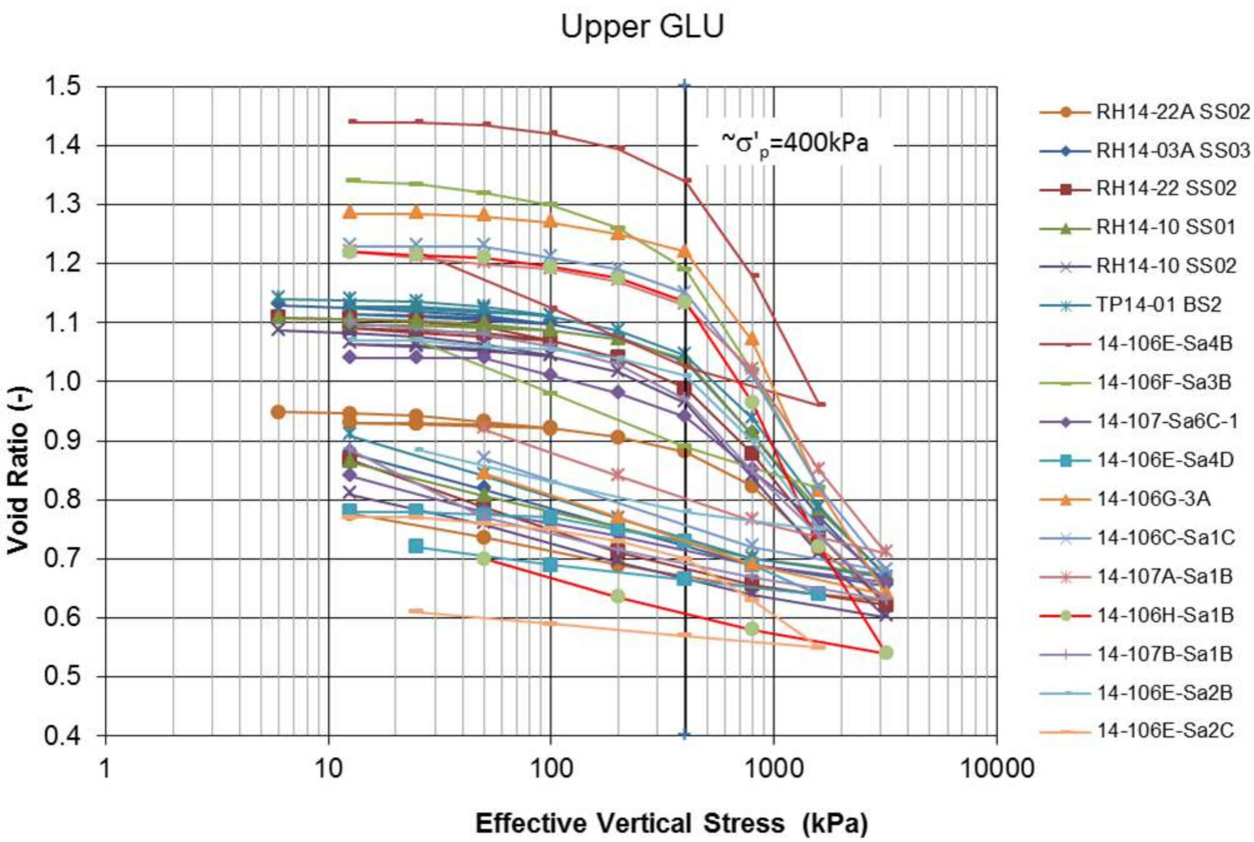


Figure 5: Results from Consolidation Tests on Specimens of UGLU Reported by the IEERP (2015) and KCB (2015b)

The peak undrained shear strength and remoulded (residual) undrained shear strength were measured with an electronic field vane and estimated from CPT data. The undrained shear strength, s_u, was estimated using the cone tip resistance, q_t, total overburden stress, σ'_{v0}, and bearing factor, N_{kt}, as follows:

$$s_u = \frac{q_t - \sigma_{v0}}{N_{kt}}$$

A value N_{kt} of 15 was used. The remoulded shear strength, s_{u_r}, was estimated directly from the sleeve friction resistance, f_s.

The histogram of peak and remoulded undrained shear strength values estimated for the UGLU are shown in Figure 6. The peak shear strength includes values estimated from field vane, CPT and simple shear tests. The remoulded undrained shear strength includes values from field vane and CPT. Figure 7 and Figure 8 show the average values and standard deviation for the peak and remoulded undrained shear strength respectively estimated for the UGLU.

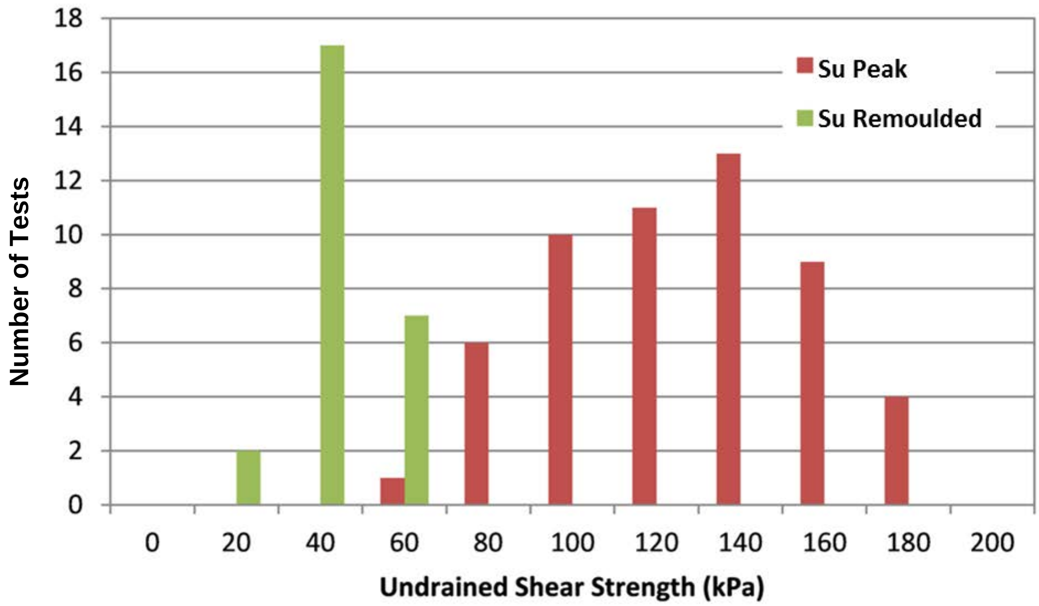


Figure 6: Histogram of Peak and Remoulded Shear Strength for the UGLU

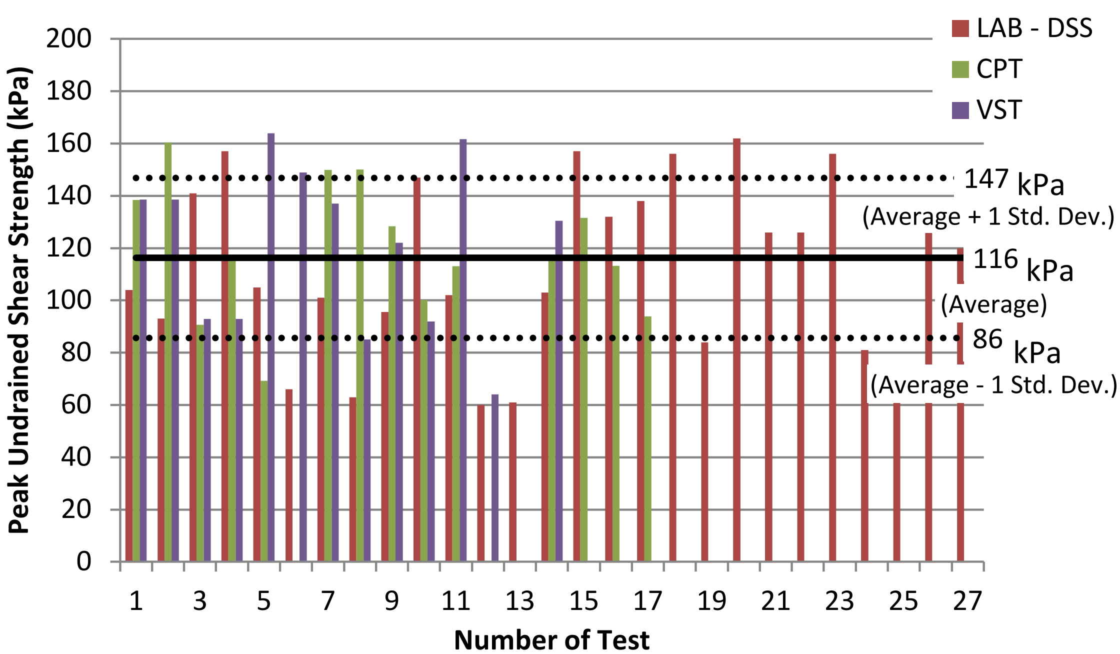


Figure 7: Peak Undrained Shear Strength Estimated for the UGLU from Field Vane, CPT and Simple Shear Tests

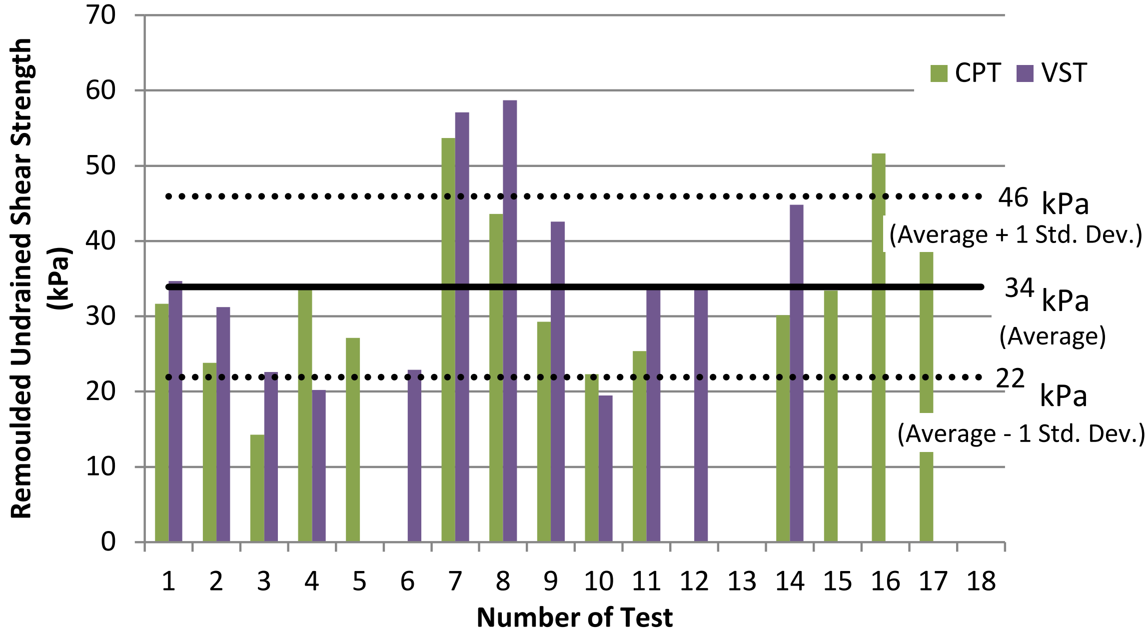


Figure 8: Remoulded Undrained Shear Strength Estimated for the UGLU from Field Vane and CPT

Figure 9 shows the shear strength ratio estimated from simple shear tests at various effective confining stress levels. Data obtained from the field vane and CPT is also included in Figure 9. An estimated function based on the SHANSEP (Stress History and Normalized Soil Engineering Properties) method (Ladd and Foot 1974) is also included in Figure 9. The undrained shear strength ratio (s_u/σ'_v) of the UGLU decreases with increasing confining vertical stress level. For stresses higher than the estimated preconsolidation pressure, the undrained shear strength ratio is constant at $s_u/\sigma'_v = 0.22$.

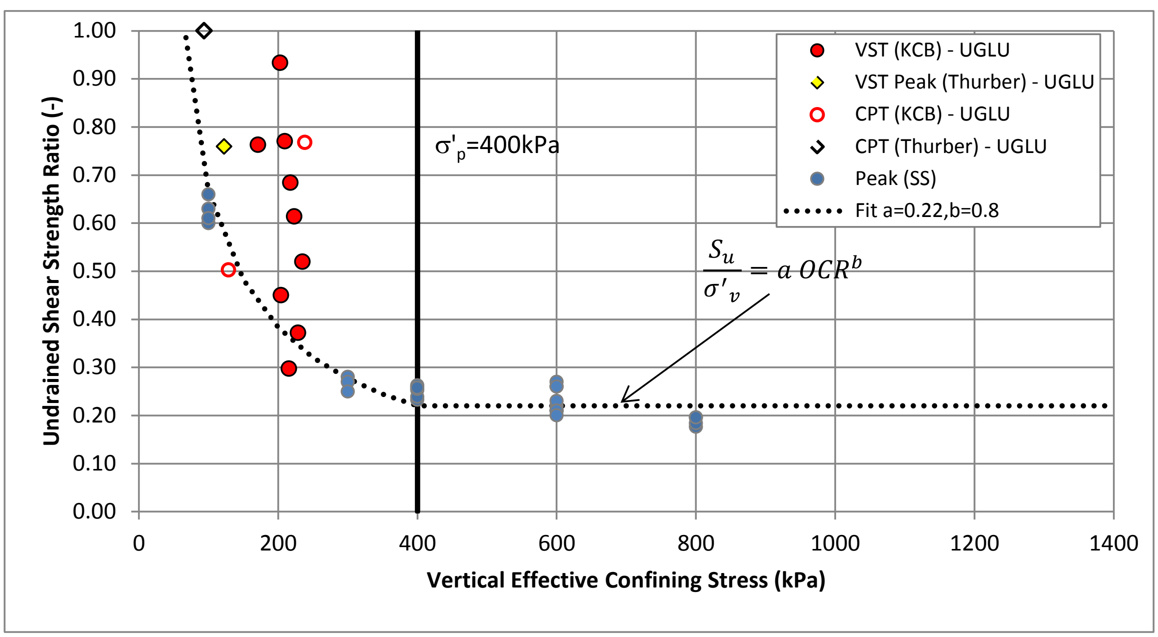


Figure 9: Peak Undrained Shear Strength Ratio Estimated for the UGLU

The IEERP report presents stability analyses using a range of strength ratios from 0.22 to 0.27, with the IEERP "favouring a result above the average, say 0.25". The deformation analyses carried out by the IEERP using PLAXIS indicated collapse occurring at an undrained strength ratio of 0.29.

The peak and residual effective friction angles of the UGLU were measured on undisturbed samples in direct shear tests. The peak effective friction angle was also measured in a triaxial test, with the specimen rotated to allow failure along the GLU. The peak friction angle ranged between 19 and 31 degrees, and the residual friction angle between 11 and 28 degrees, assuming zero cohesion and for normal stresses up to 800 kPa.

4.1.3 Lower Glaciolacustrine Unit

The Lower Glaciolacustrine Unit (LGLU) consists of clay, some silt to silty clay, trace sand with intermediate plasticity and very stiff to hard consistency. Average water content of the LGLU is 23%. The LGLU maximum thickness at the breach area is approximately 5 m. Index properties of the LGLU including water content, clay content and Plasticity Chart are shown in Figure 10. Figure 10 also presents the results of the UGLU for reference and comparison. Relative to the UGLU, the LGLU has in general lower water content, a lower amount of clay size particles and low to intermediate plasticity.

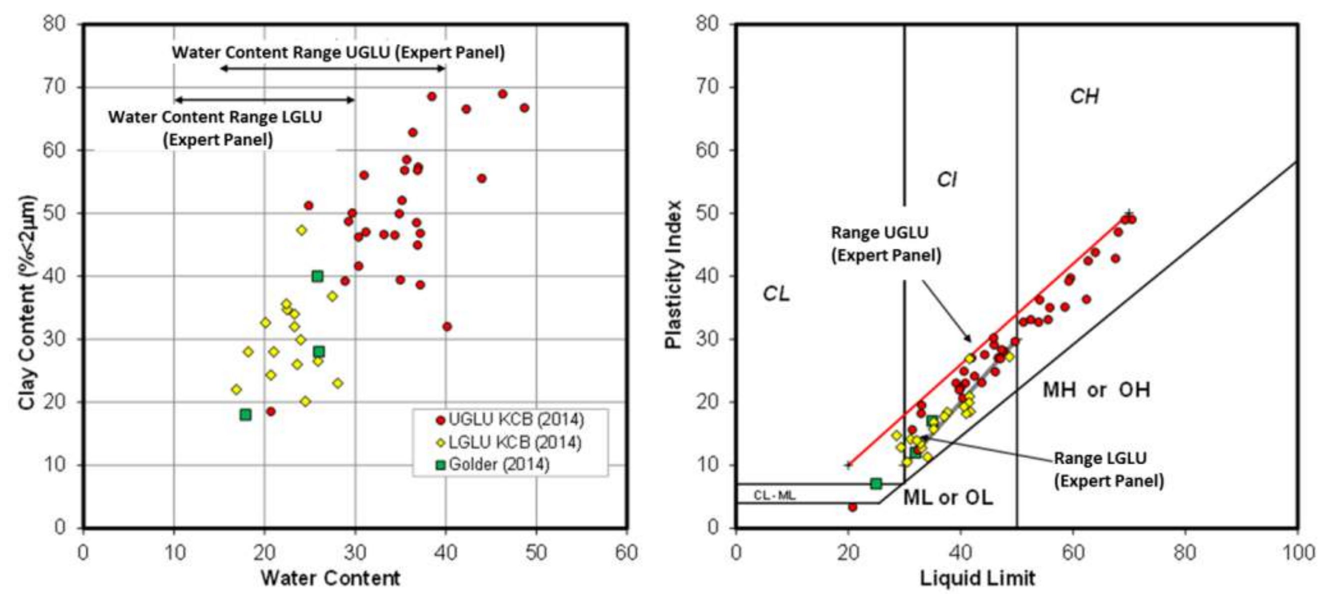


Figure 10: Index Properties of the UGLU and LGLU Units at the Breach Area Reported by the IEERP (2015) and KCB (2015b)

Consolidation test results performed on the LGLU unit are shown in Figure 11. The preconsolidation pressure was estimated between 700 kPa and 1,200 kPa.

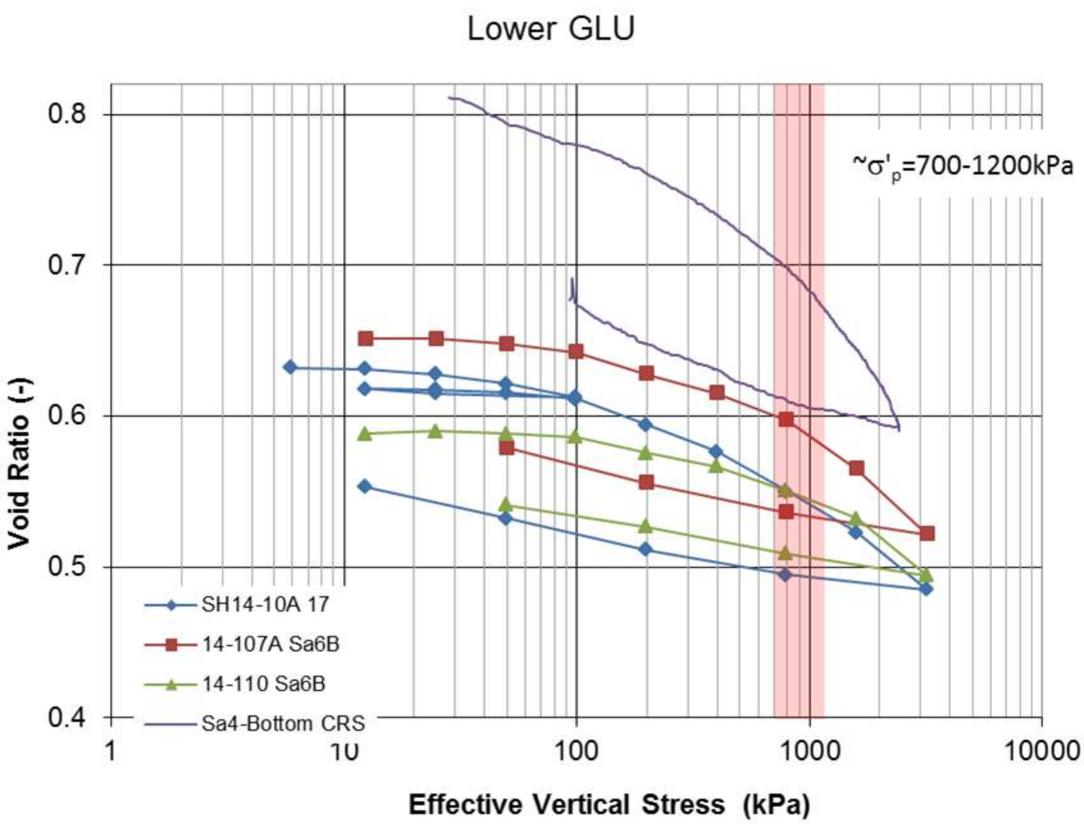


Figure 11: Results from Consolidation Tests on Specimens of LGLU Reported by the IEERP (2015) KCB (2015b) and Golder (2014g)

The peak undrained shear strength was measured in the laboratory with simple shear tests on undisturbed specimens of the LGLU. Figure 12 presents the undrained shear strength ratio function from the SHANSEP method using a preconsolidation stress of 700 kPa. For stresses higher than the estimated preconsolidation pressure, the undrained shear strength ratio is constant at $s_u/\sigma'_v = 0.22$.

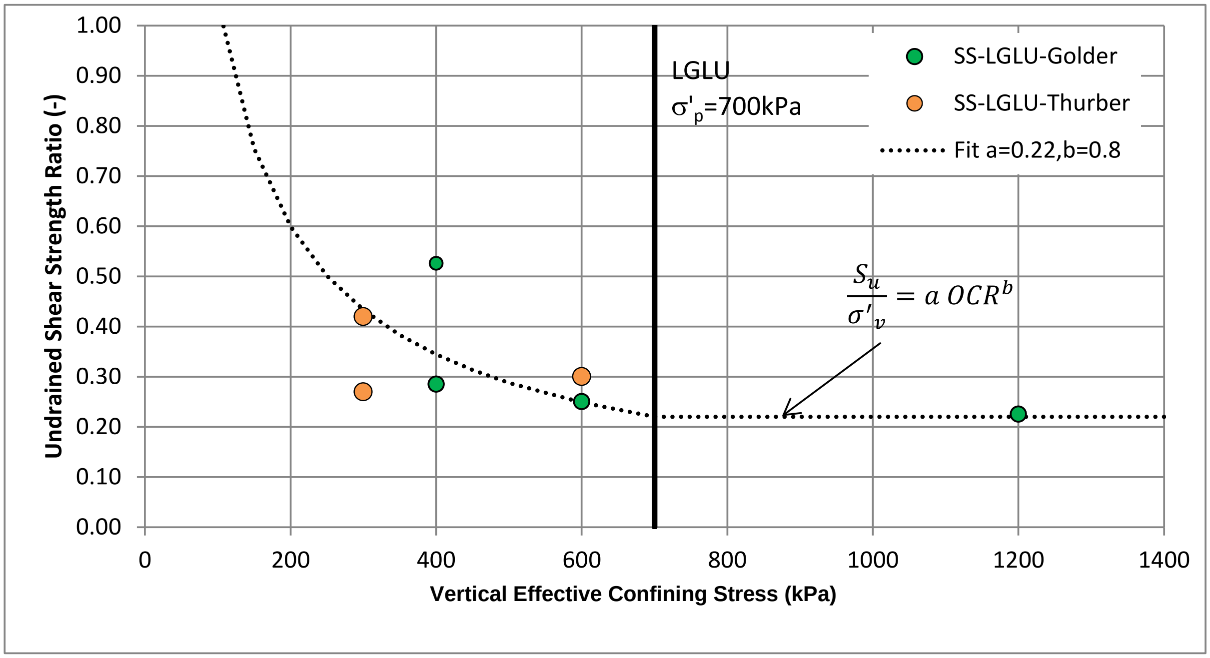


Figure 12: Peak Undrained Shear Strength Ratio Estimated for the Upper and Lower GLU

A peak effective friction angle of 33 degrees and a residual effective friction angle of 25 degrees were measured on a single undisturbed sample of LGLU in a direct shear test (KCB 2015b).

4.1.4 Glaciofluvial Unit

The glaciofluvial unit consists of compact to dense, fine to coarse sand, trace gravel, trace to some silt. The glaciofluvial unit at Corner 1 is about 4 m thick. The average water content was 18% and the estimated effective friction angle from triaxial testing was about 36 degrees measured in triaxial testing (Golder 2015g).

4.2 Foundation Characterization along the Perimeter, Main and South Embankments

A site investigation was completed along the Perimeter, Main and South Embankment to provide additional information on the soil stratigraphy along the embankments and to obtain undisturbed soil samples for laboratory testing (Golder 2015f). Nine sonic boreholes were drilled along the Perimeter Embankment, ten sonic boreholes were drilled along the Main Embankment (with two holes twinned to allow sample recovery with thin wall tubes), and two sonic boreholes were drilled along the South Embankment.

The stratigraphic units found in the foundation of the Perimeter, Main and South Embankments are similar to the ones found in the breach area, with the exception that material with similar characteristics and consolidation history to the UGLU was not encountered in the investigations outside the area of the breach.

The following units were identified:

- **Till** - mixture of gravel, sand, silt and clayey silt. The average water content of the till is approximately 12% (range between 5% and 25%) and the fines have low plasticity.
- **Glaciofluvial Units** - Generally, sand, fine to coarse, trace gravel, some silt, compact to very dense. The average water content is 18%. The fines content ranges from 0% to about 95%. The fines have low plasticity.
- **Glaciolacustrine Units** – Generally silty clay, some sand, intermediate plasticity, very stiff to hard.
  - Along the Perimeter Embankment: The glaciolacustrine soil deposits are not continuous. Glaciolacustrine soil was encountered along the toe area from approximately Stn. 3+600 to 3+200 in boreholes GA15-05, GA15-06 and VW11-09 at depths between 30 m and 35 m, and thickness between 0.5 m to 3.0 m. Glaciolacustrine soil was reported by Knight Piésold to be present further downstream at KP08-06 (Stn. 2+850), KP08-02 (Stn. 3+090), KP08-12 (Stn. 3+530) and KP08-15 (Stn. 3+770).
  - Along the Main Embankment: A semi-continuous layer of glaciolacustrine soil material is present at an elevation of approximately 900 m to 910 m, and extends along the length of the Main Embankment. Smaller pockets of glaciolacustrine soil are observed interlayered within the till.
  - Along the South Embankment: Limited presence of glaciolacustrine soil material, with none observed in the Golder 2015 investigation. Glaciolacustrine soil soil was reported by AMEC to be present in borehole VW11-02 (Stn. 1+100).
- **Highly Weathered Bedrock** – Generally gravelly clay and silts.

Within the Perimeter, Main and South Embankments, the glaciolacustrine and glaciofluvial materials generally occur as discontinuous layers within the till.

4.2.1 Perimeter Embankment

This section provides a summary of the foundation conditions along the Perimeter Embankment, excluding the Corner 1 area. Further details are provided in Golder (2015c).

Index properties of the glaciolacustrine soils encountered in the area of the Perimeter Embankment investigations, including water content, clay content and Plasticity Chart are shown in Figure 13. Index properties of the glaciolacustrine material encountered in the breach area are also included in Figure 13 for comparison. Figure 14 shows the variation of water content with depth for the boreholes located along the downstream side of the Perimeter Embankment. The water contents of the glaciolacustrine foundation materials of the Perimeter Embankment are generally similar to the LGLU and lower than the UGLU found at the Corner 1 area.

A layer of glaciolacustrine soil was encountered in borehole GA15-06 from 907 to 910 m elevation. A vane shear test was attempted in this material; however, the vane could not be pushed into the soil. This glaciolacustrine layer was not observed in the adjacent boreholes. A layer of glaciolacustrine soil was observed within boreholes GA15-05 and GA15-06 at an elevation around 902 m to 904 m, with measured water contents of around 28%, and plotting in the high plasticity range.

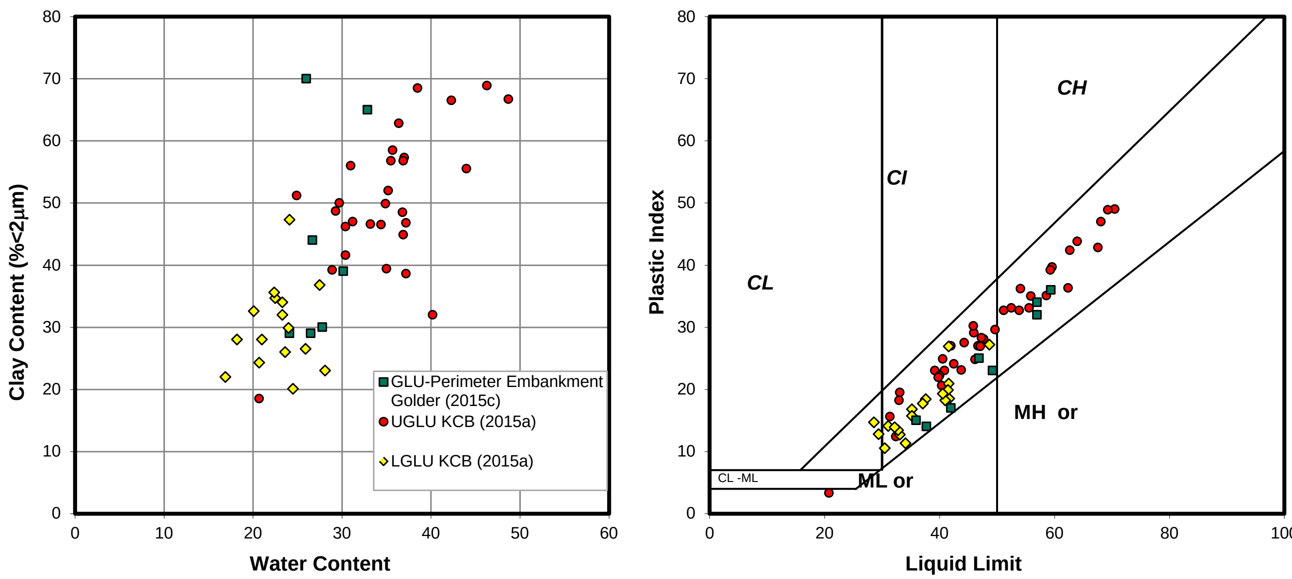


Figure 13: Index Properties of the Perimeter Embankment Glaciolacustrine Soils

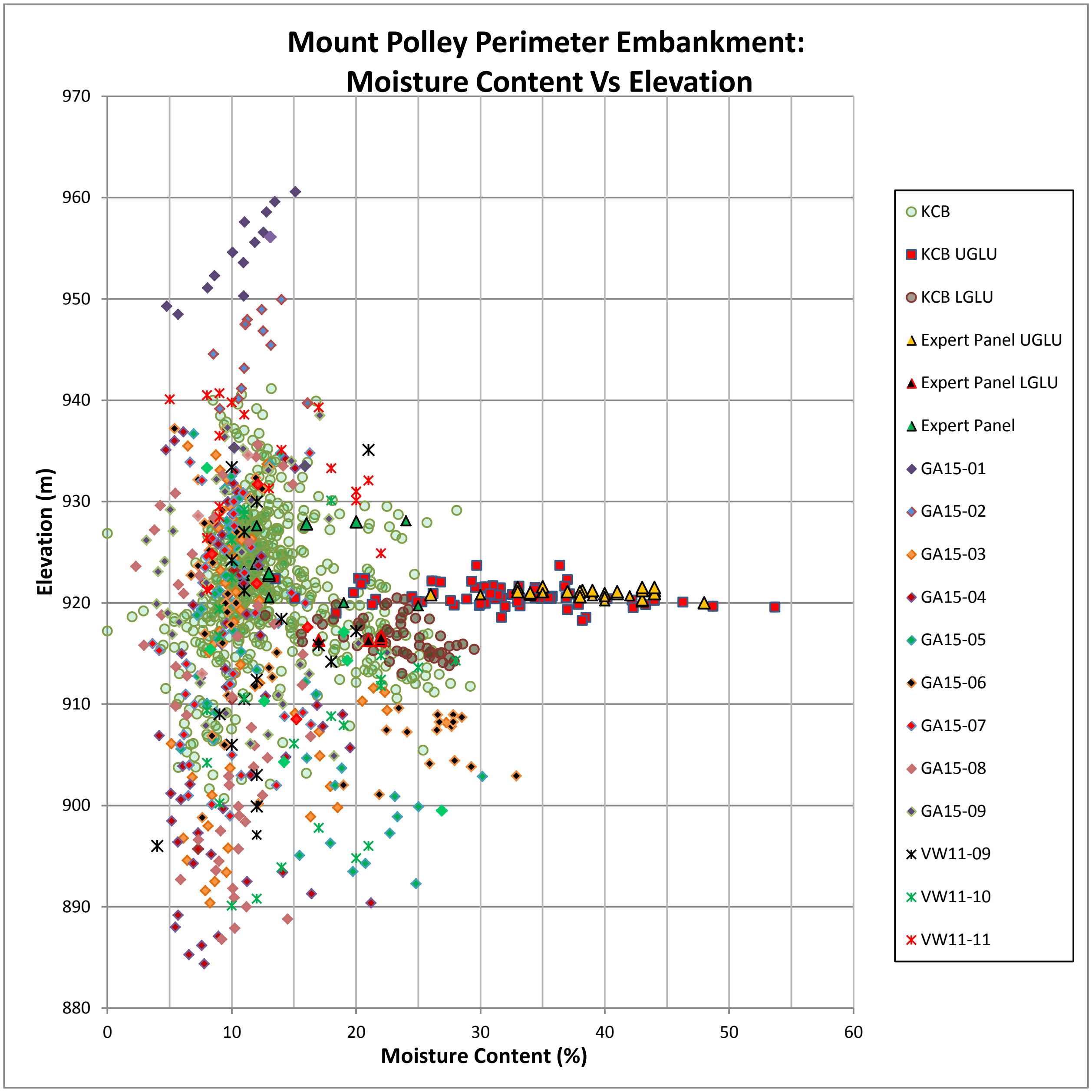


Figure 14: Variation of Water Content with Depth in the Boreholes Located along the Perimeter Embankment

Results from consolidation tests carried out on samples from sonic drilling obtained at the Perimeter Embankment indicate that the preconsolidation pressure of the glaciolacustrine soils at the Perimeter Embankment is about 1,200 kPa (Golder 2015g). Undisturbed sampling from GA15-06 was attempted; however, thin walled tube samples could not be pushed into the soil. Details of the testing are presented in Golder 2015g.

4.2.2 Main Embankment

This section provides a summary of the foundation conditions along the Main Embankment. Further details are provided in Golder (2015c).

Index properties of the glaciolacustrine soils encountered in the area of the Main Embankment, including water content, clay content and Plasticity Chart are shown in Figure 15. The results of the UGLU and LGLU encountered within the Corner 1 area of the Perimeter Embankment are shown for reference and comparison. The plasticity of the Main Embankment glaciolacustrine soil is similar to the plasticity of the LGLU (Corner 1 area), with generally low to intermediate plasticity.

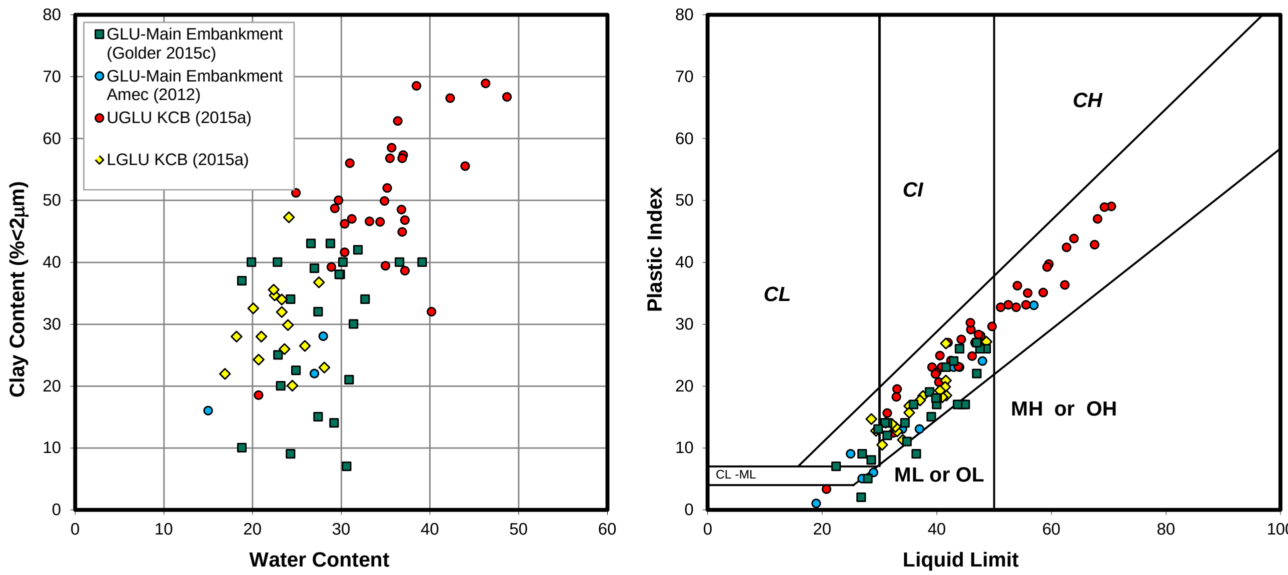


Figure 15: Index Properties of the Main Embankment Glaciolacustrine Soil

The water contents of the glaciolacustrine foundation materials of the Main Embankment are generally similar to the LGLU but with some samples having water content greater than 30%, which is within the lower range of the UGLU. The Main Embankment glaciolacustrine soil water content variation with elevation is plotted in Figure 16. Water content of the UGLU and LGLU from the Corner 1 area are included for comparison. The average water content of the glaciolacustrine soil is approximately 27%, and ranges from 16 to 40%.

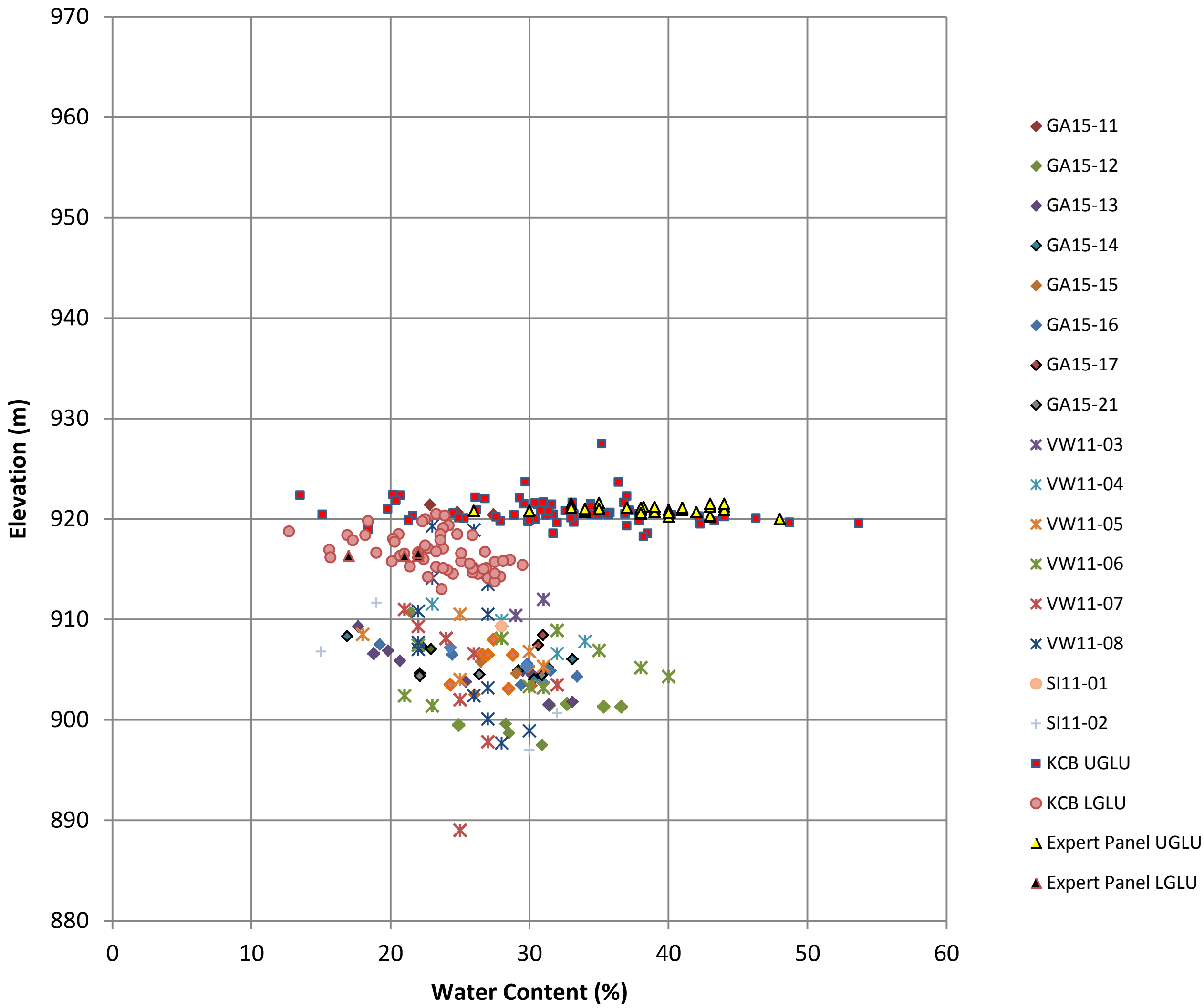


Figure 16: Variation of Water Content with Depth for the Glaciolacustrine Soil along the Main Embankment

The estimated preconsolidation stress measured from laboratory testing on glaciolacustrine soil samples from the Main Embankment ranges between 1,200 kPa and 3,000 kPa, as shown in Figure 17. Interpretation of the consolidation test data on samples from GA15-12B indicates a preconsolidation stress between 1,200 kPa and 2,000 kPa. Interpretation of the results of consolidation tests on samples from GA15-15B and GA15-21 (adjacent to GA15-16) indicates a preconsolidation stress between 2,000 and 3,000 kPa. The preconsolidation stresses were estimated using the Casagrande method and the Strain-Energy method (Becker et al. 1987), with the results presented in Golder (2015f).

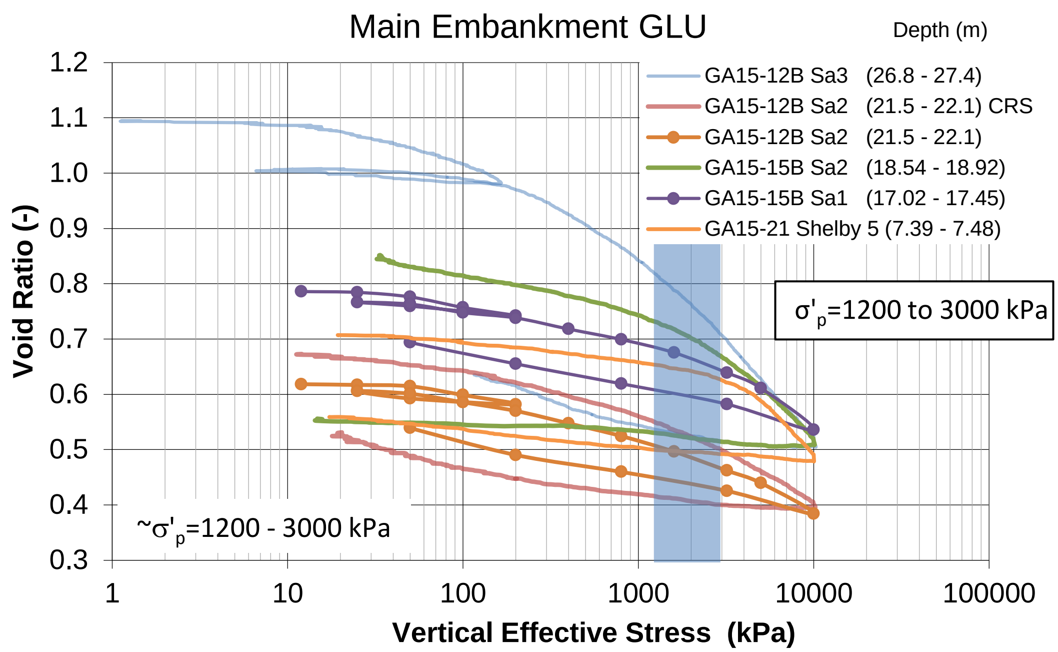


Figure 17: Consolidation Test Results on Main Embankment Glaciolacustrine Soil Samples

The results of the laboratory consolidation tests are compared with the interpreted preconsolidation stress from the nine CPTs carried out along the Main Embankment in 1996. The preconsolidation stress (σ'_p) from the CPT data was estimated as $\sigma'_p = 0.33\ (q_t - \sigma'_{vo})$ (Mayne 2001). The comparison for two of the CPTs is shown in Figure 18.

The preconsolidation stress interpreted from the CPT data is generally greater than 1,200 kPa. A few points have a preconsolidation stress between 1,000 and 1,200 kPa, as can be seen at an elevation of about 917 m for CPT PRW96-1, and below elevation 908 m for CPT 96-5. The CPT data is seen to correlate reasonably well with the laboratory consolidation tests, and provides a degree of confidence in the CPT interpreted preconsolidation stress.

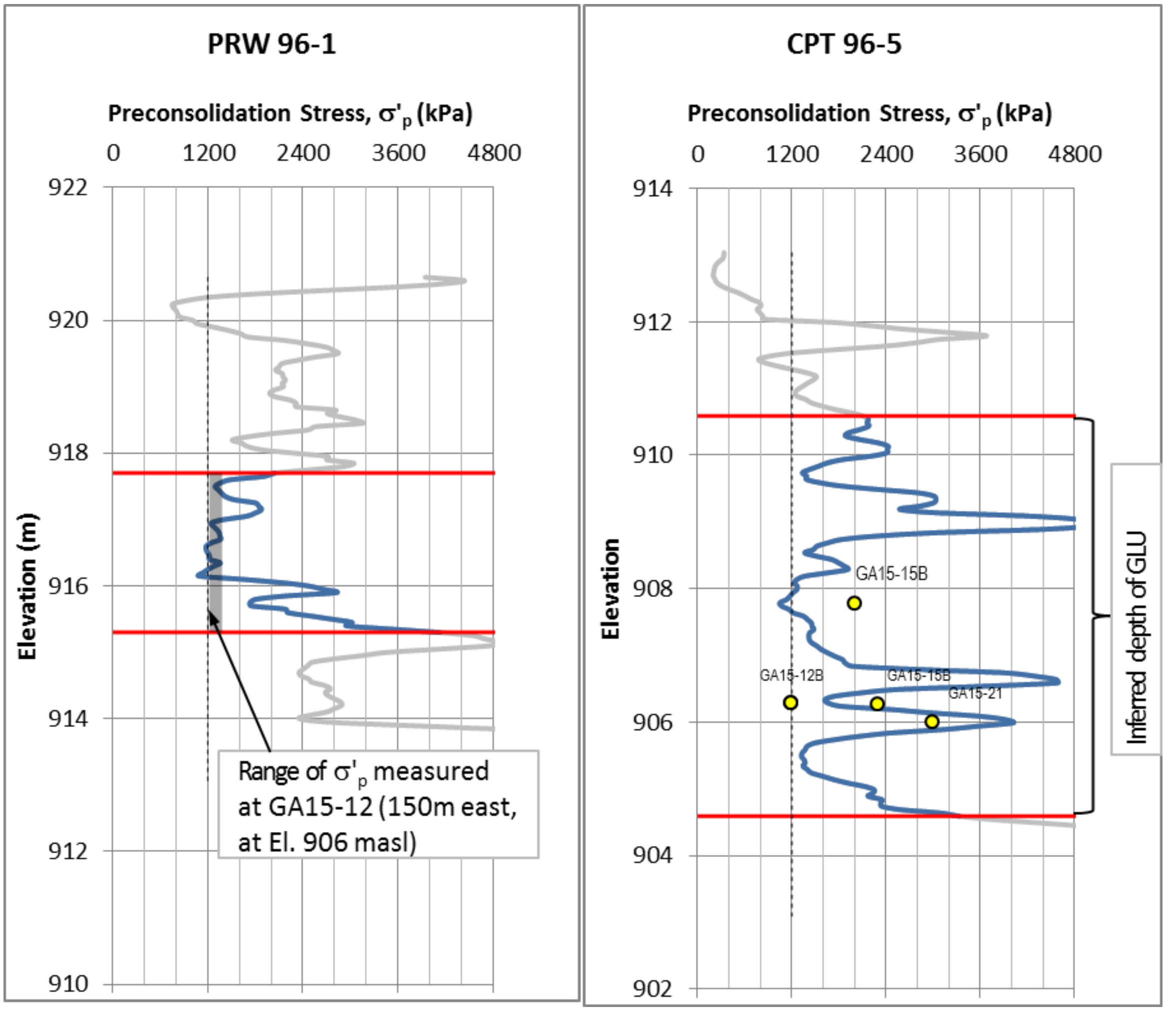


Figure 18: Preconsolidation Stress Comparison between Laboratory and CPT Data

The peak undrained shear strength was measured in the laboratory with simple shear tests on samples of the Main Embankment glaciolacustrine soil. Figure 19 presents the undrained shear strength ratio function from the SHANSEP method using preconsolidation stress of 1,200 kPa. The consolidation and simple shear tests (shown in Figures 17 and 19) were performed on samples obtained from sonic drilling (GA15-12B and GA15-15B) and from a thin walled Shelby Tube (GA15-21). Results from the simple shear tests show that for stresses higher than the estimated preconsolidation stress the undrained strength ratio (s_u/σ'_v) is between 0.17 and 0.27.

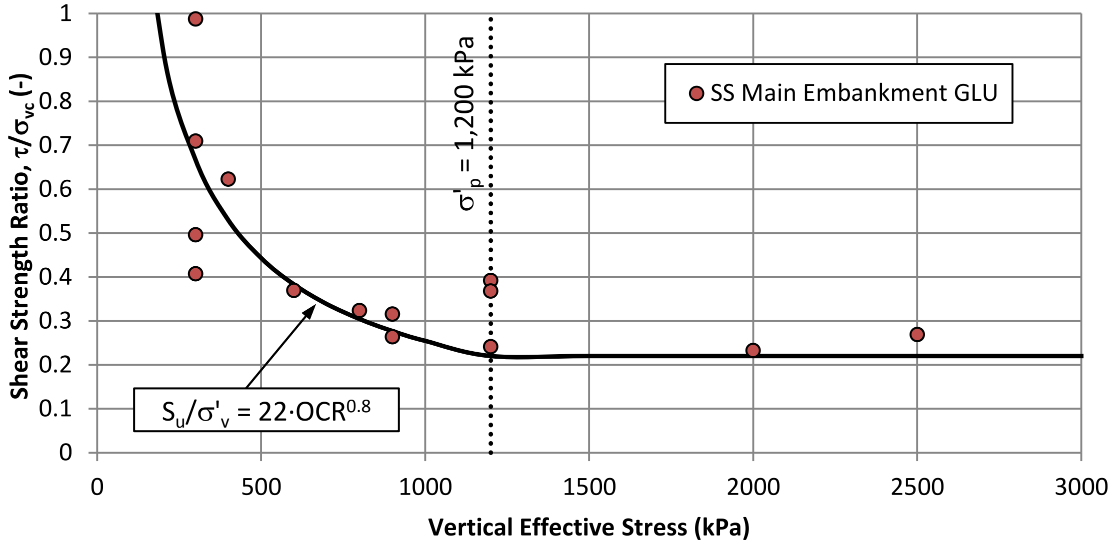


Figure 19: Peak Undrained Shear Strength Ratio Estimated for the Main Embankment Glaciolacustrine Soil

The undrained shear strength calculated using the CPT data, and assuming an average N_{kt} factor of 15 for PRW 96-1 and CPT-96-5 is shown in Figure 20. The shear strength profiles show a strength greater than that calculated using the SHANSEP shear strength model (for all the CPT data).

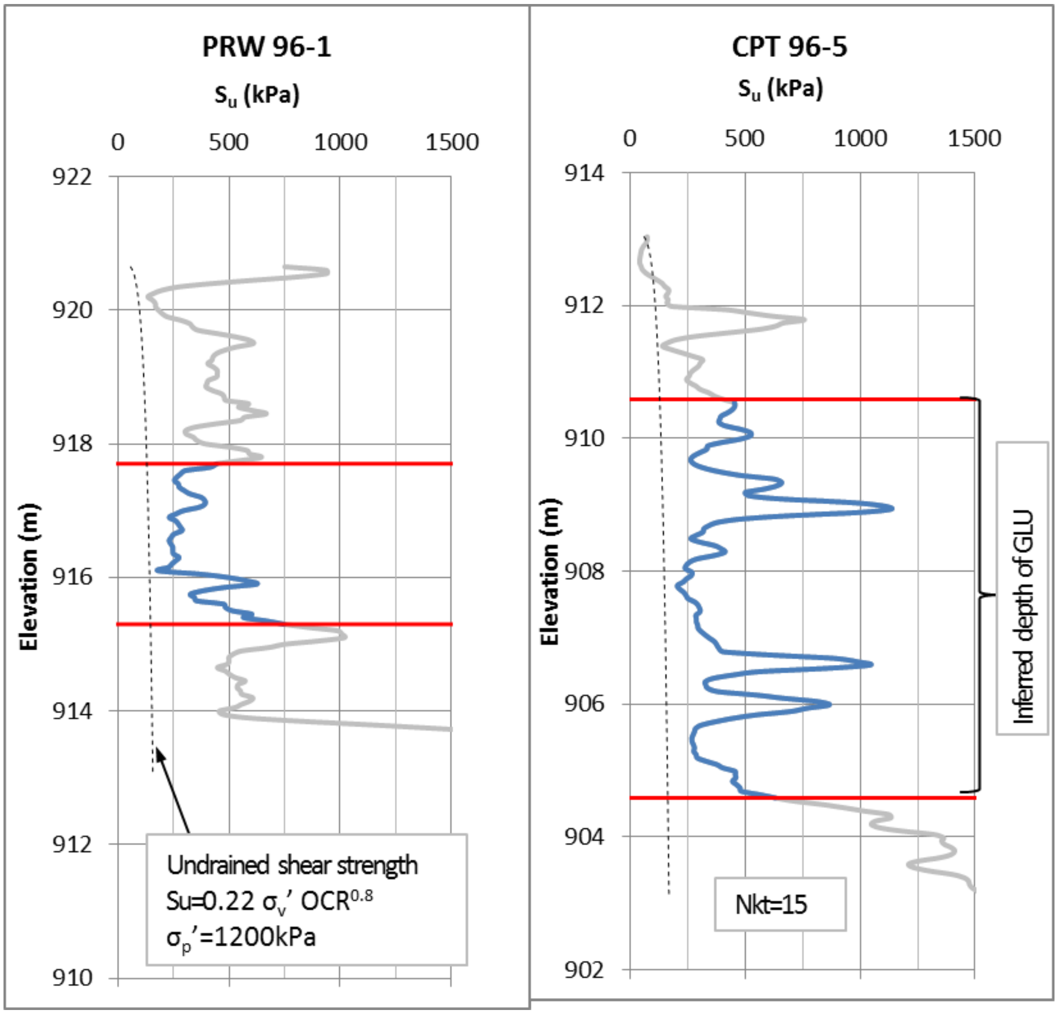


Figure 20: Undrained Shear Strength Estimated from CPT and the SHANSEP Method

The effective friction angle of undisturbed glaciolacustrine samples from the Main Embankment was measured in direct shear tests and triaxial tests.

Direct shear tests were conducted on a sample taken downstream of the Main Embankment, adjacent to the seepage collection pond, at a depth of 2.5 to 3.0 m (KP 2007). No index properties are available for this sample. The peak friction angle was 26 degrees, and the residual friction angle was 23 degrees (with zero cohesion).

Triaxial tests were conducted on a sample from the Main Embankment foundation (KP 1995). The sample had a moisture content of 28.5%, and contained 40% sand size particles and 46% silt size particles. The peak friction angle was 33 degrees, assuming zero cohesion.

As a comparison, a peak effective friction angle of 33 degrees was measured on a single undisturbed sample of LGLU in a direct shear test (KCB 2015b).

4.2.3 South Embankment

Glaciolacustrine soil has only been encountered in a single borehole (VW11-02) at Stn. 1+100 along the South Embankment. The water content was 18% with a plasticity index of 20. This glaciolacustrine soil is assumed to have similar properties to the glaciolacustrine soil along the Main Embankment.

4.3 Foundation Pore Pressure Conditions

A number of piezometers are installed within the foundation soil units along the Perimeter, Main and South Embankments.

The phreatic level varies along the length of the Perimeter Embankment. From Corner 5 to approximately Corner 1 (approximately Stn. 4+200 to 4+800) the phreatic level is at or near the surface. From approximately Stn. 3+300 to 4+200 the phreatic level is below the natural ground surface and is different within the upper and lower till, and glaciofluvial layers. From Stn. 3+300 to Corner 2 (Stn. 2+800) the piezometric level continues to vary based on the soil unit, with some piezometers measuring dry.

Along the Main Embankment, the phreatic level within the till and glaciolacustrine soil layers are similar, and at or below the natural ground elevation. Artesian pressure exists within the glaciofluvial layer between approximately Stn. 2+150 and Stn. 2+600, with the piezometric level within the glaciofluvial layer measuring up to 8 m above the natural ground level (in piezometer VW11-08). Artesian pressures along the Main Embankment have been reported in earlier design reports, and four pressure relief wells (PRW 96-1 to 4) were installed at approximately stations 1+800, 1+940, 2+100 and 2+280. These appear to be functioning, as the phreatic level between these stations is similar to that measured in the glaciolacustrine soil and till.

The two piezometers along the South Embankment show the phreatic level to be near the natural ground surface.

5.0 TAILINGS MANAGEMENT AND DEPOSITION

The design is based on tailings deposited as a slurry with approximately 35% solids by weight. The tailings will be discharged from spigot points located along the embankment crest and will form an average beach slope of approximately 1%. The sub-aqueous tailings may form a steeper slope of approximately 3%. It is assumed that the maximum pond depth is 4 m for the steeper sub-aqueous slope.

A minimum water pond volume of one million m^3 will be maintained within the TSF. Deposition of the tailings will be planned to maintain the pond away from the embankments and against the natural topography on the western perimeter. A minimum beach length of approximately 100 m will be maintained between the TSF pond and embankment crest, during normal operations. Prior to closure, the TSF pond will be pushed against the north abutment (Corner 5) so that a spillway can be constructed at the abutment and discharge water towards the water management channels, ponds and treatment plant.

The tailings deposition has been modelled using GoldTail software (Version 4.0) developed by Golder. The survey taken on May 27, 2015 was used as the base surface on which tailings would be deposited. An allowance has been made for an additional 240,000 m^3 excavated from within the TSF following this date. A maximum embankment crest elevation of 970 m was assumed. Select stages of the deposition modelling are shown in Appendix D for the average 1% beach slopes, and for the steeper sub-aqueous slope of 3%.

The tailings storage capacity versus tailings elevation is shown in Figure 21. The approximate tailings volume for the varying beach slopes is presented in Table 3. The crest elevation of 970 m will store the tailings produced during the presently defined reserve of the mine. The volumes assume closure of the TSF at elevation 970 m.

Table 3: TSF Tailings Storage Capacity

Tailings Elevation (m)	Tailings Storage							
	Sensitivity Analyses						Design Basis: 1% Sub-aerial and 3% Sub-aqueous Beach Slope	
	0.5% Beach Slope		1% Beach Slope		1.5% Beach Slope			
	Mm^3	Mtonnes	Mm^3	Mtonnes	Mm^3	Mtonnes	Mm^3	Mtonnes
955	4.5	6.0	2.8	3.8	1.9	2.2	2.7	3.6
960	8.4	11.3	7.0	9.5	5.2	6.8	6.0	8.1
965	15.5	20.9	11.9	16.1	9.7	12.7	10.6	14.3
970	25.1	33.9	25.1	33.9	25.1	33.9	25.1	33.9

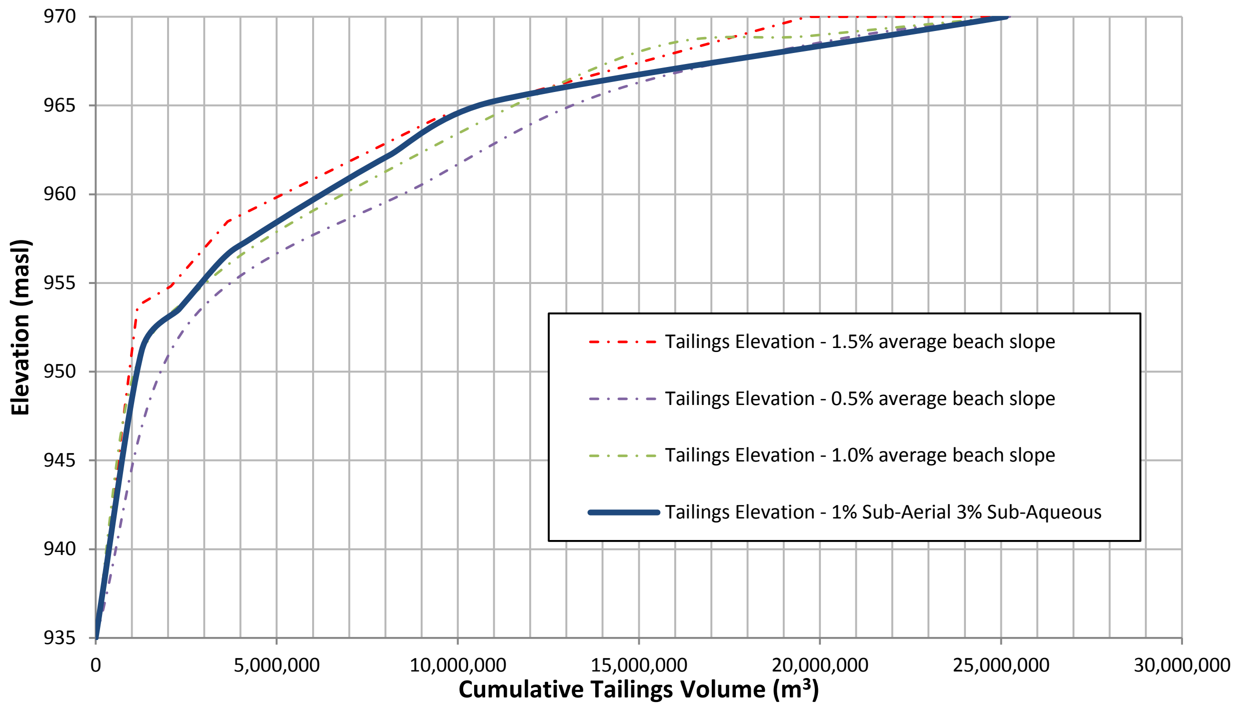


Figure 21: Tailings Storage Curves for Different Beach Slopes

In the final year of operation, the tailings deposition will be adjusted to shape the tailings surface for closure. The supernatant pond will be pushed towards Corner 5. The tailings deposition points will be moved onto the tailings beach to reduce the tailings beach slope to 0.5 %, and hence reduce the pond depth at Corner 5. Discharge of tailings directly into the pond may also be required to further reduce the potential pond depth.

A mine plan has been developed by MPMC to determine the tailings placed in the TSF till the second quarter of 2020, and is shown in Appendix C. Tailings deposition in the TSF is planned to start in May 2016 but will be dependent on the permit application. The approximately 4 million tonnes of tailings placed in Springer Pit, as part of the restricted operations, is planned to be transferred to the TSF in 2017 and 2018.

6.0 WATER MANAGEMENT

6.1 Tailings Pond Management

The Mount Polley Mine site has an annual net water surplus, and discharge from the mine site (after treatment, if required) is necessary to manage the mine site water and to prevent accumulation of water on the mine site on a year over year basis. Operations prior to the breach had an accumulation of surplus water in the TSF due to limited ability to discharge. A Water Management Plan, including the water balance, is presented in Golder (2015h). A brief summary of the water management plan is presented below.

The Water Management Plan for future operations is based on ongoing water discharge from the site at a maximum rate of 0.3 m^3/s (Golder 2015d).

The majority of water inflows into the TSF are pumped and are therefore in the direct control of the operator. These are:

- water discharged with the tailings slurry, at approximately 35% solids by weight;
- excess water pumped from the water management structures for temporary detention in the TSF, during the freshet and high flow events;
- dewatering flows from Springer Pit in anticipation of resumed mining in Springer Pit; and
- water pumped from Polley Lake to the TSF to provide make-up water to meet process requirements and to maintain the minimum pond volume in the TSF, if necessary for operation of the reclaim pumps.

The water inflows to the TSF that are not pumped, and therefore not in the direct control of the operator, are:

- precipitation on the direct footprint of the TSF; and
- runoff from the undiverted catchment directly above the TSF.

Outflows from the TSF consist of:

- reclaim water pumped to the mill by means of a floating barge within the TSF pond;
- seepage through the dam embankment and foundation to the seepage collection ponds;
- evaporation losses from the reclaim pond and wet tailings beaches;
- water required to re-saturate the existing tailings (non-recurring water loss after tailings are saturated);
- water retained in the newly-placed tailings; and
- water pumped to the Central Collection Sump (CCS).

The TSF will be managed by maintaining the pond volume within the operating range for reclaim water and make-up water. A minimum pond volume of 1.0 Mm^3 is to be maintained in the TSF to provide sufficient reclaim water for the process plant, along with a minimum pond depth of approximately 3 m for the operation of the reclaim barge. The TSF will be operated under normal conditions with a pond volume of between 1.0 and 1.5 million m^3.

Deposition of the tailings will be planned to maintain the pond in the centre of the facility, and against the natural topography on the western perimeter. A minimum beach length of approximately 100 m will be maintained between the TSF pond and embankment crest, during normal operations. Initial tailings deposition will be to fill in the eroded gulley at Corner 1 formed during the breach. The supernatant pond will, therefore, be against the Perimeter Embankment at Corner 1, which includes the Cutter Soil Mixer (CSM) constructed plastic concrete cut-off wall. As tailings deposition continues, the pond will be pushed away from the Corner 1 Perimeter Embankment. At an approximate tailings elevation of 960 m, a more uniform tailings surface will be formed and the pond can be maintained within the centre of the facility against the western boundary of the TSF against the natural topography. The location of the supernatant pond over the life of the TSF is shown in the tailings deposition figures in Appendix D.

From a tailings elevation of 965 m, the TSF will provide:

- approximately 1.5 Mm^3 of storage capacity with 300 m long beaches;
- approximately 3 Mm^3 of storage capacity with 100 m long beaches; and
- approximately 4 Mm^3 of storage capacity with the pond covering all of the beach at the edge of the embankments.

Additional detention capacity would be provided by the embankment above the tailings.

A site-wide operational water balance model was developed by Golder (2015d) using GoldSim™ simulation software (Version 11.1). Temporary detention of water will be necessary to manage the large runoff volumes generated during the freshet (April to June, inclusive). The inflows during the freshet will exceed treatment and discharge flow rates, and the detention volume is required to prevent spills from the CCS and to equalize the flow for treatment. Because of the large freshet volumes, it will be necessary to utilise the TSF for temporary detention and attenuation of flow rates: however, the fundamental basis of the water management plan is to not accumulate water on site (including the TSF) by treating and discharging water, and to not carry over water from year to year even under extreme wet conditions. The water balance model shows that under average climate conditions, the peak TSF volume is within the normal operating range and would not exceed 1.5 Mm^3. During the 90% (1 in 10 year) freshet, a peak volume of approximately 2.1 Mm^3 is expected, while for the 99.5% (1 in 200 year) freshet, a peak volume of approximately 3.5 Mm^3 is expected within the TSF in early July.

6.2 Seepage from the TSF

During the operations prior to the breach, the seepage through the foundations drains was measured and is summarized in Table 4. An additional seepage loss of 5,840 m^3/month (2.2 litres/second), not captured by the foundation drains, has previously been assumed (Knight Piésold 2005).

Table 4: Seepage Rates (Based on Field Measurements by Mount Polley)

Location	Seepage Flow Rate	
	m^3/s	L/s
To South Seepage Pond	0.0009	0.9
South Toe Drain	0.049	49
Main Toe Drain	0.0061	6.1
Perimeter Drain	0.0279	27.9

The seepage analyses carried out on typical sections of the Main and Corner 1 Perimeter Embankments show that the seepage from the TSF will not significantly increase by the raising the TSF to the 970 m elevation. The total seepage will be dependent on the degree of reduction in permeability of the consolidated tailings, and the length of the sub-aerial beach. The results of the analyses are presented and discussed in Section 13.0.

7.0 CORNER 1 PERIMETER EMBANKMENT DESIGN

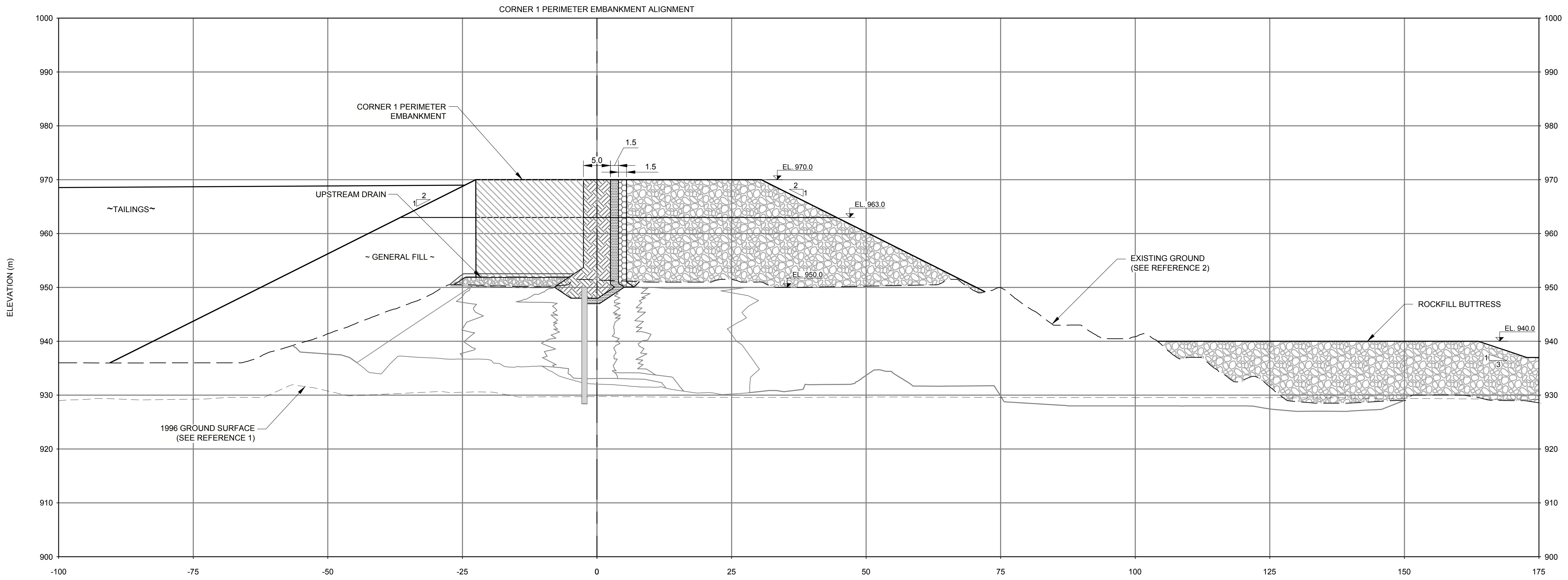
The Corner 1 Perimeter Embankment will raise the existing Freshet Embankment to a crest elevation of 970 m, and will tie into the existing Perimeter Embankment. The Corner 1 Perimeter Embankment may be constructed in one season (2016) to a crest elevation of 970 m, or over two seasons. If the construction is staged, the Corner 1 Perimeter Embankment will be raised initially to elevation 963 m, and then to elevation 970 m the following year.

The alignment of the Corner 1 Perimeter Embankment will approximately follow the cut-off wall alignment, but with fewer bends to simplify construction. A prefix of 20+ will be used for the alignment of the Corner 1 Perimeter Embankment. The Corner 1 Perimeter Embankment alignment ties into the Set Out Line (till core centreline) alignment of the existing embankments. The 2015 Freshet Management Embankment alignment, prefix 10+, will no longer be used.

7.1 Embankment Zoning

The design developed for the Corner 1 Perimeter Embankment to Elevation 970 m is shown in the construction drawings included in Appendix A. Figure 22 presents a typical section of the Corner 1 Perimeter Embankment. The design follows the same embankment zoning configuration used previously (prior to the breach in 2014). From downstream towards upstream, the 970 Detail Design will consist of the following components:

- A rockfill buttress (Zone C), with 3 Horizontal to 1 Vertical (3H:1V) downstream face, which will:
  - impose a low shear stress on the foundation soils due to the flatter downstream slope; and
  - increase the length of potential slip surfaces passing through the foundation soils, thereby resisting force and improving stability, as indicated by the calculated factor-of-safety.
- A rockfill embankment (Zone C), with a 2 Horizontal to 1 Vertical (2H:1V) downstream face placed in contact with new and existing transition material, and existing rockfill.
- Filter (Zone F) and transition (Zone T) zones to prevent internal erosion and piping of the till core:
  - filter material will be placed downstream of the till core; and
  - transition material will be in contact with the filter material.
- Till core (Zone S), which is the central zone and low permeability element.
- Upstream fill (Zone U) to provide support to the till core and surrounding aggregates.
- Upstream drain located upstream of the till core which will collect and discharge water outside the TSF.
- Existing instrumentation will be maintained during the construction. Instrumentation that is damaged during construction will be replaced.



SCALE 1:750 m (A) CORNER 1 PERIMETER EMBANKMENT TYPICAL SECTION

NOT FOR CONSTRUCTION

0 12.5 25
1:750 METRES

LEGEND

- EXISTING GROUND (SEE REFERENCE 2)
- CUT-OFF WALL
- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- DRAIN ROCK
- TILL CORE
- UPSTREAM FILL
- NON-WOVEN GEOTEXTILE

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO ADJUSTED MINE GRID DATUM.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "1996 TSF Topo.dxf", RECEIVED: MARCH 11, 2015.
2. TOPOGRAPHY FROM MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.

CLIENT
MOUNT POLLEY MINING CORPORATION

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-11-02
DESIGNED	GJ
PREPARED	JY
REVIEWED	AJH
APPROVED	TLE

PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMITER EMBANKMENT TYPICAL SECTION

PROJECT NO.	PHASE/DOC.#	REV.	FIGURE
1413803	3000/074	0	22

7.2 Surface and Foundation Preparation

Surface and foundation preparation is required at the following locations prior to any fill placement:

- along the Cut-off Wall Aggregate and Transition Material at the crest of the Freshet Embankment;
- at the north and south abutments; and
- at the foundation of the toe buttress.

A trench is to be excavated within the cut-off aggregate, on either side of the cut-off wall, to allow till placement. The trench is to be excavated down to elevation 948 m on the upstream side and backfilled with till. The trench is to be excavated down to elevation 947 m on the downstream side and backfilled with filter material to elevation 948 m and then with till. The excavation and filling sequence will be defined in the field at the start of the construction program by excavating several test pits along the wall to confirm the condition of the cut-off wall. The cut-off wall achieved an average 28 day unconfined compressive strength of 1.94 MPa and testing showed that the strength continued to increase after 28 days and is unlikely to require support. The observations made during excavation of the test pits will allow the excavation and backfill plan is to be developed by the Geotechnical Engineer (Golder). Existing cut-off aggregate and transition material downstream of the cut-off wall excavation is to be exposed to allow tie-in of the new filter and transition material. The foundation preparation and excavation required along the crest of the Freshet Embankment is shown in Drawing 514.

The existing till core on the abutments from elevation 950 m to 970 m is to be exposed, as determined by the Geotechnical Engineer. At the crest of the abutments, the placement of filter material downstream of the till was not completed prior to the breach occurring. Available survey data has been reviewed by Golder, and a verification test-pitting program was completed in 2015. The extent of this area is to be confirmed during construction. The portion of the transition material in contact with the till is to be excavated and replaced with filter. The foundation preparation and excavation at the abutments is shown in Drawing 515.

Stockpiled material, vegetation, tailings and topsoil is to be stripped along the footprint of the toe buttress. Stripped material will be managed in accordance with MPMC soil management programs. The existing tailings access road can be retained. The layer of tailings that exists beneath the road will not pose a stability concern if foundation preparation is carried out either side of the road. The extent of the foundation preparation for the buttress is shown in Drawing 519.

7.3 Till Core Tie-in Details

The till core tie-in to the existing cut-off wall is required to prevent erosion of till along the contact with the cut-off wall and to limit the hydraulic gradient across the till core.

Till will be placed on either side of the exposed cut-off wall to a minimum depth of 2 m, and to a minimum width of 2 m either side of the cut-off. This will provide a hydraulic pathway of 5 m along the till contact with the cut-off wall which is the same as the minimum width of the till core.

7.4 Upstream Drain

Drainage and consolidation of newly placed tailings will be promoted by the construction of an upstream drain along the upstream crest of the 2015 Freshet Management Embankment. The drain will also limit the hydraulic head imposed on the embankment. The upstream drain will collect water coming from within the TSF and will discharge the water outside the TSF into the Breach Pond (which reports by open ditch flow to the Perimeter Embankment Till Borrow Pond).

The upstream drain will consist of the following:

- An approximately 1 m thick and 20 m wide layer of drain rock placed on top of the existing upstream fill for the full length of the 2015 Freshet Management Embankment. The drain rock will be wrapped in a non-woven geotextile.
- Perforated corrugated polyethylene (PCPE) pipes will be placed within the drain rock at approximately 50 m spacing. The PCPE pipe will collect the seepage water within the drain rock and convey it into the solid High Density Polyethylene (HDPE) pipe. The pipe will fall at a minimum 2% grade.
- Solid HDPE pipe will convey the seepage water through the till core. The pipes will drain into a single pipe which will discharge into the Breach Pond. Filter sand will be placed around the pipe immediately downstream of the till core to prevent piping of the till core along the outside of the pipe.

The Perimeter Embankment upstream drain will drain into the Corner 1 Perimeter Embankment drain. Upstream fill will be placed along the upstream edge of the Perimeter Embankment forming a platform for the construction of the upstream drain. This drain will consist of 1 m thick drain rock wrapped in geotextile. A PCPE will be placed within the drain rock and will connect to the PCPE pipe within the Corner 1 Perimeter Embankment drain.

The design of the upstream drain is shown in Drawings 516 to 518.

7.5 Toe Buttress

A buttress will be required along the toe of the Corner 1 Perimeter Embankment, for both the elevation 963 m and 970 m designs. The buttress will increase the length of potential failure surfaces passing through the foundation soils, thereby, increasing the resisting force and increasing stability.

The buttress design is based on stability analyses of four sections along the length of the embankment, and is based on foundation information currently available and the assumption that the UGLU extends into this downstream area. The properties of the soil units within the breach area are well understood, but the downstream extent is not as clearly defined. Drilling of further geotechnical holes (assuming approval of use of the TSF for tailings deposition) would be carried out to delineate the extent of the UGLU and to assess if the proposed extent of the toe buttress could be reduced based on the actual soil conditions.

Upset conditions, with the supernatant pond extending to the embankment (no sub-aerial beach) and the upstream drains not functioning, have been used for the design of the buttresses under static conditions. The maximum normal operating pond elevation (100 m beach) has been used for the design under pseudo-static conditions. The current buttress design assumes the use of rockfill. If tailings or other alternative construction materials are used, the buttress may change depending on the weight and shear strength of the material used.

8.0 EMBANKMENT RAISE TO ELEVATION 970 M

The TSF embankments (Main, Perimeter and South) are currently at an elevation between 968 m and 970 m. The embankments are to be raised to a minimum crest elevation of 970 m.

The embankment raise consists of construction of the toe buttress along the Main and Perimeter Embankments, raise of the embankment materials to 970 m, and extension of the embankments at the abutments.

8.1 Embankment Raise

The embankments are to be raised approximately 2 m, to reach a crest elevation of 970 m.

The embankments are to be raised using centreline construction, and maintaining the existing embankment configuration. The materials used are similar to those used in previous year's construction (prior to the breach) with the exception of the filter zone. Previous construction specified the placement of transition against the till core, and the excavation of a 0.9 m deep slot in which the filter material is placed and compacted. To limit potential segregation of the filter material during placement, this methodology will not be used except where transition material has already been placed against the till core. The specified gradation of the filter material has also been modified from the construction prior to the breach.

The till core will be placed and compacted in 0.3 m thick lifts (loose thickness). The filter material will be placed against the till core, also placed and compacted in 0.3 m thick lifts. The transition material will be placed against the filter in 0.6 m thick lifts. Rockfill will be placed in maximum 1 m lifts against the transition material and compacted. The upstream fill will consist of tailings deposited in cells upstream of the till core or other free-draining granular materials.

The 2014 TSF construction program was underway at the time of the breach and was not completed. Filter material was not placed against the till core between approximately elevation 966.5 m and 968 m, along the entire length of the embankments. This was identified from the as-built survey and confirmed through test pits excavated along the crest. The construction to bring the filter material to the same level as the till core will be similar to the method used prior to the breach. A slot will be excavated within the transition material and exposing an almost vertical face of the till core. Appropriate continuity of existing materials will be confirmed and filter will be placed in the slot in a manner which limits segregation.

The rockfill shell will be raised at the existing 1.3H:1V downstream slope, with no additional material placed on the downstream slope. If the decision is made to close and rehabilitate the facility at the 970 m crest elevation, the 1.3H:1V downstream rockfill slope will be resloped to 2H:1V as part of closure and rehabilitation. If the embankment is to be raised beyond the 970 m elevation, the embankment will be constructed at a 2H:1V slope by placing rockfill in lifts along the toe of the embankment.

The buttress is considered separate to the embankment and is constructed with a 3H:1V downstream slope.

8.2 Abutment Detail

The embankment will extend onto natural ground at the Corner 4 and Corner 5 abutments. The abutment detail will consist of the till core tied into competent foundation till or onto bedrock. A filter blanket is to be placed downstream of the till core, along the till foundation. The abutment tie-in design will be similar to that specified previously by AMEC (AMEC 2013) to maintain a consistent till core and filter blanket tie-in.

The location and extent of the abutment excavation will be confirmed by the Geotechnical Engineer during construction. Access roads into the TSF and the embankment of the bio-solids stockpile are present at the Perimeter Embankment Abutment. A pond and clean water diversion ditch is present at the South Embankment Abutment.

The foundation preparation will consist of removal of top soil, organics, and soft or loose soil to expose either a competent till foundation or bedrock. Where the foundation till is greater than 2 m thick, the till core will be keyed into the foundation till. Where the till is less than 2 m, the till core is to extend down to competent bedrock. The depth of the till foundation will be confirmed by the excavation of test pits.

Where excavation is down to bedrock, highly fractured and weathered bedrock overlying sound bedrock is to be removed. The surface of the exposed bedrock is to be cleaned of all soils and loose bedrock. Depending on the condition of the bedrock and the opinion of the Geotechnical Engineer, additional treatment may be required which may consist of the placement of bentonite, shotcrete or slush grout.

The embankment design at the abutments is shown in Drawing 522, included in Appendix A.

8.3 Toe Buttress

Additional toe buttressing is required along the Main and Perimeter Embankment, with the design of the toe buttress presented in Golder (2015c). An amendment to the *Mines Act* Permit M-200 was received on October 22, 2015 that authorizes construction of these buttresses.

The buttress designs are based on stability analyses carried out on sections along the length of the embankments, presented in Golder (2015c). Additional analyses are presented in this report (Section 14) for a tailings elevation to 969 m, which represents the tailings closure surface at the end of the currently proposed mine plan. No change to the design is required based on these additional analyses.

9.0 CONSTRUCTION MATERIALS

The following subsections provide the details of the materials to be used for the embankment construction. All fill material will be non-potentially acid generating and fall within the specified gradations envelopes, as shown in Figure 23.

Fill materials are to be produced, stockpiled, hauled, placed and spread in a manner to minimize segregation. Materials not complying with the specified gradations will not to be used in the construction. If placed materials are determined not to meet the required gradations, or become contaminated such that the gradation specifications are not met, the material will be removed or corrections implemented at the direction of the Geotechnical Engineer.

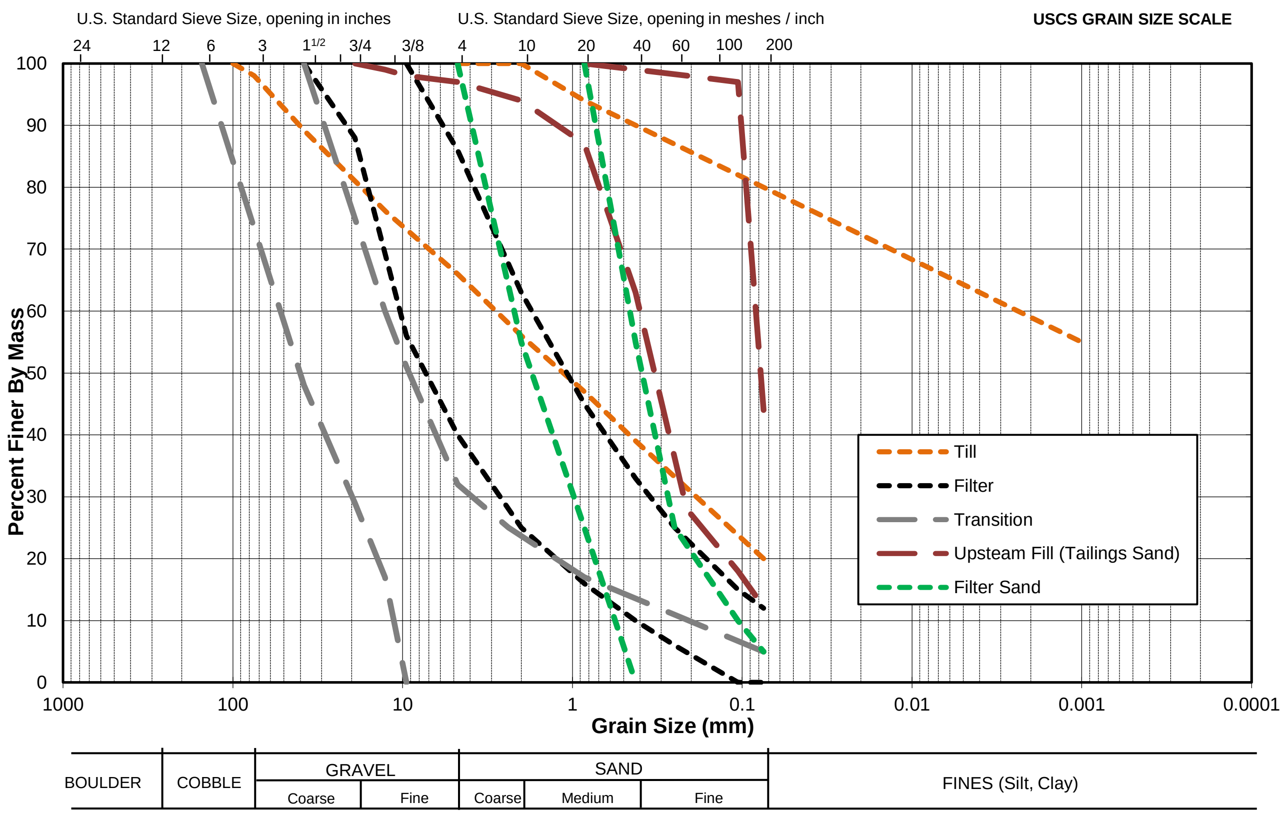


Figure 23: Construction Material Particle Size Distribution Envelope

9.1 Till (Zone S)

The till (Zone S) will be used to construct the central core of the embankment, and will control seepage through the embankment. The till is to be well graded with a minimum fines content of 20% by weight. The particle size distribution is shown in Table 5 and in Figure 23.

The till will be sourced from specified borrow areas or from excavations made during the construction of the water management structures downstream of the TSF. The hydraulic conductivity of the till will be less than $1x10^{-6}$ cm/s.

Table 5: Gradation Limits for the Till

Size (mm)	Sieve Size (USS)	Percent Passing (%)
150	6"	100
19.1	3/4"	65 - 100
4.75	#4	40 - 85
0.075	#200	20 - 40

The till will be placed in 0.3 m loose lifts and compacted to 95% of the Standard Proctor maximum dry density at between plus or minus 2% of the Standard Proctor optimum moisture content, as determined by ASTM D 698.

9.2 Filter (Zone F)

The filter material (Zone F) will be comprised of sand and gravel that is produced by crushing waste rock or processed from natural sand and gravel deposits. The particle size distribution is shown in Table 6 and in Figure 23.

The filter material has been designed to be filter compatible with the till core. The key particle size limits for the filter are a maximum D_{15} = 0.7 mm for filter compatibility with the till and tailings and a minimum sand content of 40% (maximum D_{40} = 4.75 mm). Internal stability of a granular filter composed of crushed aggregates with a similar gradation to the proposed filter was carried out by Golder for the Antamina Tailings Facility (Eldridge and Gilmer, 2002). This filter material was shown not to erode under hydraulic gradients much greater than is expected within the MPMC TSF embankments. Construction of the Antamina tailings dam was started in 1999 and the dam has now been raised to a height greater than 220 m.

Table 6: Gradation Limits for the Filter

Size (mm)	Sieve Size (USS)	Percent Passing (%)
37.5	1.5"	100
19.1	0.75"	88 - 100
9.5	3/8"	56 - 100
4.75	#4	40 - 86
2	#10	25 - 63
0.85	#20	16 - 45
0.425	#40	10 - 33
0.25	#60	6 - 25
0.106	#140	0 - 15
0.075	#200	0 - 12

USS = United States Standard Sieve Size

The filter material will be placed in 0.3 m thick loose lifts and compacted to at least 95% of the Standard Proctor maximum dry density at between plus or minus 5% of the Standard Proctor optimum moisture content. If the moisture content of the filter is too high for compaction, the lift will be allowed to drain prior to compaction. Over compaction of the filter will be avoided to reduce the production of fines from particle breakage during compaction.

9.3 Transition (Zone T)

The transition material (Zone T) is to be comprised of cobbles, gravel and sand that are formed from crushing or screening waste rock to produce a material with a particle size distribution shown in Table 7 and Figure 23.

Table 7: Gradation Limits for the Transition

Size (mm)	Sieve Size (USS)	Percent Passing (%)
152.4	6"	100
25.4	1"	48 - 100
19.1	0.75"	29 - 75
12.7	0.5”	17 - 60
9.5	3/8”	0 - 51
4.75	#4	0 - 32
2.38	#8	0 - 25
0. 85	#20	0 - 17
0.075	#200	0 - 5

USS = United States Standard Sieve Size

The transition material is to be placed in 0.6 m loose lifts and compacted using 6 passes of a 12-tonne vibratory smooth drum roller or equivalent compactive effort.

9.4 Filter Sand

The filter sand is to be a granular material meeting the particle size distribution shown in Table 8.

Table 8: Gradation Limits for Filter Sand

Size (mm)	Sieve Size (USS)	Percent Passing (%)
4.75	#4	100
2	#10	55-100
0.85	#20	25-100
0.425	#40	0-55
0.25	#60	0-25
0.106	#140	0-10
0.075	#200	0-5

The filter sand will be placed in 0.3 m thick loose lifts and compacted to at least 95% of the Standard Proctor maximum dry density.

9.5 Upstream Fill (Zone U)

The upstream fill (Zone U) provides support for the till core. The upstream fill will consist of tailings sand which will either be mechanically placed and compacted for the Corner 1 Perimeter Embankment raise to elevation 970 m, or as tailings discharged into cells and compacted for the South, Main and Perimeter Embankments raise to elevation 970 m.

The upstream fill placement, prior to the breach, was typically tailings deposited in cells and compacted, which confined the coarser fraction and allowed the water and finer fraction to overflow into the TSF. Rockfill material was also used as upstream fill, prior to the breach, select locations. During construction of the Freshet Embankment, tailings sand obtained from the upstream fill along the South Embankment was used.

9.5.1 Corner 1 Perimeter Embankment

For the Construction of the Corner 1 Perimeter Embankment, tailings sand excavated from the upstream fill zone along the South, Perimeter and Main Embankments will be used. There is only sufficient tailings sand for the approximately 20 m zone in contact with the till core. The remainder of the upstream fill which forms the downstream slope, can be general fill which can include tailings, till or rockfill.

The tailings sand will be placed in 0.6 m thick layers and compacted with a smooth-drum roller, to achieve a dry density of at least 95% of the Standard Proctor maximum dry density, as determined by ASTM D 698.

9.5.2 South, Main and Perimeter Embankments

The upstream fill zone along the South, Main and Perimeter Embankments will be constructed similar to prior to the breach. The tailings will be placed in cells confined by berms created from previously placed tailings. A weir (discharge box) will decant the fine water and finer tailings from the cell to the TSF, leaving the coarser tailings to settle out in the cell. A dozer will be used to evenly distribute the coarser tailings in the cells, provide compaction, and promote the drainage of excess water.

The tailings delivery line will allow the placement of tailings along the entire length of the embankments. The use of rockfill, or alternative construction materials, as upstream fill will be evaluated when there are construction delays or to meet depositional objectives.

9.6 Rockfill

The Rockfill used for the embankment and buttress construction will be well graded with a maximum particle diameter of 1 m, and obtained from run-of-mine waste rock.

The Zone C Rockfill placed within 10 m adjacent to the Transition Material will be placed in maximum 1 m loose lifts and compacted using 6 passes of 12-tonne vibratory smooth drum roller. The remainder of the Zone C Rockfill for the embankment will be placed in a loose lifts, up to 3 m thick, and nominally compacted by routing of loaded haul truck traffic on the Rockfill.

The Rockfill for the buttress will be placed and spread in a single lift.

9.7 Drain Rock

Drain rock with a uniform gradation between 150 mm and 300 mm will be used to construct the upstream drains. To prevent the migration of the tailings sand within the drain rock, the drain rock will be wrapped with geotextile.

9.8 Geotextile

An 800 g/m^2 non-woven needle punched geotextile will be placed along the base of the drain rock, and will be covered with a 340 g/m^2 non-woven needle punched geotextile. The use of the heavy geotextile under the drain rock allows the drain rock to be dumped from trucks directly onto the geotextile.

9.9 Perforated and Solid Pipes

The perforated pipe will be PCPE, ADS N-12 and 150 mm diameter with a smooth interior wall.

The solid pipe will be HDPE pipe, SDR 9 and 150 mm diameter.

10.0 SPILLWAY DESIGN

A spillway will be constructed at Corner 5 at closure of the TSF. The spillway will be constructed at an invert elevation to limit the maximum pond size to not exceed approximately 15% of the tailings surface area. The spillway will be designed to route the probable maximum flood (PMF) and will discharge into the CCS.

The design of the spillway is presented in Drawings 526 and 527.

11.0 CONSTRUCTION SCHEDULE AND SEQUENCE

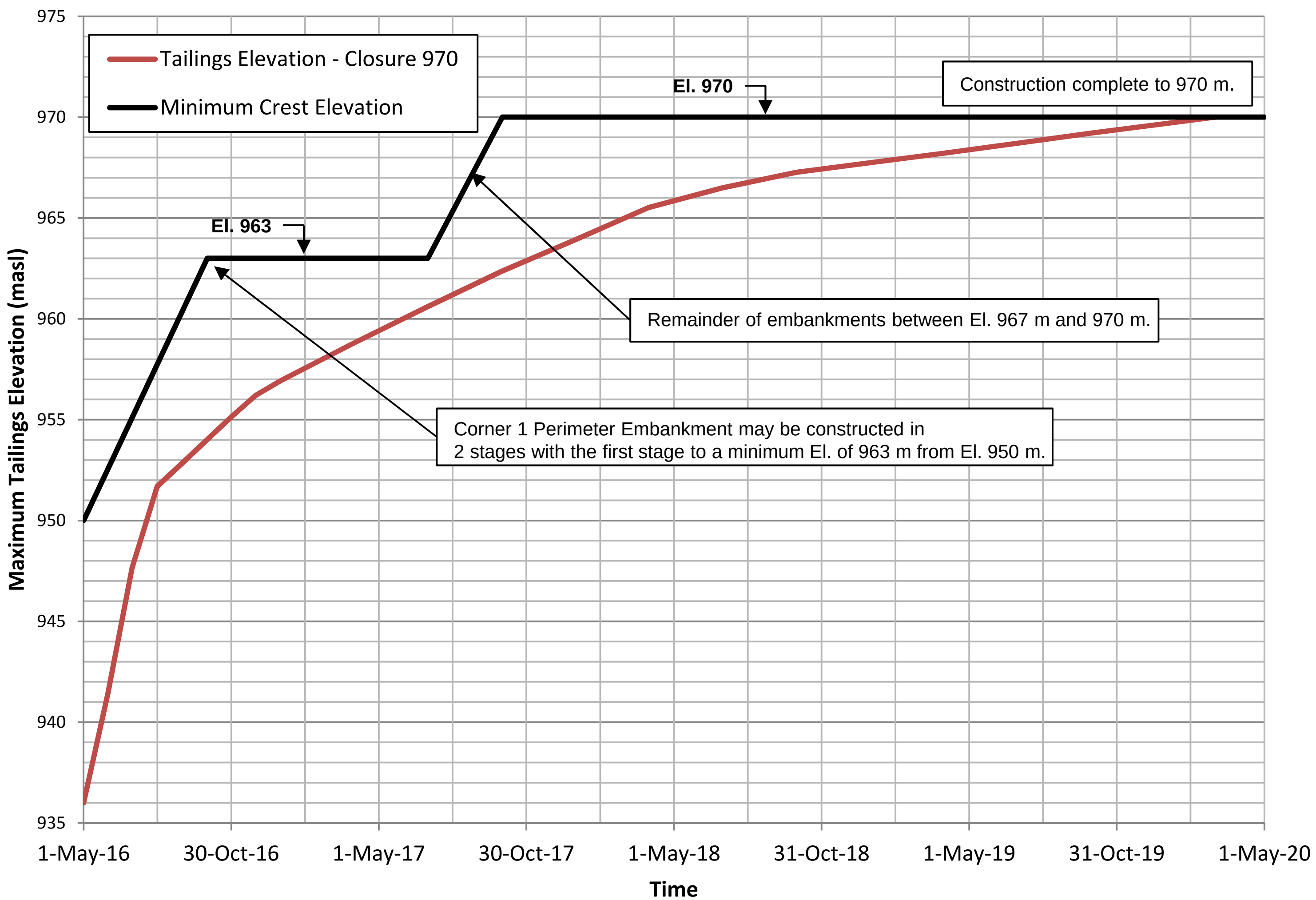
The planned construction schedule is based on MPMC obtaining a permit to start depositing tailings within the TSF in May of 2016.

The construction of the embankments, with a till core, can generally only occur from May to the end of September. June is typically a wet month which may delay construction. The construction of the rockfill buttresses, and placement of Zone U (Upstream Fill), Zone F (Filter) and Zone T (Transition) can occur year-round provided measures are taken to manage snow, ice and surface water. The construction schedule and sequence has assumed a construction period from May to end of September for till core placement.

11.1 Construction Schedule

MPMC have received a permit to start construction of the buttresses along the Perimeter and Main Embankment (Golder 2015c). This work is scheduled to start in late 2015. The construction of the Corner 1 Perimeter Embankment to crest elevation 963 m could start at any time of the year for placement of the downstream rockfill buttress fills, the upstream fills. Placement and compaction of till core could start in approximately May 2016. The construction of the Corner 1 Perimeter Embankment to elevation 970 m will be completed the following year (2017), along with the raise of the South, Perimeter and Main Embankments. A minimum freeboard of approximately 2 m (top of tailings surface to crest of dam) shall be maintained prior to the start of the next stage of construction. Figure 24 shows the embankment construction sequence to a 970 m crest elevation, along with the planned tailings deposition schedule.

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Tailings Deposition Planning\June 2015



Notes:
1. Deposition rate based on MPMC Mine Plan and a settled density of 1.35 tonnes/m^3.
2. Tailings surface with a 1% sub-aerial and 3% sub-aqueous beach slope.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
TSF EMBANKMENT
CONSTRUCTION SCHEDULE

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	30OCT15	SCALE NTS	REV.0
CADD	CTM	30OCT15	**FIGURE - 24**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

11.2 Construction Sequence

The following construction sequence is proposed for the Corner 1 Perimeter Embankment, although some activities will be performed simultaneously:

1) Construction of the till core tie-in, which consists of the excavation of the crest of 2015 Freshet Management Embankment, and backfill with filter and till material. The excavation and backfill, upstream and downstream of the cut-off wall, is to be sequenced to protect the integrity of the cut-off wall between elevation 947 m and 950 m.
2) Foundation excavation and preparation of the north and south abutments.
3) Construction of the upstream drain, which includes excavation and backfill of the pipe trenches.
4) Till core construction from elevation 950 m, including surrounding upstream fill, filter transition and rockfill.
5) Instrumentation installation.

Toe buttress construction, which includes foundation preparation, can be started at any time. The buttress construction should be completed no later than the completion of the embankment construction at each stage of construction (963 m and 970 m).

Sufficient construction material must be stockpiled or available during the construction to allow the sequential raising of the embankment with upstream fill, till, filter, transition and rockfill.

12.0 INSTRUMENTATION

Where possible, existing instrumentation will be maintained, extended and monitored throughout the construction works. Data obtained from the instrumentation will form one component of the overall system that will be used to monitor the condition and performance of the embankment.

The instrumentation will consist of:

- **Vibrating Wire Piezometers** to measure the pore pressure response in the foundation soils, and monitor the phreatic level within the embankment materials and tailings;
- **Slope Inclinometers** to monitor deformation and movement within the foundation; and
- **Shape-Accel-Array (SAA)** to monitor deformations within the cut-off wall (Freshet Embankment) and movement within the foundation (at Corner 1).

12.1 Corner 1 Perimeter Embankment

The SAA and vibrating wire piezometers present within the embankment and foundation will be maintained. The cables from the SAA and vibrating wire piezometers will be extended and protected from damage during the construction.

Four slope inclinometer casings are installed within the cut-off wall of the Freshet Embankment. SAAs will be installed in two of the casings (SI15-28 and SI15-30), and the other two casings will be backfilled and sealed with grout.

Slope inclinometer SI15-02 will likely be destroyed with the construction of the access ramp.

An additional 3 vibrating wire piezometers and slope inclinometer casings are to be installed downstream of the embankment, as part of the 2016 geotechnical investigation program.

The locations of the existing and additional instrumentation are shown on Drawing 525.

The monitoring, frequency and threshold levels of the instruments have been specified in the Operation, Maintenance and Surveillance (OMS) manual.

12.2 South, Perimeter and Main Embankments

No additional instrumentation is required to be installed within the embankment or foundation for the raise of the TSF to elevation 970 m. Additional inclinometers and piezometers may be installed within the foundation during the 2016 Geotechnical investigation program in anticipation of the ultimate 984 m crest elevation of the TSF (Golder 2015a).

Four vibrating wire piezometers are planned to be installed within the tailings during cone penetration testing to be conducted on the tailings beach.

13.0 SEEPAGE ANALYSIS

Seepage analyses were carried out on a typical section of the Corner 1 Perimeter Embankment to provide an assessment of steady-state seepage, the effect of the upstream drain, and the potential hydraulic gradients in various embankment materials. Seepage analyses were also carried out on typical sections of the Main and Perimeter Embankments to provide an assessment of the steady-state seepage.

The computer software SEEP/W Ver. 7.17, developed by GEO-SLOPE International Ltd (GEO-SLOPE 2007), was used.

The porewater pressures obtained from the seepage analyses were used to develop the phreatic surfaces for the stability analyses.

13.1 Material Properties

The material properties used in the seepage analyses are shown in Table 9, and are based on the parameters used in previous design reports and results of the forensic investigation within the breach.

Table 9: Material Properties Used for Seepage Analyses

Material	Saturated Hydraulic Conductivity (m/s)	Notes
Till-Core, Foundation Till, Glaciofluvial	$1x10^{-8}$	Based on basal till (Knight Piésold 2005) and forensic investigation data.
Glaciolacustrine Unit (GLU)	$5x10^{-10}$	Based on Golder consolidation test results and forensic investigation data.
Filter	$1x10^{-2}$	Assumed by Golder.
Rockfill, Transition, Upstream Drain Material	$1x10^{-2}$	Assumed by Golder.
Upstream Fill	$1x10^{-5}$	Assumed by Golder.
Consolidated Tailings	$1x10^{-8}$	Assumed by Golder.
Tailings	$1x10^{-6}$	Golder (2015b).
Cut-off Wall	$1x10^{-8}$	Golder (2015e) QA testing during construction of the Cut-off wall shows that the hydraulic conductivity is less than $1x10^{-9}$ m/s.

The hydraulic conductivity selected for the cut-off wall is an upper bound based on the permeability testing of samples taken from the cut-off wall (Golder 2015e). Additional analyses were carried out to determine the sensitivity of the seepage to a reduced permeability of the cut-off wall.

The upstream drains will be constructed from drain rockfill with a saturated hydraulic conductivity of approximately 1 $x10^{-2}$ m/s.

The tailings currently present in the TSF, deposited prior to the breach, have been consolidated and it is therefore assumed that these tailings will have a lower permeability than recently deposited tailings. The reduction in permeability is estimated to be two orders of magnitude, and is similar to the value assumed by Knight Piésold for consolidated tailings with increased loading (Knight Piésold 2005).

13.2 Analysis Sections

The following sections were analysed:

- Corner 1 Embankment section at Stn. 20+240;
- Main Embankment at Stn. 2+240; and
- Perimeter Embankment at Stn. 3+950.

The analyses were carried with the embankment at a crest elevation of 970 m and a maximum tailings elevation of 969 m. The sub-aerial tailings beach was varied within each analysis to estimate the influence on seepage. The upstream drain at the Corner 1 Perimeter Embankment, constructed at an elevation of 950 m upstream of the till core on the existing upstream fill, was included in the analyses.

13.3 Seepage Analysis Results

The seepage analyses are included in Appendix E and the results summarised in the sub-sections below.

13.3.1 Corner 1 Perimeter Embankment

The results of the seepage analyses for the Corner 1 Perimeter Embankment are summarised in Table 10 and Figure 25. The analyses are presented in Appendix E. The seepage values calculated includes the seepage through and under the embankment, as well as the seepage through the upstream drain where this has been modelled.

Table 10: Seepage Analyses Results – Corner 1 Perimeter Embankment

Configuration	Seepage							
	No Beach		100 m Beach		200 m Beach		300 m Beach	
	m^3/sec /m	L/s	m^3/sec /m	L/s	m^3/sec /m	L/s	m^3/sec /m	L/s
Cut-off Wall Permeability 10^{-8} m/s								
No Upstream Drain	7.03×10^{-6}	2.21	3.83×10^{-6}	1.21	2.42×10^{-6}	0.76	1.69×10^{-6}	0.53
With Upstream Drain	2.44×10^{-5}	7.69	4.47×10^{-6}	1.41	2.42×10^{-6}	0.76	1.69×10^{-6}	0.53
Cut-off Wall Permeability 10^{-9} m/s								
No Upstream Drain	1.45×10^{-6}	0.46	1.17×10^{-6}	0.37	9.74×10^{-7}	0.31	8.20×10^{-6}	0.26
With Upstream Drain	2.44×10^{-5}	7.69	4.45×10^{-6}	1.40	2.22×10^{-6}	0.70	1.40×10^{-6}	0.44

Notes

Corner 1 Perimeter embankment length of 315 m used to calculate the total seepage

The upstream drain is located at an elevation of 950 m

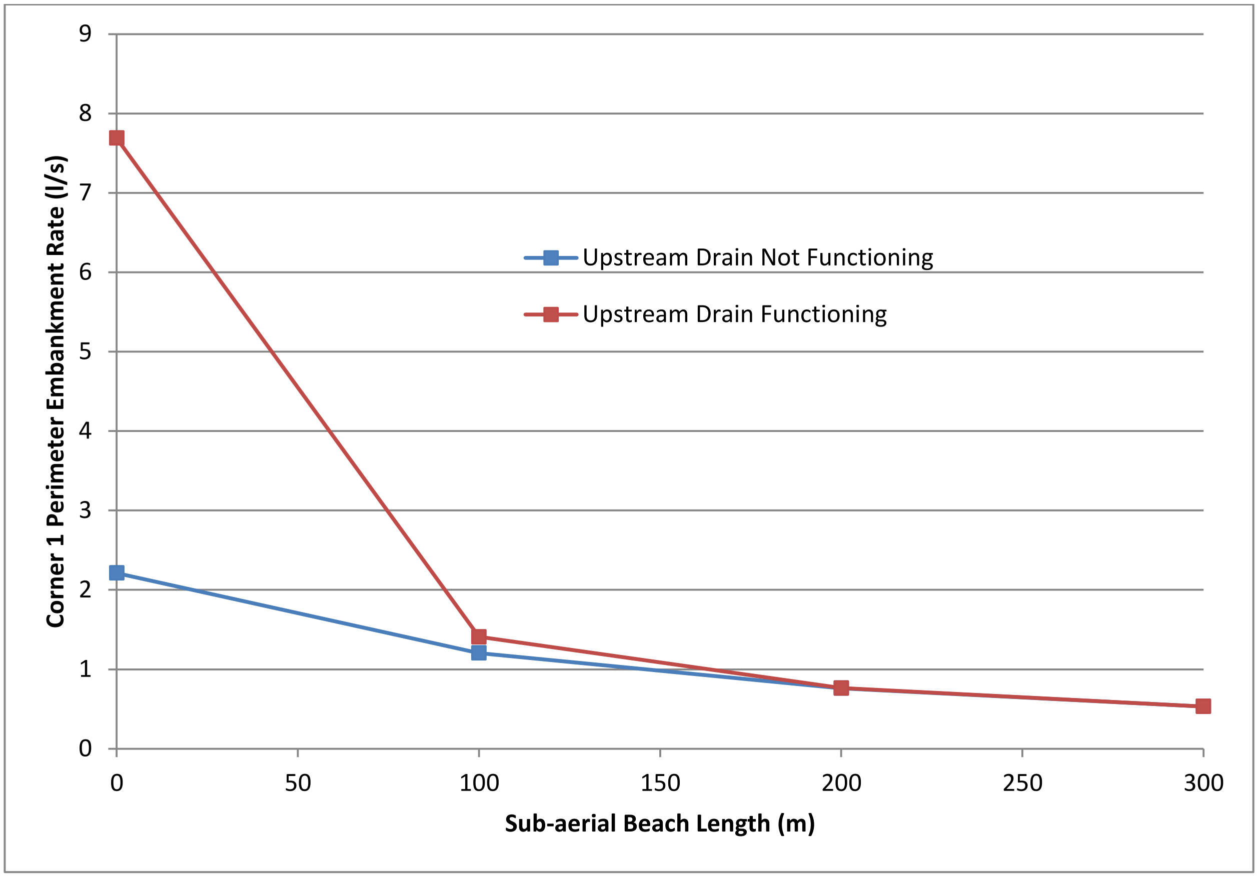


Figure 25: Estimated Seepage Rate Through the Corner 1 Perimeter Embankment (Elevation 970

The purpose of the upstream drain is to enhance consolidation of the tailings and to reduce the hydraulic head imposed on the existing core. Inclusion of the drain in the embankment section therefore increases the total amount of seepage that passes beneath the embankment, through the core and through the drain. The upstream drain captures a large portion of the total seepage, approximately 90%, with no sub-aerial beach. The portion of the seepage through the drain reduces to 35% with a 100 m sub-aerial beach. Minimal seepage is predicted to report through the upstream drain at beach lengths greater than 100 m.

The seepage analysis was also used to estimate the vertical hydraulic gradient for the Corner 1 Perimeter Embankment downstream of the cut-off wall. The upset condition with pond against the embankment was selected to represents the worst case scenario, along with a beach length of 100 m representing the maximum normal operating elevation of the pond. The filter blanket is adequate for the hydraulic gradients calculated. Results are presented in Figure E-14 in Appendix E.

13.3.2 Main and Perimeter Embankments

The results of the seepage analyses for the Main and Perimeter Embankments are summarised in Table 11. The seepage values calculated includes the seepage through and under the embankment.

Table 11: Seepage Analyses Results - Main and Perimeter Embankments

Tailings Permeability	Seepage							
	No Beach		100 m Beach		200 m Beach		300 m Beach	
	m^3/sec /m	L/s	m^3/sec /m	L/s	m^3/sec /m	L/s	m^3/sec /m	L/s
Main Embankment [a]								
Consolidated Tailings Permeability of 10^{-8} m/s	1.39×10^{-6}	1.66	1.60×10^{-7}	0.19	9.77×10^{-8}	0.12	6.88×10^{-8}	0.08
Uniform Tailings Permeability of 10^{-6} m/s	2.09×10^{-6}	2.51	1.69×10^{-6}	2.03	1.43×10^{-6}	1.72	1.23×10^{-6}	1.47
Perimeter Embankment [b]								
Consolidated Tailings Permeability of 10^{-8} m/s	1.20×10^{-6}	1.56	3.39×10^{-7}	0.44	1.57×10^{-7}	0.20	8.99×10^{-8}	0.12
Uniform Tailings Permeability of 10^{-6} m/s	1.33×10^{-6}	1.60	1.06×10^{-6}	1.27	8.68×10^{-7}	1.04	7.24×10^{-7}	0.87

a) Main Embankment length of 1,200 m used to calculate the total seepage, from approximately Stn. 1+600 to 2+800.

b) Perimeter Embankment length of 1,300 m used to calculate the total seepage, from Approximately Stn. 2+800 to Stn. 4+100.

The seepage values reduce with increased beach length.

14.0 STABILITY ANALYSIS

Stability analyses were carried out on the Corner 1 Perimeter Embankment using the slope stability computer software SLOPE/W Ver. 7.17, developed by GEO-SLOPE International Ltd (GEO-SLOPE 2007). The Morgenstern-Price method of slices was utilized and slip surfaces penetrating bedrock were not evaluated.

Total and effective stress analyses were completed. The total stress analysis was performed using the glaciolacustrine soil's undrained shear strength, and the effective strength parameters for all other soil and fill units.

To account for partial consolidation of the foundation soils during construction from elevation 950 m to 970 m, B-Bar values were assigned to the till, glaciofluvial, and glaciolacustrine soils to account for the excess pore pressures that may be generated during construction. The B-Bar value used was based on the measured pore-pressure response during construction of the 2015 Freshet Embankment.

14.1 Analysis Criteria

The minimum factors of safety (FoS) required are summarised in Table 12, and are as described in Section 3.0.

Table 12: Factor of Safety for Slope Stability Analyses

Loading Condition	Minimum Factor of Safety
End of Construction	1.5
Long-term	1.5
Pseudo-Static	1.0

For the pseudo-static analysis, the peak ground acceleration with a return period of 1:1000 years was selected for the design based on the Significant consequence classification of the embankments (refer to Section 3.0 and Appendix C). The coefficient of horizontal ground acceleration of 0.048 g was applied (50% of 0.096 g), along with 20% strength reduction for the glaciolacustrine soil, as per the recommendations of Hynes-Griffin and Franklin (Hynes-Griffin and Franklin 1984).

14.2 Material Parameters

14.2.1 Embankment Fill

Strength parameters to be used in the stability analyses have been selected based on interpretation of the available field and laboratory test data. This includes data from historic site investigation programs and the recent Golder site investigation program (Golder 2015f).

The properties used in the stability analyses for tailings and embankment materials are presented in Table 13.

Table 13: Embankment Material Properties for Stability Analyses

Material	Unit Weight (kN/m^3)	Shear Strength	Notes
Till-Core	20.5	Friction Angle, ϕ' =33° Cohesion = 0 kPa	Based on triaxial testing of two recompacted samples of till during the 1995 investigation (KP 1995) and triaxial testing by KCB (2015a and 2015b).
Filter / Cut-off Wall Aggregate	20	Friction Angle, ϕ' = 30° Cohesion = 0 kPa	Based on triaxial testing (Golder 2015b).
Rockfill	21.5	Non-Linear Strength Function: $\tau = 1.726\ \sigma_n^{0.899}$	Strength function based on Leps (1970) average rockfill. (Appendix F1).
Transition	20		
Upstream Fill (Compacted Sandy Tailings)	20	Friction Angle, ϕ' = 32° Cohesion = 0 kPa	Assumed by Golder.
Sandy Tailings (Uncompacted)	17	Friction Angle, ϕ' = 25° Cohesion = 0 kPa	Assumed by Golder.

τ = Shear strength; σ_n'= Effective normal stress;ϕ' Friction angle

14.2.2 Foundation Soil

The properties used in the stability analyses for the foundation materials are presented in Table 14.

The strength parameters selected for the foundation till and glaciofluvial layers are consistent with the parameters used in the previous design analyses, the results of the testing and analyses of the Perimeter Embankment breach carried out by the IEERP, and the laboratory testing results provided by Klohn Crippen Berger (KCB 2015a and 2015b). It is recognized that the till and glaciofluvial materials vary in gradation depending on location, elevation and depositional history. The shear strength used represents an average for the material.

The glaciolacustrine soils have been analyzed using total stress (undrained) and effective stress (drained) strength parameters. The total stress approach uses the SHANSEP model that accounts for preconsolidation of the soil. The preconsolidation stress that has been selected for modelling the strength of each of the glaciolacustrine soil layers is based on the data collected for the specific layer and soils in the immediate area. The data used includes the results of the laboratory strength testing, CPT profiles, and the response of the soils during the drilling and sampling program, such as not being able to push a shear vane into the soil layer and bending of Shelby tubes during sampling. Along the Perimeter and Main Embankments, the preconsolidation stress selected for use in the analyses is at or below the lower bound of the values calculated from the laboratory consolidation tests and estimated from the CPT profiles.

Table 14: Foundation Material Parameters for Stability Analyses Within Corner 1 Area

Material	Unit Weight (kN/m^3)	Shear Strength		Pore Pressure Coefficient B-bar [a]	Notes
		Undrained	Effective Strength (Drained)		
Foundation Till	22	N/A	ϕ' =34° c = 0 kPa	0.2	Triaxial testing of samples of till by IEERP and KCB (2015a and 2015b).
Glaciofluvial	22	N/A	ϕ' =34° c = 0 kPa	0.2	Triaxial testing of undisturbed glaciofluvial samples by Golder (Golder 2015b) and KCB (2015a and 2015b).
Upper GLU (Corner 1 Perimeter Embankment)	20	Peak: $\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ Where σ'_p = 400 kPa Remoulded: Sur = 22 kPa	ϕ_p' =19 c = 0 kPa ϕ_r' =11 c = 0 kPa	0.46 (peak)	Extensive field and laboratory test programs by IEERP and KCB. Vane shear tests, CPT, Direct Simple Shear, Direct Shear and Triaxial Testing. Remoulded undrained shear strength selected as the average minus one standard deviation of the measured undrained shear strength values.
Lower GLU (Corner 1 Perimeter Embankment)	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ Where σ'_p = 700 kPa	ϕ_p' =25 c = 0 kPa	0.2	Field and laboratory test programs by IEERP, KCB and Golder. Vane shear tests, CPT, Direct Simple Shear, Direct Shear and Triaxial Testing.
GLU along the remainder of the Perimeter Embankment	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ Where σ'_p = 900 kPa	ϕ_p' =25 to 33° c = 0 kPa	0.2	Consolidation testing by Golder on GLU samples from Borehole GA15-06 at Perimeter Embankment indicates preconsolidation stress of 1200 kPa. σ'_p = 900 kPa selected as the design basis considering range of values obtained for the LGLU.
GLU along Main and South Embankments	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ Where σ'_p = 1200 kPa	ϕ_p' =25 to 33° c = 0 kPa	0.2	Field and laboratory test programs by KP, AMEC and Golder. Vane shear tests, CPT, Direct Simple Shear, Direct Shear and Triaxial Testing. Consolidation tests indicate a range of preconsolidation pressure from 1200 kPa to 3000 kPa. σ'_p = 1200 kPa selected as the design basis.

a) Refer to Section 14.2.3 for explanation of B-bar values chosen

τ = Shear strength; σ_v'= Effective vertical stress; ϕ_p' = Peak friction angle; ϕ_r' = remoulded friction angle; OCR = Over consolidation ratio; σ'_p = Preconsolidation Stress; c = cohesion

14.2.3 Pore Pressure Response Within the Foundation Soils

Excess pore pressures are generated within soils when a load is applied at a rate faster than water can drain from the pore spaces in the soil. The amount of excess pore pressure depends directly on the magnitude of the applied load, the permeability of the soil, and the rate of application. The pore pressure response within the soil units can be interpreted by means of the pore pressure coefficient B-bar, defined as the change in pore pressure over the change in confining stress (Skempton 1954).

The pore pressure response was measured within the glaciolacustrine soil, till, and glaciofluvial layers within the breach area by vibrating wire piezometers monitored during construction of the 2015 Freshet Management embankment, and at a single location along the Perimeter Embankment during the buttress construction.

The pore pressure response in the UGLU was measured with vibrating wire piezometer VST14-03 located beneath the zone of compacted rockfill for the 2015 Freshet Management Embankment construction. The maximum B-bar measured was 0.46 at an intermediate stage of construction, and at the end of fill placement.

The pore pressure response in the till and glaciofluvial layers were measured with vibrating wire piezometer SH-14-07 located adjacent to the zone of upstream fill. The maximum B-bar values were measured at the initial piezometer readings following fill placement. The B-bar values decreased with further fill placement. The decrease in the pore pressure and hence B-bar is due to drainage from the soil occurring at a rate faster than the rate of load application.

Only piezometers installed in GA15-06 at Stn. 3+400 along the Perimeter Embankment outside of the Corner 1 area showed a pore pressure response to the approximately 5 m high buttress rockfill that was placed.

Further detail on how the B-bar values calculations is included in Golder (2015c) and Golder (2015e).

The B-bar values are used for the analysis of the end of construction condition. The piezometers will be monitored during the construction to confirm the excess pore pressures do not exceed those assumed for the stability analyses. The glaciolacustrine soils will take approximately one year to dissipate based on the rate of consolidation measured in the laboratory and the field.

14.3 Corner 1 Perimeter Embankment

14.3.1 Stability Sections

Four sections, identified to represent the variability of the foundation and embankment conditions over the length of the Corner 1 Perimeter Embankment, were chosen for stability analysis. The sections are as follows:

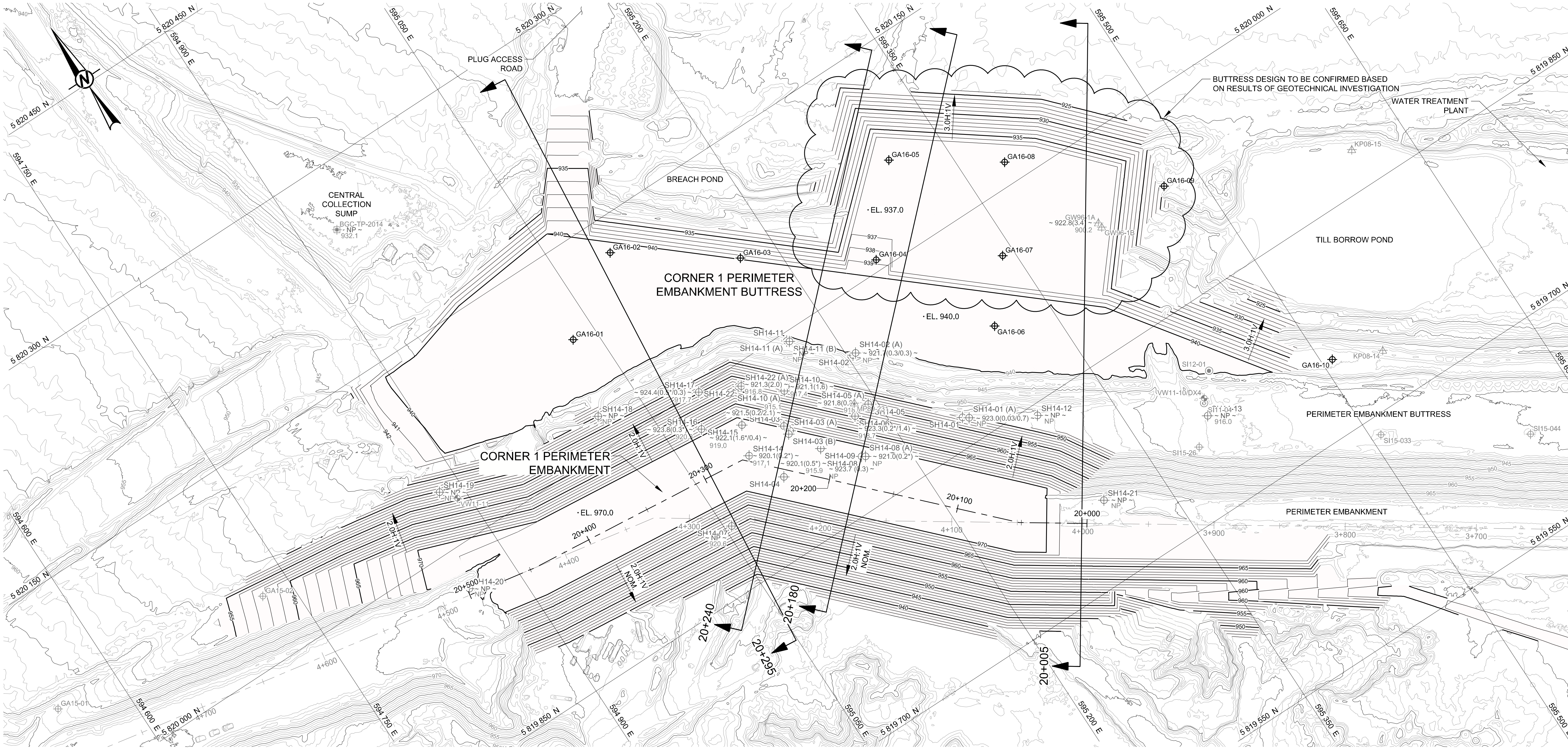
- Stn. 20+005;
- Stn. 20+180;
- Stn. 20+240; and
- Stn. 20+295.

The foundation conditions modelled are based on data from the available geotechnical site investigations. A layer of UGLU is assumed to be present downstream of the embankment from Stn. 20+000 to past Stn. 20+240, based on the glaciolacustrine soil observed in borehole GW96-1A.

The location of the stability sections, along with the borehole locations are shown in Figure 26.

An embankment crest elevation of 970 m and a tailings closure elevation of 969 m were used in the analyses. A Corner 1 Perimeter Embankment intermediate crest elevation of 963 m was also analysed.

The water level was set at the tailings elevation, representing an upset condition with the pond volume exceeding the normal operating water level and the upstream drains not functioning. This is considered a conservative condition. A 100 m beach length, based on the minimum beach length under normal operating conditions, was also analysed.



NOT FOR CONSTRUCTION

0 50 100
1:1,500 METRES

LEGEND

- 20+000 / 4+400 — CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
- SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)
- GA16-10 — PROPOSED BOREHOLE LOCATIONS (GOLDER 2016)
- SH14-21 — SONIC DRILLING AND INSTRUMENTATION INSTALLATION (KCB 2014)
- GW96-1B — MONITORING WELL OR PIEZOMETER INSTALLATION (KP 1996)
- BGC-TP-2014 — TEST PIT (BGC 2014)
- ~ 922.8 (3.4) ~ — TOP ELEVATION (THICKNESS) OF UPPER GLACIOLACUSTRINE UNIT - SEE NOTE 3
- 900.2 — TOP ELEVATION OF LOWER GLACIOLACUSTRINE UNIT - SEE NOTE 3
- NP — NOT PRESENT
- STABILITY SECTION LOCATIONS

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. FORWARD SLASH INDICATES SEPARATION BETWEEN TWO DISTINCT LAYERS OF UGLU AND LGLU, AN UPPER AND LOWER LAYER. * INDICATES UGLU IS INTERLAYERED WITH GLACIAL TILL.

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
3. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING NO. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT NO. P14178, FILE NAME: "ACAD-01.DWG", DATED: SEPTEMBER 2014.

CLIENT: MOUNT POLLEY MINING CORPORATION

CONSULTANT: Golder Associates

YYYY-MM-DD	2015-11-02
DESIGNED	GJ
PREPARED	JY
REVIEWED	AJH
APPROVED	TLE

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE: **CORNER 1 PERIMETER EMBANKMENT STABILITY SECTION LOCATIONS**

PROJECT NO.	PHASE/DOC.#	REV.	FIGURE
1413803	3000/074	0	26

14.3.2 Corner 1 Perimeter Embankment Buttress Design

Iterative analyses were conducted to design a buttress that would achieve a minimum static FoS of 1.5 and pseudo-static value of 1.0.

Two conditions were analysed:

- End of construction – Short term condition with the foundation soils only partially consolidated due to the applied load of the embankment. The tailings elevation used is based on the mine plan.
- Long term – The foundation soils have fully consolidated due to the loading of the embankment fill and the tailings elevation are 1 m below the crest of the embankment, representing the tailings closure surface.

The results for the analyses for the Corner 1 Perimeter embankment raises to elevation 963 m and 970 m are summarized in Table 15 and Table 16 for total and effective stress analysis. The analyses results presented assume that the upstream drain is not functioning. The analyses are presented in Appendix F.

Table 15: Total Stress Stability Analyses Results – Corner 1 Perimeter Embankment

Section	Crest Elevation (m)	Buttress Crest Width and Elevation	End of Construction [a]		Long Term	
			0 m Beach	100 m Beach	0 m Beach	100 m Beach
20+005	963	None required	N/A	N/A	N/A	N/A
	970	None Required	N/A	N/A	1.8	1.9
20+180	963	59 m at 936 masl	1.6	1.8	1.6	1.8
	970	59 m at 940 masl; 100 m at 937 masl	1.7	1.7	1.6	1.7
20+240	963	None required	1.6	1.8	1.6	1.7
	970	91 m at 940 masl;	1.6	1.8	1.5	1.9
20+295	963	None required	1.5	1.5	1.6	1.6
	970	79 m at 940 masl;	2.0	2.0	2.0	2.0

a) Tailings elevation at 954 for an embankment crest elevation of 963 m, and tailings elevation of 969 m for the 970 m crest elevation.

N/A = not analysed.

Table 16: Effective Stress Stability Analyses Results – Corner 1 Perimeter Embankment

Section	Crest Elevation (m)	Buttress Crest Width and Elevation	End of Construction	Long Term
			0 m beach	0 m beach
20+005	963	None required	N/A	N/A
	970	None Required	N/A	1.9
20+180	963	59 m at 936 masl	2.2	2.1
	970	59 m at 940 masl; 100 m at 937 masl	2.1	2.2
20+240	963	None required	2.0	2.1
	970	91 m at 940 masl	2.0	2.1
20+295	963	None required	1.9	1.9
	970	79 m at 940 masl	2.4	2.4

a) Tailings elevation at 954 for an embankment crest elevation of 963 m, and tailings elevation of 969 m for the 970 m crest elevation.

N/A = not analysed.

The extent of the glaciolacustrine layers, and specifically the UGLU, beyond the current toe of the 2015 Freshet Embankment is uncertain due to the limited number of boreholes in this area. In designing the required buttress, the UGLU has conservatively been assumed to extend downstream over the width of the buttress. If the UGLU is not present past GW-96-1, the width of the buttress required for a minimum FoS of 1.5 reduces by approximately 28 m (Figure F21 in Appendix F).

In addition to the design case, additional analyses were carried out to determine the sensitivity of the FoS to the phreatic level.

The FoS stays constant at approximately 1.8 if the beach length is 100 m or greater. The upstream drain functioning lowers the phreatic level near the embankment and improves the FoS to 1.8 for a beach length of less than 200 m. The results are shown in Figure 27.

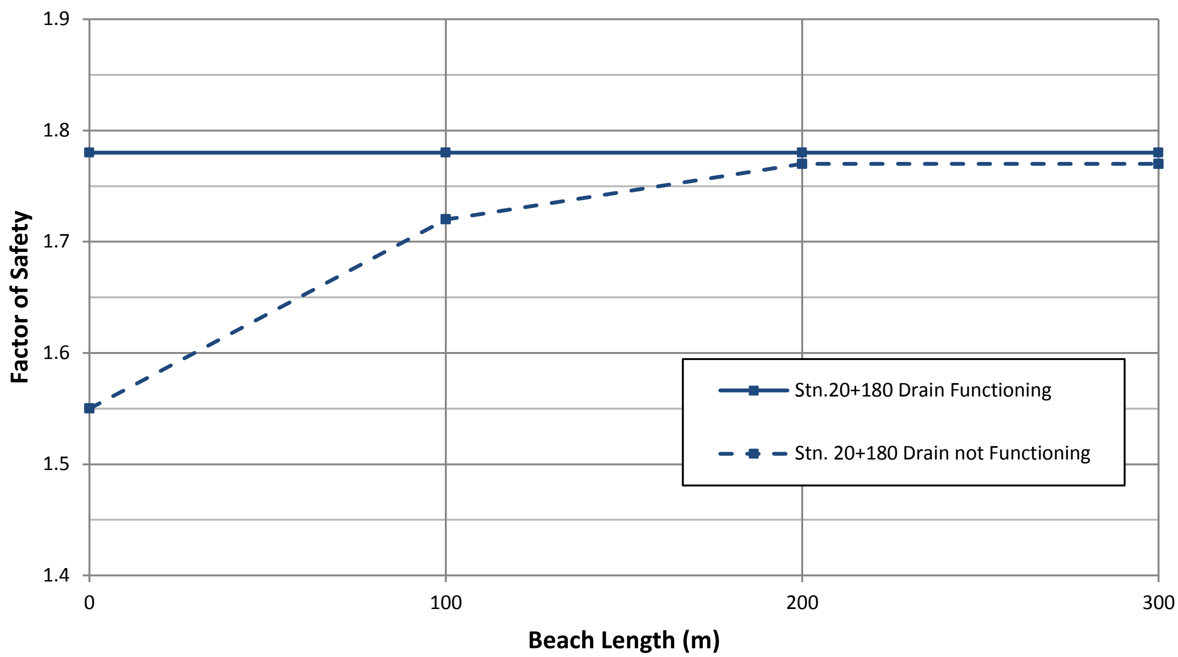


Figure 27: Influence of Beach Length and Upstream Drain on Corner 1 Perimeter Embankment Stability

14.3.3 Pseudo-Static Analyses

The results of the pseudo-static analyses are presented in Table 17. A seismic coefficient of 0.048 g was applied, and a 100 m minimum beach length during normal operations. The upstream drain was assumed not to be functioning.

Table 17: Pseudo-Static Stability Analyses Results – Corner 1 Perimeter Embankment

Section	Crest Elevation (m)	Total Stress Analysis	Effective Stress Analysis
20+005	963	N/A	N/A
	970	1.6	1.6
20+180	963	1.1	1.5
	970	1.1	1.5
20+240	963	1.4	1.8
	970	1.2	1.7
20+295	963	1.3	1.7
	970	1.8	2.1

Pseudo-static analyses used 100 m beach length

N/A = not applicable

14.4 Perimeter Main and South Embankments

The stability analyses and buttress design for the Perimeter, Main and South Embankments are presented in Golder (2015c). The buttress design was based on a tailings elevation of 967 m, which assumes the embankments will be raised beyond a crest elevation of 970 m. If the TSF is closed at crest elevation 970 m, the maximum tailings elevation increases to 969 m.

Table 18 present the FoS with the tailings at an elevation of 969. Total stress analyses, using isotropic GLU shear strength function and a beach length of 0 m and 100 m, was conducted. The analyses assume fully consolidated foundation conditions. No upstream drain was assumed to be present, as these likely will not be constructed if the TSF is closed at elevation 970 m.

Table 18: Total Stress Stability Analyses Results – South, Main, and Perimeter Embankments

Embankment	Section	Buttress Crest Width and Elevation	0 m Beach		100 m Beach	
			Static	Pseudo-Static	Static	Pseudo-Static
South	1+100	None required	1.8	1.4	1.9	1.5
Main	1+850	90 m at 930 masl	1.6	1.1	1.6	1.1
	2+060	90 m at 930 masl	1.6	1.1	1.6	1.1
	2+240	96 m at 930 masl	1.5	1.1	1.6	1.1
	2+460	85 m at 937 masl	1.8	1.3	1.8	1.3
	2+700	53 m at 942 masl	2.4	1.9	2.5	2.0
Perimeter	2+850	64 m at 945 masl	1.9	1.3	1.9	1.4
	3+190	49 m at 940 masl	1.9	1.6	2.0	1.5
	3+275	53 m at 940 masl	1.6	1.1	1.6	1.2
	3+400	64 m at 940 masl; 30 m at 930 masl	1.6	1.1	1.6	1.1
	3+535	67 m at 940 masl	1.5	1.1	1.6	1.2
	3+770	52 m at 940 masl	1.9	1.6	2.0	1.7
	4+525	None required	1.8	1.6	1.9	1.7

N/A = not analysed.

The existing buttress design meets the required static and pseudo-static design criteria.

14.5 Embankment Deformation During Earthquake

Deformations in an earth dam can result from a new or increased load to the facility such as a raise or an externally imposed load by an earthquake. As the Mount Polley TSF has been, and is planned to be, raised progressively, deformations associated from construction have been incorporated by subsequent raises. An estimate of the crest settlement that would occur as a result of an earthquake generating a PGA on site of 0.096 g was made using the method presented by Swaisgood (2003), shown in Figure 28.

Deformation would be in the range from 0.02% to 0.1% of the embankment height plus soil foundation depth. In the event of the design earthquake with the embankment at a crest elevation of 970 m, a fill height of 32 m, and maximum 60 m of soil in the foundation, the settlement of the crest would be less than 10 cm.

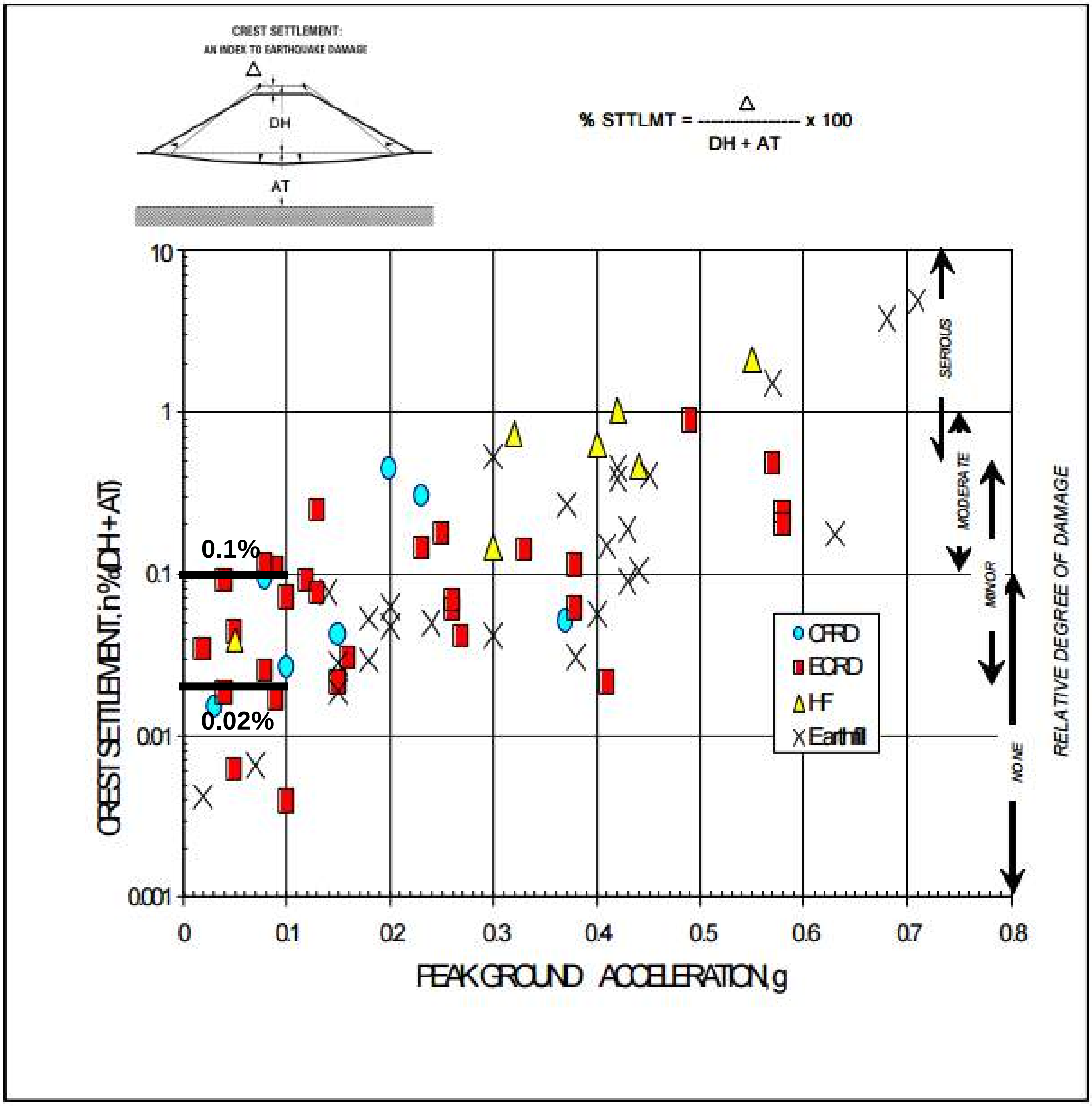


Figure 28: Settlement of Embankment Dams from Earthquakes After Swaisgood (2003)

15.0 CONSTRUCTION MATERIAL QUANTITIES

The estimated in-place material quantity required for construction of the embankments to a crest elevation of 970 m is summarized in Table 19. The estimated volumes are based on the May 27, 2015 survey. Actual volumes may vary based on conditions encountered in the field.

Table 19: Estimated Construction Quantities

Task	Unit	Stage 1 Corner 1 Perimeter Embankment to Elevation 963 m	Stage 2 TSF Raise to Elevation 970 m	Total
Foundation Preparation for Toe Buttress	m^2	19,100	40,900	600,000
Surface Preparation for Embankment	m^2	10,250	49,650	59,900
Embankment Excavation	m^3	14,300[d]	24,750[e]	39,050
Till Core	m^3	31,800	42,150	73,950
Filter	m^3	9,650	21,150	30,800
Transition	m^3	7,450	20,650	28,100
Rockfill[a]	m^3	527,000	607,300	1,134,300
Upstream Fill[b]	m^3	143,300	280,900	424,200
Drain Rock	m^3	10,270	N/A	10,270
Filter Sand	m^3	40	20	60
General Fill[c]	m^3	239,750	N/A	239,750
Geotextile 800 g/m^2	m^2	12,060	N/A	12,060
Geotextile 340 g/m^2	m^2	12,060	N/A	12,060
PCPE Pipe	m	650	N/A	650
HDPE Solid Pipe	m	675	N/A	675

a) Quantity includes material for the buttress and the embankment

b) Quantity estimated for a 20 m wide zone downstream of the till core

c) Quantity includes support for the Upstream Fill at Corner 1 and the Perimeter Embankment fill below the upstream drain

d) Quantity estimated for excavation of Cut-off Aggregate on both sides of cut-off wall at the 2015 Freshet Management Embankment

e) Quantity estimated for excavation of existing Transition material placed adjacent to Till core at the embankment crest above elevation 966.5 m

N/A = not applicable

16.0 QUALITY ASSURANCE AND QUALITY CONTROL

The quality assurance (QA) and quality control (QC) requirements are described in detail in the Technical Specification included in Appendix B.

The Geotechnical Engineer's Representative will be present full time on site and be responsible for the QA activities during construction. The Geotechnical Engineer's Representative shall carry out planned and systematic activities that provide adequate confidence to the Owner's Representative and various stakeholders that quality control is being implemented effectively such that the work is constructed in accordance with the design Drawings and Technical Specifications.

The Geotechnical Engineer's Representative will be responsible for:

- performing QA tasks outlined in the Technical Specifications including observing, testing, inspecting, documenting, monitoring and reporting the relevant project activities;
- implementation of changes in QA aspects of the work including frequency of testing, monitoring, or additional testing to confirm conformance with the Technical Specifications; and
- approving compliance of the Work with the Drawings and Technical Specifications and capturing the intent of the design.

The laboratory testing and frequency for the QA/QC program is outlined in the Technical Specifications.

17.0 TSF CLOSURE AND RECLAMATION

The reclamation plan for the Mount Polley mine is presented in Hallam Knight Piésold (1996). The following objectives to the closure and reclamation have been identified:

- long term preservation of water quality within and downstream of decommissioned operations;
- long term stability of the TSF;
- removal of all access roads, ponds, ditches, pipelines, structures and equipment not required following mine closure;
- long-term stabilization of all exposed materials that are susceptible to erosion;
- establishment of a self-sustaining vegetative cover consistent with existing forestry, grazing and wildlife needs; and
- natural integration of disturbed lands into the surrounding landscape and restoration of the natural appearance of the area, to the greatest practicable extent.

The surface of the TSF will be converted into a forested and wetlands site. Approximately 15% of the surface area of the TSF basin will be covered with water, with the remainder of the area being vegetated with indigenous species of trees, shrubs and grasses. The pond level within the TSF will be controlled by an overflow spillway constructed at an abutment. The spillway will be sized to manage the PMF. The downstream embankment slopes will be pushed down to a slope of 2H:1V and these slopes and the 3H:1V buttress slopes will be covered with selected overburden materials and seeded with grasses and legumes to provide a stable vegetation mat that resists erosion. The seepage collection ponds and recycle pumps will be retained after closure until monitoring results indicate that the water quality from the TSF is suitable for direct release to the environment.

The tailings deposition plan will be to maintain the supernatant pond at the centre of the facility, against the natural topography. Within the last year of deposition, prior to closure, the deposition plan will change to push the pond closer to corner 5 where the spillway is located, and at the same time reduce the pond volume. The operational spillway will limit the size of the pond and maintain the majority of the tailings in an unsaturated state.

The tailings conveyance system will be removed from the TSF immediately following cessation of operations. The reclaim barge, pumps and pipeline will be utilized for supplementary flooding of the open pits, as required, and will then be removed. Once open pit flooding is complete, the surface water diversion channel will be regraded to allow natural run-off through the tailings area.

18.0 CLOSURE

The reader is referred to the Study Limitations, which precedes the text and forms an integral part of this report.

We trust the above meets your present requirements. If you have any questions or requirements, please contact the undersigned.

GOLDER ASSOCIATES LTD.

Gerd Janssens, P.Eng.
Geotechnical Engineer

Andy Haynes, P.Eng.
Principal, Senior Geotechnical Engineer

Nov 3/15

Terry Eldridge, P.Eng.
Principal, Engineering Manager

GJ/AJH/rs/ls

\\golder.gds\gal\burnaby\final\2014\dynamics numbers - mining division\1413803\1413803-074-r-rev0-3000\1413803-074-r-rev0-3000-mp tsf el 970 detailed design report 03nov_15.docx

REFERENCES

AMEC. 2013. Mount Polley Mine Tailings Storage Facility Stage 9 2013 construction Monitoring Manual. Prepared for Mount Polley Mining Corporation. Submitted April 11, 2013.

AMEC. 2014. *Mount Polley Mine, Tailings Storage Facility Stage 9 – 2013 As-Built and Annual Review Report.* Prepared for Mount Polley Mining Corporation. Likely, BC. Submitted March 12, 2014.

CDA. (Canadian Dam Association) 2013. *Dam Safety Guidelines 2007 (Revised 2013)*.

GEO-SLOPE. 2010. *Stability Modeling with SLOPE/W 2007 Version. An Engineering Methodology:* 4th edn. GEO-SLOPE International Ltd., Calgary, February 2010.

Golder (Golder Associates Ltd.) 2015a. Mount Polley Mine Tailings Storage Facility Life of Mine Feasibility Design. Prepared for Mount Polley Mining Corporation. Submitted November 3, 2015. Document No. 1413803-072-R-Rev0-9000.

Golder 2015b. Mount Polley Mine 2015 Freshet Management Embankment Design. Mount Polley Tailings Storage Facility. Prepared for Mount Polley Mining Corporation. Submitted May 8, 2015. Document No. 1413803-008-R-Rev3-2000.

Golder 2015c. Mount Polley Tailings Storage Facility. Elevation 970 m Embankment Stability Analysis and Buttress Design. Prepared for Mount Polley Mining Corporation. Submitted July 10, 2015. Document No. 1413803-059-R-Rev-0-3000.

Golder. 2015d. Mount Polley Mine –Short Term Effluent Discharge Technical Assessment Report in Support of an Effluent Permit Ammendment. Prepared for Mount Polley Mining Corporation. Submitted May 29, 2015.

Golder 2015e. Mount Polley Mine 2015 Freshet Management Embankment As-Built Construction. Prepared for Mount Polley Mining Corporation. Submitted September 4, 2015. Document No. 1413803-065-R-Rev0-2000.

Golder 2015f. 2015 Draft Geotechnical Investigation Factual Report. Prepared for Mount Polley Mining Corporation. Submitted July 7, 2015. Document No. 1413803-061-R-RevB-2000.

Golder 2015g. Laboratory Testing Results from Mount Polley Mine. Technical Memorandum prepared for Mount Polley Mining Corporation. Submitted March 26, 2015. Document No. 1413803-012-TM-Rev0-2000.

Golder 2015h. Mount Polley Mine Phase 4 Water Management Plan (TSF 970 m Design). Prepared for Mount Polley Mining Corporation. Submitted November 2, 2015. Document No. 1411734-094-R-Rev0-12000.

Hynes-Griffin, M. E. and Franklin, A. G. 1984. *Rationalizing the Seismic Coefficient Method.* Miscellaneous Paper No. GL-84-3. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi.

Independent Expert Engineering Investigation and Review Panel. (IEERP). 2015. Report on Mount Polley Tailings Storage Facility Breach. Province of British Columbia. January 30, 2015.

KCB (Klohn Crippen Berger). 2015a. Mount Polley Dam Failure. Site Investigation – Progress Report No. 2. BC Ministry of Energy and Mines. January 21, 2015.

KCB. 2015b. Mount Polley Dam Failure. Advanced Laboratory Testing Program – Progress Report No. 4. BC Ministry of Energy and Mines. February 12, 2015.

Knight Piésold. 1996. Mount Polley Project, Report on Geotechnical Investigations and design of Open Pits and Waste Dumps. Ref No. 1628/1. Prepared for Imperial Metals Corporation. Submitted July 5, 1996.

Knight Piésold. 2005. Mount Polley Mine Design of the Tailings Storage Facility to Ultimate Elevation. Ref. no. VA101-001/08-1. Prepared for Mount Polley Mining Corporation. Submitted March 14, 2005.

Leps, T.M. 1970. *Review of Shearing Strength of Rock Fill*. Proceedings of the ASCE, Journal of the Soil Mechanics and Foundations Division. Vol. 96, SM4:1159-1170, July 1970.

Skempton, A.W. 1954. The Pore Pressure Coefficients A and B. Geotechnique volume 4, pages 143-147.

Swaisgood, J.R. (2003). *Embankment Dam Deformations Caused by Earthquakes*. New Zealand National Society for Earthquake Engineering. Proceedings of the 2003 Pacific Conference on Earthquake Engineering. Paper No. 014.

APPENDIX A

Construction Drawings

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

INDEX OF DRAWINGS

DRAWING NUMBER	DRAWING TITLE	DRAWING REVISION	DATE ISSUED
501	TITLE SHEET	0	NOVEMBER 3, 2015
502	SITE PLAN	0	NOVEMBER 3, 2015
503	TAILINGS STORAGE FACILITY - PRE-CONSTRUCTION CONDITIONS	0	NOVEMBER 3, 2015
504	TAILINGS STORAGE FACILITY GENERAL ARRANGEMENT - EMBANKMENT RAISE TO EL. 970 m AT YEAR 2020	0	NOVEMBER 3, 2015
505	EL. 963 m - CORNER 1 PERIMETER EMBANKMENT AND BUTTRESS - PLAN	0	NOVEMBER 3, 2015
506	EL. 970 m - CORNER 1 PERIMETER EMBANKMENT AND BUTTRESS - PLAN	0	NOVEMBER 3, 2015
507	CORNER 1 PERIMETER EMBANKMENT - PLAN	0	NOVEMBER 3, 2015
508	CORNER 1 PERIMETER EMBANKMENT - PROFILE	0	NOVEMBER 3, 2015
509	CORNER 1 PERIMETER EMBANKMENT SECTION - STATION: 20+141	0	NOVEMBER 3, 2015
510	CORNER 1 PERIMETER EMBANKMENT SECTION - STATION: 20+345	0	NOVEMBER 3, 2015
511	CORNER 1 PERIMETER EMBANKMENT - SECTIONS (1 OF 3)	0	NOVEMBER 3, 2015
512	CORNER 1 PERIMETER EMBANKMENT - SECTIONS (2 OF 3)	0	NOVEMBER 3, 2015
513	CORNER 1 PERIMETER EMBANKMENT - SECTIONS (3 OF 3)	0	NOVEMBER 3, 2015
514	CORNER 1 PERIMETER EMBANKMENT - SURFACE PREPARATION	0	NOVEMBER 3, 2015
515	CORNER 1 PERIMETER EMBANKMENT - SURFACE PREPARATION - NORTH AND SOUTH BREACH ABUTMENTS	0	NOVEMBER 3, 2015
516	CORNER 1 PERIMETER EMBANKMENT - UPSTREAM DRAIN LAYOUT	0	NOVEMBER 3, 2015
517	CORNER 1 PERIMETER EMBANKMENT - UPSTREAM DRAIN - SECTION AND DETAILS	0	NOVEMBER 3, 2015
518	CORNER 1 PERIMETER EMBANKMENT - UPSTREAM DRAIN TIE-IN	0	NOVEMBER 3, 2015
519	CORNER 1 PERIMETER EMBANKMENT BUTTRESS - SURFACE PREPARATION	0	NOVEMBER 3, 2015
520	CORNER 1 PERIMETER EMBANKMENT BUTTRESS - PLAN	0	NOVEMBER 3, 2015
521	FILTER COMPLETION TO EL. 968 m AND EMBANKMENT RAISE TO EL. 970 m - TYPICAL SECTIONS	0	NOVEMBER 3, 2015
522	EMBANKMENT RAISE TO EL. 970 m - ABUTMENT DETAIL	0	NOVEMBER 3, 2015
523	TAILINGS STORAGE FACILITY - PIEZOMETER INSTRUMENTATION	0	NOVEMBER 3, 2015
524	TAILINGS STORAGE FACILITY - SLOPE INCLINOMETER AND SAA INSTALLATION	0	NOVEMBER 3, 2015
525	CORNER 1 PERIMETER EMBANKMENT - INSTRUMENTATION AND DETAILS	0	NOVEMBER 3, 2015
526	EL. 970 m - SPILLWAY DESIGN - PLAN	0	NOVEMBER 3, 2015
527	EL. 970 m - SPILLWAY DESIGN - SECTION AND DETAILS	0	NOVEMBER 3, 2015

PROJECT LOCATION PLAN

NOT TO SCALE

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	AJH	TLE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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Nov 3/15

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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
TITLE SHEET

PROJECT No	PHASE/TASK	Rev.	of	DRAWING
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

25 mm

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 2 m MINOR AND 10 m MAJOR. CONTOURS OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WERE COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MTPOLLEY2013-DTM.dwg", RECEIVED: OCTOBER 1, 2014.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAMES: "10cm contours full tailings.dxf" AND "10cm Hazeltine 3 Reprocessed.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015 AND FILE: "151015 ASBUILT SURFACE.msr", RECEIVED: OCTOBER 15, 2015.

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A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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PROJECT

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE

SITE PLAN

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
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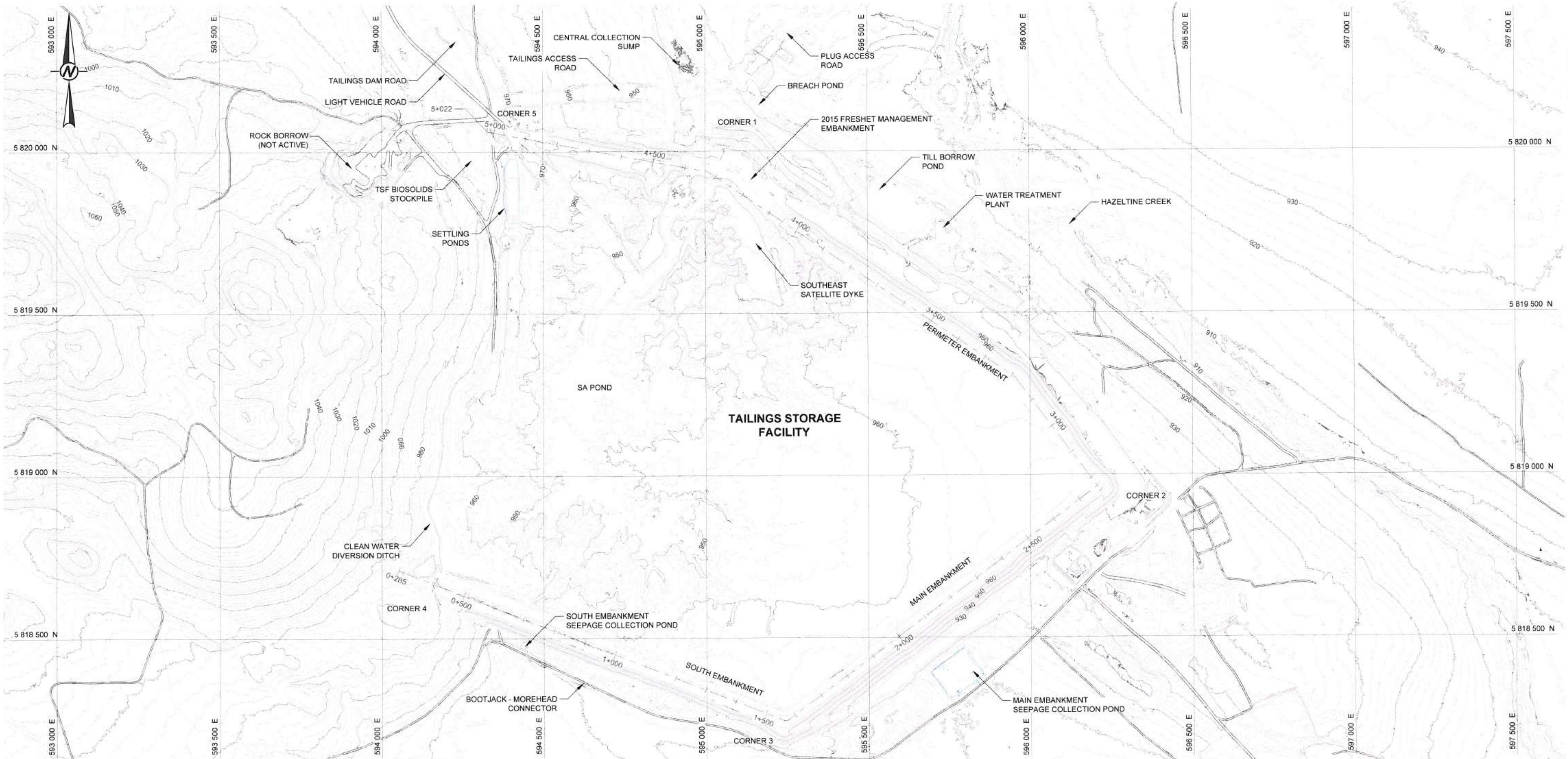

LEGEND

4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

NOTES

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3. S.O.L. - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING NO. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT NO. P14178, FILE NAME: "ACAD-01.DWG", DATED: SEPTEMBER 2014.

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PROJECT

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE

TAILINGS STORAGE FACILITY
PRE-CONSTRUCTION CONDITIONS

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
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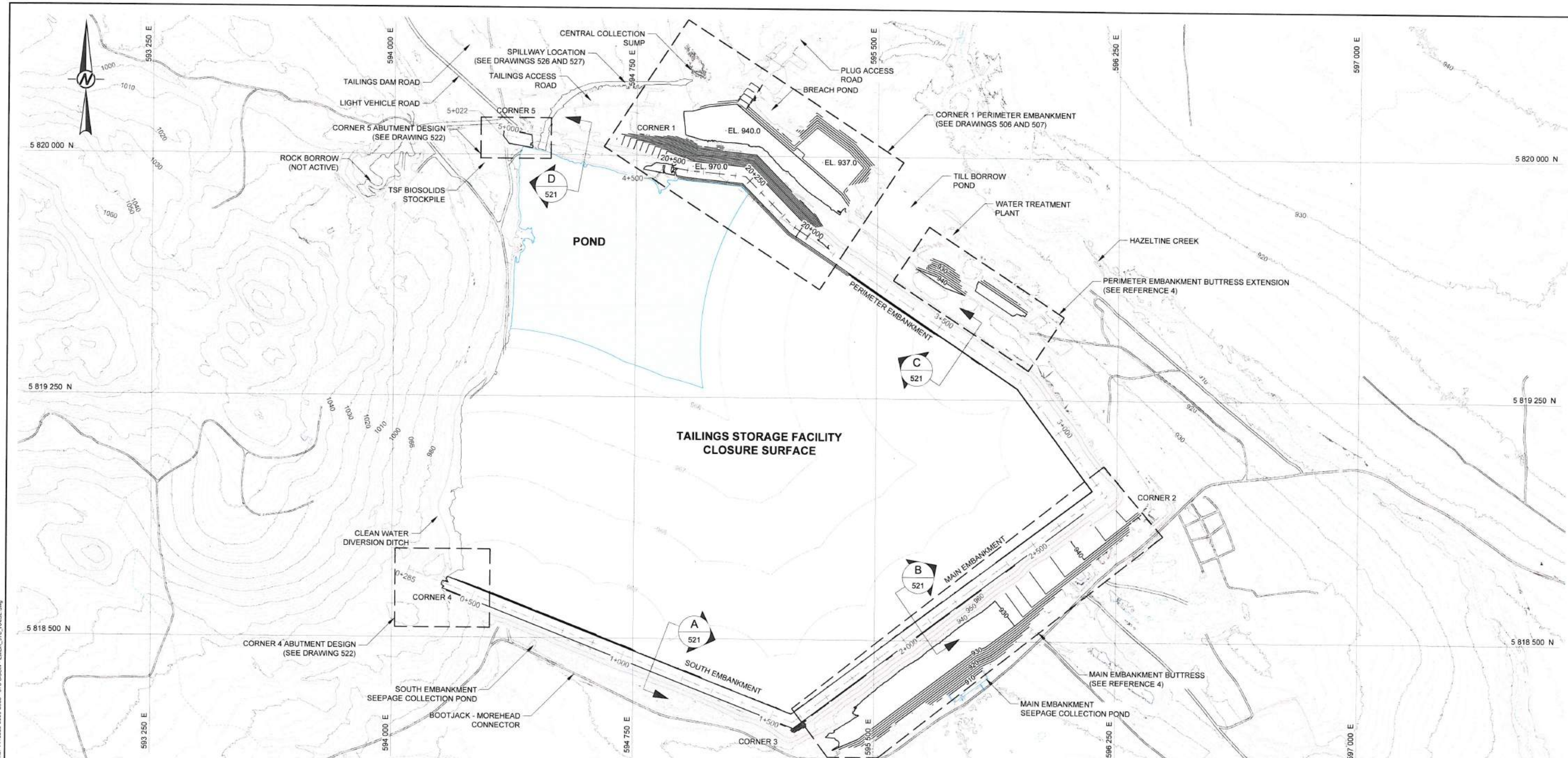

LEGEND

4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
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4. GOLDER ASSOCIATES LTD. 2015. MOUNT POLLEY TAILINGS STORAGE FACILITY. ELEVATION 970 m EMBANKMENT STABILITY ANALYSIS AND BUTTRESS DESIGN. PREPARED FOR MOUNT POLLEY MINING CORPORATION. SUBMITTED JULY 10, 2015. DOCUMENT NO. 1413803-059-R-REV-0-3000.

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A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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PROJECT

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE

TAILINGS STORAGE FACILITY GENERAL ARRANGEMENT
EMBANKMENT RAISE TO EL. 970 m
TAILINGS DEPOSITION AT YEAR 2020

PROJECT No.	PHASE/TASK	Rev.	DRAWING
1413803	3000/3500	0	504

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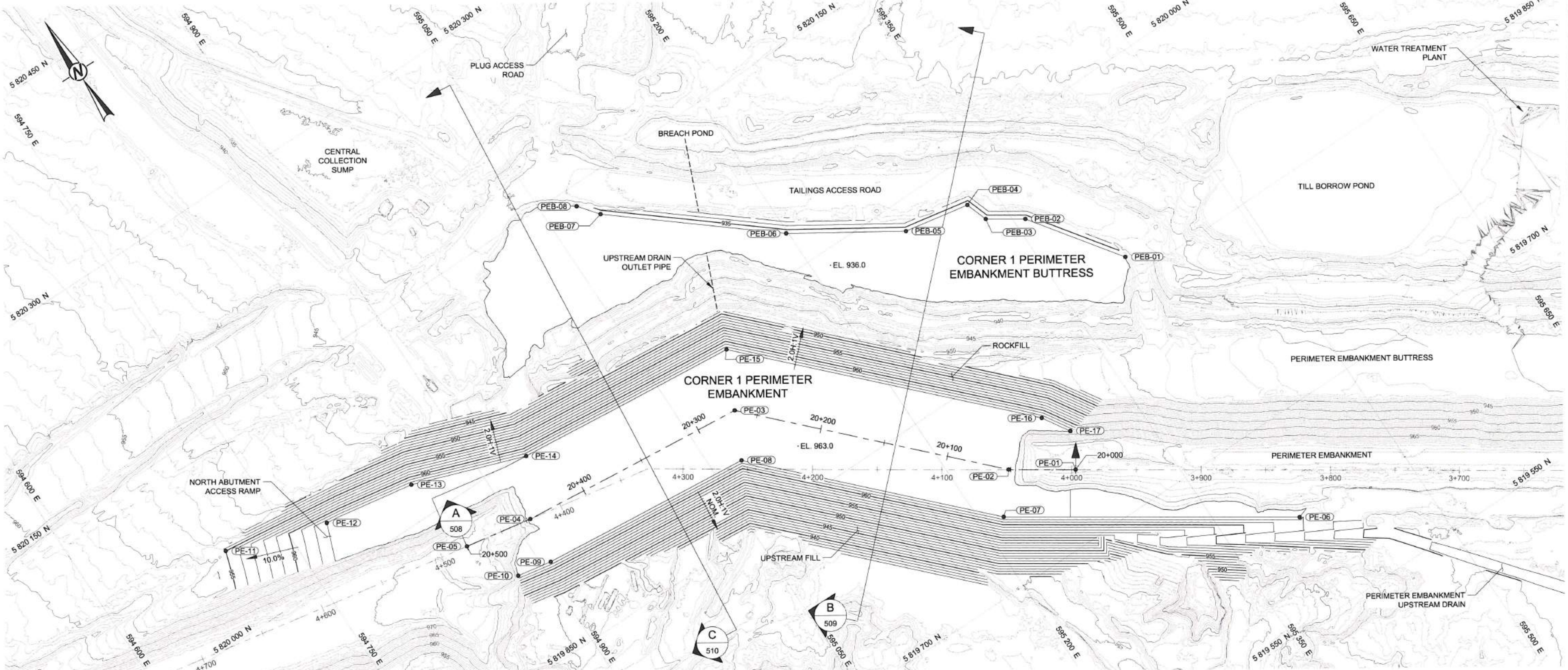

LEGEND

- (PE-17) CORNER 1 PERIMETER EMBANKMENT CONTROL POINTS
- (PEB-08) CORNER 1 PERIMETER EMBANKMENT BUTTRESS CONTROL POINTS
- 20+000 CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
- 4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

NOTES

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CORNER 1 PERIMETER EMBANKMENT EL. 963 DESIGN CONTROL POINTS

POINT ID	EASTING	NORTHING	ELEVATION
PE-01	595283.06	5819752.14	969.48
PE-02	595240.25	5819780.92	963.00
PE-03	595089.89	5819936.39	963.00
PE-04	594912.13	5819954.31	963.00
PE-05	594859.55	5819964.01	969.88
PE-06	595406.42	5819625.23	963.00
PE-07	595216.69	5819752.78	963.00
PE-08	595072.94	5819901.42	963.00
PE-09	594906.98	5819918.15	963.00

CORNER 1 PERIMETER EMBANKMENT EL. 963 DESIGN CONTROL POINTS

POINT ID	EASTING	NORTHING	ELEVATION
PE-10	594880.20	5819923.09	963.00
PE-11	594702.92	5820063.64	955.00
PE-12	594779.55	5820038.82	963.00
PE-13	594850.16	5820027.29	963.00
PE-14	594936.24	5819996.60	963.00
PE-15	595110.55	5819979.03	963.00
PE-16	595283.44	5819799.79	963.00
PE-17	595296.25	5819779.18	963.00

CORNER 1 PERIMETER EMBANKMENT BUTTRESS DESIGN CONTROL POINTS

POINT ID	EASTING	NORTHING	ELEVATION
PEB-01	595406.07	5819866.87	936.00
PEB-02	595358.24	5819934.25	936.00
PEB-03	595332.80	5819951.27	936.00
PEB-04	595326.98	5819968.14	936.00
PEB-05	595276.35	5819977.85	936.00
PEB-06	595198.48	5820027.80	936.00
PEB-07	595087.09	5820119.99	936.00
PEB-08	595075.24	5820135.24	936.00

0 50 100
1:1,500 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	AJH	TLE
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A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA T. L. ELDRIDGE

Nov 3/15

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PROJECT

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE

EL. 963 m - CORNER 1 PERIMETER EMBANKMENT AND BUTTRESS - PLAN

PROJECT No	PHASE/TASK	Rev	of	DRAWING
1413803	3000/3500	0		505

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

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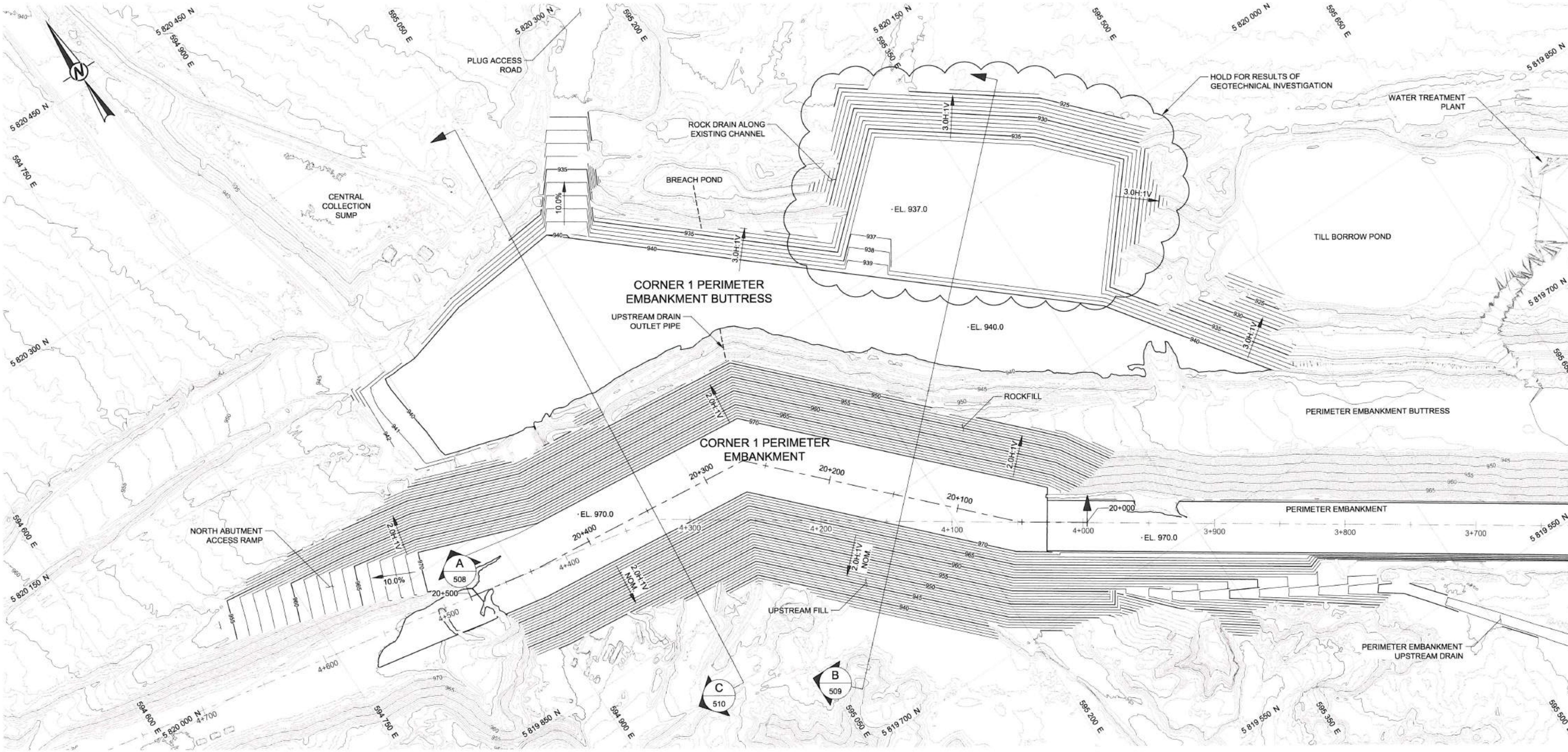

LEGEND

20+000	CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
4+400	SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
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2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015 AND FILE: "151015 ASBUILT SURFACE.msr", RECEIVED: OCTOBER 15, 2015.
3. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

0 50 100
1:1,500 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	AJH	TLE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL

PROFESSIONAL PROVINCE OF BRITISH COLUMBIA T. E. ELDRIDGE ENGINEER

Nov 3 '15

CLIENT

MOUNT POLLEY MINING CORPORATION

CONSULTANT

Golder Associates

VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

PROJECT

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

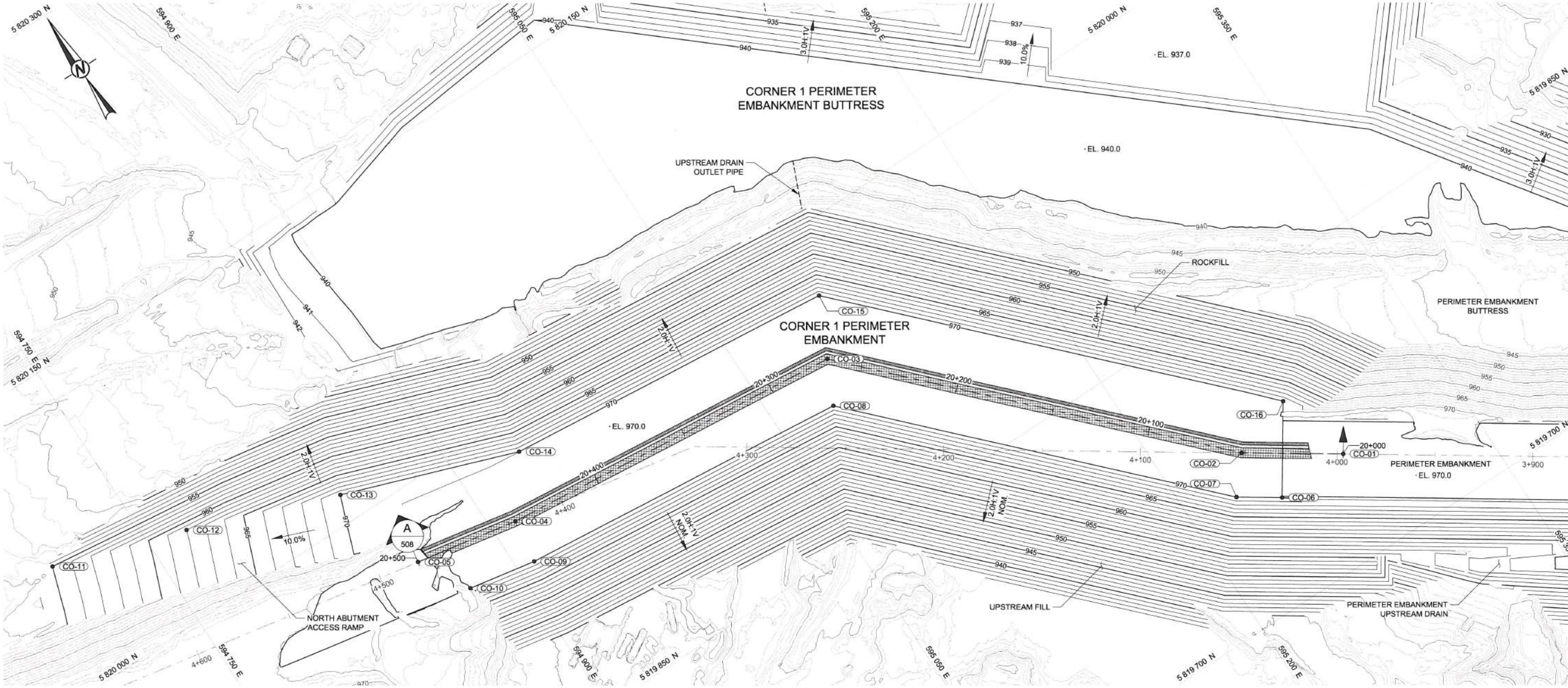
TITLE

EL. 970 m - CORNER 1 PERIMETER EMBANKMENT AND BUTTRESS - PLAN

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		506

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

Path: \\golder.gds\gal\Burnaby\CAD-GIS\Client\1413803\PHASE_1\3000\Task 3500\500 Series\ | File Name: 1413803-3000-3500_-970-DSGN - EMBK_BTRS.dwg



CORNER 1 PERIMETER EMBANKMENT EL. 970 DESIGN CONTROL POINTS			
POINT ID	EASTING	NORTHING	ELEVATION
CO-01	595283.06	5819752.14	970.00
CO-02	595240.25	5819780.92	970.00
CO-03	595089.89	5819936.39	970.00
CO-04	594912.13	5819954.31	970.00
CO-05	594859.55	5819964.01	970.00
CO-06	595244.98	5819750.63	970.00
CO-07	595225.72	5819763.57	970.00
CO-08	595079.44	5819914.83	970.00

CORNER 1 PERIMETER EMBANKMENT EL. 970 DESIGN CONTROL POINTS			
POINT ID	EASTING	NORTHING	ELEVATION
CO-09	594908.95	5819932.01	970.00
CO-10	594874.57	5819938.31	970.00
CO-11	594702.95	5820063.64	955.00
CO-12	594769.97	5820041.92	962.00
CO-13	594844.97	5820014.29	970.00
CO-14	594933.14	5819982.85	970.00
CO-15	595104.05	5819965.62	970.00
CO-16	595272.28	5819791.24	970.00

LEGEND

- FILTER MATERIAL
- TRANSITION MATERIAL
- TILL
- (CO-16) CORNER 1 PERIMETER EMBANKMENT CONTROL POINTS
- 20+000 CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
- 4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR. CONTOURS OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WERE COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
3. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

0 50 100
1:1,000 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	AJH	TLE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA T. L. ELDRIDGE
2015/11/5

CLIENT
MOUNT POLLEY MINING CORPORATION

CONSULTANT
Golder Associates
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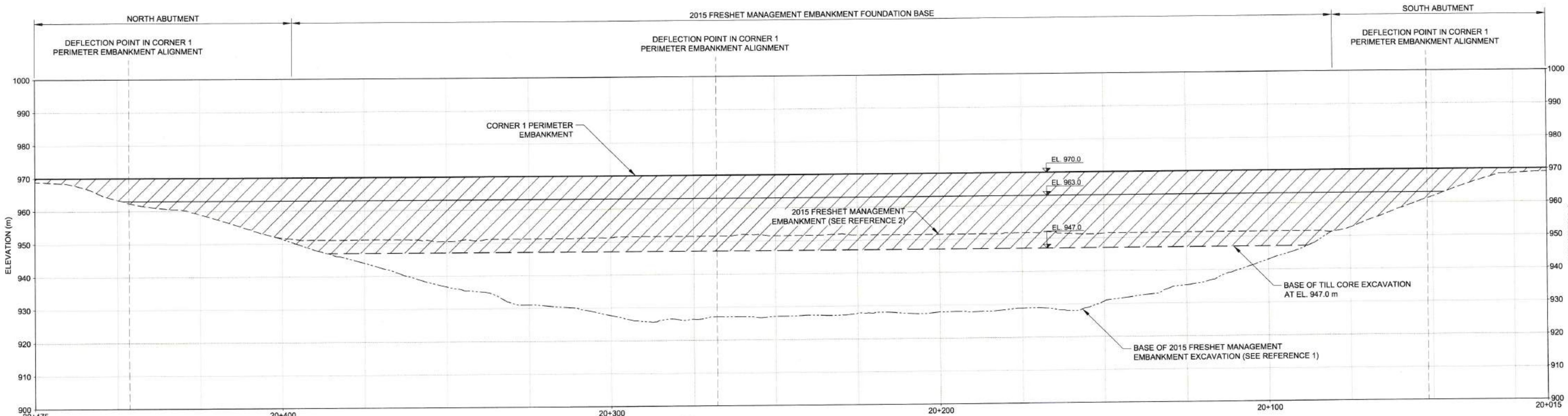
www.golder.com

PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT PLAN

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		507

25 mm
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



SCALE 1:600 m A 505 506 CORNER 1 PERIMETER EMBANKMENT PROFILE

LEGEND

20+000	CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
(hatched)	CORNER 1 PERIMETER EMBANKMENT
— — —	BASE OF TILL CORE EXCAVATION
—·—·—	BASE OF 2015 FRESHET MANAGEMENT EMBANKMENT (SEE REFERENCE 1)
– – – –	EXISTING GROUND (SEE REFERENCE 2)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. FOUNDATION SURFACE WAS PREPARED BY GOLDER ON JULY 9, 2015 BASED ON AS-BUILT, MATERIAL PLACEMENT AND CONSTRUCTION PROGRESS SURVEYS; AND FIELD NOTES.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.

0 20 40
1:600 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	AJH	TLE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA T. L. ELDRIDGE

2015/11/03

CLIENT

MOUNT POLLEY MINING CORPORATION

CONSULTANT

Golder Associates

VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

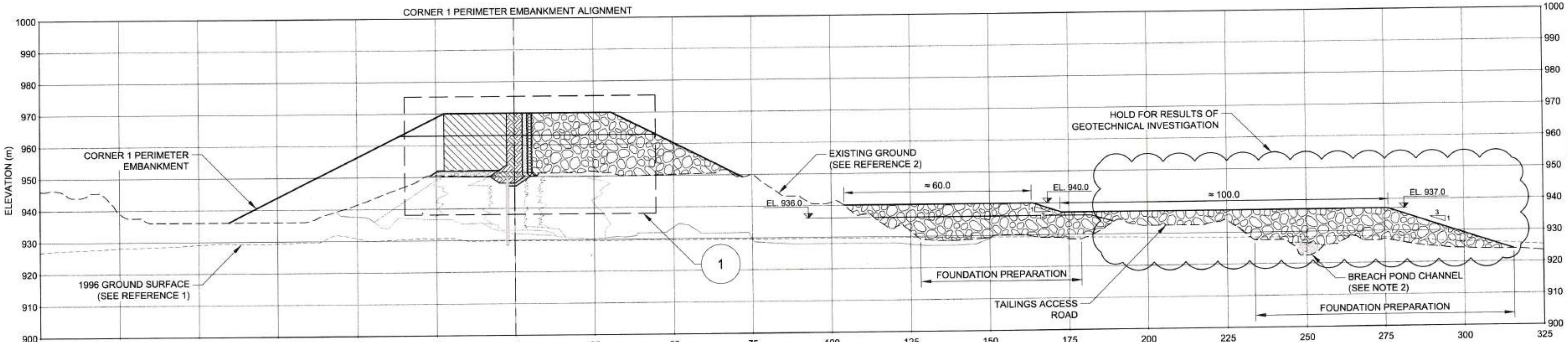
PROJECT

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE

CORNER 1 PERIMETER EMBANKMENT PROFILE

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		508



SCALE 1:750 m B 505 506 CORNER 1 PERIMETER EMBANKMENT - STATION: 20+141

LEGEND

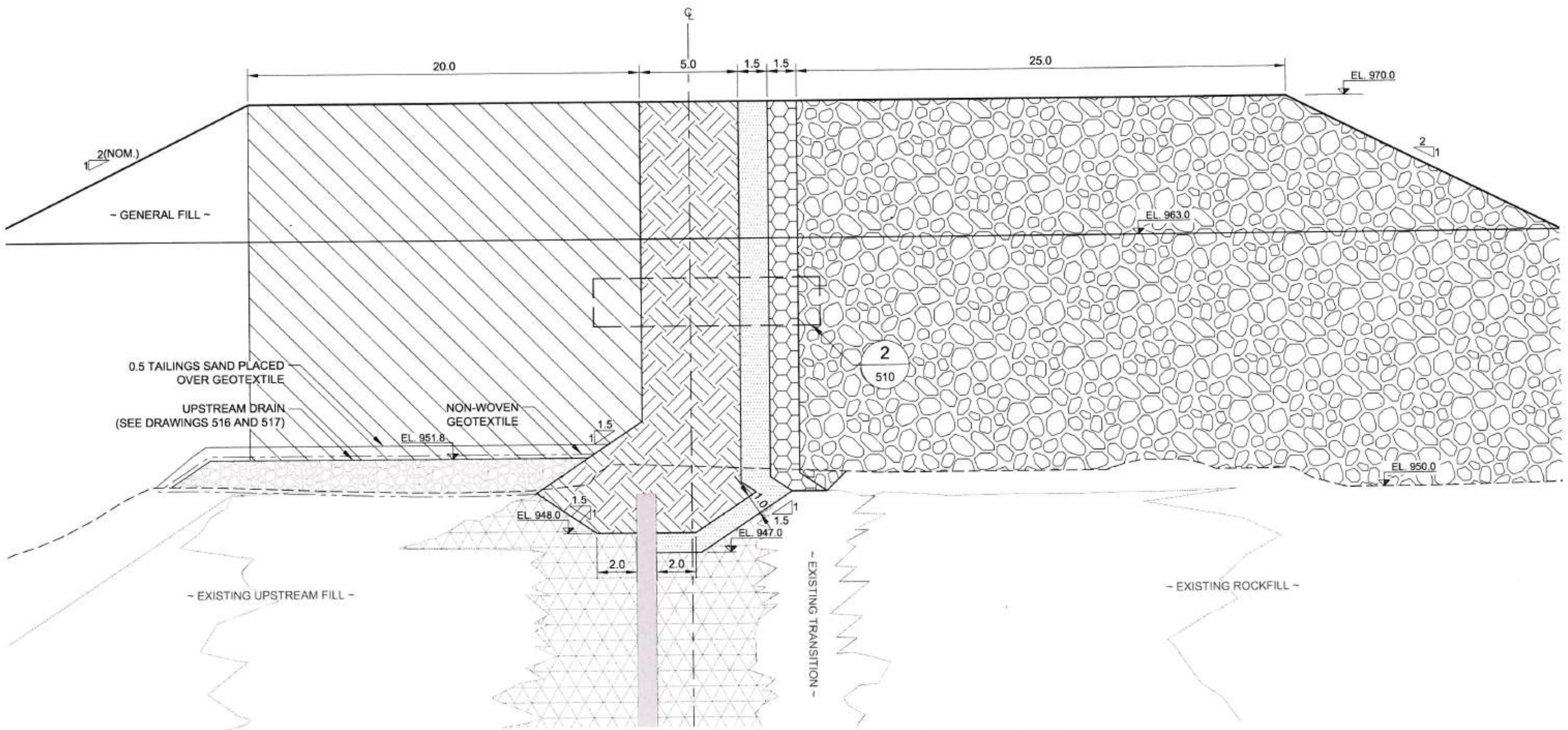
- EXISTING GROUND (SEE REFERENCE 2)
- EXISTING CUT-OFF WALL
- EXISTING CUT-OFF AGGREGATE
- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- DRAIN ROCK
- TILL CORE
- UPSTREAM FILL
- NON-WOVEN GEOTEXTILE

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO ADJUSTED MINE GRID DATUM.
2. DRAIN ROCK TO BE PLACED WITHIN BREACH POND CHANNEL TO FORM A ROCK DRAIN.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "1996 TSF Topo.dxf", RECEIVED: MARCH 11, 2015.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.



SCALE 1:150 m 1 CORNER 1 PERIMETER EMBANKMENT DETAIL

0 5 10 1:150 METRES

0 25 50 1:750 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL: PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA T. ELDRIDGE Nov 3/15

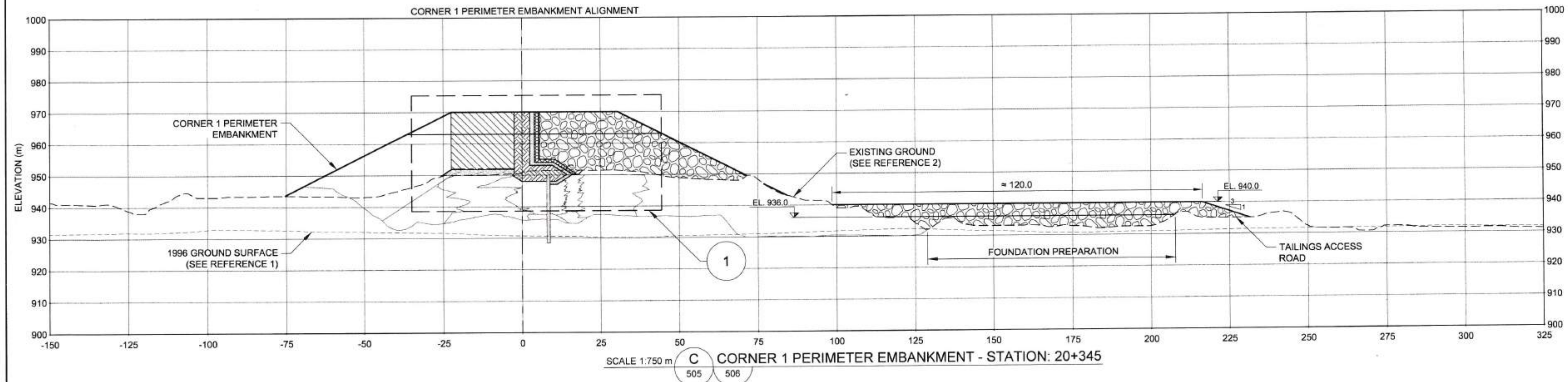
CLIENT: MOUNT POLLEY MINING CORPORATION

CONSULTANT: Golder Associates — VANCOUVER OFFICE [+1] (604) 296 4200 www.golder.com

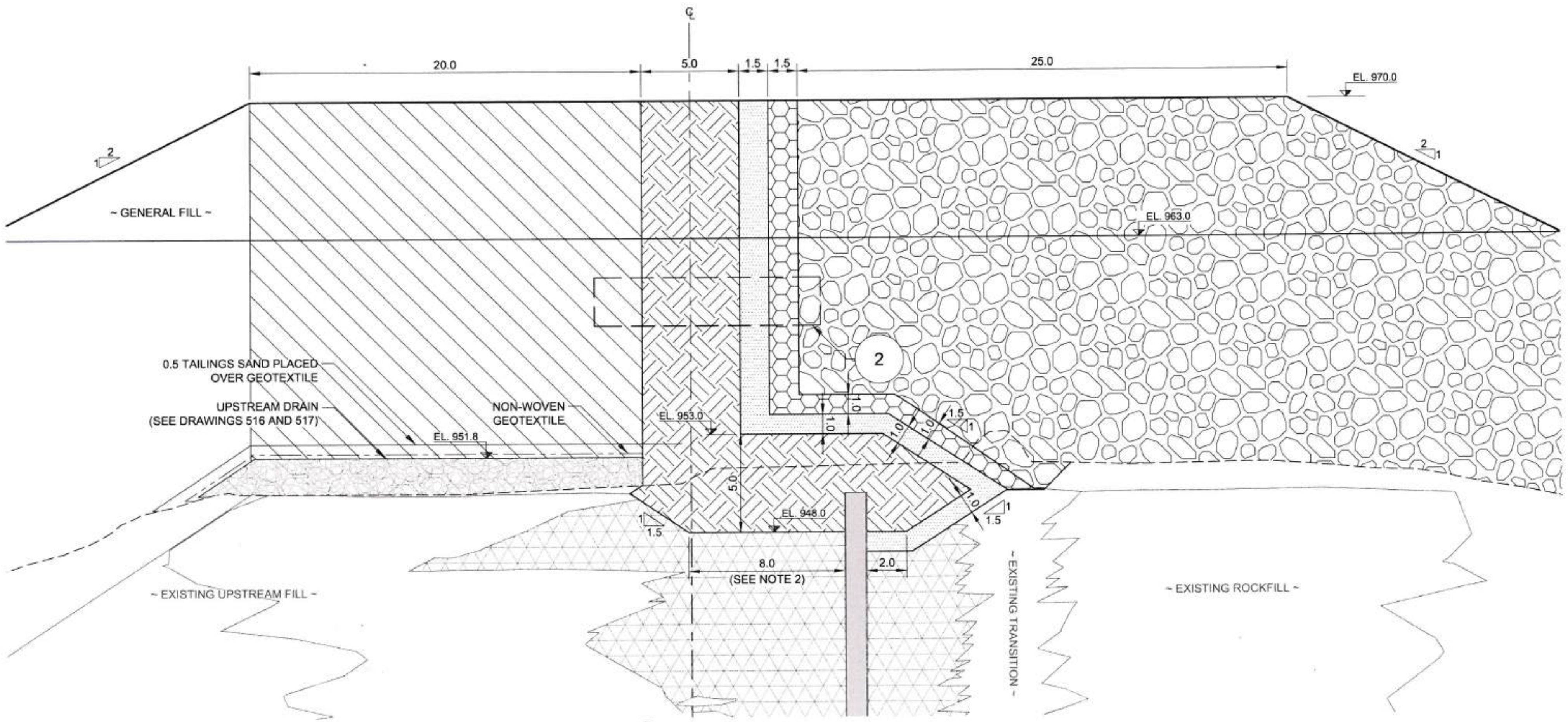
PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE: **CORNER 1 PERIMETER EMBANKMENT SECTION - STATION: 20+141**

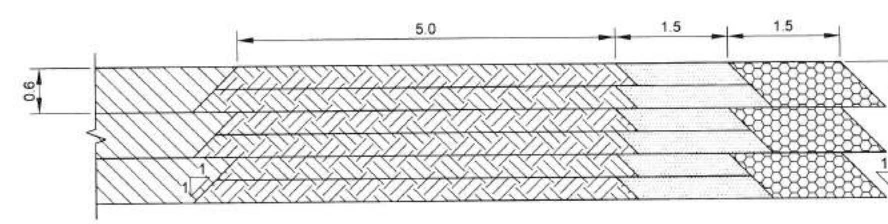
PROJECT No.	PHASE/TASK	Rev.	DRAWING
1413803	3000/3500	0	509



SCALE 1:750 m C (505, 506) CORNER 1 PERIMETER EMBANKMENT - STATION: 20+345



SCALE 1:150 m 1 CORNER 1 PERIMETER EMBANKMENT DETAIL



SCALE 1:50 m 2 (509, 510) DETAIL

LEGEND

- EXISTING GROUND (SEE REFERENCE 2)
- EXISTING CUT-OFF WALL
- EXISTING CUT-OFF AGGREGATE
- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- DRAIN ROCK
- TILL CORE
- UPSTREAM FILL
- NON-WOVEN GEOTEXTILE

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO ADJUSTED MINE GRID DATUM.
2. DRAIN ROCK TO BE PLACED WITHIN BREACH POND CHANNEL TO FORM A ROCK DRAIN.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "1996 TSF Topo.dxf", RECEIVED: MARCH 11, 2015.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.

0 2 4 METRES 1:50
0 5 10 METRES 1:150
0 25 50 METRES 1:750

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	GJ	TLE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, T. L. ELDRIDGE, Nov 3/15

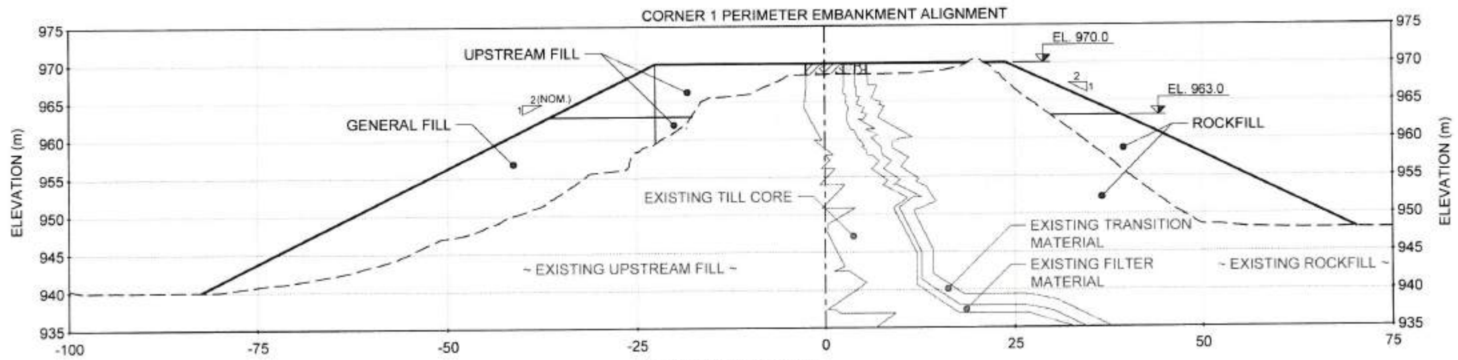
CLIENT: MOUNT POLLEY MINING CORPORATION

CONSULTANT: Golder Associates
VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

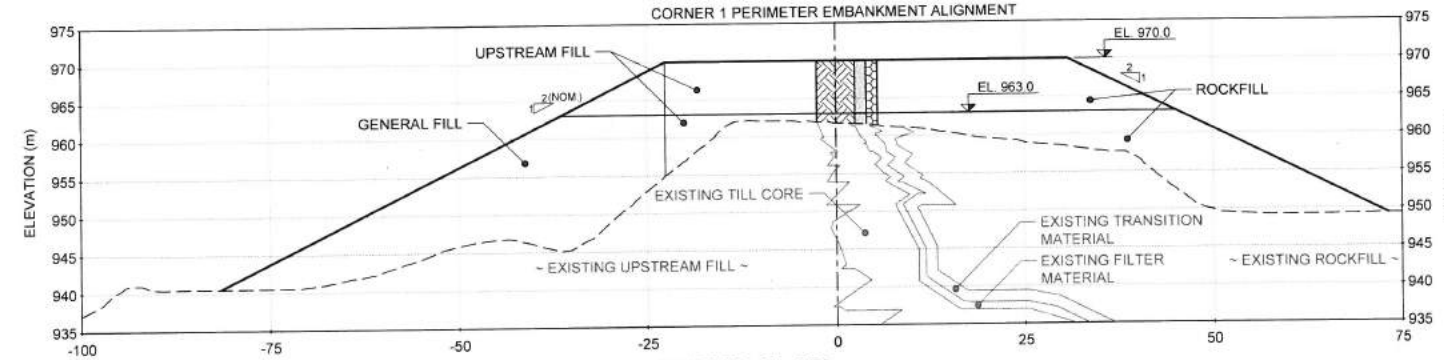
PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE: **CORNER 1 PERIMETER EMBANKMENT SECTION - STATION: 20+345**

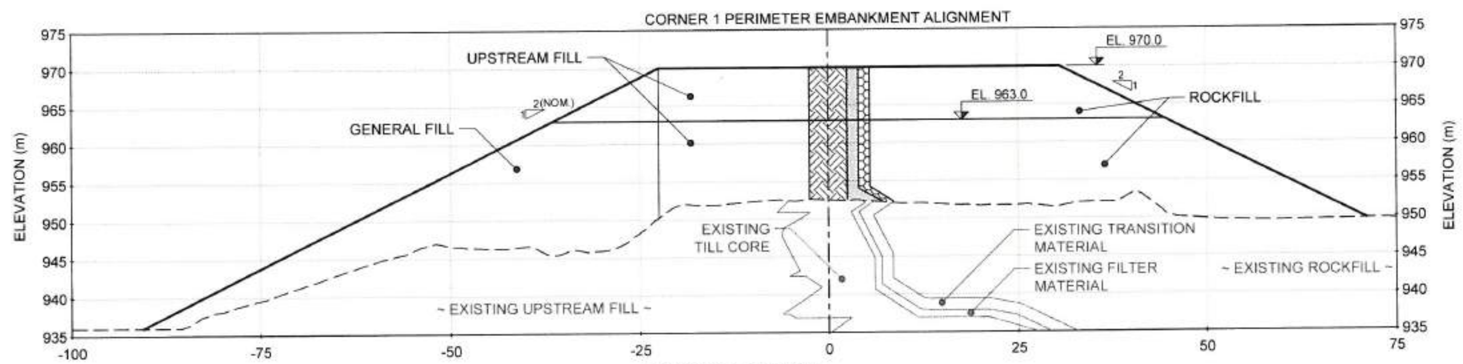
PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		510



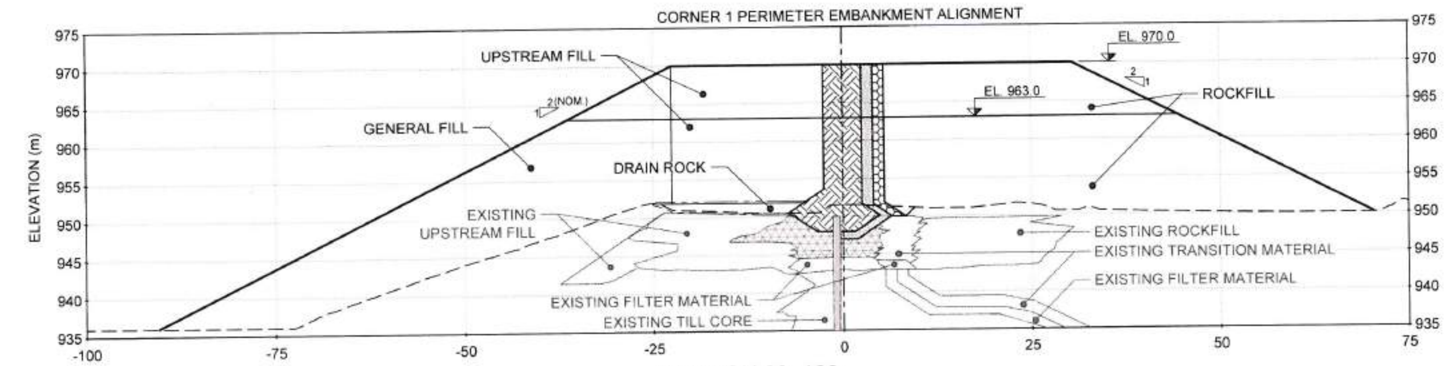
STATION 20+025
SCALE 1:500 m



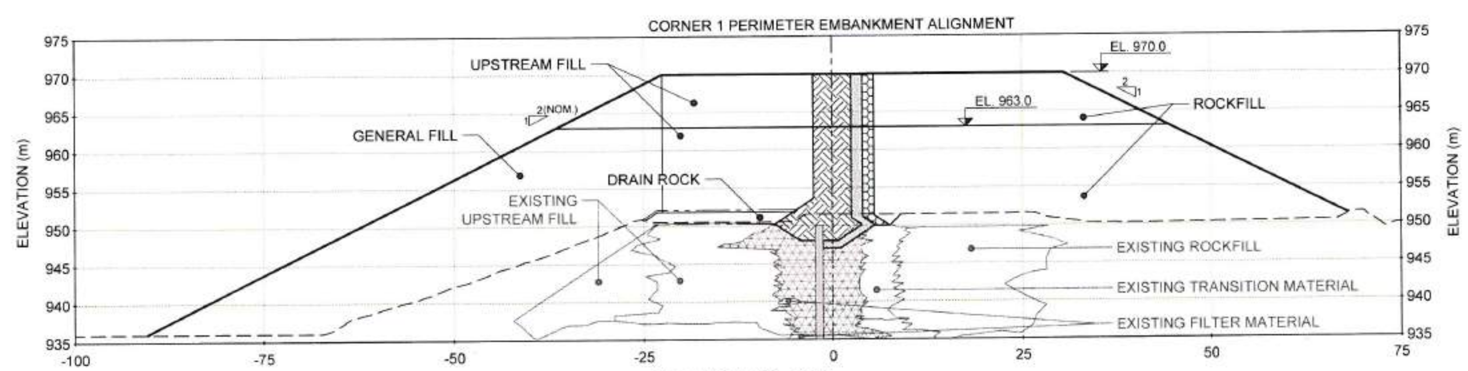
STATION 20+050
SCALE 1:500 m



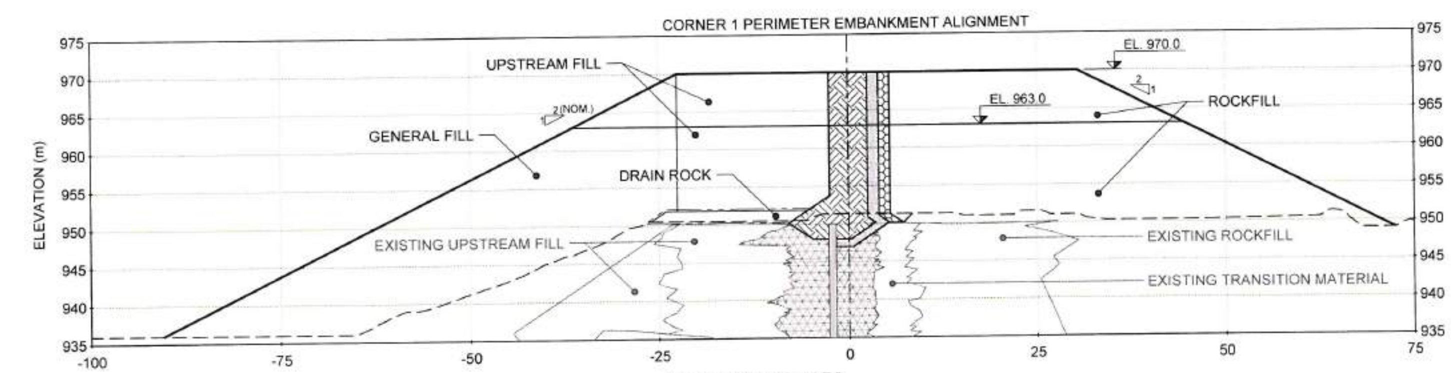
STATION 20+075
SCALE 1:500 m



STATION 20+100
SCALE 1:500 m



STATION 20+125
SCALE 1:500 m



STATION 20+150
SCALE 1:500 m

LEGEND

- EXISTING GROUND (SEE REFERENCE 1)
- EXISTING CUT-OFF WALL
- EXISTING CUT-OFF AGGREGATE
- FILTER MATERIAL
- TRANSITION MATERIAL
- TILL CORE
- NON-WOVEN GEOTEXTILE

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO ADJUSTED MINE GRID DATUM.
2. MATERIAL BOUNDARIES SHOWN FOR CONSTRUCTION PRIOR TO THE 2015 FRESHET MANAGEMENT EMBANKMENT ARE APPROXIMATE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.

0 20 40
1:500 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL
PROFESSIONAL PROVINCE OF BRITISH COLUMBIA T. L. ELDRIDGE No. 5115 ENGINEER

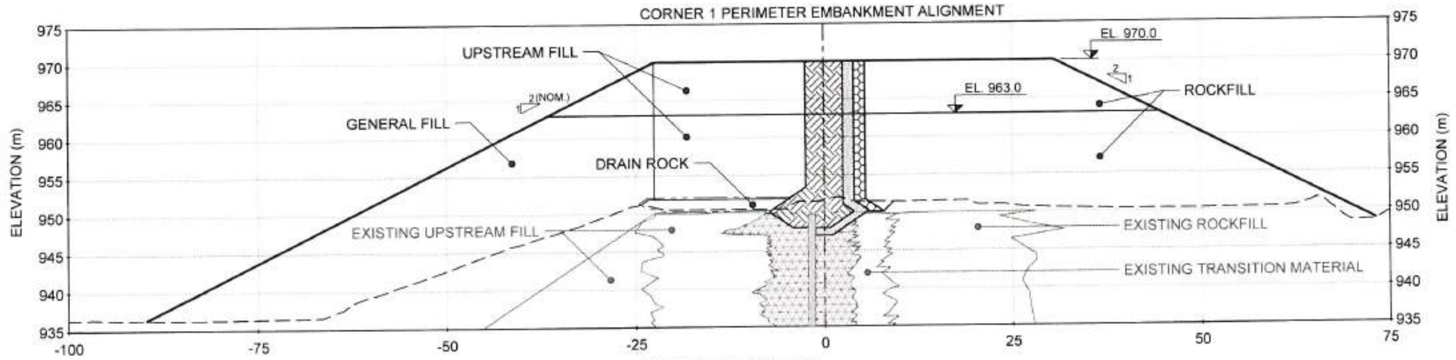
CLIENT
MOUNT POLLEY MINING CORPORATION

CONSULTANT
Golder Associates
VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

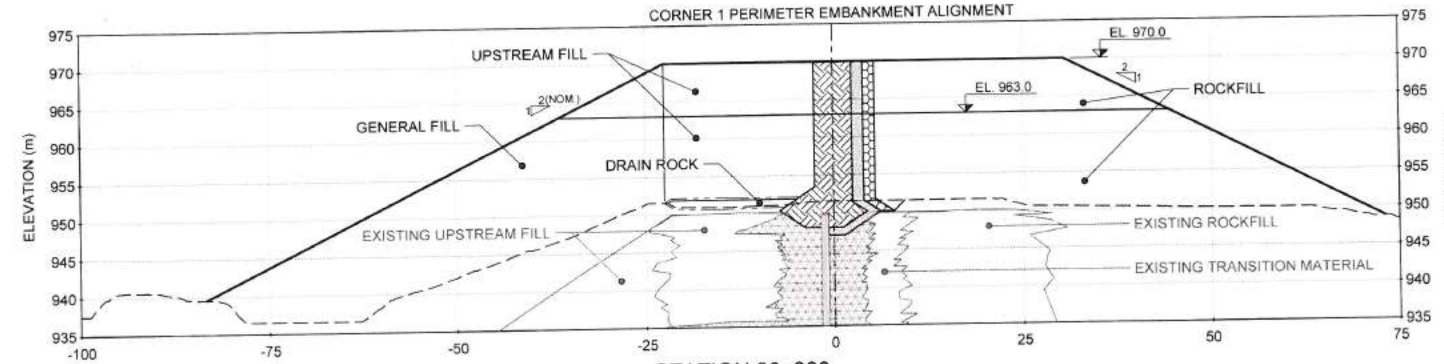
PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT SECTIONS (1 OF 3)

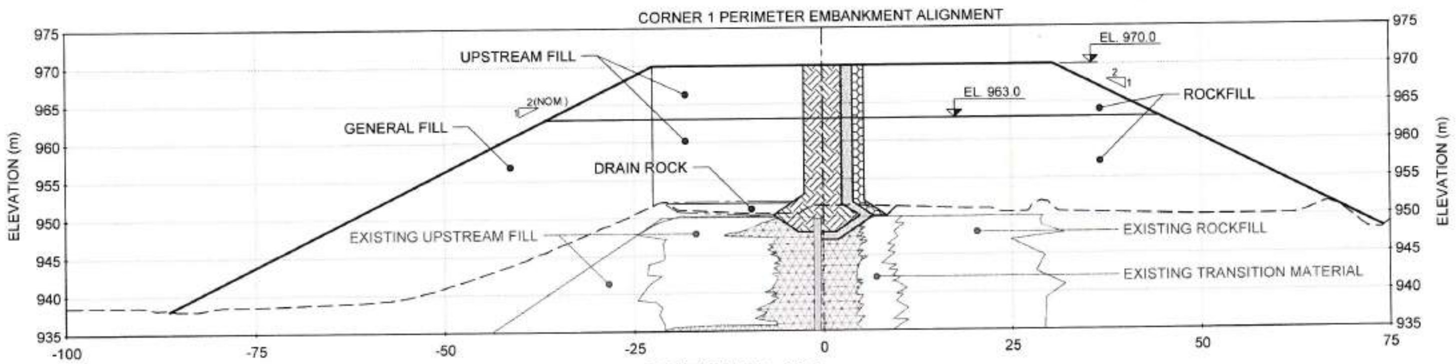
PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		511



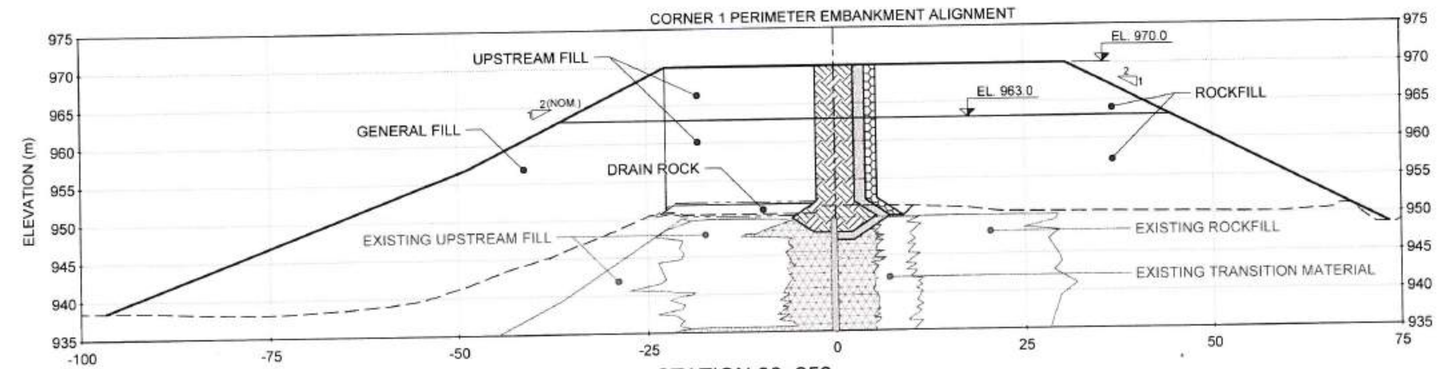
STATION 20+175
SCALE 1:500 m



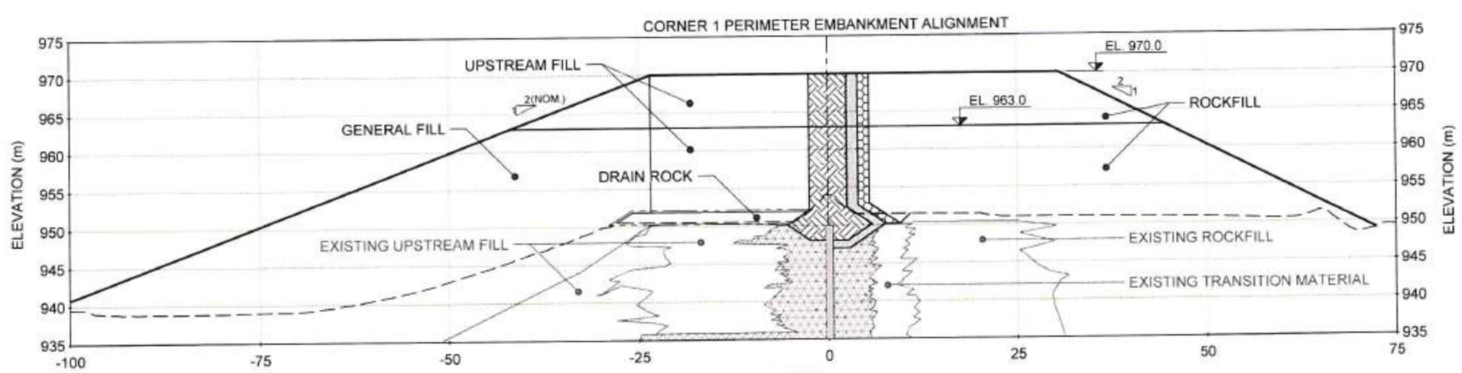
STATION 20+200
SCALE 1:500 m



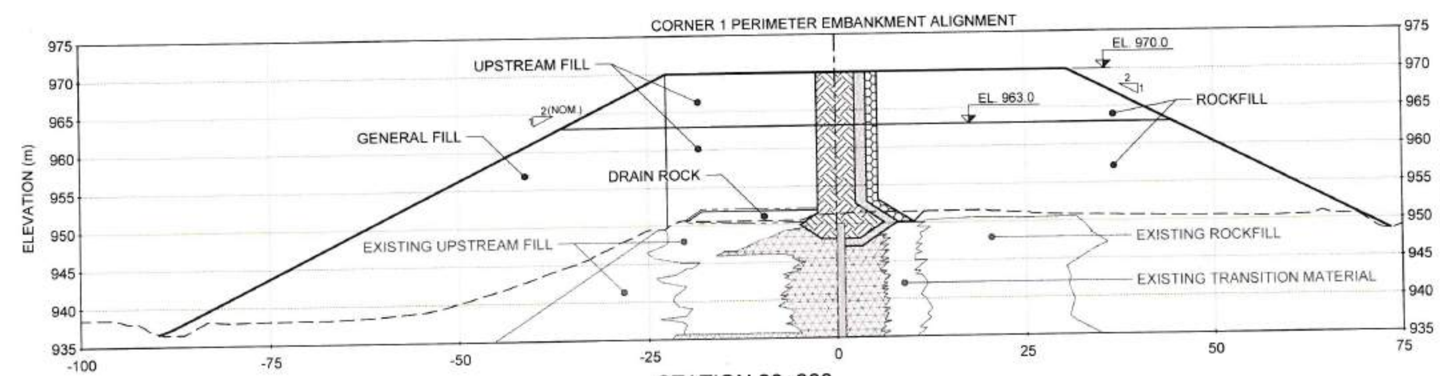
STATION 20+225
SCALE 1:500 m



STATION 20+250
SCALE 1:500 m



STATION 20+275
SCALE 1:500 m



STATION 20+300
SCALE 1:500 m

LEGEND

- EXISTING GROUND (SEE REFERENCE 1)
- EXISTING CUT-OFF WALL
- EXISTING CUT-OFF AGGREGATE
- FILTER MATERIAL
- TRANSITION MATERIAL
- TILL CORE
- NON-WOVEN GEOTEXTILE

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO ADJUSTED MINE GRID DATUM.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.

0 20 40
1:500 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL
PROFESSIONAL PROVINCE OF BRITISH COLUMBIA T. C. ELDRIDGE ENGINEER
Nov 3/15

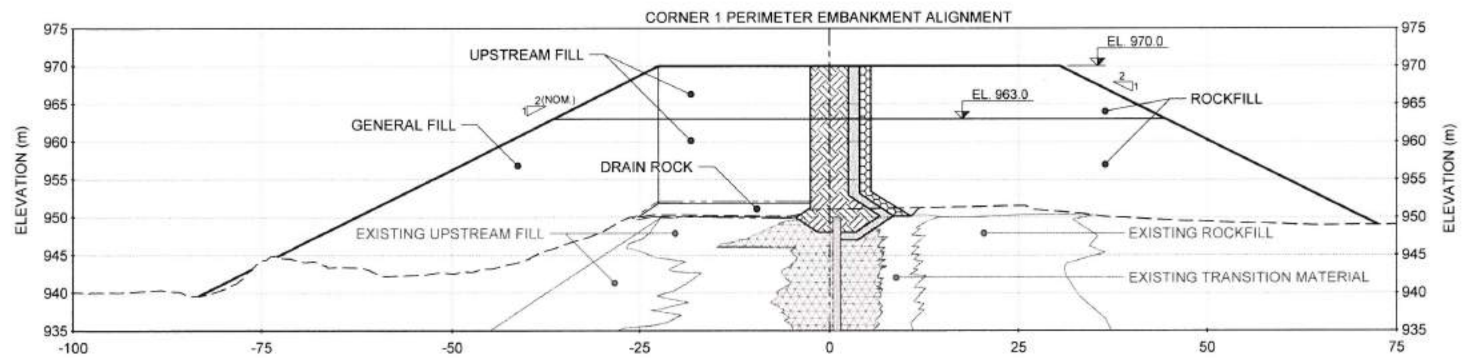
CLIENT
MOUNT POLLEY MINING CORPORATION

CONSULTANT
Golder Associates
VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

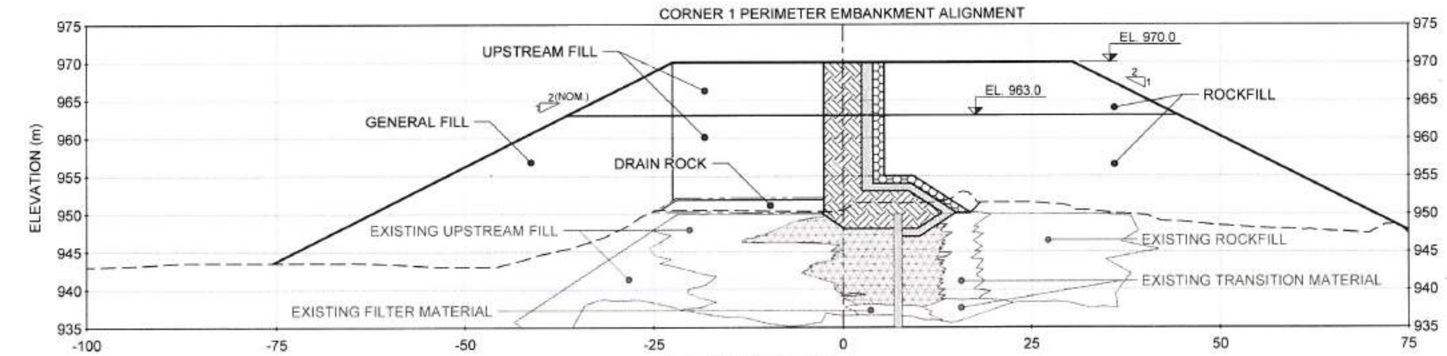
PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT SECTIONS (2 OF 3)

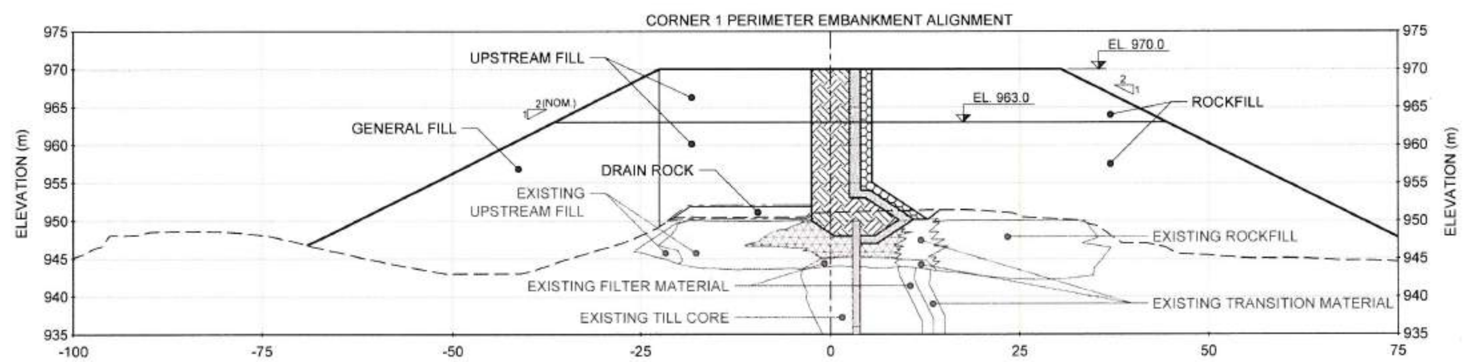
PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		512



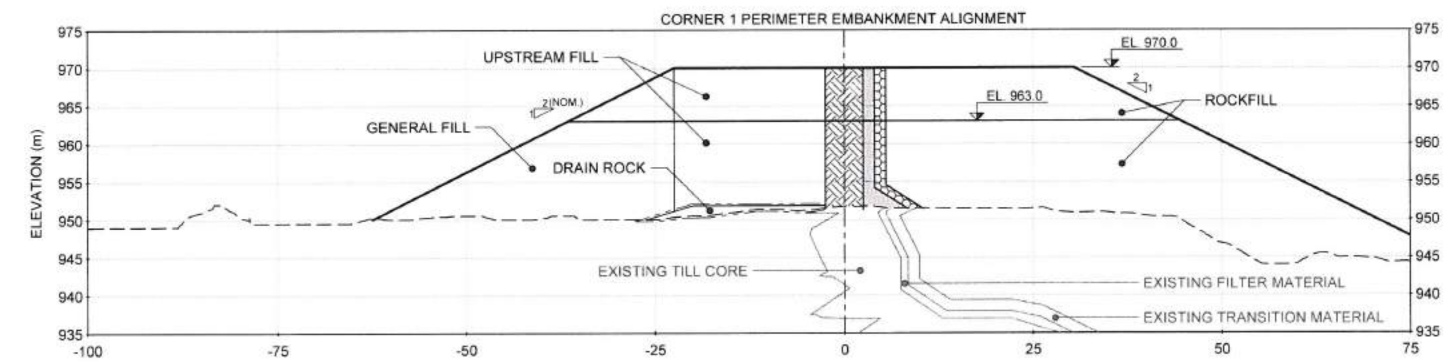
STATION 20+325
SCALE 1:500 m



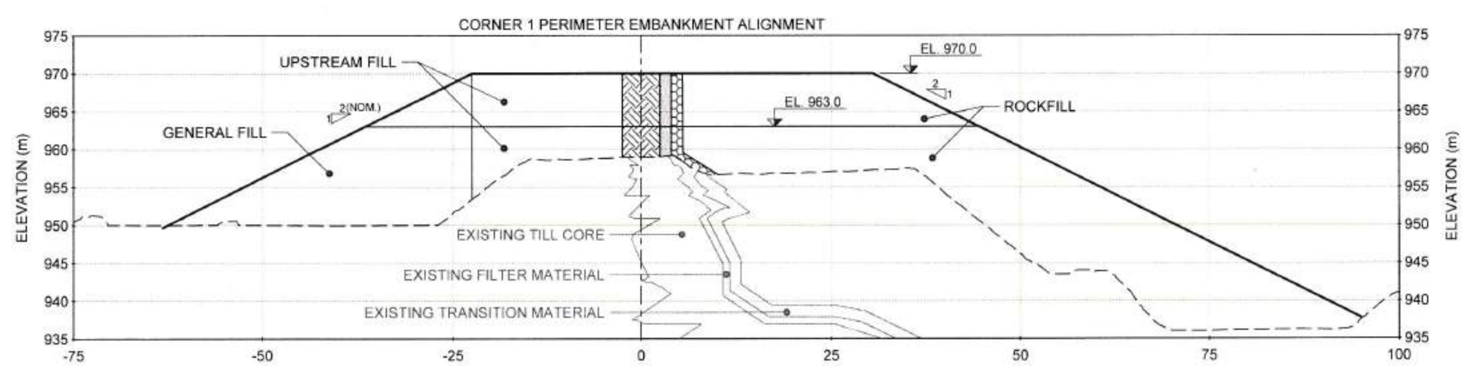
STATION 20+350
SCALE 1:500 m



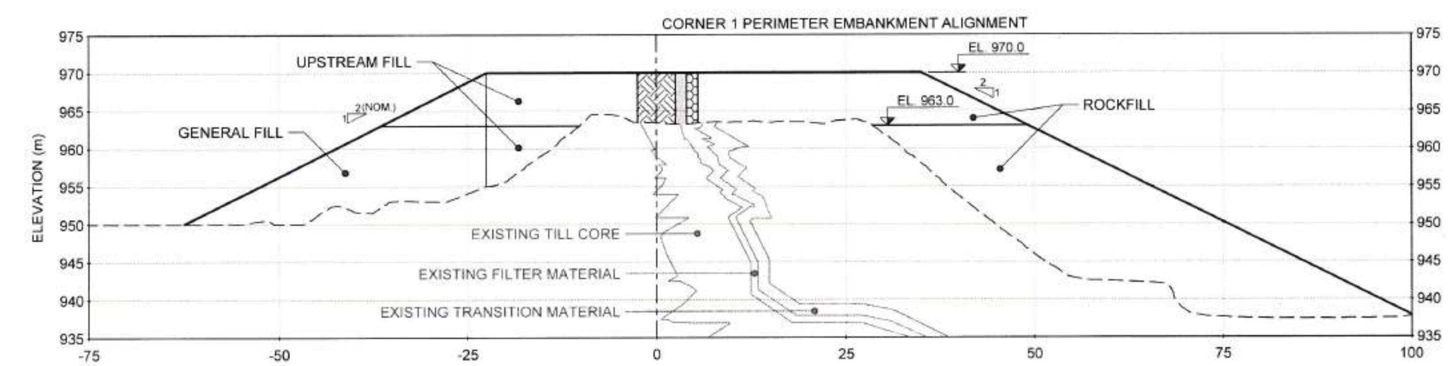
STATION 20+375
SCALE 1:500 m



STATION 20+400
SCALE 1:500 m



STATION 20+425
SCALE 1:500 m



STATION 20+450
SCALE 1:500 m

LEGEND

- EXISTING GROUND (SEE REFERENCE 1)
- EXISTING CUT-OFF WALL
- EXISTING CUT-OFF AGGREGATE
- FILTER MATERIAL
- TRANSITION MATERIAL
- TILL CORE
- NON-WOVEN GEOTEXTILE

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO ADJUSTED MINE GRID DATUM.
2. MATERIAL BOUNDARIES SHOWN FOR CONSTRUCTION PRIOR TO THE 2015 FRESHET MANAGEMENT EMBANKMENT ARE APPROXIMATE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.

0 20 40
1:500 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, T. L. ELDRIDGE. Nov 3/15

CLIENT
MOUNT POLLEY MINING CORPORATION

CONSULTANT
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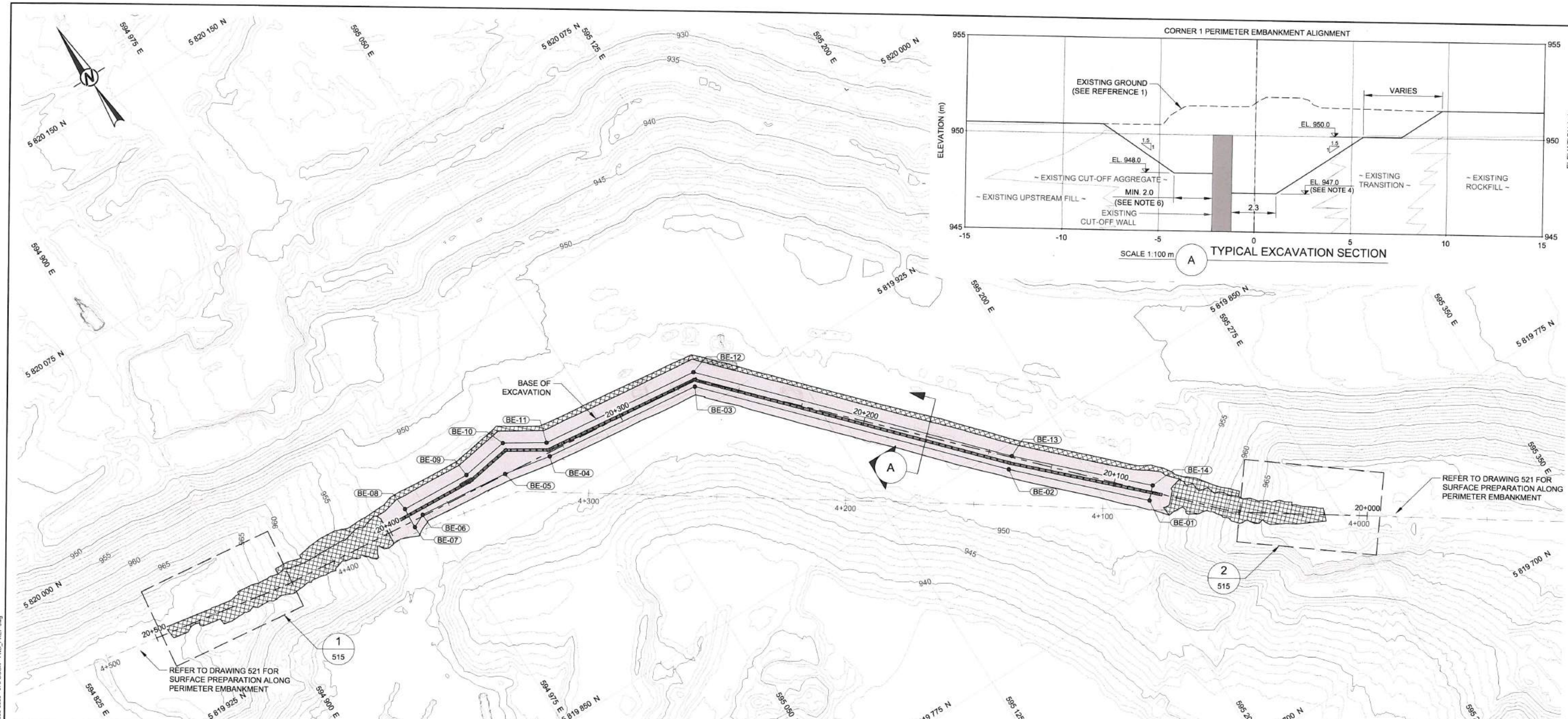
PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT SECTIONS (3 OF 3)

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		513

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



SCALE 1:100 m A TYPICAL EXCAVATION SECTION

LEGEND

- EXISTING CUT-OFF WALL
- EXCAVATION AREA AROUND CUT-OFF WALL
- EXPOSE TILL, FILTER, TRANSITION AND CUT-OFF AGGREGATE SURFACE (SEE NOTE 5)
- • (BE-13) BASE OF EXCAVATION CONTROL POINTS
- 20+000 CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
- 4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 2)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR.
4. EXCAVATION AREA AROUND CUT-OFF WALL TO BE DONE IN STAGES. THE UPSTREAM SIDE EXCAVATION TO BE BACKFILLED BEFORE EXCAVATION OF DOWNSTREAM SIDE BEGINS.
5. THE EXTENT OF THE EXPOSED MATERIAL SURFACES TO BE DETERMINED DURING CONSTRUCTION BY THE GEOTECHNICAL ENGINEER'S REPRESENTATIVE.
6. LENGTH VARIES BETWEEN 2.0 m AND 8.0 m FROM STATION 20+275 TO STATION 20+340.
7. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
2. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

BASE OF EXCAVATION CONTROL POINTS

POINT ID	EASTING	NORTHING
BE-01	595214.53	5819802.47
BE-02	595174.63	5819841.83
BE-03	595088.69	5819934.04
BE-04	595026.45	5819941.35
BE-05	595008.18	5819944.88
BE-06	594972.46	5819948.73
BE-07	594967.33	5819946.26

BASE OF EXCAVATION CONTROL POINTS

POINT ID	EASTING	NORTHING
BE-08	594967.80	5819954.33
BE-09	594995.26	5819952.57
BE-10	595013.90	5819955.44
BE-11	595028.29	5819946.46
BE-12	595091.25	5819939.06
BE-13	595178.41	5819845.54
BE-14	595218.68	5819806.78

0 5 10
1:100 METRES

0 25 50
1:750 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA T. ELDRIDGE

CLIENT

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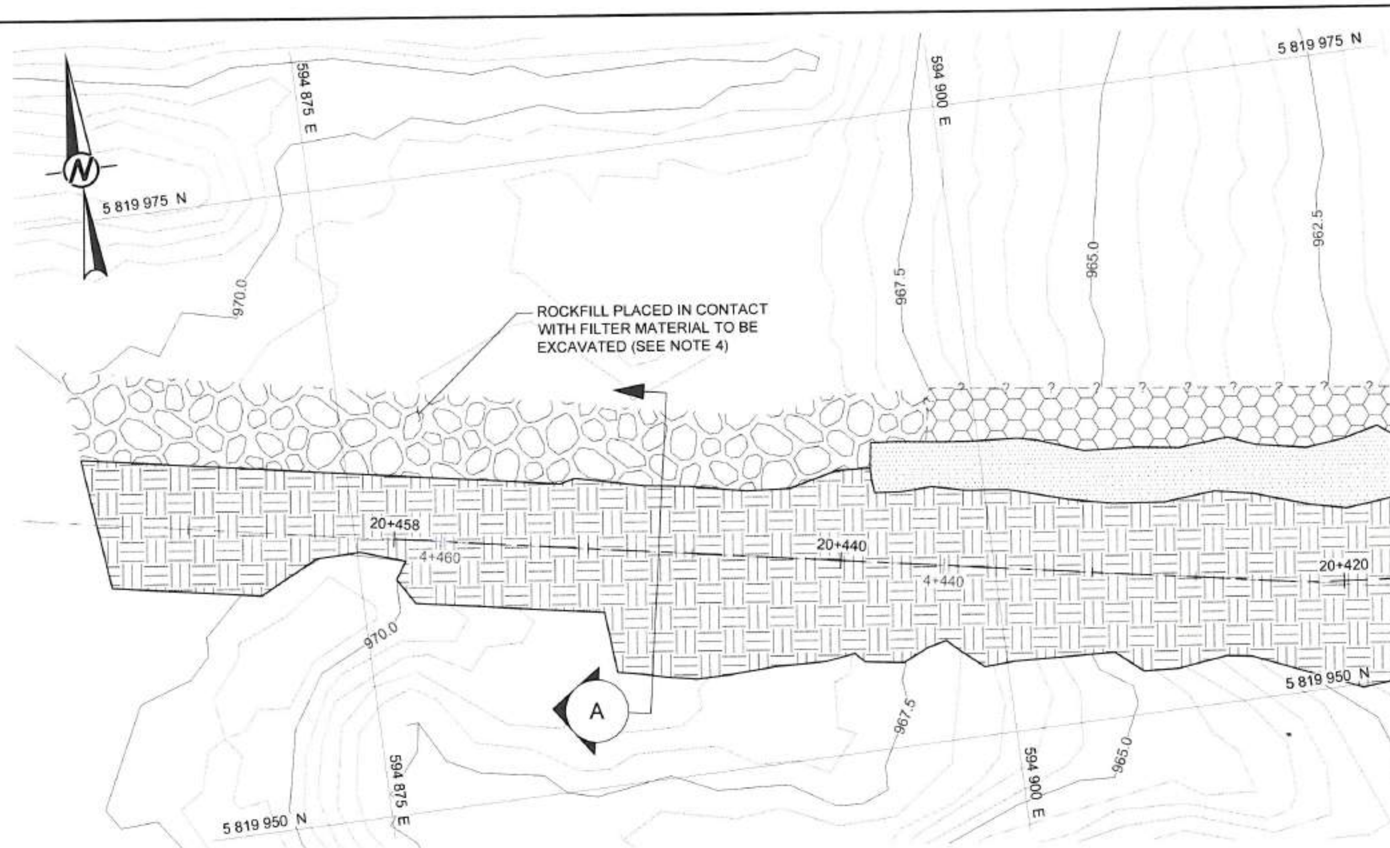
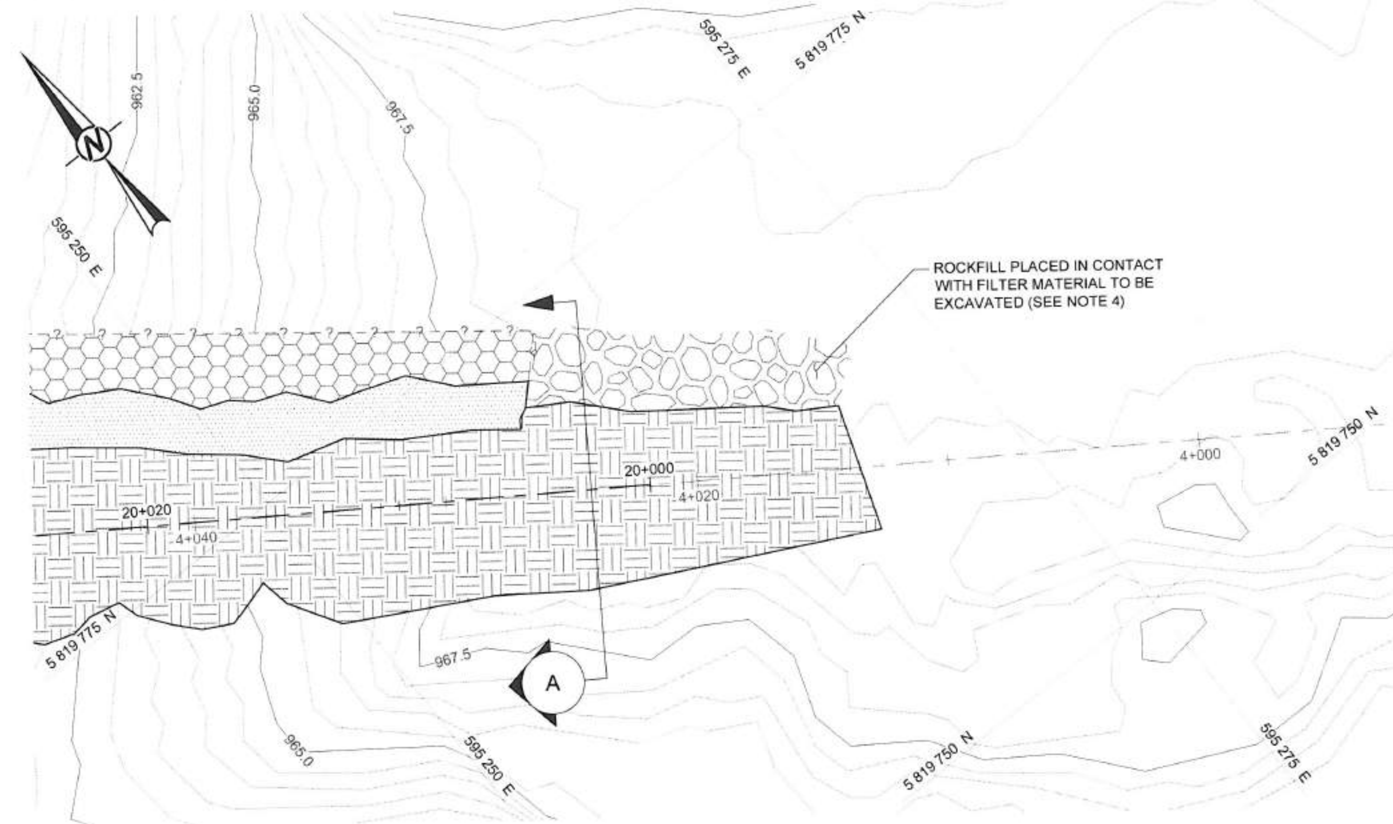
PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT SURFACE PREPARATION

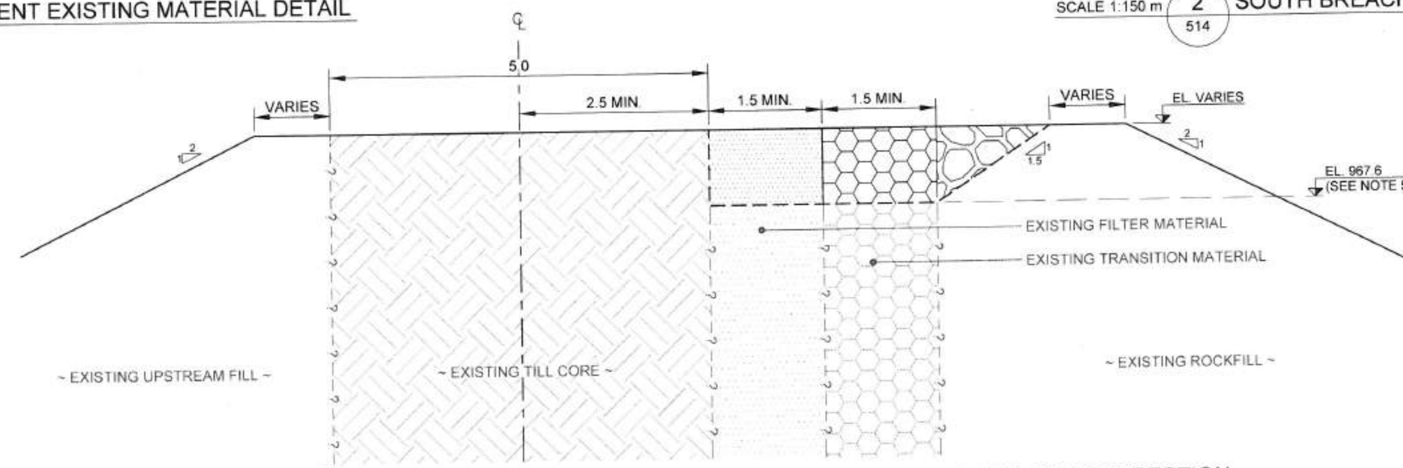
PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		514



SCALE 1:150 m 1/514 NORTH BREACH ABUTMENT EXISTING MATERIAL DETAIL



SCALE 1:150 m 2/514 SOUTH BREACH ABUTMENT EXISTING MATERIAL DETAIL



SCALE 1:50 m A BREACH ABUTMENT SURFACE PREPARATION AND BACKFILL TYPICAL SECTION

LEGEND

- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- EXISTING TILL CORE
- 20+000 CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
- 4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 2)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 0.5 m MINOR AND 2.5 m MAJOR.
4. EXCAVATION EXTENT TO BE DETERMINED BY THE GEOTECHNICAL ENGINEER'S REPRESENTATIVE.
5. EXCAVATION ELEVATION TO BE DETERMINED BY THE GEOTECHNICAL ENGINEER'S REPRESENTATIVE.
6. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
2. S.O.L. - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

0 2 4 1:50 METRES

0 5 10 1:150 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	GJ	TLE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA T. L. ELDRIDGE Nov 3/15

CLIENT

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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT - SURFACE PREPARATION NORTH AND SOUTH BREACH ABUTMENTS

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		515

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

SCALE 1:100 m 1 PIPE DETAIL THROUGH EMBANKMENT MATERIALS

LEGEND

- 150 mm Ø PERFORATED HDPE UPSTREAM DRAIN PIPE
- 150 mm Ø SOLID HDPE UPSTREAM DRAIN PIPE
- 150 mm Ø SOLID HDPE DRAIN PIPE PLACED ON EMBANKMENT SLOPE
- UPSTREAM DRAIN FOOTPRINT
- FILTER SAND
- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- TILL CORE
- (UDP-16) UPSTREAM DRAIN PIPE CONTROL POINTS
- 20+000 CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
- 4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 2)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR.
4. PIPE LOCATION AND INVERT ELEVATION TO BE CONFIRMED BY THE GEOTECHNICAL ENGINEER'S REPRESENTATIVE.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
2. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

UPSTREAM DRAIN PIPE CONTROL POINTS

POINT ID	EASTING	NORTHING	INVERT ELEVATION
UDP-01	595199.17	5819794.63	950.61
UDP-02	595227.92	5819822.44	951.47
UDP-03	595164.41	5819830.57	950.48
UDP-04	595193.16	5819858.38	949.31
UDP-05	595131.08	5819867.90	950.50
UDP-06	595158.40	5819894.32	948.81
UDP-07	595098.48	5819905.93	950.50
UDP-08	595123.64	5819930.26	948.31
UDP-09	595080.79	5819917.20	950.50
UDP-10	595084.80	5819957.00	949.02
UDP-11	595031.34	5819925.20	950.26
UDP-12	595035.05	5819962.02	949.52
UDP-13	594981.59	5819930.22	950.49
UDP-14	594985.30	5819967.03	949.75
UDP-15	595099.18	5819955.55	947.96
UDP-16	595173.73	5820132.28	925.00

0 5 10
1:100 METRES

0 25 50
1:750 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	AJH	TLE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL
PROFESSIONAL ENGINEER
PROVINCE
T. L. EVERIDGE
BRITISH COLUMBIA
Nov 3 '15

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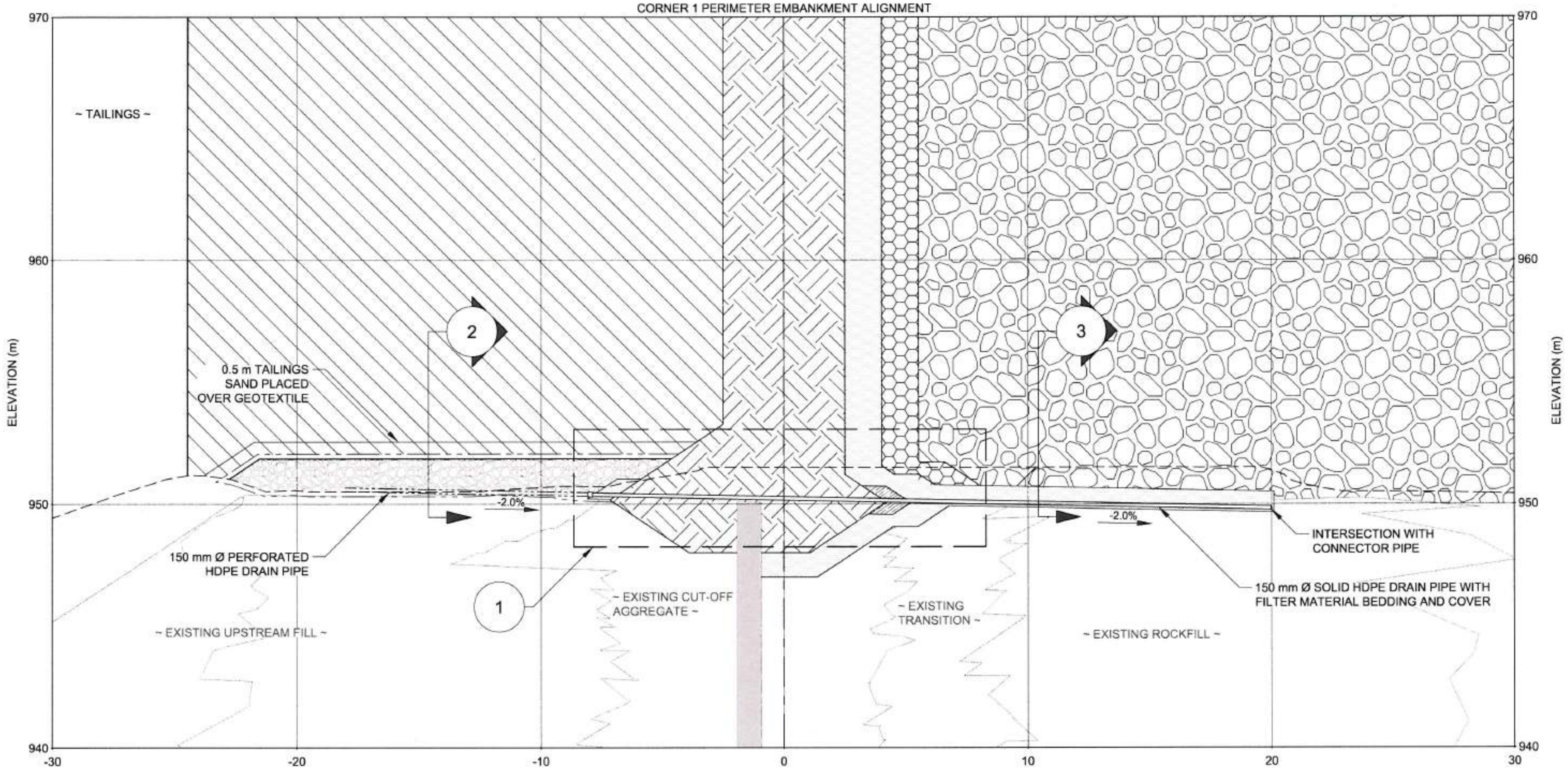
www.golder.com

PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT UPSTREAM DRAIN LAYOUT

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		516



SCALE 1:125 m A 516 CORNER 1 PERIMETER EMBANKMENT UPSTREAM DRAIN - STATION: 20+190

LEGEND

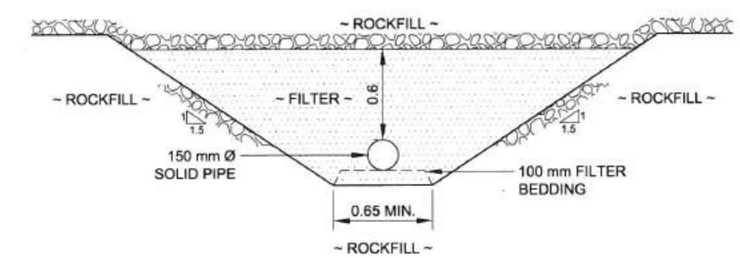
- EXISTING GROUND (SEE REFERENCE 1)
- CUT-OFF WALL
- FILTER SAND
- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- DRAIN ROCK
- TILL CORE
- UPSTREAM FILL
- 340 g/m² NON-WOVEN GEOTEXTILE
- 800 g/m² NON-WOVEN GEOTEXTILE

NOTES

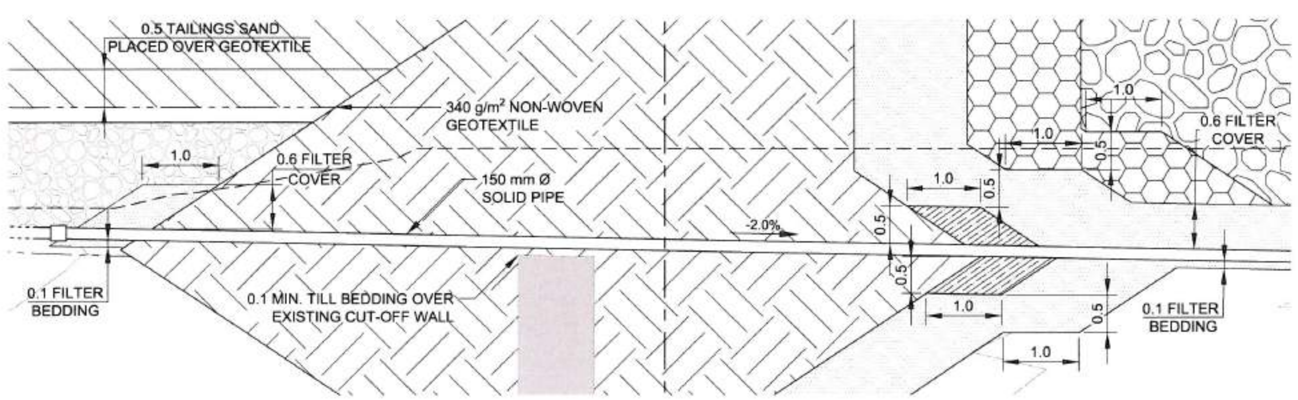
1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO ADJUSTED MINE GRID DATUM.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

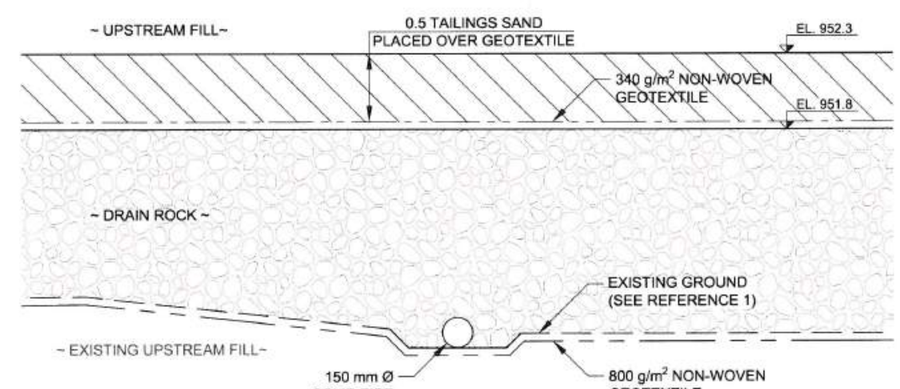
1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.



SCALE 1:25 m 3 TYPICAL DETAIL THROUGH ROCKFILL



SCALE 1:50 m 1 PIPE THROUGH EMBANKMENT DETAIL



SCALE 1:25 m 2 TYPICAL DETAIL THROUGH UPSTREAM DRAIN

0 1 2 — 1:25 METRES

0 2 4 — 1:50 METRES

0 5 10 — 1:125 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	GJ	TK
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — T. L. ELDRIDGE

Nov 3/15

CLIENT

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PROJECT

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

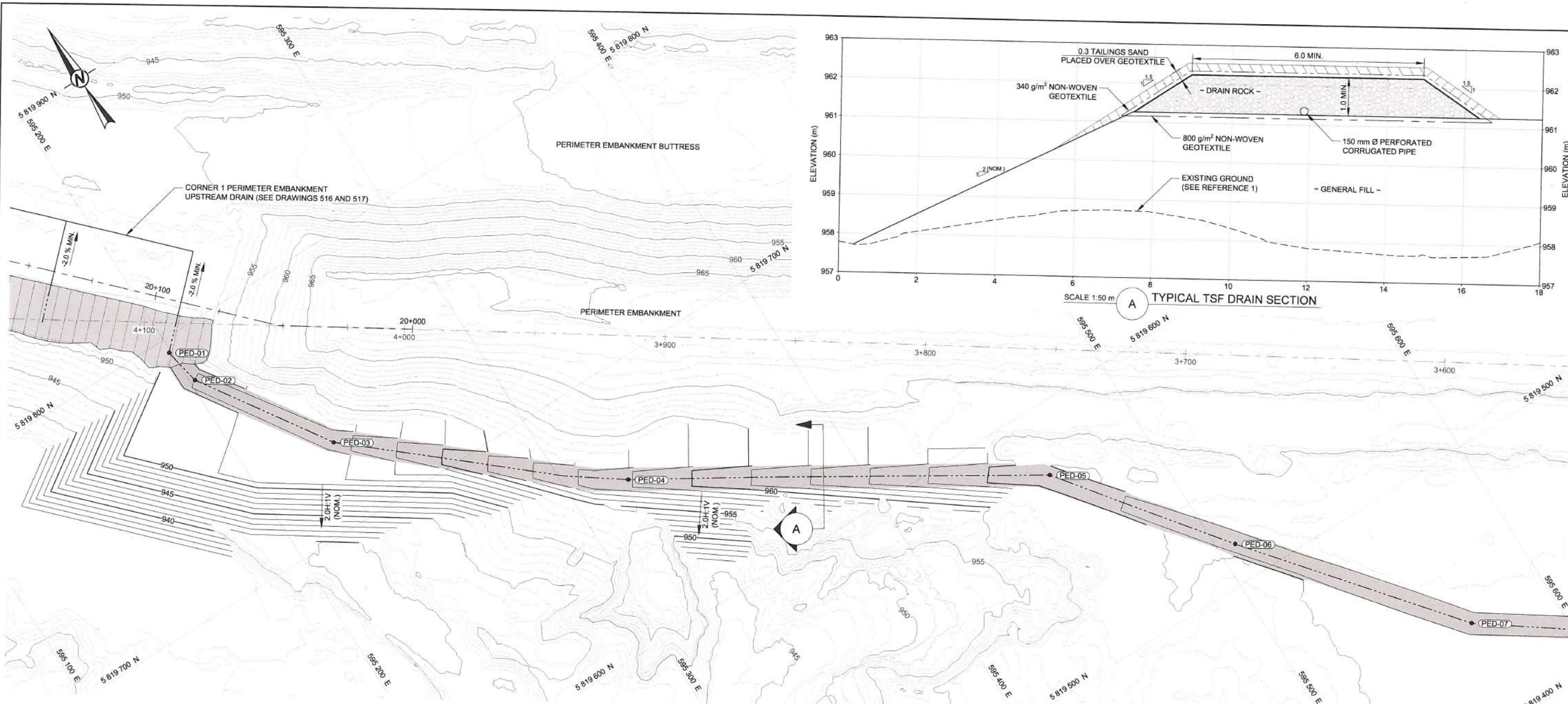
TITLE

CORNER 1 PERIMETER EMBANKMENT UPSTREAM DRAIN SECTIONS AND DETAILS

PROJECT No	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		517

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

Path: \\golder.gds\gal\Burnaby\CAD-GIS\Client\1413803\PHASE 1\3000\Task 3500\500 Series\ | File Name: 1413803-3000-3500 - 970-DSGN - UPSTREAM_DRAIN_PIPES_SECT.dwg



LEGEND

UPSTREAM DRAIN AREA

150 mm Ø PERFORATED HDPE UPSTREAM DRAIN PIPE

150 mm Ø SOLID HDPE UPSTREAM DRAIN PIPE

DRAIN ROCK

UPSTREAM FILL

(PED-07) PERIMETER EMBANKMENT UPSTREAM DRAIN PIPE CONTROL POINTS

340 g/m² NON-WOVEN GEOTEXTILE

800 g/m² NON-WOVEN GEOTEXTILE

20+000 CORNER 1 PERIMETER EMBANKMENT ALIGNMENT

4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 2)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR.
4. PIPE LOCATION AND INVERT ELEVATION TO BE CONFIRMED BY THE GEOTECHNICAL ENGINEER'S REPRESENTATIVE.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
2. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

PERIMETER EMBANKMENT DRAIN PIPE CONTROL POINTS

POINT ID	EASTING	NORTHING	INVERT ELEVATION
PED-01	595199.17	5819794.63	950.61
PED-02	595201.99	5819780.41	951.00
PED-03	595234.04	5819731.79	951.60
PED-04	595322.19	5819659.17	957.93
PED-05	595460.31	5819574.75	964.87
PED-06	595506.76	5819514.50	965.61
PED-07	595567.94	5819440.26	965.82

0 2 4
1:50 METRES

0 25 50
1:750 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL
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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT UPSTREAM DRAIN TIE-IN

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		518

25 mm | IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

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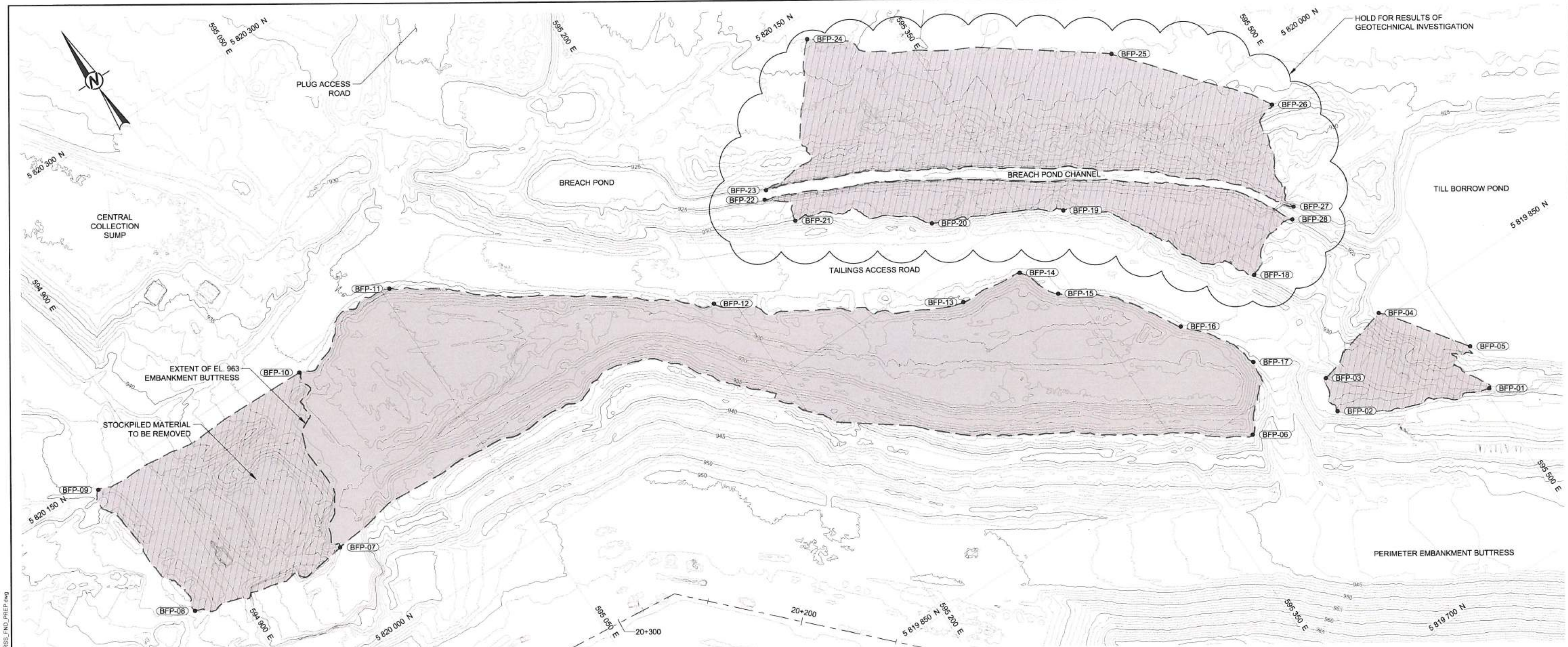


LEGEND

	EL. 963 EMBANKMENT BUTTRESS FOUNDATION PREPARATION AREA
	EL. 970 EMBANKMENT BUTTRESS FOUNDATION PREPARATION AREA
• BFP-28	CORNER 1 PERIMETER EMBANKMENT BUTTRESS FOUNDATION PREPARATION CONTROL POINTS
20+000	CORNER 1 PERIMETER EMBANKMENT ALIGNMENT

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR. CONTOURS OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WERE COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).
4. EXTENT OF FOUNDATION PREPARATION TO BE CONFIRMED BY THE GEOTECHNICAL ENGINEER'S REPRESENTATIVE.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015 AND FILE: "151015 ASBUILT SURFACE.msr", RECEIVED: OCTOBER 15, 2015.

CORNER 1 PERIMETER EMBANKMENT BUTTRESS FOUNDATION PREPARATION CONTROL POINTS

POINT ID	EASTING	NORTHING
BFP-01	595502.09	5819789.19
BFP-02	595429.39	5819823.47
BFP-03	595433.87	5819841.08
BFP-04	595475.60	5819853.93
BFP-05	595505.94	5819812.84
BFP-06	595385.94	5819837.80
BFP-07	594958.52	5820052.72
BFP-08	594877.42	5820066.86
BFP-09	594870.44	5820146.96
BFP-10	594991.16	5820140.12

CORNER 1 PERIMETER EMBANKMENT BUTTRESS FOUNDATION PREPARATION CONTROL POINTS

POINT ID	EASTING	NORTHING
BFP-11	595054.09	5820150.56
BFP-12	595190.48	5820050.45
BFP-13	595299.10	5819978.92
BFP-14	595331.80	5819975.34
BFP-15	595342.40	5819955.20
BFP-16	595386.03	5819905.45
BFP-17	595407.23	5819869.02
BFP-18	595432.66	5819906.32
BFP-19	595368.64	5819989.61
BFP-20	595308.08	5820022.12

CORNER 1 PERIMETER EMBANKMENT BUTTRESS FOUNDATION PREPARATION CONTROL POINTS

POINT ID	EASTING	NORTHING
BFP-21	595249.76	5820062.73
BFP-22	595242.53	5820080.66
BFP-23	595245.89	5820084.39
BFP-24	595307.22	5820138.10
BFP-25	595434.80	5820043.37
BFP-26	595489.75	5819974.82
BFP-27	595469.56	5819924.43
BFP-28	595465.32	5819919.30

0 50 100
1:1,000 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	GJ	KE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA
T. L. EBERLIDGE
Nov 3/15

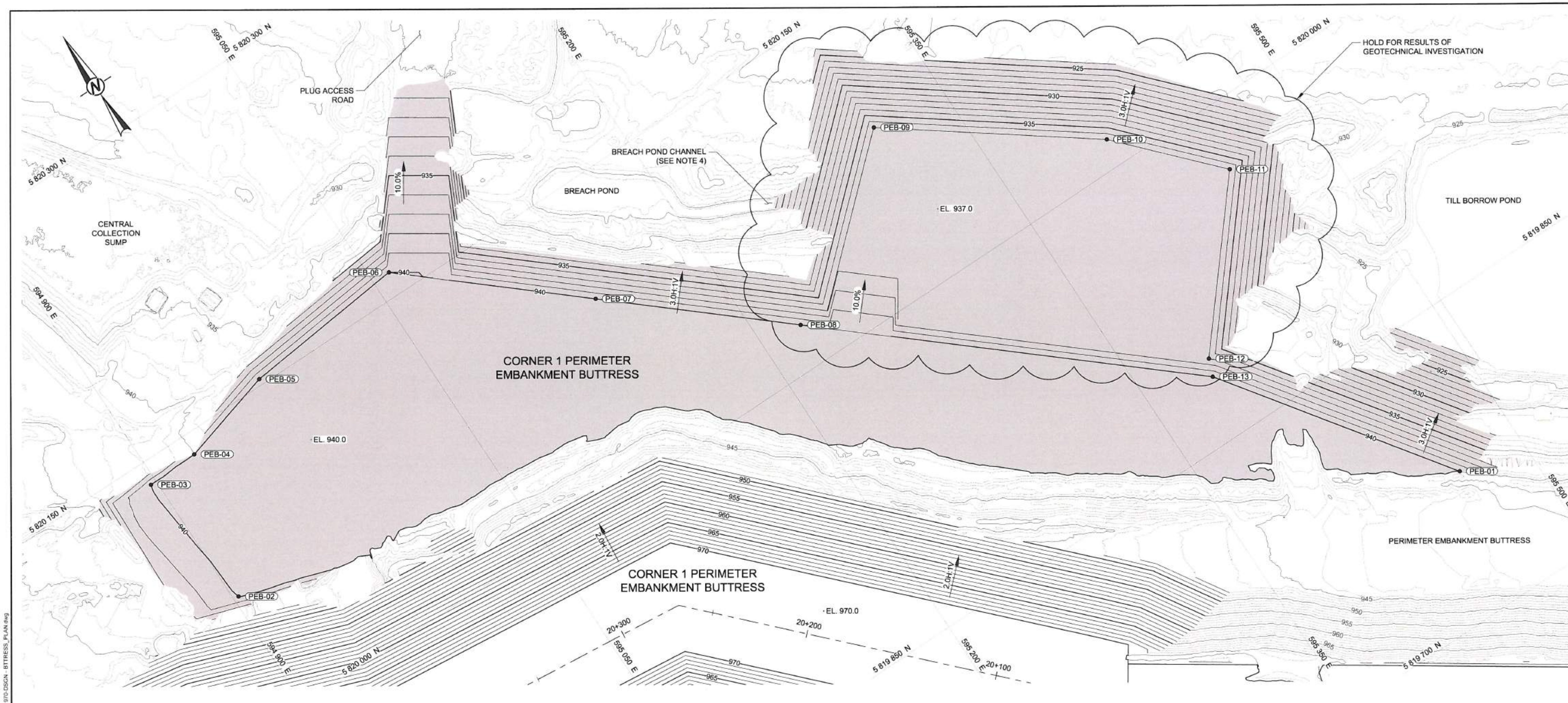
CLIENT
MOUNT POLLEY MINING CORPORATION

CONSULTANT
Golder Associates
VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT BUTTRESS SURFACE PREPARATION

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		519



LEGEND

CORNER 1 PERIMETER EMBANKMENT BUTTRESS

PEB-13 CORNER 1 PERIMETER EMBANKMENT BUTTRESS CONTROL POINTS

20+000 CORNER 1 PERIMETER EMBANKMENT ALIGNMENT

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR. CONTOURS OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WERE COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).
4. DRAIN ROCK TO BE PLACED WITHIN BREACH POND CHANNEL.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015 AND FILE: "151015 ASBUILT SURFACE.msr", RECEIVED: OCTOBER 15, 2015.

CORNER 1 PERIMETER EMBANKMENT BUTTRESS CONTROL POINTS

POINT ID	EASTING	NORTHING	ELEVATION
PEB-01	595464.46	5819771.11	940.00
PEB-02	594902.73	5820065.35	940.00
PEB-03	594896.80	5820138.22	940.00
PEB-04	594923.94	5820139.15	940.00
PEB-05	594973.24	5820153.11	940.00
PEB-06	595059.51	5820162.15	940.00
PEB-07	595141.23	5820091.88	940.00

CORNER 1 PERIMETER EMBANKMENT BUTTRESS CONTROL POINTS

POINT ID	EASTING	NORTHING	ELEVATION
PEB-08	595222.18	5820022.27	940.00
PEB-09	595309.89	5820086.42	937.00
PEB-10	595407.07	5820014.56	937.00
PEB-11	595451.31	5819966.75	937.00
PEB-12	595388.35	5819891.27	937.00
PEB-13	595384.86	5819882.40	940.00

0 50 100
1:1,000 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA T. L. ELDRIDGE

Nov 3/15

CLIENT

MOUNT POLLEY MINING CORPORATION

CONSULTANT

Golder Associates

VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

PROJECT

MOUNT POLLEY MINE TAILINGS STORAGE FACILITY EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

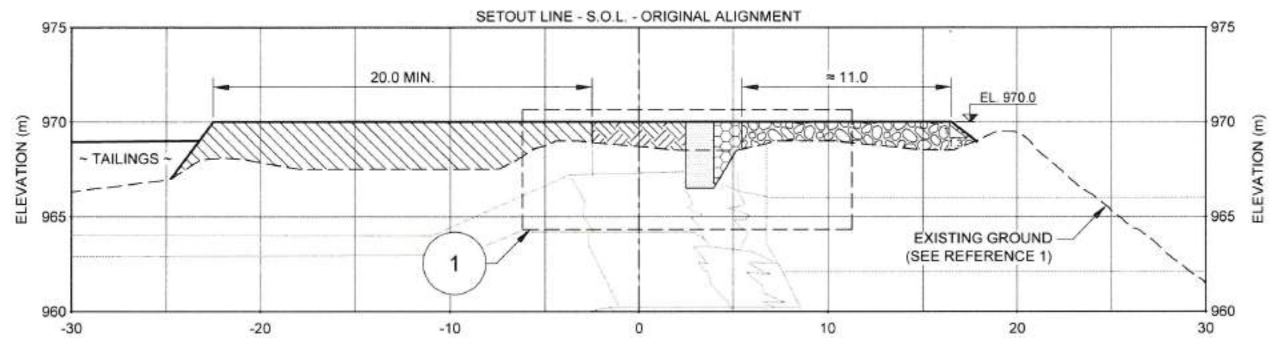
TITLE

CORNER 1 PERIMETER EMBANKMENT BUTTRESS PLAN

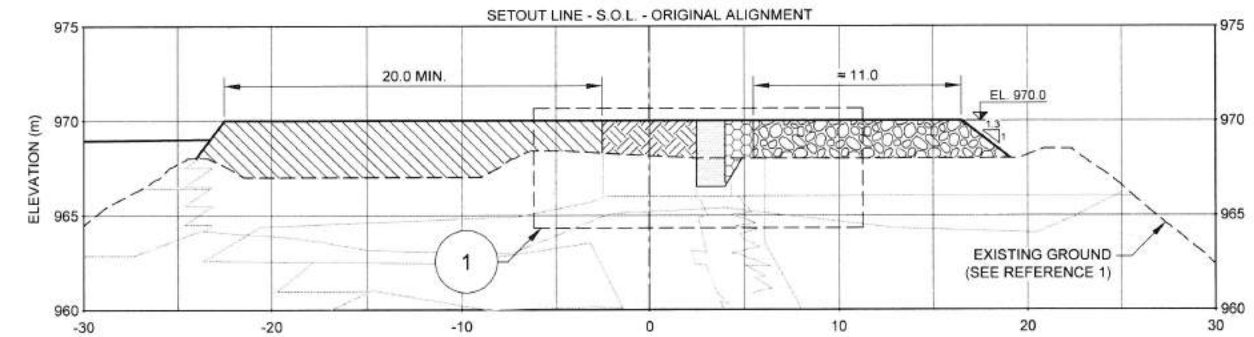
PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		520

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

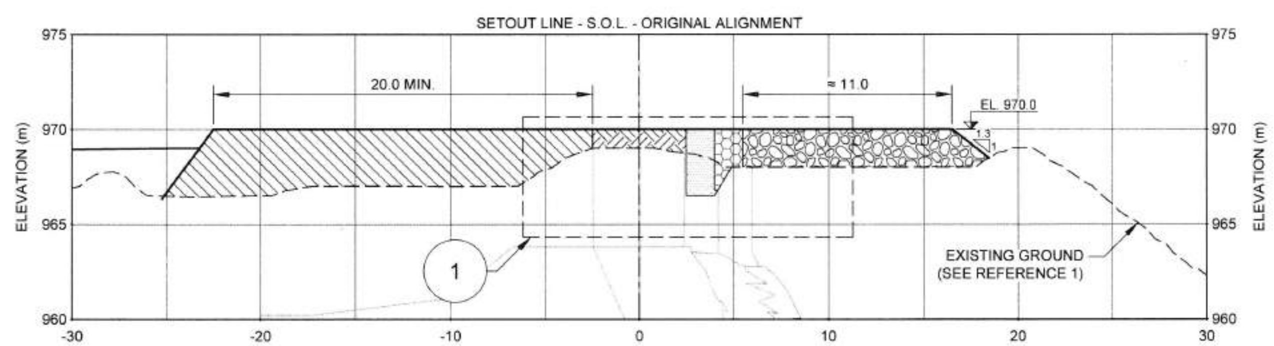
Path: \\golder.gds\gal\Burnaby\CAD-GIS\Client\1413803\PHASE 13000\Task 3500\500 Series\ | File Name: 1413803-3000-3500 - 970-DSGN - BTTRESS_PLAN.dwg



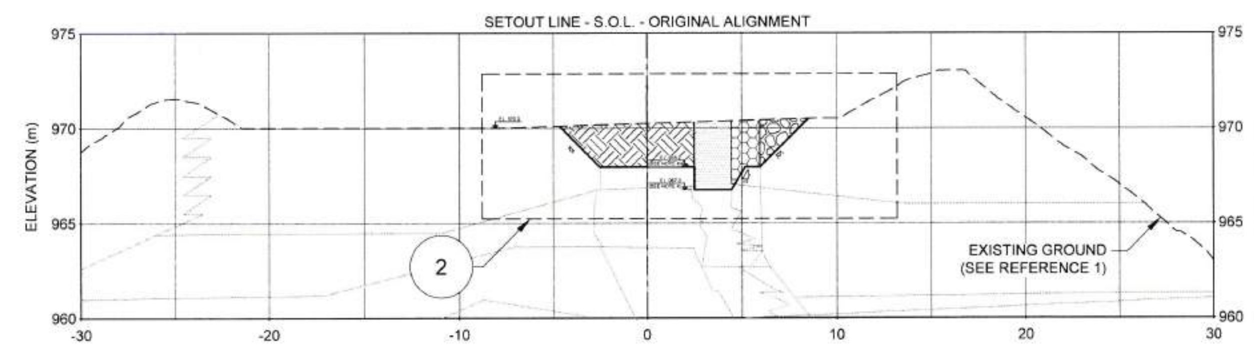
SCALE 1:200 m A/504 SOUTH EMBANKMENT STATION 1+100



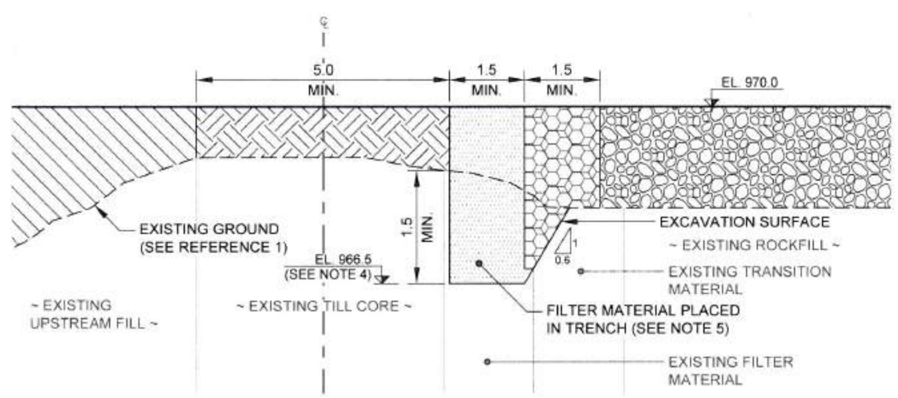
SCALE 1:200 m B/504 MAIN EMBANKMENT STATION 2+060



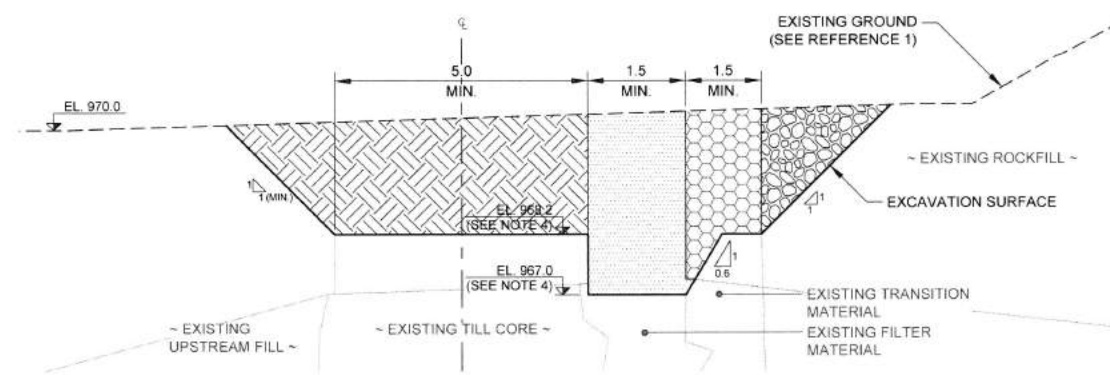
SCALE 1:200 m C/504 PERIMETER EMBANKMENT STATION 3+400



SCALE 1:200 m D/504 PERIMETER EMBANKMENT STATION 4+750



SCALE 1:75 m 1 TYPICAL DETAIL



SCALE 1:75 m 2 TYPICAL DETAIL

LEGEND

- EXISTING GROUND (SEE REFERENCE 1)
- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- TILL CORE
- UPSTREAM FILL

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. EXISTING MATERIAL BOUNDARIES SHOWN ARE APPROXIMATE.
3. EXCAVATION DEPTH TO BE CONFIRMED BY THE GEOTECHNICAL ENGINEER'S REPRESENTATIVE.
4. FILTER MATERIAL TO BE PLACED IN 0.3 m LIFTS, COMPACTED IN 0.9 m LOOSE LIFTS AS DEFINED IN TECHNICAL SPECIFICATIONS.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC,
FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
2. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

0 2.5 5 METRES 1:75

0 10 20 METRES 1:200

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	BC	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	BC	GJ	AJH	TLE

SEAL: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, T. L. ELDRIDGE

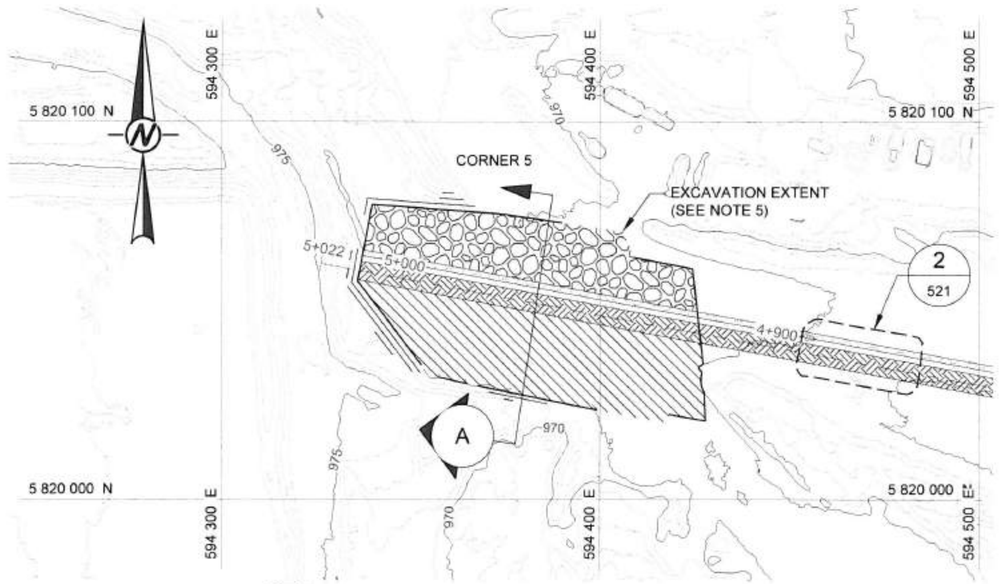
CLIENT: MOUNT POLLEY MINING CORPORATION

CONSULTANT: Golder Associates — VANCOUVER OFFICE, [+1] (604) 296 4200, www.golder.com

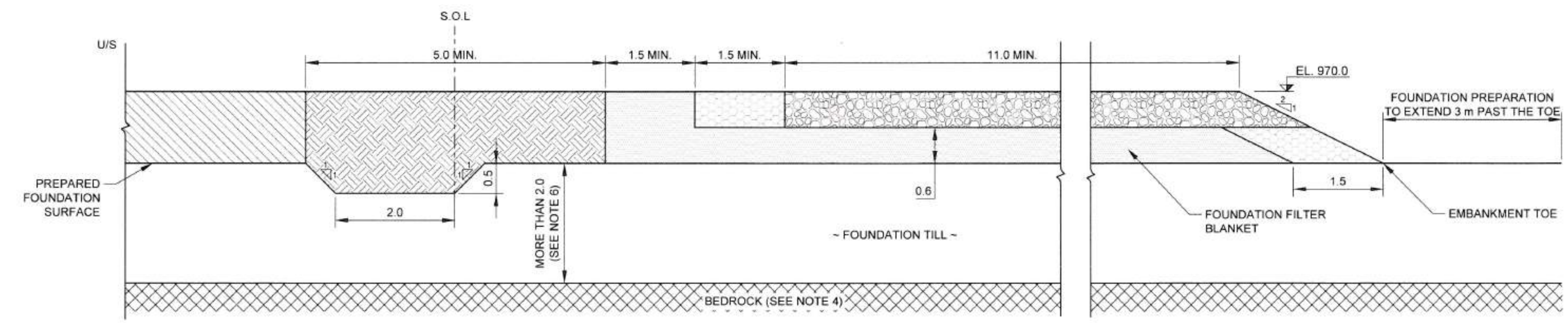
PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE: **FILTER COMPLETION TO EL. 968 m AND EMBANKMENT RAISE TO EL. 970 m - TYPICAL SECTIONS**

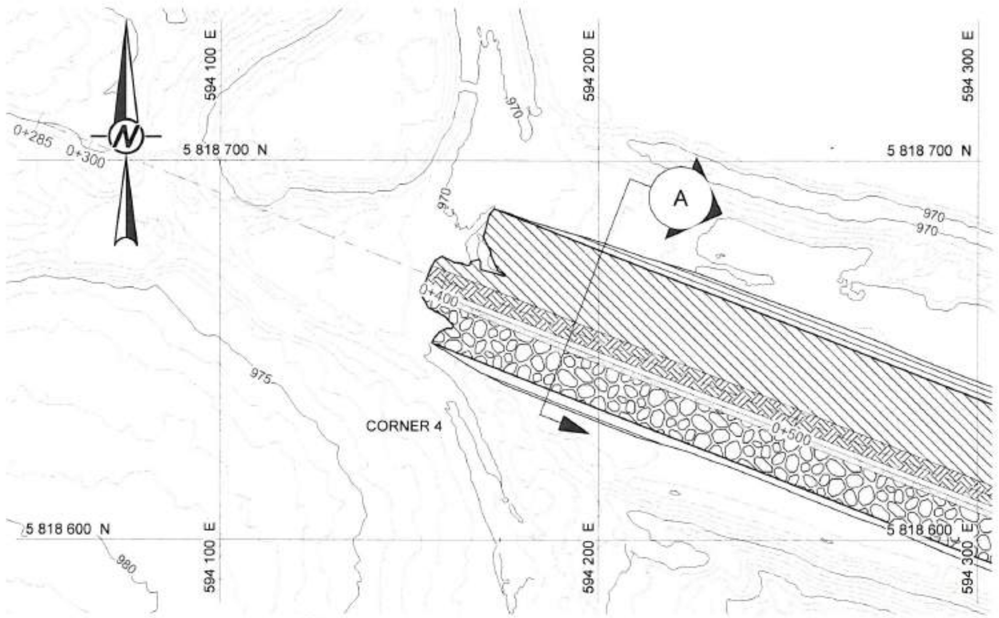
PROJECT No.	PHASE/TASK	Rev.	DRAWING
1413803	3000/3500	0	521



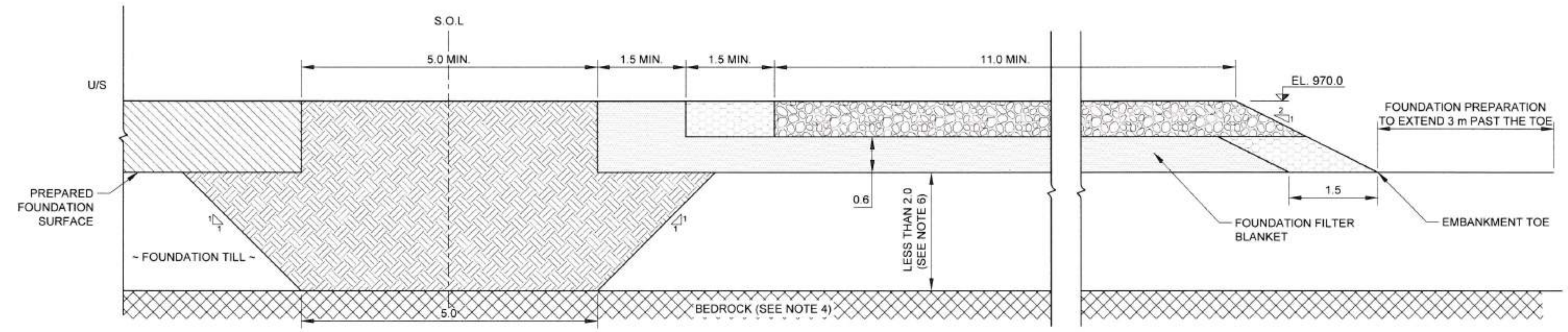
SCALE 1:1,000 m 1/504 PERIMETER EMBANKMENT ABUTMENT DETAIL



SCALE 1:50 m A TYPICAL TILL CORE TIE-IN TO FOUNDATION TILL



SCALE 1:1,000 m 2/504 SOUTH EMBANKMENT ABUTMENT DETAIL



SCALE 1:50 m A TYPICAL TILL CORE TIE-IN TO FOUNDATION BEDROCK

LEGEND

- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- TILL CORE
- UPSTREAM FILL
- 4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 2)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR.
4. DEPTH TO BEDROCK TO BE CONFIRMED BY THE GEOTECHNICAL ENGINEER'S REPRESENTATIVE.
5. EXTENT OF EXCAVATION AND FOUNDATION PREPARATION TO BE CONFIRMED BY THE GEOTECHNICAL ENGINEER'S REPRESENTATIVE.
6. EXTEND TILL CORE TO BEDROCK IF FOUNDATION TILL THICKNESS IS LESS THAN 2.0 m.
7. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
2. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

0 2 4 — 1:50 METRES

0 50 100 — 1:1,000 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ	AJH	TLE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	BC	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	BC	GJ	AJH	TLE

SEAL: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA — ELDRIDGE — Nov 3/15

CLIENT: MOUNT POLLEY MINING CORPORATION

CONSULTANT: Golder Associates — VANCOUVER OFFICE [+1] (604) 296 4200 www.golder.com

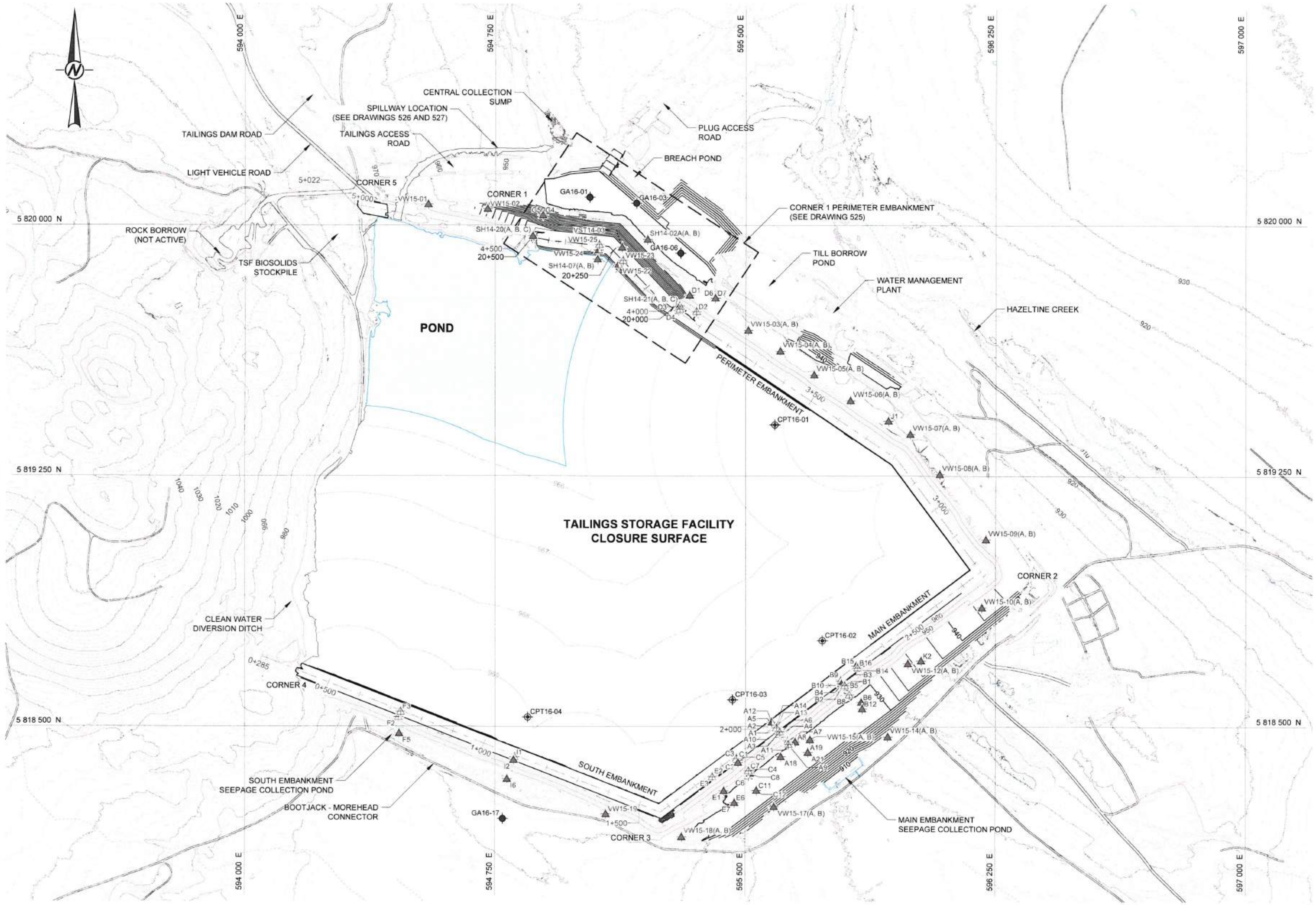
PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE: **EMBANKMENT RAISE TO EL. 970 m ABUTMENT DETAIL**

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		522

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI D — 25 mm

Path: \\golder.gds\gal\Burnaby\CAD-GIS\Client\1413803\PHASE 1\3000\Task 3500\500 Series\ | File Name: 1413803-3000-3500 - 970-DSGN - EMBK_970_RAISE_ABTMNT_DTL.dwg



LEGEND

CPT16-04	VIBRATING WIRE PIEZOMETER - TO BE INSTALLED IN TAILINGS
GA16-17	VIBRATING WIRE PIEZOMETER - TO BE INSTALLED IN FOUNDATION
	EXISTING VIBRATING WIRE PIEZOMETER - INSTALLED IN EMBANKMENT
	EXISTING VIBRATING WIRE PIEZOMETER - INSTALLED IN UPSTREAM FILL/TAILINGS
	EXISTING VIBRATING WIRE PIEZOMETER - INSTALLED IN FOUNDATION
20+000	CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
4+400	SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 2 m MINOR AND 10 m MAJOR.
4. VIBRATING WIRE PIEZOMETERS TO BE INSTALLED AS PART OF THE 2016 GEOTECHNICAL INVESTIGATION PROGRAM.
5. EXISTING VIBRATING WIRE PIEZOMETERS ARE TO BE EXTENDED AS REQUIRED. REFER TO DETAIL ON DRAWING 525.
6. ALL INSTRUMENTATION IS TO BE PROTECTED FROM DAMAGE UNLESS DIRECTED OTHERWISE BY THE GEOTECHNICAL ENGINEER.
7. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAMES: "10cm contours full tailings.dxf" AND FILE: "10cm Hazeltine 3 Reprocessed.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015 AND FILE: "JULY 16, 2015.msr", RECEIVED: JULY 23, 2015 AND FILE: "151015 ASBUILT SURFACE.msr", RECEIVED: OCTOBER 15, 2015.
3. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — T. L. ELDRIDGE — Nov 3/15

CLIENT

MOUNT POLLEY MINING CORPORATION

CONSULTANT

Golder Associates

VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

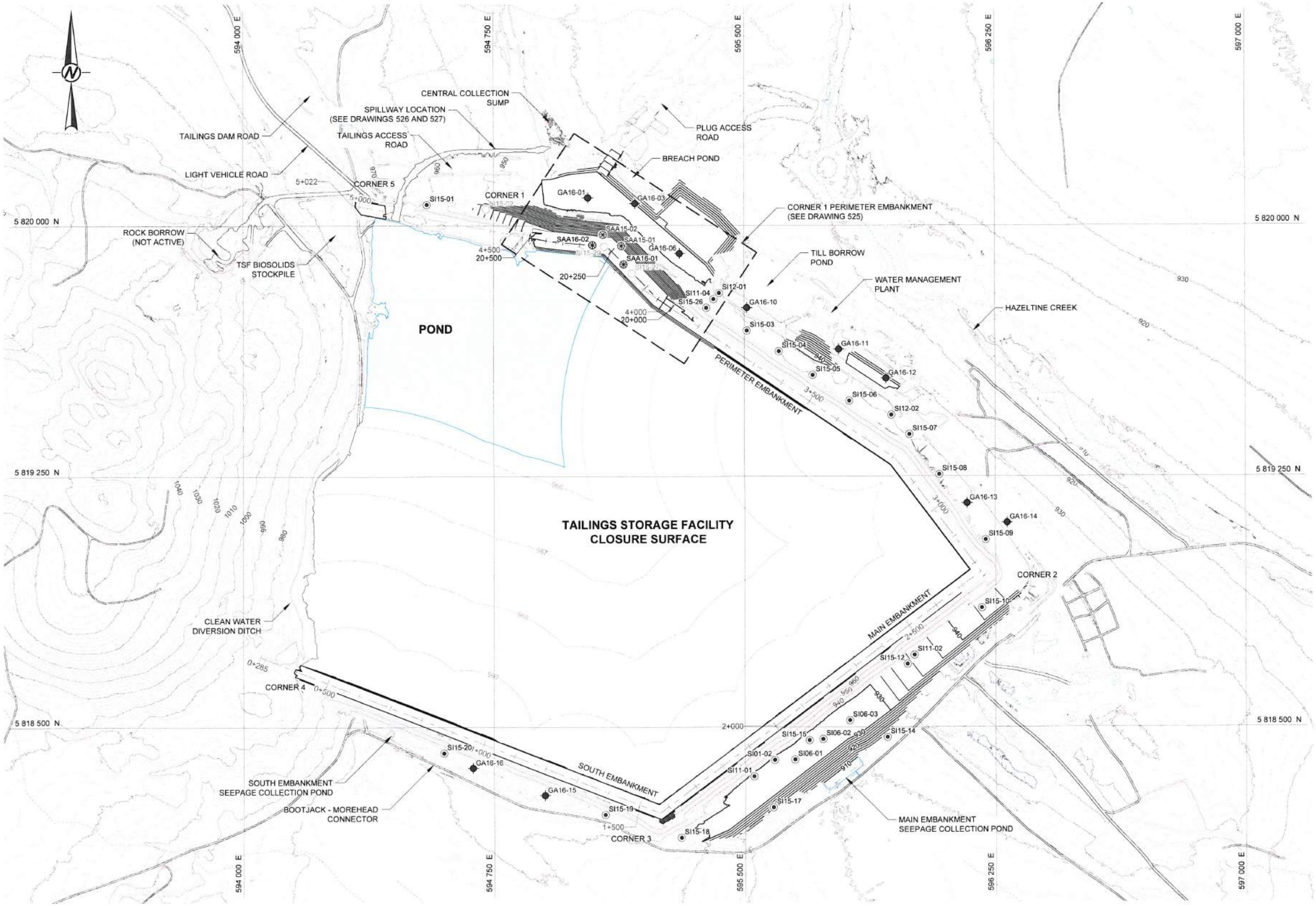
PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
TAILINGS STORAGE FACILITY PIEZOMETER INSTRUMENTATION

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		523

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

25 mm



LEGEND

- GA16-16 SLOPE INCLINOMETER CASING INSTALLATION (INSTALLED AS PART OF 2016 DRILLING PROGRAM)
- SAA16-02 SHAPE ACCEL ARRAY INSTALLATION (SAA)
- SAA15-02 EXISTING SHAPE ACCEL ARRAY (SAA)
- EXISTING SLOPE INCLINOMETERS
- EXISTING SLOPE INCLINOMETERS TO BE DESTROYED BY CONSTRUCTION
- 20+000 CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
- 4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 2 m MINOR AND 10 m MAJOR.
4. ADDITIONAL INCLINOMETER CASINGS TO BE INSTALLED AS PART OF THE 2016 GEOTECHNICAL INVESTIGATION PROGRAM.
5. THE EXISTING INCLINOMETER CASINGS TO BE EXTENDED AS REQUIRED. SAA CABLES TO BE EXTENDED AS REQUIRED. REFER TO DETAIL ON DRAWING 525.
6. ALL INSTRUMENTATION TO BE PROTECTED FROM DAMAGE UNLESS OTHERWISE SHOWN OR AS DIRECTED OTHERWISE BY THE GEOTECHNICAL ENGINEER.
7. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAMES: "10cm contours full tailings.dxf" AND FILE: "10cm Hazeltine 3 Reprocessed.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015 AND FILE: "JULY 16, 2015.msr", RECEIVED: JULY 23, 2015 AND FILE: "151015 ASBUILT SURFACE.msr", RECEIVED: OCTOBER 15, 2015.
3. S.O.L. - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
B	2015-10-29	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — T. L. ELDRIDGE

CLIENT

MOUNT POLLEY MINING CORPORATION

CONSULTANT

Golder Associates

VANCOUVER OFFICE
[+1] (604) 296 4200
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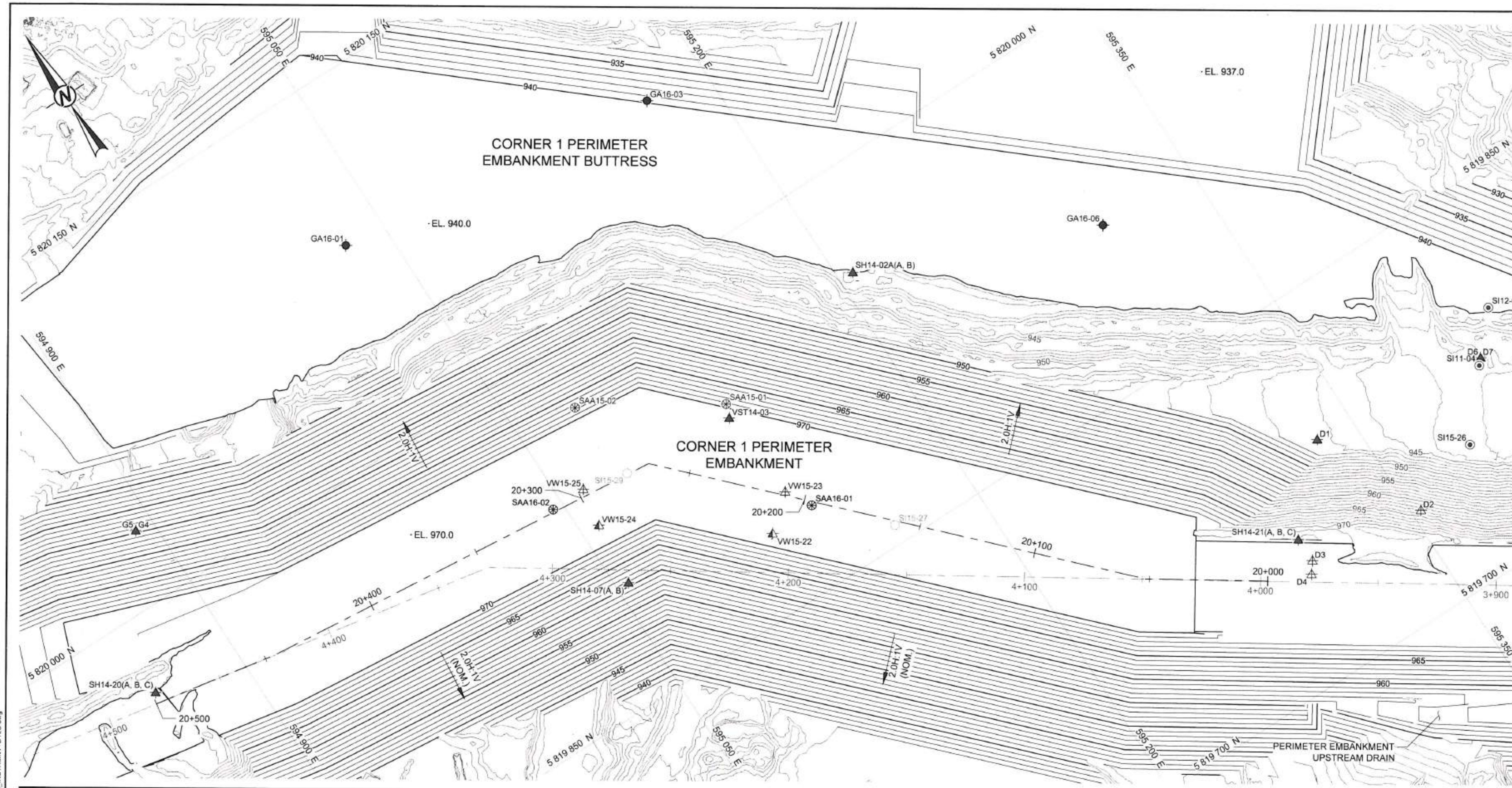
PROJECT

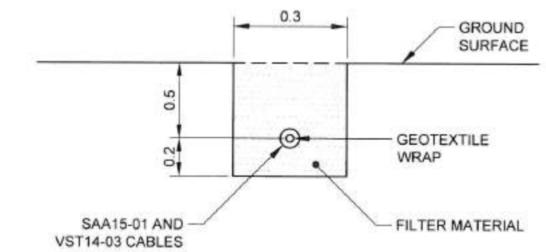
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE

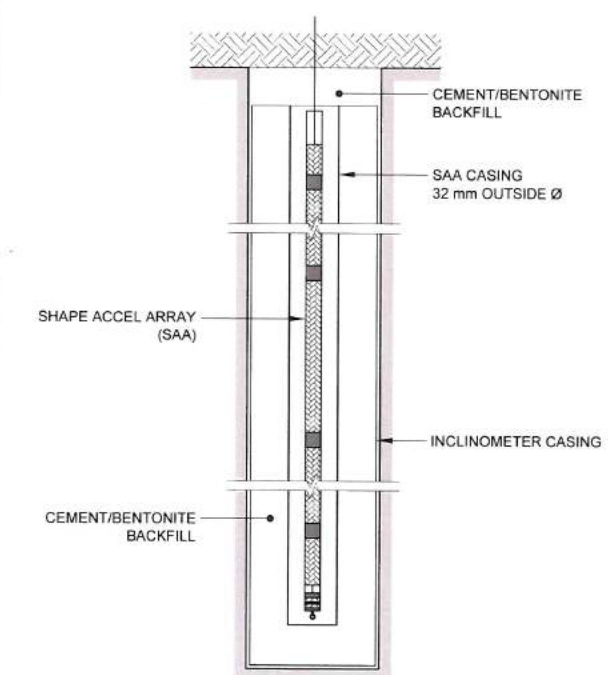
TAILINGS STORAGE FACILITY
SLOPE INCLINOMETER AND SAA INSTRUMENTATION

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		524





NOT TO SCALE 1 INSTRUMENTATION CABLE EXTENSION TYPICAL DETAIL



NOT TO SCALE 2 SAA INSTALLATION DETAIL

0 50 100
1:1,000 METRES

LEGEND

- GA16-06 SLOPE INCLINOMETER CASING AND VIBRATING WIRE PIEZOMETER INSTALLATION
- SAA16-02 SHAPE ACCEL ARRAY INSTALLATION (SAA)
- SAA15-02 EXISTING SHAPE ACCEL ARRAY (SAA)
- EXISTING SLOPE INCLINOMETERS
- EXISTING SLOPE INCLINOMETERS TO BE DESTROYED BY CONSTRUCTION
- EXISTING VIBRATING WIRE PIEZOMETER - INSTALLED IN EMBANKMENT
- EXISTING VIBRATING WIRE PIEZOMETER - INSTALLED IN UPSTREAM FILL/TAILINGS
- EXISTING VIBRATING WIRE PIEZOMETER - INSTALLED IN FOUNDATION
- CUT-OFF WALL
- FILTER MATERIAL
- TILL CORE
- 20+000 CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
- 4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 2)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR.
4. ADDITIONAL INSTRUMENTATION DOWNSTREAM OF THE EMBANKMENT WITHIN THE BUTTRESS FOOTPRINT TO BE INSTALLED AS PART OF THE 2016 GEOTECHNICAL INVESTIGATION PROGRAM.
5. ALL INSTRUMENTATION TO BE PROTECTED FROM DAMAGE UNLESS OTHERWISE SHOWN OR AS DIRECTED OTHERWISE BY THE GEOTECHNICAL ENGINEER.
6. SLOPE INCLINOMETER CASINGS WITHIN THE CUT-OFF WALL ARE TO BE BACKFILLED WITH GROUT AS DETAILED IN THE SPECIFICATIONS.
7. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
2. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING No. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT No. P14178, FILE NAME: "ACAD-01.dwg", DATED: SEPTEMBER 2014.

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	GJ		
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A	2015-10-23	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

SEAL

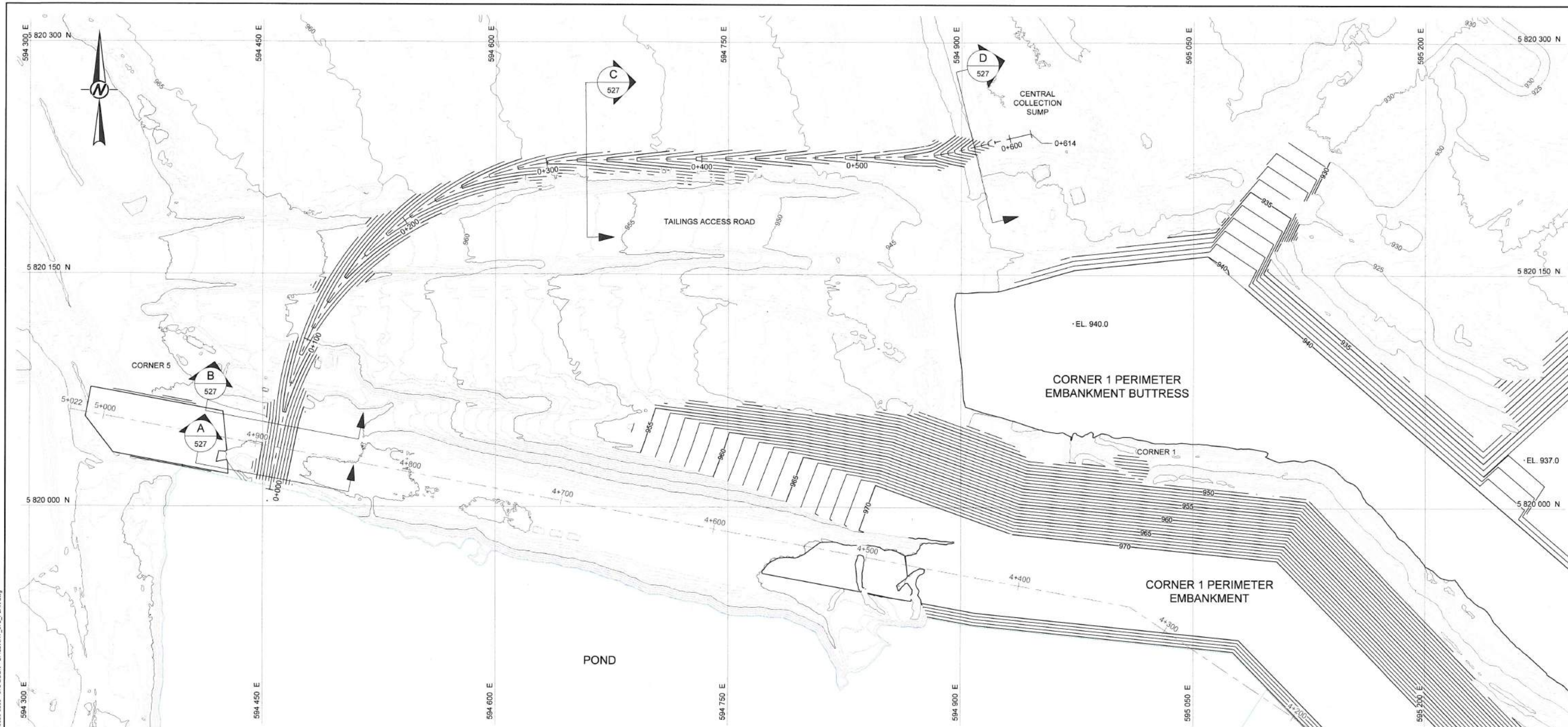
CLIENT
MOUNT POLLEY MINING CORPORATION

CONSULTANT
Golder Associates
VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
CORNER 1 PERIMETER EMBANKMENT INSTRUMENTATION PLAN AND DETAILS

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		525



LEGEND

0+600 — SPILLWAY DESIGN ALIGNMENT

4+400 — SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. COORDINATES ARE SHOWN IN TAILINGS GRID.
3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR. CONTOURS OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WERE COMBINED WITH THE LATEST SURVEY OF THE TAILINGS STORAGE FACILITY (SEE REFERENCES 2).
4. CLOSURE SPILLWAY DESIGNED FOR PROBABLY MAXIMUM FLOOD EVENT, ROUTED THROUGH THE TAILINGS STORAGE FACILITY TO CALCULATE THE PEAK OUTFLOW.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAMES: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
3. S.O.L - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING NO. 01, DRAWING TITLE, "SI PLANNING PLAN MAP", PROJECT NO. P14178, FILE NAME: "ACAD-01.DWG", DATED: SEPTEMBER 2014.

0 50 100
1:1,250 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	SH	JO	KE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	BC	SH	JO	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	BC	SH	JO	TLE

SEAL

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — T. L. ELDRIDGE — Nov 3/15

CLIENT

MOUNT POLLEY MINING CORPORATION

CONSULTANT

Golder Associates

VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE
EL. 970 m - SPILLWAY DESIGN PLAN

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		526

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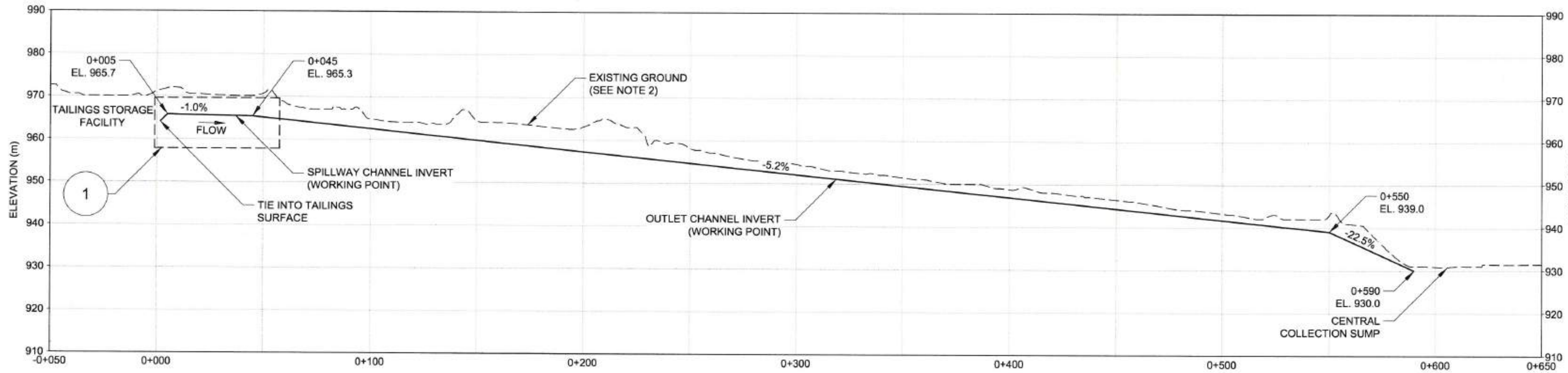
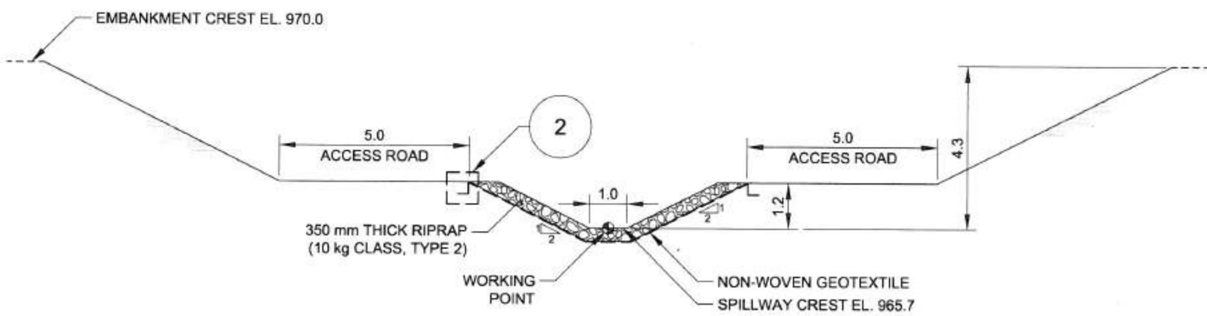
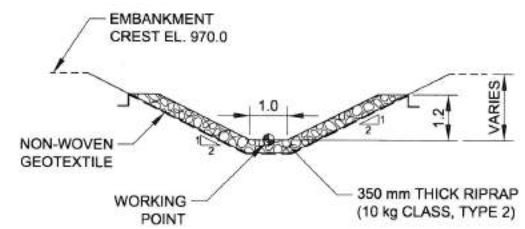
25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



SPILLWAY PROFILE
SCALE 1:1,250 m
VERTICALLY EXAGGERATED 2x



SCALE 1:100 m A 526 SPILLWAY CREST SECTION
STATION 0+005



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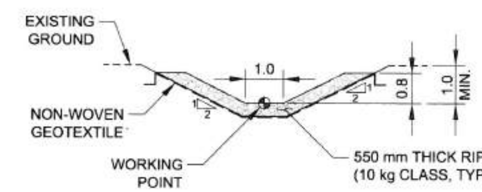
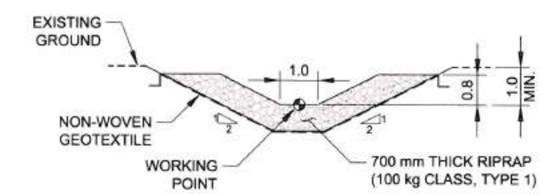
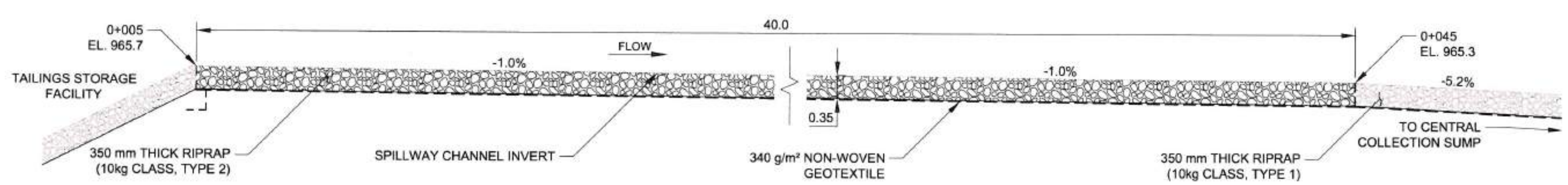


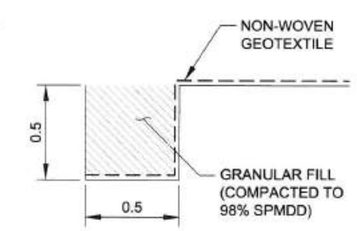
SCALE 1:100 m C 526 OUTLET CHANNEL TYPICAL SECTION
STATION 0+045 TO STATION 0+550



SCALE 1:100 m D 526 CCS SLOPE CHANNEL
STATION 0+550 TO STATION 0+590



SCALE 1:50 m 1 SPILLWAY DETAIL



SCALE 1:20 m 2 GEOTEXTILE ANCHOR TRENCH DETAIL

LEGEND

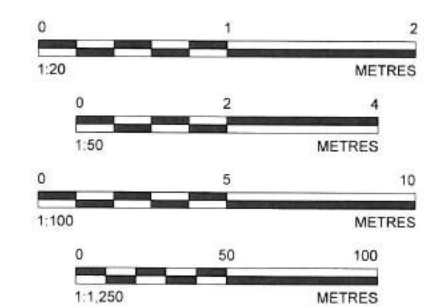
- RIPRAP - TYPE 1
- RIPRAP - TYPE 2

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. GROUND INFORMATION OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WERE COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).
3. WORKING POINT - TOP OF RIPRAP.
4. SPILLWAY INVERT TO BE CONFIRMED BASED ON THE TAILINGS CLOSURE SURFACE.
5. SEE SPECIFICATIONS FOR RIPRAP CLASS AND GRADATION.
6. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING DRAWINGS AND SPECIFICATIONS. THE GEOTECHNICAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY WHERE UNCERTAINTIES OR DISCREPANCIES ARISE WITH THE DRAWINGS AND/OR TECHNICAL SPECIFICATIONS.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.



Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED FOR CONSTRUCTION	TAK	SH	JO	TLE
B	2015-10-29	ISSUED FOR CLIENT REVIEW	BC	SH	JO	TLE
A	2015-10-23	ISSUED FOR INTERNAL REVIEW	BC	SH	JO	TLE

SEAL: PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, ... ELDRIDGE, Nov 3/15

CLIENT: MOUNT POLLEY MINING CORPORATION

CONSULTANT: Golder Associates
VANCOUVER OFFICE
[+1] (604) 296 4200
www.golder.com

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
EMBANKMENT CONSTRUCTION TO ELEVATION 970 m

TITLE: **EL. 970 m - SPILLWAY DESIGN SECTION AND DETAILS**

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	3000/3500	0		527

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

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APPENDIX B

Technical Specifications

PREPARED FOR

Mount Polley Mining Corporation

PREPARED BY:

Golder Associates

0	30OCT15	ISSUE FOR CONSTRUCTION		T. L. ELDRIDGE Oct 30/15
B	29OCT15	ISSUE FOR CLIENT REVIEW	AJH	TLE
A	23OCT15	ISSUE FOR INTERNAL REVIEW	AJH	TLE
REV.	**DATE**	**DESCRIPTION**	**CHECKED**	**APPROVED**

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1.0 GENERAL

1.1 Scope

This document provides the Technical Specifications for the raising of the TSF embankments to elevation 970 m, including the raising of the Corner 1 Perimeter Embankment. This section of the Technical Specification provides technical requirements for the Work.

The scope of the Work includes but is not limited to the following:

- Foundation preparation;
- South, Main and Perimeter Embankments;
- Sourcing and placement of fills for the upstream drain;
- Sourcing and placement of fills for the closure spillway;
- Supply and installation of piping materials;
- Supply and installation of instrumentation; and
- Control of water during construction.

The Work is to be constructed in accordance with and to the lines and grades shown on the Drawings, and as directed by the Owner's Representative and Geotechnical Engineer's Representative.

1.2 Background

The Mount Polley Mine is an open pit gold/copper mine located approximately 56 km northeast of Williams Lake and 10 km southwest of the town of Likely, BC.

Tailings generated from the operation have been deposited within a side-hill constructed TSF. The TSF currently consists of a single embankment about 4.3 km long. Originally, the TSF was contained by three separate embankments, referred to as the Main Embankment, Perimeter Embankment, and South Embankment. As the facility has been raised, the embankments have merged into a single containment embankment. The maximum height of the embankment is approximately 58 m along the Main Embankment, 40 m along the Perimeter Embankment, and 32 m along the South Embankment. Crest elevations are between 968 and 970 m, except at the location of the breach (Corner 1).

On August 4, 2014, a breach of the Perimeter Embankment occurred near station 4+300 (Corner 1). The 2015 Freshet Management Embankment was constructed within the breach to a top of cut-off wall elevation of 950 m.

Construction of the Corner 1 Perimeter embankment to a height of 20 m above the 2015 Freshet Management Embankment, and raising of the South, Main and Perimeter Embankments by approximately 2 m is required to allow future tailings deposition within the TSF.

1.3 Definitions and Standards

1.3.1 Definitions

The definitions used in these Technical Specifications are given in Table 1-1.

Table 1-1: List of Definitions

Term	Definition
Approval	A written engineering or geotechnical opinion, concerning the progress and completion of the work.
ASTM	ASTM International, originally known as American Society for Testing and Materials.
Cut-off Wall	A relatively impermeable vertical element constructed in the 2015 Freshet Management Embankment.
Cut-off Aggregate	Crushed granular material located upstream and downstream of the cut-off wall constructed in the 2015 Freshet Management Embankment.
Drain Rock	Screened rockfill used within the upstream drain and till borrow channel, and meeting the requirements of these Technical Specifications.
Drawings	The most recent version of the Issued for Construction (IFC) drawings prepared by the Geotechnical Engineer.
Geotechnical Engineer	Golder Associates Ltd. (Golder).
Fill	A general terminology to describe soil or rockfill materials placed during the construction.
Filter (Zone F)	Crushed granular material to be placed in contact with the existing Till Core, new Till Core, Cut-Off Wall, Cut-Off Aggregate and transition, and meeting the requirements of these Technical Specifications.
Filter Sand	Granular material to be placed downstream of the Till Core where the upstream drain pipe passes through the Till Core, and meeting the requirements of these Technical Specifications.
NPAG	Non-Potentially Acid Generating.
Owner	Mount Polley Mining Corporation (MPMC).
Owner's Representative (Construction Manager)	Person employed by the Owner to oversee the project works and the Owner's interests. The primary point of contact for the Geotechnical Engineer.
PAG	Potentially Acid Generating.
Quality Assurance (QA)	A planned system of inspection and testing that documents, to the satisfaction of the Owner, the Geotechnical Engineer, other stakeholders and regulators, that the Work complies with the design intent as set out in the Drawings and Technical Specifications.
Geotechnical Engineer's Representative	Geotechnical Engineer's Representative that oversees QA / QC activities.
Quality Control (QC)	A planned system of inspection, testing and documentation carried out during construction to ensure that the Work is being completed in a manner that complies with the Drawings and Technical Specification.
Riprap	Armour rock used for erosion protection within water infrastructure.
Rockfill or Zone C	Run-of-Mine rock material meeting the Technical Specifications.
Technical Specifications	Technical Specifications for completion of the work, prepared by the Geotechnical Engineer.
TSF	Tailings Storage Facility.
Till (Zone S)	Soil consisting of sizes ranging from clay to cobbles that will be placed and compacted to form a relatively impermeable core, and meeting the requirements of these Technical Specifications.
Till Core	Till placed and compacted to form a relatively impermeable core.
Till Foundation	Natural soil layer consisting of sizes ranging from clay to cobbles that will form the foundation at the Perimeter and South Embankment abutments.
Transition (Zone T)	Material produced from crushing of NPAG Rockfill to be placed in contact with the Filter and Rockfill, and meeting the Technical Specifications.

Term	Definition
Upstream Fill (Zone U)	Fill consisting of mainly tailings and meeting the Technical Specifications.
Work	Tasks required to construct the Corner 1 Perimeter Embankment, and raise the Main, Perimeter and South Embankments to 970 m elevation, as described in the Technical Specifications and Drawings.

1.3.2 Standards

Work shall conform to, but not be limited to, the requirements of the latest editions of the following standards listed in Table 1-2. Work included in this Technical Specifications shall conform to the applicable provisions of these publications, except as modified by the requirements specified herein or as indicated in the Drawings. Each publication shall be the most recent revision in effect at the time of issue of the bid package for this work.

Table 1-2: Standards

Standard	Description
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM C117	Standard Test Method for Materials Finer than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing.
ASTM D422	Standard Test Method for Particle-Size Analysis of Soils.
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
ASTM D2216	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
ASTM D2657	Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
ASTM D3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
ASTM D5261	Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
ASTM D4632	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
ASTM D6241	Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50 mm Probe.
ASTM D4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
ASTM D4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
ASTM D4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile.

If materials are offered which conform to a standard other than that specified then the standard offered shall be equal to or superior, when tested, to the specified standard and full details of the differences between the standard offered and the standard specified shall be given.

1.4 Specifications and Drawings

The Technical Specifications and Construction Drawings relevant to this Work are listed in Table 1-3 and Table 1-4, respectively. The Technical Specification 1413803-SP-08, and Drawing number 300 series for the construction of the Main and Perimeter Embankment Buttress have been included for reference.

Where a discrepancy exists between these Technical Specifications and the Drawings, the Geotechnical Engineer shall be notified verbally upon discovery of the discrepancy, and a formal written Request for Information (RFI) shall be issued to the Geotechnical Engineer to clarify the design intent.

If there is a conflict between the Construction Drawings and Technical Specifications, the Technical Specifications will have precedence.

Table 1-3: Technical Specifications

Number	Specification Title
1413803-SP-08	Main and Perimeter Embankment Buttress (for reference)
1413803-SP-09	TSF Construction to Elevation 970 m

Table 1-4: Construction Drawings

Drawing Number	Drawing Title
300	TITLE SHEET (for reference)
301	MAIN EMBANKMENT – BUTTRESS FOUNDATION PREPARATION (for reference)
302	MAIN EMBANKMENT – BUTTRESS DESIGN (for reference)
303	MAIN EMBANKMENT – BUTTRESS DESIGN CROSS-SECTIONS (for reference)
304	PERIMETER EMBANKMENT - BUTTRESS EXTENSION FOUNDATION PREPARATION (for reference)
305	PERIMETER EMBANKMENT - BUTTRESS EXTENSION DESIGN (for reference)
306	PERIMETER EMBANKMENT - BUTTRESS EXTENSION DESIGN CROSS-SECTIONS (for reference)
501	TITLE SHEET
502	SITE PLAN
503	TAILINGS STORAGE FACILITY EXISTING CONDITIONS
504	TAILINGS STORAGE FACILITY GENERAL ARRANGEMENT – TAILINGS DEPOSITION RAISE TO EL. 970 m AT YEAR 2020
505	El. 963 m CORNER 1 PERIMETER EMBANKMENT AND BUTTRESS PLAN
506	EL. 970 m CORNER 1 PERIMETER EMBANKMENT AND BUTTRESS PLAN
507	CORNER 1 PERIMETER EMBANKMENT PLAN
508	CORNER 1 PERIMETER EMBANKMENT PROFILE
509	CORNER 1 PERIMETER EMBANKMENT SECTION STATION 20+141
510	CORNER 1 PERIMETER EMBANKMENT SECTION STATION 20+345
511	CORNER 1 PERIMETER EMBANKMENT SECTIONS (1 OF 3)
512	CORNER 1 PERIMETER EMBANKMENT SECTIONS (2 OF 3)
513	CORNER 1 PERIMETER EMBANKMENT SECTIONS (3 OF 3)
514	CORNER 1 PERIMETER EMBANKMENT – SURFACE PREPARATION
515	CORNER 1 PERIMETER EMBANKMENT – SURFACE PREPARATION – NORTH AND SOUTH BREACH ABUTMENTS
516	CORNER 1 PERIMETER EMBANKMENT – UPSTREAM DRAIN LAYOUT
517	CORNER 1 PERIMETER EMBANKMENT – UPSTREAM DRAIN – SECTION AND DETAILS
518	CORNER 1 PERIMETER EMBANKMENT – UPSTREAM DRAIN TIE-IN
519	CORNER 1 PERIMETER EMBANKMENT BUTTRESS – FOUNDATION PREPARATION
520	CORNER 1 PERIMETER EMBANKMENT BUTTRESS – PLAN
521	FILTER COMPLETION TO EL. 968 m AND EMBANKMENT RAISE TO EL. 970 m - TYPICAL SECTIONS
522	EMBANKMENT RAISE TO EL. 970 m – ABUTMENT DETAIL
523	TAILINGS STORAGE FACILITY – PIEZOMETER INSTRUMENTATION
524	TAILINGS STORAGE FACILITY – SLOPE INCLINOMETER AND SAA INSTALLATION
525	CORNER 1 PERIMETER EMBANKMENT – INSTRUMENTATION AND DETAILS
526	ELEVATION 970 m – SPILLWAY DESIGN – PLAN
527	ELEVATION 970 m – SPILLWAY DESIGN – SECTION AND DETAILS

1.5 Roles and Responsibilities

Unless otherwise stipulated by project-specific addenda, the responsibility and authority of each party involved in the Work shall follow the lines set forth in the following sections and the applicable regulations and/or permit conditions.

1.5.1 Owner

The owner is MPMC. All references to the Owner in the Technical Specifications shall implicitly include the Owner's Representative, designated specifically for the project by the Owner.

1.5.2 Owner's Representative

The Owner's Representative is responsible for coordinating project communication, obtaining all relevant permits, arranging for supply of all fill material, arranging daily and weekly progress meetings, holding problem resolution meetings, and resolution of any QA/QC issues, and ensuring compliance with MPMC Health and Safety requirements.

The Geotechnical Engineer's Representative reports to the Owner's Representative.

1.5.3 Geotechnical Engineer

The Engineer of Record for the TSF as of November 2014 is Golder Associates Ltd. (Golder) and is responsible for:

- the design including the Drawings and Technical Specifications;
- submittals listed in sub-Section 1.8;
- construction Quality Assurance; and
- approval of design modifications and clarifications that may occur prior to and/or during construction.

The Geotechnical Engineer is represented on site by the Geotechnical Engineer's Representative.

1.5.4 Geotechnical Engineer's Representative

The Geotechnical Engineer's Representative represents the Geotechnical Engineer, and has authority for technical aspects of the project, through the Owner's Representative.

The Geotechnical Engineer's Representative shall carry out planned and systematic activities that provide adequate confidence to the Owner's Representative and various stakeholders that quality control is being implemented effectively such that the work is constructed in accordance with the design Drawings and Technical Specifications.

The Geotechnical Engineer's Representative is responsible for:

- performing QA tasks outlined in the Technical Specifications including observing, testing, inspecting, documenting, monitoring and reporting the relevant project activities;
- implementation of changes in QA aspects of the work including frequency of testing, monitoring, or additional testing to confirm conformance with the Technical Specifications; and
- approving compliance of the Work with the Drawings and Technical Specifications and capturing the intent of the design.

QA results will be reported to the Owner's Representative.

The Geotechnical Engineer's Representative has the authority to stop work that is not in compliance with the design but does not have the authority to change methodology or to make any decisions related to the cost without prior approval of the Owner's Representative.

1.6 Equivalent Materials

When the Construction Drawings and Technical Specification specify a product with a trademark, substitution of an equivalent product must be approved in writing by the Geotechnical Engineer.

1.7 Meetings

The Owner's Representative will organize communications through various meetings described in this Section. Other meetings may be called as required by the Owner's Representative and Geotechnical Engineer.

All official communications shall be in writing, in English, including all paper and electronic records, survey data, and test results, with records of communications kept by both the Owner and the Geotechnical Engineer.

1.7.1 Construction Meetings

Weekly progress meetings will be held and chaired by the Owner's Representative and shall be attended by the Geotechnical Engineer's Representative. H&S concerns will be reviewed. Minutes of meetings will be prepared and distributed by the Owner's Representative.

1.7.2 Daily H&S Meeting

Daily H&S Meetings will be held prior to start of each shift. The Owner's Representative will relay any relevant information to the Geotechnical Engineer's Representative.

1.8 Submittals

The Geotechnical Engineer will submit the following documents:

- Daily Report – report summarising any health and safety incidents, work completed and issues to be addressed. The report is submitted daily to the Owner's Representative.
- As-built Report – submitted to the owner 10 weeks following final completion of the Work.

2.0 CARE OF WATER

2.1 Scope

This Section describes Care of Water during the Construction, which consists of all work required to control water from any sources, including groundwater, surface water, snowmelt and precipitation, in order to complete the Work in accordance with the Drawings and Technical Specifications, and in accordance with all environmental and safety controls established by MPMC.

Care of water shall include the following:

- Managing water before, during and after excavating, preparing, placing, and compacting embankment fill material. Water management is also to be conducted in designated waste areas, access roads, stockpiles, and when undertaking any other part of the Work.
- Dewatering foundations and associated working areas. Providing, operating and maintaining any channels, flumes, drains, sumps, pumps and other drainage facilities and equipment necessary to divert or to remove water from construction areas.
- Constructing and maintaining any embankments and other protective works required to divert water away from areas required for the Work, and where applicable, removing such structures upon completion of the Work.

2.2 General

Surface water shall be temporarily diverted and managed during construction of the Work. Appropriate channel, ditch, dike and other facilities required to divert surface water from any area required to complete the Work shall be constructed.

Pumps, hoses, culverts and any other equipment required to dewater and maintain all parts of the construction site free from water shall be furnished, installed, maintained and operated.

Temporary diversion and protective works and pumping stations shall be adequately operated and maintained. These shall also be readily accessible at all times.

Temporary dikes and other temporary works shall be removed promptly when they are no longer required at the direction of the Owner's Representative. Materials from such removal shall be hauled to disposal areas designated by the Owner's Representative.

Excavations shall be dewatered in advance, to ensure that the Work is carried out in safe and dry conditions. Proposed methods for preventing and controlling seepage shall be submitted to the Owner's Representative for review.

3.0 SURFACE AND FOUNDATION PREPARATION

3.1 Scope

This Section provides the requirements for excavation and surface and foundation preparation for the construction of the Corner 1 Perimeter Embankment and raising the TSF embankments. The excavation and surface and foundation preparation for the Corner 1 Perimeter Embankment include:

- excavation of the cut-off aggregate upstream and downstream sides of the cut-off wall;
- excavation of filter material at the crest of the North and South Abutments;
- expose till, cut-off aggregate, filter and transition on the crest of the 2015 Freshet Management Embankment and along the abutments;
- preparation of exposed Till surface;
- clearing and stripping, within the foundation footprint of the Buttress and access ramps; and
- loading, hauling, dumping and disposing of excavated materials.

The excavation and surface and foundation preparation for the South, Main and Perimeter Embankments include:

- expose Till Core, Filter, and Transition along the crest of the embankments;
- excavate Transition material adjacent to the Till Core, and Filter material identified by the Geotechnical Engineer as not meeting specifications;
- clearing and stripping at the embankment abutments and buttress footprint;
- excavation of Till at the abutments; and
- loading, hauling, dumping and disposing of excavated materials.

3.2 General

Excavation shall be carried out in accordance with the Drawings and Technical Specifications using ground support and water control measures required for safe and effective operation. Excavation procedures shall be such that the stability of adjacent fill or cut slopes or of completed Work shall not be at risk.

The excavation shall be laid out, subject to inspection by the Geotechnical Engineer's Representative, prior to commencing any excavation. Excavation shall not start on any part of the Work until the proposed methodology and construction sequence has been approved by the Owner's Representative.

Survey shall be performed to confirm the elevations and coordinates shown on the Drawings.

Excavation work may begin only after the necessary infiltration and runoff control measures have been completed in accordance with Section 2.0, and the necessary equipment, elements and materials for protection of surface excavations are available at the site. Temporary drainage and pumping systems shall be provided, operated and maintained, as required, to direct water away from the excavation areas, as specified in Section 2.0.

The location of the exposed material boundaries and exposed surface shall be surveyed.

3.3 Buttress Foundation Preparation

The following subsections specifies the clearing and stripping, and foundation preparation required along the footprint of the Embankment buttress in areas for permanent structures, waste disposal areas, stockpile areas, access roads and ditches.

The foundation preparation for the Main Embankment and Perimeter Embankment is to be according to Specification 1413803-SP-08 (revision 0) issued on July 9, 2015.

3.3.1 Clearing and Stripping

Any area to be cleared and stripped shall require prior approval by the Owner's Representative and the MPMC Environmental Department.

Clearing and stripping shall consist of removing tailings, stockpile material, topsoil, vegetation and other deleterious materials, including trees, brush, stumps, roots, and debris, and loading, hauling and dumping such materials into stockpiles within designated waste areas.

Tailings within the Corner 1 Perimeter Embankment buttress footprint are to be removed to the satisfaction of the Geotechnical Engineer’s Representative. The tailings underneath the Tailings Access Road may remain in place. The excavated tailings are to be disposed of in an area designated by the Owner's Representative.

Vegetation shall not be disturbed beyond the boundaries shown on the Drawings unless so directed by the Owner's Representative. Waste materials shall not be deposited into any riverbed or other water channel.

3.3.2 Surface and Foundation Preparation

Following clearing and stripping, the surface of the foundation shall be proof-rolled, as directed by the Geotechnical Engineer’s Representative. Where movements are observed which are deemed unacceptable by the Geotechnical Engineer’s Representative, the area shall be excavated, as directed by the Geotechnical Engineer’s Representative.

Fill placement shall not commence until preparation works have been completed, and written approval to proceed has been provided by the Geotechnical Engineer's Representative.

3.4 Corner 1 Perimeter Embankment

This section specifies the surface preparation required for the Corner 1 Perimeter Embankment.

3.4.1 Along the Crest of the 2015 Freshet Management Embankment

Any existing material on the crest of the 2015 Freshet Management Embankment, that is considered unsuitable by the Geotechnical Engineer's Representative, shall be removed. Rockfill placed on top of the 2015 Freshet Management Embankment next to the North Abutment, which was used to connect the upstream side with the downstream side of the embankment shall be removed. The existing Cut-Off Aggregate and Transition materials along the crest of the 2015 Freshet Management Embankment shall be exposed, as directed by the Geotechnical Engineer's representative.

The Cut-off Aggregate upstream and downstream of the cut-off wall shall be excavated to the lines and dimensions shown on the drawings. Excavation procedures shall be such that the integrity of the Cut-Off Wall is not compromised. The upstream and downstream sides of the Cut-Off Wall shall not be excavated concurrently. The length of the excavation shall be carried out in sections. A test excavation will be carried out under the direction of the Geotechnical Engineer's Representative to define the length of excavation along the cut-off wall that can be made before backfilling with till is carried out. The exposed vertical Cut-Off Wall face shall be protected against the elements.

3.4.2 North and South Abutments

The existing Till Core, Filter and Transition along the north and south abutments shall be exposed, as directed by the Geotechnical Engineer's Representative. The Existing Till Core surface shall be exposed using a smooth, cleaning bucket, with no teeth on the cutting edge. The extent of the Till Core exposure is subject to the approval of the Geotechnical Engineer's Representative. Exposed existing Till Core that becomes dry or desiccated shall be scarified, wetted and recompacted prior to the placement of the Till. Where Transition material is in contact with Till Core, a 1.5 m wide trench is to be excavated within the Transition material to allow Filter Material to be placed adjacent to the existing Till Core. The existing Till Core excavated from the North and South Abutments shall be placed within an authorised stockpile area, designated by the Owner's Representative. The Geotechnical Engineer's Representative shall determine if the excavated material is suitable for re-use.

3.5 South, Main and Perimeter Embankments

3.5.1 Along the Crest of the Embankments

The existing Till Core, Filter and Transition material along the crest of the South, Main and Perimeter Embankment is to be exposed, as directed by the Geotechnical Engineer's Representative. Along the Perimeter Embankment from approximately Stn. 4+500 to 5+000, rockfill has been placed over the Till Core, Filter and Transition material. This rockfill shall be removed as directed by the Engineer's Geotechnical Representative.

Where Transition material is in contact with exiting Till Core, a 1.5 m wide trench is to be excavated within the Transition material to allow Filter material to be placed adjacent to the Till Core, along with replacement of Transition material removed as part of the excavation.

Where the existing Filter material does not meet the specifications as determined by the Geotechnical Engineer's Representative, the Filter material is to be excavated and replaced with new Filter material meeting the specifications.

3.5.2 Perimeter and South Embankments Abutments

Stockpiled material, topsoil, vegetation and other deleterious materials, including trees, brush, stumps, roots, and debris is to be removed at the South Embankment abutment and Perimeter Embankment abutment. The material is to be loaded, hauled and dumped into stockpiles within designated waste areas.

The thickness of competent till is to be confirmed by the excavation of test pits, as directed by the Geotechnical Engineer's Representative. The test pits are to be excavated along the Till Core alignment and upstream of the Till Core.

Where a minimum of 2 m of competent till exists above bedrock, the Till Core will be keyed into the foundation till by the excavation of a 0.5 m deep and 2.0 wide trench.

Where the depth of foundation till to bedrock is less than 2 m, the Till Core shall be placed directly onto bedrock. The bedrock surface will be prepared to receive Till by the removal of all residual soil to fully expose the bedrock. Relatively loose, diggable bedrock is to be excavated and the surface cleaned by high pressure jets. Depending on the condition of the bedrock surface, the Geotechnical Engineer's Representative may request additional preparation which could include placement of bentonite, shotcrete or slush grout.

3.6 Designated Waste Areas

Surplus and unsuitable materials shall be disposed of at waste areas designated by the Owner's Representative. Such materials shall be loaded, hauled and placed into such waste areas, and shaped into waste embankments. Waste embankments shall be constructed such that drainage of surface water and groundwater is not impeded, and such that the embankments are stable as defined by the Owner's Representative.

Vegetation, topsoil and other materials resulting from Clearing and Stripping operations shall be stockpiled separately from other soil or rock materials at designated waste areas, avoiding obstruction of any natural or man-made water flows. All vegetation beyond the limits of such storage areas shall be preserved.

Upon completion of the work, the designated waste area shall be shaped in accordance with the requirements of the Owner's Representative.

3.7 Quality Control and Quality Assurance

Quality Control (QC) will be performed to ensure that the Work is constructed in accordance with the Drawings and Technical Specifications.

QA monitoring will be carried out by the Geotechnical Engineer through his Representative, to satisfy himself and MPMC that the Work is being carried out in accordance with the design intent and in compliance with the Drawings and Technical Specifications.

4.0 FILL PLACEMENT

4.1 Scope

This section comprises the requirements for placement of fills in the Works to the lines and grades shown on the Drawings, or as directed by the Owner's Representative and Geotechnical Engineer’s Representative.

4.2 General

Fill placement shall be to the lines, grades and cross-sections shown on the Drawings and in accordance with the Technical Specifications.

Dam embankment materials shall not encroach upon adjacent zones any further than allowed by the tolerances shown on the Drawings.

Water control measures such as temporary drainage and pumping systems shall be operated and maintained as required to direct water away from the fill placement areas as specified in Section 2.0.

Access to the Work will be provided and coordinated by the Owner's Representative.

No fill shall be placed on any portion of the Works until excavation and surface and foundation preparation, as specified in Section 3.0, has been completed and such portions have been approved in writing by the Geotechnical Engineer’s Representative.

Fill shall not be placed on a frozen surface or where ice, snow or excessive moisture has accumulated. A previously approved foundation or fill surface, which in the opinion of the Geotechnical Engineer’s Representative, has deteriorated shall be repaired prior to any fill placement.

Fill shall consist of unfrozen material that is free of organic or other deleterious material, as approved by the Geotechnical Engineer’s Representative.

Fill which, while acceptable at the time of selection has, in the opinion of the Geotechnical Engineer’s Representative, deteriorated for any reason such that it no longer meets the Technical Specifications for that material shall not be incorporated in the works.

Construction traffic shall be routed such that no ruts are formed on the surface of excavated or placed fill areas. If ruts are formed, the ruts shall be graded level and re-compacted to the relevant degree of compaction for the particular fill type as required by the Specification.

4.3 Fill Materials

The material zones of the embankment are shown on the Drawings and described in this Technical Specifications.

Materials used in the construction are to be non-potentially acid generating (NPAG). Acceptance of all fill materials based on geochemical properties shall be the responsibility of the Owner's Representative.

The particle size envelopes shown in these Technical Specifications shall apply to the as-placed materials and in the stockpile.

Fill materials shall be well-graded within the specified gradation limits; i.e., they shall contain an even distribution of all sizes of particles within the designated envelope, without significant deficiency in any sizes. Fill material gradations shall meet the specification gradation within the envelope drawn between the specified points and not just at the specified points. Any unsuitable material from the fill shall be excavated and removed.

4.3.1 Till (Zone S)

The Till (Zone S) shall be a well graded Till with a minimum fines content of approximately 20% by weight (particles finer than 0.075 mm). The Till will be sourced from designated borrow areas. The Till shall have a minimum plasticity index (PI) of 7.

The Till shall meet the gradation in Table 4-1.

Table 4-1: Gradation Limits for the Till (Zone S)

Size (mm)	Sieve Size (USS)	Percent Passing (%)
100	4”	100
75	3”	98 - 100
37.5	1 ½”	89 - 100
19	0.75”	81 - 100
12.5	0.5”	76 - 100
4.75	#4	66 - 100
2	#10	56 - 100
0.85	#20	47 - 94
0.425	#40	39 - 90
0.075	#200	20 - 85

Particles larger than 150 mm shall be removed from the material prior to compaction.

USS = United States Standard Sieve Size.

4.3.2 Filter Material (Zone F)

The Filter (Zone F) material is to be placed downstream of the till core. The material shall consist of hard, durable mineral particles, without organic matter, clay, soft particles, snow, ice, or any other unsuitable material.

The Filter shall meet the gradation in Table 4-2.

Table 4-2: Gradation Limits for the Filter Material (Zone F)

Size (mm)	Sieve Size (USS)	Percent Passing (%)
37.5	1.5"	100
19.1	0.75"	88 - 100
9.5	3/8"	56 - 100
4.75	#4	40 - 86
2	#10	25 - 63
0.85	#20	16 - 45
0.425	#40	10 - 33
0.25	#60	6 - 25
0.106	#140	0 - 15
0.075	#200	0 - 12

USS = United States Standard Sieve Size.

4.3.3 Transition Material (Zone T)

The Transition (Zone T) material shall be used as a transition zone between the Filter and Rockfill.

The material shall consist of a mix of processed boulders, cobbles, gravel and sand produced by crushing rockfill. The material shall consist of hard, durable mineral particles, without organic matter, clay, soft particles, snow, ice, or any other unsuitable material.

The Transition material shall meet the gradation in Table 4-3.

Table 4-3: Gradation Limits for the Transition Material

Size (mm)	Sieve Size (USS)	Percent Passing (%)
152.4	6"	100
25.4	1"	48 - 100
19.1	0.75"	29 - 75
12.7	0.5”	17 - 60
9.5	3/8”	0 - 51
4.75	#4	0 - 32
2.38	#8	0 - 25
0.85	#20	0 - 17
0.075	#200	0 - 5

USS = United States Standard Sieve Size.

4.3.4 Upstream Fill (Zone U)

The Upstream Fill (Zone U) shall consist of sandy tailings material or other granular material approved by the Geotechnical Engineer.

Along the South, Main and Perimeter Embankment, the upstream fill is to be placed by depositing the tailings into cells.

Along the Corner 1 Perimeter Embankment, the upstream fill shall be excavated from within the TSF. The upstream fill used shall be subject to approval by the Geotechnical Engineer's Representative.

Till may be used if conditions allow compaction, and subject to the approval of the Geotechnical Engineer. Filter material, Transition material or Rockfill may be used in select locations subject to the approval of the Geotechnical Engineer's Representative.

4.3.5 Embankment Rockfill (Zone C) and Buttress Rockfill

The Embankment Rockfill (Zone C) and Buttress Rockfill shall consist of well graded material with a maximum size of 1 m, obtained from run-of-mine NPAG waste rock.

The material shall consist of hard, durable mineral particles, without organic matter, clay, soft particles, or any other unsuitable material.

4.3.6 Drain Rock

The Drain Rock shall consist of screened rockfill with uniform particle sizes between 300 mm and 150 mm.

The material shall consist of hard, durable mineral particles, without organic matter, clay, soft particles, or any other unsuitable material.

4.3.7 Filter Sand

The Filter Sand shall be placed between the Zone S Till Core and Zone F Filter where the upstream drain pipe passes through the till core.

The material shall consist of hard, durable mineral particles, without organic matter, clay, soft articles, snow, ice, or any other unsuitable material.

The Filter Sand shall meet the gradation in Table 4-4.

Table 4-4: Gradation Limits for the Filter Sand

Size (mm)	Sieve Size (USS)	Percent Passing (%)
4.75	#4	100
2	#10	55-100
0.85	#20	25-100
0.425	#40	0-55
0.25	#60	0-25
0.106	#140	0-10
0.075	#200	0-5

4.3.8 General Fill

General Fill material can be used to backfill the TSF tailings gullies where the upstream drain will be constructed. The General Fill can also be used to support the 20 m wide Zone U Upstream Fill at the Corner 1 Perimeter Embankment.

General Fill can consist of tailings, till, rockfill, or as directed by the Engineer’s Geotechnical Representative.

4.4 Placement and Compaction

Fill materials shall be placed to the lines and elevations shown on the Drawings.

The placement of fill materials for the various zones of the embankment shall be scheduled as directed by the Owner's Representative. To achieve this, the various fill materials shall be stockpiled so that they are available at the location of the fill placement when required.

The Owner's Representative may require modifications to the fill construction program, depending upon conditions encountered during construction.

The embankments shall be constructed such that lenses, pockets, streaks and layers of materials differing substantially in gradation from the surrounding material within each zone are avoided.

Filter and Transition shall be hauled, placed and spread in such a manner as to prevent segregation. Any material placed which, in the opinion of the Geotechnical Engineer’s Representative, does not meet the specified requirements shall be removed or remixed, blended or otherwise reworked to produce a material which meets the specified requirements, whether or not such material has been covered by other fill material.

The fill shall be leveled prior to compaction by means of a tracked dozer or other suitable approved equipment to obtain an even surface with no depressions.

4.4.1 Till (Zone S)

The Till material shall be spread parallel to the axis of the embankment in horizontal lifts of uniform thickness not exceeding 0.3 m prior to compaction. Thinner lifts may be required if till compaction is carried out in freezing conditions.

Till shall only be placed in contact with the existing Cut-Off Wall, existing Cut-Off Aggregate, existing Till Core, Upstream Fill and Filter. Till shall not be placed in direct contact with Transition material or Rockfill.

Precautions shall be taken to avoid any presence of particles greater than 150 mm. Oversize material shall be removed to the satisfaction of the Geotechnical Engineer’s Representative. Affected zones of Till material shall be removed at the direction of the Geotechnical Engineer’s Representative.

The Till shall be compacted with a sheep’s foot drum roller to achieve a dry density of at least 95% of the Standard Proctor maximum dry density, as determined by ASTM D 698 and within plus or minus 2% of the optimum moisture content.

Where the moisture content is outside these limits, the lift must be either dried or wetted as directed by the Geotechnical Engineer’s Representative. The compacted till surface shall be graded to prevent ponding water.

When placing Till adjacent to a slope of existing Till, the slope of the existing fill shall be benched, the bench height being equal to the fill lift thickness, to achieve a suitable contact surface between the ground and the new fill.

4.4.2 Filter Zone (Zone F) and Filter Sand

The Filter (Zone F) material and Filter Sand material shall be placed in loose lift thicknesses of 0.3 m or less (prior to compaction).

Precautions shall be taken to prevent any contamination of the material. Any contaminated materials shall be removed and replaced. Contaminated material shall be removed to the satisfaction of the Geotechnical Engineer’s Representative prior to additional material being placed. Precautions shall be taken to prevent segregation of the Filter material during placement and spreading. Visibly segregated zones of Filter material shall be removed at the direction of the Geotechnical Engineer’s representative.

Filter material shall only be placed in contact with compacted Till Core, Transition materials, Filter Sand, existing Filter and existing Cut-Off Aggregate. Filter material shall not be placed in direct contact with Rockfill.

Filter Sand will only be placed in contact with Till Core, Filter and Cut-off Aggregate material.

The Filter and Filter Sand material shall be compacted with a smooth-drum roller to achieve a dry density of 95% of the Standard Proctor maximum dry density, as determined by ASTM D 698. Over-compaction of the Filter is to be avoided to minimize particle breakage and production of fine particles.

The Filter material will be compacted in 0.9 m loose lifts where the Filter is placed within a 1.5 m wide trench with a depth greater than 1 m.

The Filter (Zone F) material shall be raised simultaneously with the Till (Zone S), with no more than one 0.3 lift thickness between the elevations of both zones. The Till (Zone S) layer shall be raised ahead of the Filter (Zone F) layer.

4.4.3 Transition Zone (Zone T)

The Transition (Zone T) material shall be placed in loose lift thicknesses of 0.6 m or less (prior to compaction).

The Transition material shall be compacted with six (6) passes of a smooth drum vibratory compactor having a static weight of at least twelve (12) tonnes.

The Transition (Zone T) and Filter (Zone F) material shall be raised with no more than one (1) Transition lift thickness between the elevations of both zones. The Zone F is to be placed ahead of the Zone T.

4.4.4 Compacted Embankment Rockfill (Zone C)

The Rockfill (Zone C) next to the Transition (Zone T) shall be placed in a loose lift thickness of 1 m or less. The Zone C shall extend a minimum of 10 m downstream of the Zone T. Oversize boulders (greater than 1 m) shall not be incorporated in the fill. Such oversize materials shall be broken to size, or moved to the downstream edge of the embankment.

The rockfill shall be raised ahead of the Transition with no more than 1 m lift thickness between the elevation of both zones.

The Transition material shall be compacted with six (6) passes of a smooth drum vibratory compactor having a static weight of at least twelve (12) tonnes.

4.4.5 Embankment Rockfill

The Rockfill shall be placed downstream of the compacted rockfill in a loose lift thicknesses of 3 m or less (prior to compaction). Routing of the loaded haul truck traffic on the rockfill shall be carried out such that compaction is obtained across the entire width of the fill.

Oversize boulders (greater than 1 m) shall not be incorporated in the fill. Such oversize materials shall be broken to size, or moved to the downstream edge of the embankment.

All ramps constructed in rockfill shall be submitted to the Owner's Representative for review. Ramp slopes for Haul trucks shall not exceed 10%.

4.4.6 Upstream Fill (Zone U)

The Upstream Fill (Zone U) shall be placed within the 20 m wide zone adjacent to the Till Core.

For the Corner 1 Perimeter Embankment, the Zone U upstream fill shall be placed in nominal 0.6 m thick layers or less and compacted with a smooth-drum roller. The sandy tailings shall be compacted with a smooth drum vibratory compactor having a static weight of at least twelve (12) tonnes to achieve a dry density of at least 95% of the Standard Proctor maximum dry density, as determined by ASTM D 698.

For the South, Main and Perimeter Embankments, the Upstream Fill (Zone U) shall be tailings deposited in cells. A confining berm shall be constructed on the outside edges of the cells. A culvert is to be constructed through the berm at the end farthest from the tailings discharge point. The culvert will drain the water and finer tailings material into the TSF. Constant reworking of the tailings by a dozer shall be required to provide uniform distribution of the tailings within the cells.

4.4.7 Drain Rock

The Drain Rock shall be used for the construction of the upstream drain and within the breach pond channel.

The Drain Rock shall be placed in a single lift of 1.0 m. Traffic of construction equipment over the Drain Rockfill shall be limited to only what is required for placement of the material.

4.4.8 Pipe Bedding and Backfill Material

Till (Zone S), Filter (Zone F) material, or Filter Sand shall be used as pipe bedding and backfill material for the solid HDPE pipe. The bedding and backfill material to be used is as shown on the Drawings.

Where Till (Zone S) is used as pipe bedding and backfill:

- Particles greater than 20 mm shall be removed and the Till shall be wet of optimum.
- The trench through the Till core shall be sufficient width to allow proper placement and compaction of the bedding and backfill material.
- The pipe bedding shall be placed in a single minimum 0.1 m thick loose lift. The pipe haunch backfill shall be placed in a 75 mm loose lift. The embedment material shall be worked and tamped within the haunches of the pipe.

- The Till backfill shall be placed in 0.15 m minimum loose lifts. The 0.15 m loose lift shall be carried out after the backfill material has reached the pipe crown. The backfill material shall extend to a minimum of 0.6 m above the crest of the pipe.
- Compact Till bedding and backfill to achieve a dry density of at least 95% of the Standard Proctor maximum dry density, as determined by ASTM D 698 and at plus 2% of the optimum moisture content.

Where Filter Material (Zone F) and Filter Sand is used as pipe bedding and Backfill:

- The pipe bedding shall be placed in a single minimum 0.15 m thick loose lift and nominally compacted.
- The pipe haunch backfill shall be placed in a 75 mm loose lift and shall be nominally compacted. The embedment material shall be worked and tamped within the haunches of the pipe.
- Pipe backfill material shall be placed in 0.3 m loose lifts and compacted with a minimum of four (4) passes using hand-held compaction equipment. The 0.3 m loose lift shall be carried out after the backfill material has reached the pipe crown. The backfill material shall extend to a minimum of 0.6 m above the crest of the pipe.

A minimum 0.15 m thick layer of backfill material is to be placed over any pipe before hand-held equipment is operated above the pipe. A minimum 1.0 m thick layer of fill material is to be placed over any pipe before ride-on equipment or construction vehicles are operated above the pipe.

Drain Rock shall be placed around the perforated corrugated polyethylene pipe (PCPE), unless directed otherwise.

4.4.9 Buttress Rockfill

The Buttress rockfill shall be placed in a single lift, and dumped/pushed from the crest to toe, resulting in segregation of the rockfill. Coarser rockfill shall collect along the base of the buttress and shall remain there. Buttress rockfill is to be resloped by pushing the slope down to the slope shown on the drawings. Resloping shall be carried concurrently with fill placement so that no more than 50 m of rockfill is at the angle of repose.

The rockfill placement for the Main Embankment and Perimeter Embankment buttress is to be according to Specification 1413803-SP-08 (revision 0) issued on July 9, 2015.

All ramps constructed in rockfill shall be submitted to the Owner's Representative for review. Ramp slopes for haul truck traffic shall not exceed 10%.

4.5 Compaction Requirements

Each layer of spread fill material shall be compacted in a systematic, orderly and continuous manner to ensure that the entire fill is properly compacted. Layer thickness is defined as the thickness of the loose fill before compaction.

Compaction equipment shall generally travel parallel to the axis of the embankment being constructed, except where such routing is not practical, such as at turning areas, adjacent to instrumentation, and at lower elevations. In such areas, the compaction equipment shall be routed such that the best compaction can be attained.

Materials that cannot be adequately compacted by the specified compaction equipment because of location or space limitations shall be compacted with specified special compactors. Where such special compactors are required, fill layer thickness shall be modified, as required by the Geotechnical Engineer’s Representative.

One (1) pass shall mean a single traverse of a compactor across the surface of a layer in one direction. An overlap of at least 0.5 m shall be maintained between adjacent passes.

Vibratory rollers shall travel at an operating speed of no more than 70 m per minute. The operating speed of the compaction equipment is subject to review by the Geotechnical Engineer’s Representative, and will depend on the type of fill.

The compaction traffic pattern at fill zone boundaries or construction ramp joints shall be carried out such that the full number of roller passes extends completely across such boundaries.

4.5.1 Compaction Equipment

Sufficient compaction equipment of the types and sizes specified, as necessary for compaction of the various fill materials, shall be provided. This equipment shall be available and shall be maintained in good condition at all times.

Alternative compaction equipment may be used only if it can be demonstrated to the satisfaction of the Geotechnical Engineer’s Representative that such alternative equipment will compact the fill materials as effectively as the specified equipment, and also that the material after compaction meets the requirements of the Technical Specifications.

4.5.2 Special Compactors

Special compactors shall include loaded dump trucks, hand-operated mechanical tampers and vibratory rollers, and any other compaction equipment not specified, subject to the approval of the Geotechnical Engineer’s Representative.

Special compactors shall be capable of producing the required compaction within a reasonable number of passes.

Hand-operated heavy-duty mechanical tampers shall be used under restricted space and access conditions. The operating frequency shall be such that previously compacted material is not disturbed. Operation shall proceed continuously until the specified level of compaction has been achieved.

A sufficient number of special compactors shall be available to compact inaccessible areas.

4.6 Protection and Maintenance

Any fill placed shall be maintained in a condition satisfactory to the Geotechnical Engineer's Representative until completion of the Work. All necessary steps shall be taken to avoid ponding of water on the fill, or contamination of the fill by traffic or other causes. The surface and slopes shall at all times be kept free from rejected or unsuitable fill, or waste materials.

Should slides or erosion occur within or onto any placed fill, such materials and all other materials affected shall be removed, and the portion rebuilt as required.

4.7 Quality Control and Quality Assurance

Quality Control (QC) will be performed to ensure that the Work is constructed in accordance with the Drawings and Technical Specifications.

Quality Assurance (QA) monitoring and testing will be carried out by the Geotechnical Engineer through his Representative, to satisfy himself and MPMC that the Work is being carried out in accordance with the Drawings and Technical Specifications.

The QC and QA testing requirements and frequency are listed in Table 4-5. At a minimum, all the required testing shall be performed to document the construction quality. The material testing listed in Table 4-5 shall be completed on record samples taken from placed material on the abutment slopes and flat zones to evaluate suitability of material and segregation during placement.

All necessary inspections sampling and testing shall be performed to ensure that only materials of the specified composition, gradation and moisture content are supplied to the construction area. A sufficient number of control samples from the stockpile are to be tested prior to use to confirm the suitability of the material used.

The Owner's Representative shall identify material stockpiles available for use in the construction.

Table 4-5: QC/QA Testing of Fill Placement

Material	Testing		
	Test	**QC Frequency**	**QA Frequency**
Perimeter and South Embankment Abutment Foundation	Water Content (ASTM D2216)	1 every 200 m^2 [a]	1 every 5 QC Tests
	Atterberg Limits (ASTM D4318)	1 every 200 m^2 [a]	1 every 5 QC Tests
	Gradation and Hydrometer (ASTM D422)	1 every 200 m^2 [a]	1 every 5 QC Tests
Zone S Till Core Material	Water Content (ASTM D2216)	1 every 500 m^3	1 every 10 QC Tests
	Atterberg Limits (ASTM D4318)	1 every 2,000 m^3	1 every 10 QC Tests
	Gradation (ASTM D422)	1 every 5,000 m^3	1 every 10 QC Tests
	Hydrometer (ASTM D422)	1 every 10,000 m^3	1 every 10 QC Tests
	Standard Proctor Maximum Dry Density (ASTM D698)	1 every 5,000 m^3	1 every 10 QC Tests
	In Situ Density by Portable Nuclear Gauge (ASTM D6938)	2 per lift and 1 every 500 m^3	1 every 10 QC Tests
	Lift Thickness	Measured continiously	Measured periodically
Zone F Filter Material	Water Content	1 every 1,000 m^3	1 every 10 QC Tests
	Wash Sieve Gradation (ASTM C136 & C117)	1 every 1,000 m^3	1 every 10 QC Tests
	Standard Proctor Maximum Dry Density (ASTM D698)	1 every 5,000 m^3	1 every 10 QC Tests
	In Situ Density by Nuclear Densometer (ASTM D6938)	2 per lift and 1 every 500 m^3	1 every 10 QC Tests
	Lift Thickness	Measured continuously	Measured periodically
Zone T Transition Material	Wash Sieve Gradation (ASTM C136 & C117)	1 every 5,000 m^3	1 every 2 QC Tests
	Lift Thickness	Measured continuously	Measured periodically
	Number of Passes of Compactor	Measured continuously	Measured periodically
Zone C Rockfill	Lift Thickness	Measured continuously	Measured periodically
	Visual Gradation	Continuously	Continuously
Upstream Fill (Tailings Sand)	Wash Sieve Gradation (ASTM C136 & C117)	1 every 10,000 m^3	1 every 10 QC Tests
	Standard Proctor Maximum Dry Density (ASTM D698)	1 every 10,000 m^3	1 every 10 QC Tests
	In Situ Density by Portable Nuclear Gauge (ASTM D6938)	1 every 5,000 m^3	1 every 10 QC Tests
	Lift Thickness	Measured continuously	Measured periodically

Material	Testing		
	Test	**QC Frequency**	**QA Frequency**
Filter Sand	Water Content	1 test per pipe installation	1 test
	Wash Sieve Gradation (ASTM C136 & C117)	2 test	1 test
	Standard Proctor Maximum Dry Density (ASTM D698)	1 test	None required
	In Situ Density by Nuclear Densometer (ASTM D6938)	1 per lift per pipe installation	1 every 10 QC Tests
	Lift Thickness	Measured continuously	Measured periodically
Drain Rock	Visual Gradation	Continuously	Continuously

a) Minimum of one test per abutment.

5.0 UPSTREAM DRAIN

5.1 Scope

This Section comprises all requirements for construction of the upstream drains, which includes the placement of Drain Rock and Filter Sand materials, and installation of geotextile and pipeline, according to the lines and grades shown on the Drawings or as directed by the Owner's Representative and Geotechnical Engineer's Representative.

5.2 General

5.2.1 Tolerances

Excavation limits are defined by the lines and elevations shown on the drawings.

Uniform gradients shall be maintained between adjacent spot elevations shown on the drawings. The excavation shall be in a manner so that piping can be laid straight at a uniform grade, without sags or humps.

The tolerances for the pipeline, unless otherwise approved by Geotechnical Engineer's Representative, shall be as follows:

- Line ± 150 mm; and
- Grade ± 30 mm.

5.2.2 Handling and Storage

Pipe and pipe fittings shall be stored on clean level ground, free of sharp objects which could damage these materials. Stacking shall be limited to a height that shall not cause excessive deformation of the bottom layers of pipe under anticipated temperature conditions. Where necessary, due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

During delivery to site, the geotextile shall be wrapped to protect it from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, or other damaging or deleterious conditions. Upon delivery at the job site, the geotextile rolls shall be handled and stored in accordance with the manufacturer's instructions to prevent damage, and in particular is to be protected from UV exposure.

The Geotechnical Engineer's Representative shall inspect the pipe, pipe fittings and geotextile prior to use, to verify that the proper material has been received. The material shall also be inspected to ensure they are free of flaws or damage occurring during manufacturing, shipping, or handling.

5.3 Materials

5.3.1 Polyethylene Pipe and Fittings

Pipes and fittings shall be homogenous throughout and free of visible cracks, holes (other than intentional manufactured perforations), foreign inclusions, or other deleterious effects, and shall be uniform in color, density, melt index, and other physical properties.

Fittings at the ends of pipes shall consist of polyethylene end cap.

The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe. Fittings supplied by manufacturers other than the manufacturer of the pipe shall not be permitted without the approval of the Geotechnical Engineer's Representative.

The polyethylene pipe is to be perforated, where perforated pipe is shown on the Drawings. The perforations shall be drilled into the pipe after manufacture at the manufacturing plant.

The following pipe will be required for the works:

- 150 mm diameter perforated and corrugated polyethylene pipe (PCPE), ADS N-12 or equivalent approved, with smooth interior wall. The PCPE pipe shall be joined with split corrugated couplings.
- 150 mm diameter solid, SDR 9 high density polyethylene pipe (HDPE), PE4710.

5.3.2 Pipe Bedding and Backfill Material

Pipe bedding and backfill material shall meet the requirements of Section 4.4.8 of these Specifications.

5.3.3 Geotextile

An 800 g/m2 non-woven needle punched geotextile shall be placed along the base of the Drain Rockfill and a 340 g/m2 non-woven needle punched geotextile shall be placed over the Drain Rockfill. The geotextile shall be manufactured from prime quality virgin polymer. The geotextile shall meet or exceed all material properties listed in Table 5-1 and Table 5-2.

Table 5-1: Properties of 800 g/m^2 non-woven Geotextile

Property	Standard	Unit	Value
Mass per Unit Area	ASTM D 5261	g/m^2	812
Grab Tensile Strength	ASTM D 4632	N	2,000
Grab Elongation	ASTM D 4632	%	50
CBR Puncture Strength	ASTM D 6241	N	1,100
Trapezoidal Tear Strength	ASTM D 4533	N	890
UV Resistance	ASTM D 4355	% retained after 500 hours	70

Table 5-2: Properties of 340 g/m^2 non-woven Geotextile

Property	Standard	Unit	Value
Mass per Unit Area	ASTM D 5261	g/m^2	340
Grab Tensile Strength	ASTM D 4632	N	1,020
Grab Elongation	ASTM D 4632	%	50
CBR Puncture Strength	ASTM D 6241	N	530
Trapezoidal Tear Strength	ASTM D 4533	N	420
UV Resistance	ASTM D 4355	% retained after 500 hours	70

All rolls of the geotextile shall be identified with permanent marking on the roll or packaging, with the manufacturers name, product identification, roll number and roll dimensions.

5.4 Execution

5.4.1 Trench Excavation

The trench excavations shall be performed to the lines and grades shown on the Drawings or as directed by Geotechnical Engineer's Representative. Trench excavation shall not begin until the Surveyor has provided construction staking for the proposed work. The exposed subgrade along the trench shall be inspected by Geotechnical Engineer's Representative and approved prior to any fill being placed. Final surface shall be free of loose materials, clods, and other debris including grade stakes and hubs.

The trench excavations shall be graded and properly maintained to provide adequate drainage at all times. Work shall be suspended when, in the opinion of the Geotechnical Engineer's Representative, the site is overly wet, muddy, or otherwise unsuitable for proper maintenance, until directed otherwise by Geotechnical Engineer's Representative.

5.4.2 Fill Placement

All fill placement, including Drain Rockfill, pipe bedding and backfill, shall be in accordance with Section 4.0 of these Specifications.

5.4.3 Piping

5.4.4 Handling and Placement

Care shall be exercised when transporting, handling and placing pipe and fittings, such that they are not cut, kinked, twisted, or otherwise damaged.

The pipe manufacturer's recommendations for handling, storage, and installation of all polyethylene pipe fittings shall be complied with.

Ropes, fabric, or rubber-protected slings and straps shall be used when handling pipe. Slings, straps, etc., shall not be positioned at butt-fused joints. Chains, cables or hooks shall not be inserted into the pipe ends as a means of handling pipe.

Pipe or fittings shall not be dropped onto rocky or unprepared ground. Under no circumstances shall pipe or fittings be dropped into trenches, or dragged over sharp objects.

The maximum allowable depth of cuts, gouges or scratches on the exterior surface of pipe or fittings is 10 percent of the wall thickness. The interior of the pipe and fittings shall be free of cuts, gouges and scratches. All pipe and fittings shall be carefully examined for cracks, damage or defects before installation. The Geotechnical Engineer’s Representative shall inspect all pipes. Sections of pipe with excessive cuts, gouges or scratches shall be rejected and the rejected pipe shall be removed and replaced.

Whenever pipe laying is not actively in progress, the open end of pipe that has been placed shall be closed using a watertight plug.

5.4.5 Pipe Installation

All pipe and fittings shall be installed in accordance with this Technical Specification, the pipe manufacturer’s instructions, and ASTM D2321. All pipe and fittings shall be laid or placed to the grades and elevations shown in the Drawings with bedding and backfill as shown in the Drawings.

The interior of all pipe and fittings shall be inspected, and any foreign material shall be completely removed from the pipe interior before it is moved into final position.

Field-cutting of pipes, where required, shall be made with a machine specifically designed for cutting pipe. Cuts shall be carefully made, without damage to pipe or lining, so as to leave a smooth end at right angles to the axis of pipe. Cutter ends shall be tapered and sharp edges filed off smooth. Flame cutting shall not be allowed.

No pipe shall be laid until the Geotechnical Engineer’s representative has observed the condition of the pipe.

No pipe shall be brought into position until the preceding length has been bedded and secured in its final position. Blocking under piping shall not be permitted unless specifically accepted by the Geotechnical Engineer’s representative for special conditions.

Placement of overlying pipe backfill shall be carried out such that pipe is not damaged. The Geotechnical Engineer’s Representative may periodically request to prove that covered pipe has not been crushed.

The location and final elevation of the invert of the pipes shall be surveyed. The pipes shall be surveyed at ends and at approximately 20 m intervals between the ends.

5.4.6 Joints and Connections

All HDPE pipe shall be joined with thermal butt-fusion joints. All joints shall be made in strict compliance with ASTM D2657 and the pipe manufacturer's recommendations.

All corrugated polyethylene pipe shall be joined with split corrugated couplings, and in strict compliance with the pipe manufacturer's recommendations.

5.4.7 Geotextile Installation

The geotextile shall be installed in accordance with this Technical Specification and the manufacturer's instructions. The geotextile shall be laid to the lines shown in the Drawings. The geotextile shall be placed after the underlying foundation has been prepared and approved by the Geotechnical Engineer's Representative.

The geotextile shall be handled in such a manner as to minimize damage during installation.

The geotextile panels are to overlap a minimum of 450 mm. No direct equipment trafficking over geotextile is permitted. The geotextile shall not be exposed to rain or snow precipitation prior to being installed and shall not be left exposed for more than 15 days after installation.

Damaged areas in the geotextile shall be repaired to the satisfaction of the Geotechnical Engineer's Representative. Prior to repair, any soil or other materials that has penetrated the damaged geotextile shall be removed. The geotextile shall be repaired by placing a patch of the same type of geotextile that extends a minimum of 300 mm beyond any edge of the area to be repaired. Geotextile that cannot be repaired shall be replaced with new geotextile that complies with the project requirements.

5.5 Quality Assurance

QA monitoring will be carried out by the Geotechnical Engineer through his Representative, to satisfy himself and MPMC that the Work is being carried out in accordance with the Drawings and Technical Specifications.

6.0 SPILLWAY

6.1 General

As the spillway is designed for mine closure, it has been assumed that all haul roads and other road infrastructure will be decommissioned, and that open channels will be constructed to discharge flow.

The final tailings surface will be graded to provide positive gradient to the spillway crest from the closure tailings pond.

Material excavation and placement shall be to the lines, grades and cross-sections shown on the Drawings, and in accordance with the Technical Specifications.

Access to the Work will be provided and coordinated by the Owner's Representative.

6.2 Construction Materials

6.2.1 General

The materials to be used for spillway construction are shown on the Drawings and described herein.

6.2.2 Riprap

Riprap material shall consist of NPAG and non-metal leaching, hard, durable, well-graded angular rock. Riprap material may be sourced from existing waste rock dumps and may require processing to achieve the specified grain size distribution. It shall be free of clay lumps, organic matter, debris, cinders, ash, refuse, snow, ice and other deleterious materials, and is subject to the approval of the Geotechnical Engineer.

Riprap material shall conform to the gradation limits for riprap shown in Table 6-1 and Table 6-2. Material shall be well-graded, approximately the specified or directed sizes, and individual rock's minimum dimension shall be greater than one-third its maximum dimension and none shall have a mass greater than five times that of the specified class of riprap.

The thickness of riprap, measured at right angles to the slope, shall be the nominal thickness shown on the Drawings, or as required by the Geotechnical Engineer.

Table 6-1: Approximate Average Dimensions of Riprap

Class of Riprap	Approximate Average Dimensions (mm)			
(kg)	15%	50%	85%	<100%
10 (Type 1)	90	195	280	330
50	155	330	475	565
100	195	415	600	715

Class 10 riprap comes in two types (Type 1 and Type 2), as shown on the Drawings. Type 1 is regular clean riprap, as shown in Table 6-1, and Type 2 riprap includes a higher proportion of fines, according to the gradation in Table 6-2.

Table 6-2: Gradation Limits of Class 10 (Type 2) Riprap

Size or Sieve Number (USS)	Percent Passing (%)
300 mm	75-100
150 mm	60-80
25 mm	40-60
12.7 mm	30-50
#4 (4.75 mm)	20-35
#8 (2.36 mm)	10-20
#20 (0.85 mm)	3-8

6.2.3 Geotextile

A 340 g/m^2 non-woven, needle punched geotextile, composed of a minimum 85% polypropylene or polyester polymers, formulated to resist deterioration by ultraviolet exposure and free of manufacturing defects, cuts, tears, or any other physical damage, that meets the criteria defined in Section 5.3.3.

6.3 Execution

General:

1. Source, blend and stockpile riprap on site from locations agreed with Owner’s Representative.
2. Riprap shall be off-loaded from trucks and installed such that the specified gradation is achieved.

Geotextile:

1. Geotextile shall be placed in accordance with the manufacturer’s written instructions.

Riprap Placement:

1. Riprap shall be well graded and shall be placed directly over the geotextile (where applicable) without pockets of small stones or clusters of large boulders. The finished areas shall form a firm, stable, uniform mass of interlocking stone with a minimum of voids.

2. Dumping or rolling of rock down the bank face is not an acceptable method of placement. Rock must be carefully placed and “keyed” into position, commencing with the largest rocks, then filling voids with the smaller pieces.

3. Riprap shall be placed with the use of an excavator equipped with a hydraulic thumb. The operator of the excavator shall be experienced in the placement of riprap using a hydraulic thumb.

7.0 INSTRUMENTATION

7.1 Scope

This Section describes the requirements for the supply, installation, testing, data acquisition and protection of instrumentation. The requirements include equipment and application software for the data acquisition, transmission and processing system.

The main items include installation of:

- vibrating-wire piezometers as part of the 2016 Geotechnical investigation;
- ShapeAccelArray (SAA) within the cut-off wall inclinometer casings;
- inclinometers as part of the 2016 Geotechnical investigation; and
- data acquisition and processing equipment.

Also included is the extension of the existing vibrating-wire piezometer and SAA cables buried as part of the construction works.

The work shall include all labour, materials and equipment to complete the design as shown on the Drawings.

7.2 General

The locations for the instrumentation are shown in the Drawings, and installation procedures provided in this Specification. The location of all instruments and installation will be subject to approval by the Geotechnical Engineer’s Representative.

New instrumentation will be installed as shown in the Drawings. The existing instrumentation integrity shall be kept unless otherwise shown in the drawings.

The instrumentation and all materials required for the installation shall be brought to site at least 15 days in advance of installation, and the Geotechnical Engineer’s Representative shall review and approve them.

7.3 Submittals

A list of all instruments, cable, and casing lengths are to be submitted to the Geotechnical Engineer. A method for marking and identifying cables for individual instruments are to be included.

Manufacturer calibration sheets for all instruments to be installed are to be submitted.

Installation data including the installed location, the instrument identification number, the instrument serial number, and the installation date and time is to be provided to the Geotechnical Engineer. The data is to include the SAA azimuth corrections for software, and azimuth direction of X-marks.

7.4 Installation Procedures

Installation of the instruments shall be carried out in accordance with the Drawings, Technical Specification and the instructions of the equipment manufacturer.

Readings of each instrument shall be taken to verify correct functioning. Backfill shall not be placed over the instruments or cable leads until the instruments have been tested and initial readings have been taken. An initial set of readings shall be taken immediately after installation.

Sufficient cable to route to the SAA Earth Station or vibrating wire piezometer connector box shall be purchased. The cable shall be long enough to provide adequate strain relief. Existing instrumentation shall be extended.

All cables shall be marked with identification tags at intervals of 15 m, or closer if required. In addition, each instrument shall be marked with the identification given to it on the Drawings or as identified by the Geotechnical Engineer's Representative.

All instruments, cables, and connectors shall be protected from damage and displacement during progress of the work, and markers and barricades shall be provided as necessary.

Cables from the instruments to the SAA Earth Station and connector boxes shall be wrapped in geotextile and installed into trenches, as shown on the Drawings or as directed by the Geotechnical Engineer's representative. The instrumentation cables shall be protected from impact and damage during construction by hand-tamped sand backfill.

No traffic or equipment shall pass over any part of any instrument, cables or connections until at least 600 mm thickness of compacted material cover has been installed.

7.5 Electrical Protection and Safety

New and existing instrumentation shall be connected to the data acquisition system and it shall be confirmed that the system provides the following minimum protection for all electrical equipment:

- over-voltage peak suppressor;
- alternating current filter to eliminate interference; and
- Grounding system for lightning protection.

7.6 Instrument Cabins and Protection

Cabins, supports and accessories necessary for the installation and protection of the instruments shall be provided.

All cabins and support structures shall be protected from corrosion and shall be finished and painted.

7.7 Voltage and Electrical Frequency

Facilities requiring permanent electrical power, including battery chargers and space heaters, shall be configured to operate at 110 V, alternating current at 60 Hz.

7.8 Protection

The instrumentation shall be protected with end caps and protective casing.

7.9 Grout Mix

The grout mix in Table 6-7-1 shall be used for the vibrating wire piezometer, inclinometer casing, and SAA installation; and to seal two of the four inclinometer casing installed on the cut-off wall.

Table 6-7-1: Grout Mix for Vibrating Wire Piezometer, SAA and Inclinometer Installation

Material	Quantity	Ratio by Weight
Portland Cement	42.5 kg	1
Water	107.5 L	2.5
Bentonite Powder	12.8 kg	0.3

The above quantities shall be adjusted to match the cement weight such that the mix comprises a unit number of bags of cement.

Mixing shall be carried out by first introducing the water into the mixer followed by the cement. The water cement mixture shall be thoroughly mixed before the bentonite is added. Bentonite powder and not pellets shall be used. Mixing shall continue until a stable, uniform slurry is achieved.

Grout shall be continuously agitated during pumping and grouting.

Instrumentation shall be backfilled from the bottom up. Grout shall be delivered into the hole by a threaded tremie PVC pipe.

7.10 Vibrating Wire Piezometers

7.10.1 General

Vibrating-wire piezometers shall include the piezometer sensors, leads, the connector box, and all associated equipment and materials, including waterproof junction boxes, universal lead connectors, electrical protection systems and conduits, necessary for installation, testing, and operation. All such equipment shall be provided by the same manufacturer.

Data reading and recording shall be carried out manually during construction of the Work, and automatically thereafter.

Each piezometer shall have a sensor measuring range of up to 1 MPa, with a sensitivity of 0.025% and accuracy of ±0.1% of full scale pressure (FS).

The following piezometers may to be installed:

- Model VW2100 manufactured by RST Instruments, or approved equivalent; or
- Model 4500S manufactured by Geokon Incorporated, or approved equivalent.

The connector boxes shall have capacity for simultaneous installation of all leads from the piezometers shown on the Drawings.

Additional piezometer cables may be required to connect to the existing piezometers, which will be buried as part of construction, to the connector boxes.

A read-out unit shall be provided to process signals from vibrating-wire piezometers and to display the results.

7.10.2 Installation

Piezometers shall be installed according to the manufacturer's instructions, within the embankment fill and foundation at elevations shown on the Drawings or as directed by the Geotechnical Engineer's Representative. Piezometers will be installed at the same time the inclinometer casing is been installed.

Prior to installation, the piezometer shall be immersed in de-aired water in accordance with the manufacturer's instructions.

The vibrating wire piezometers shall be attached, filter facing upward, to the outside of the inclinometer casing using duct or electrical tape. The vibrating wire piezometer filter shall not be covered with the tape.

An initial reading is required right after the readings have been stabilized in the hole and before the hole is backfilled with grout.

Following installation, the hole shall be grouted with cement-bentonite from bottom to top using a tremie pipe. The grout mix to be used is defined in Section 7.9.

Installation of the piezometers shall be completed by connecting the leads to the connector boxes within the instrumentation cabin. The leads from the instruments to the connector boxes shall be wrapped in geotextile and installed into trenches, as shown on the Drawings or as directed by the Geotechnical Engineer's representative.

7.11 Shape Acceleration Array Systems

7.11.1 General

This section covers furnishing and installing ShapeAccelArrays (SAAs) systems, and earth stations.

The SAA system shall be an SAAF, as manufactured by Measurand Inc. or approved equivalent. The SAA system shall be constructed to the lengths shown in the Drawings and shall have segment lengths of 500 mm.

The Earth Station is a logger system with housing and accessories used to remotely collect data from the SAA instrument. The Earth Station shall contain a CR800 logger, manufactured by Campbell Scientific Inc. for collecting data from the SAA system. A SAA232 logger interface modules shall be used to connect the SAA systems to the logger communications ports. Only one interface shall be connected per logger communications port.

Four SAAs will be installed. Two SAAs shall be installed on existing inclinometer casing located in the cut-off wall.

Only SAA splice kits, manufactured by Measurand Inc., or "ScotchCast Signal and Control Cable Inline Splicing Kit 72-N1" manufactured by 3M will be used for splicing SAA cables. Other splicing kits can only be used with SAA Manufacturer approval.

PVC conduit used for housing the SAA shall have an inside diameter of 27 mm +1 mm / -0.5 mm. Outside diameter shall be 32 mm + / - 1 mm.

A 12 V 100 Ah deep cycle absorbed glass mat (AGM) battery shall be supplied to provide power for the logger and SAA System. A solar panel not exceeding 50 W of rated power shall be used to charge the battery for the earth station. The Earth Stations shall contain a 12 V regulator to control battery charging via the solar panel.

The Earth Station components shall be housed in a NEMA 4 rated enclosure. The battery shall be housed in a separate NEMA 3R rated enclosure. The Earth Station and battery enclosure may be contained in the cabinet, or alternatively connected to a 2" galvanized steel pipe. The pipe shall be installed below frost depth and extend at least 2.4 m above the ground surface.

7.11.2 Installation

The SAA systems shall be installed in accordance with the manufacturer’s handling and installation specifications.

Instrument and conduit assembly shall be carried out in accordance with the following procedure:

- The PVC conduit shall be assembled in a generally flat area using PVC cement suitable for the temperature and weather conditions.
- The SAA reel shall be placed on a reel stand with a minimum height of 0.6 m. The reel shall be placed on the reel stand such that the SAA will be pulled from the bottom of the reel.
- The SAA shall be pulled into the conduit using a rope or a cable with a swivel attachment.
- The X-marks shown on the SAA shall be marked onto both ends of the PVC conduit. The X-marks on the PVC will be verified to make sure that the PVC is not twisted.
- The end cap shall be glued onto the bottom end of the conduit, at the eyebolt end of the SAA.
- The PEX at the cable end of the SAA shall be secured to the conduit using the set-screw assembly provided in the SAA installation kit.

The vertical installation shall be done in accordance with the following procedure:

- The installation depth for the SAA shall be confirmed and documented by the Geotechnical Engineer’s Representative.
- The SAA and PVC conduit assembly shall be inserted into the borehole while maintaining a minimum 3.5 m radius on the entire assembly. See manufacturer’s instructions for more details.
- In cases where the SAA and PVC conduit assembly is shorter than the borehole, the bracket supplied in the install kit shall be used to provide support.
- Once the SAA and PVC conduit are placed in the borehole, the set-screw shall be loosened. The SAA shall be pushed down into the conduit and up to 23 kg of axial compression shall be applied to the PEX. Once the axial compression is applied, the set-screw shall be tightened to hold the SAA in compression.
- The azimuth of the X-mark shall be determined using surveying techniques and the SAA Protractor Kit. The azimuth offset measured and the overall azimuth shall be marked on the final drawings.
- The SAA and PVC conduit shall be grouted into the borehole using the appropriate grout mix defined in Section 7.9.
- Splicing of transducer cables will be permitted when using splices recommended or supplied by the manufacturer.

7.12 Inclinometers

7.12.1 General

A 70 mm diameter inclinometer casing manufactured by Slope Indicator, or approved equivalent, shall be installed. The CPI casing coupling manufactured by Slope Indicator, or approved equivalent, shall be used to connect the inclinometer casings.

7.12.2 Installation

The borehole diameter should be large enough to accommodate the inclinometer casing and a tremie pipe so that grout can be pumped into the annulus from the bottom up.

Installation should closely follow the following procedure:

- Once the hole has been drilled to the required depth, the first length of casing shall be inserted, complete with bottom cap, anchor and attached tremie pipe. Additional lengths of casing are added until the desired depth is reached.
- Once the slope inclinometer casing is lowered into the hole to the required depth, a pair of grooves should be aligned in the expected direction of ground movement. This should be done only if it can be accomplished without applying excessive torque to the casing.
- Grout should be pumped through the tremie pipe into the hole, displacing any groundwater within the borehole.
- During casing installation, groundwater, drilling fluid, or fluid grout within the borehole may exert an uplift buoyancy force on the casing, lifting the casing out of the borehole. The following possible measures may be used to prevent this uplift:
  - Anchor the casing at the bottom of the borehole prior to grouting by special accessory “casing anchors”.
  - Fill the inclinometer casing with water prior to grouting.
  - Grout the borehole in stages.
  - Blow all water from the inclinometer casing.
- Where there are no special constraints, the casing should stick up about 0.5 to 0.75 m.
- Spiral twisting of the grooves should not exceed 0.75 degrees per metre length of the tubing. Where considered necessary by the Geotechnical Engineer’s representative (e.g., on very deep installations, typically >60 m) a spiral survey of the casing grooves shall be carried out after installation and an appropriate correction applied by the data reduction software.

- Upon completion of the installation, the inside of the casing should be kept clean so that the probe can travel accurately in the grooves all the way in and out of the casing. If the grooves become contaminated by grout, they should be cleaned by flushing with water and gentle brushing, and a dummy probe can be lowered to the bottom to check that the grooves are clear.
- After installation and curing of the grout, two sets of inclinometer readings should be taken to provide a reliable baseline. If the two sets show any apparent movement, a third set should be taken.

7.12.3 Inclinometer Extensions

Existing inclinometer casings shall be extended. Inclinometer casing extensions shall be protected with fine crushed material before rockfill is placed around them. Inclinometer casing ends shall be capped while material is been placed to avoid clogging. Extension pipes, caps and fittings shall be provided in advance. The Inclinometer casings shall be extended above the buttress construction surface.

7.12.4 Inclinometers Decommissioning

Two of the four inclinometer casings within the 2015 Freshet Management Embankment cut-off wall will be decommissioned by backfilling the casing with grout. Grout mix is defined in Section 7.9.

The inclinometer casing shall be backfilled from the bottom up. Grout shall be delivered into the hole by a threaded tremie PVC pipe.

The slope inclinometers installed downstream of the embankment and identified in the Drawings that will be destroyed due to the embankment and buttress construction, do not require backfill with grout.

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APPENDIX C

Design Criteria

1.0 CLIMATE DATA

The climate of the Mount Polley Mine site was characterised using the Environment Canada station in the nearby town of Likely, as well as three on site climate stations. The climate data is presented in Golder (2015).

The temperatures at Likely are generally mild to cold, with the average monthly temperatures ranging from 15.1ºC in July to -6.6ºC in January.

The average annual precipitation is estimated to be 670 mm, with the highest average monthly precipitation generally falling in June (78 mm) and December (86 mm). The average annual precipitation for a 1:200 dry year is 354 mm, and 1,092 mm for a 1:200 wet year. The monthly distribution of average monthly precipitation in shown on Figure 1, and the average, 1:200 year wet and dry precipitation depths are shown on Figure 2. Freshet is typically between March and May, with the majority of snowmelt occurring in April.

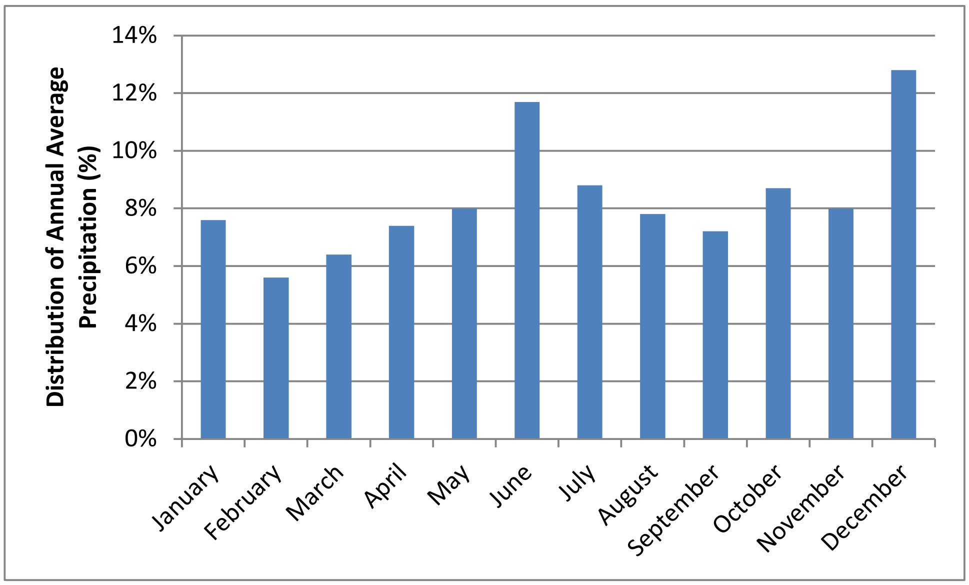

Figure 1: Distribution of Annual Average Precipitation

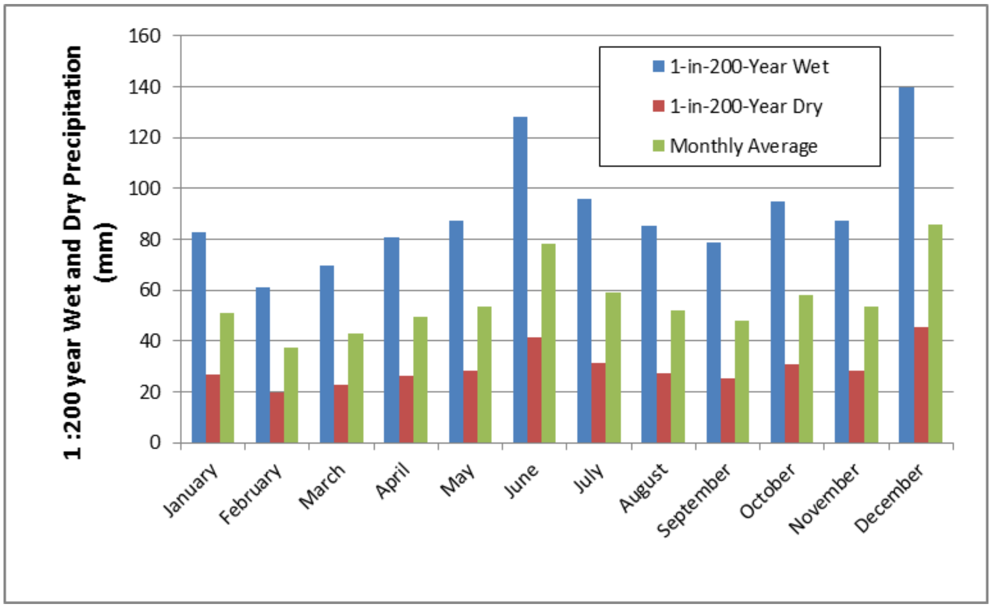

Figure 2: 1:200 Year Wet and Dry Precipitation

The rainfall during storm events is presented in Table 1.

Table 1: Storm Event Precipitation

Return Period	Rainfall Depth (mm)		
	24 Hour	3 Day	10 Day
1 in 2 year	34.2	40.1	64.7
1 in 1000 year	73.8	93.9	156.9
Probable Maximum Precipitation (PMP)	188.1	239.4	400.0

Lake (open water) evaporation has been calculated based on measured climate parameters. Lake evaporation shows a typical seasonal profile, with negligible evaporation/sublimation in the winter months and maximum evaporation in the summer months. Average annual lake evaporation at Mount Polley is estimated to be 404 mm.

2.0 EMBANKMENT CONSEQUENCE CLASSIFICATION

Guidelines for the classification of dams are presented in the Canadian Dam Association Dam Safety Guidelines (CDA 2013). The CDA has recently published a technical bulletin, Application of Dam Safety Guidelines to Mining Dams (CDA 2014). The dam classification in the technical bulletin remains unchanged from that presented in the Dam Safety Guidelines (CDA 2013) and shown in Table 2. Consequence categories are based on the incremental losses that a failure of the dam may inflict on downstream or upstream areas, or at the dam location itself. Incremental losses are those over and above losses that might have occurred in the same natural event or condition had the dam not failed. The consequences of a dam failure are ranked for each of the loss categories. The classification assigned to a dam is the highest rank determined among the loss categories.

Table 2: Dam Classification in Terms of Consequences of Failure

Dam Class	Population at Risk[(a)]	Incremental Losses		
		Loss of Life[(b)]	Environmental and Cultural Values	Infrastructure and Economics
Low	None	0	Minimal short term loss. No long term loss.	Low economic losses; area contains limited infrastructure or service.
Significant	Temporary Only	Unspecified	No significant loss or deterioration of fish or wildlife habitat. Loss of marginal habitat only. Restoration or compensation in kind highly possible.	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes.
High	Permanent	10 of fewer	Significant loss or deterioration of important fish or wildlife habitat. Restoration or compensation in kind highly possible.	High economic losses affecting infrastructure, public transport, and commercial facilities.
Very High	Permanent	100 of fewer	Significant loss or deterioration of critical fish or wildlife habitat. Restoration or compensation in kind possible but impractical.	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances).
Extreme	Permanent	More than 100	Major loss of critical fish or wildlife habitat. Restoration or compensation in kind impossible.	Extreme losses affecting critical infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances).

Source: CDA (2013, 2014)

(a) Definition for population at risk:

None – There is no identifiable population at risk, so there is no possibility of loss of life other than through unforeseeable misadventure.

Temporary – People are only temporarily in the dam-breach inundation zone (e.g., seasonal cottage use, passing through on transportation routes, participating in recreational activities).

Permanent – The population at risk is ordinarily located in the dam-breach inundation zone (e.g., as permanent residents); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimates of potential loss of life (to assist in decision-making if the appropriate analysis is carried out).

(b) Implications for loss of life:

Unspecified – The appropriate level of safety required a dam where people are temporarily at risk depends on the number of people, the exposure time, the nature of their activity, and other conditions. A higher class could be appropriate, depending on the requirements. However, the design flood requirement, for example, might not be higher if the temporary population is not likely to be present during the flood season.

Each of the TSF Embankments has been evaluated according to the loss criteria. The classifications are summarised in Table 3. The Corner 1 Perimeter Embankment is included with the Perimeter Embankment classification. In the event of a dam breach, the run-off would flow southeast along Hazeltine or Edney Creek, depending on the location of the breach.

Table 3: Consequence Classification of TSF Embankments

Embankment	Population at Risk	Loss of Life	Environmental and Cultural	Infrastructure and Economics
Perimeter	Temporary only	Significant	Significant	Low
Main	Temporary only	Significant	Significant	Low
South	Temporary only	Significant	Significant	Low

The consequence classification is ranked as Significant based on loss of life, and environmental and cultural values; and ranked as Low based on infrastructure and economics for all three embankments. The TSF is, therefore, classified as a Significant consequence structure.

3.0 SEISMICITY

Peak Ground Acceleration (PGA) values obtained for the approximate location of the mine from the 2010 National Building Code of Canada Seismic Hazard Calculator are presented in Table 4.

Table 4: Peak Ground Acceleration by Return Period

Return Period	Peak Ground Acceleration
1 in 100 years	0.030 g
1 in 475 years	0.069 g
1 in 1,000 years	**0.096 g**
1 in 2,475 years	0.138 g

Notes:

1) Based on site coordinates: Latitude: 52.5611° N, Longitude: 121.62° W.

2) Spectral and peak hazard values are determined for firm ground (NBCC 2010 soil class C – average shear wave velocity 360-750 m/s).

For a dam with a Significant consequence classification, CDA (2013) recommends an earthquake design ground motion be selected based on the 1 in 1,000 year return period earthquake.

4.0 SLOPE STABILITY CRITERIA

The CDA (2013) recommends minimum factor of safety values for slope stability under a number of static and seismic loading conditions as summarized in Table 5.

Table 5: Factor of Safety for Slope Stability for Static Assessment (CDA 2013, Section 6.6)

Loading Conditions	Minimum Factor of Safety	Slope
End of Construction before Reservoir Filling	1.3 [(a)]	Upstream and Downstream
Long-term (steady-state seepage, normal reservoir level)	1.5	Downstream
Pseudo-static	1.0	Downstream
Post-earthquake	1.2 to 1.3	Upstream and Downstream

(a) Permit M-200 amendment for the 2015 Freshet Management Embankment requires end of construction factor of safety of 1.5.

Permit M-200 amendment for the construction of the 2015 Freshet Management Embankment required an end of construction factor of safety of 1.5. This will be maintained for the design of the Corner 1 Perimeter Embankment to an elevation of 970 m, and for the design of all the embankments to an elevation of 984 m. The long-term, pseudo-static and post-earthquake loading condition factor of safety are as recommended in CDA (2013).

5.0 FREEBOARD

A minimum storage capacity of one million m^3 (low operating water level) is to be maintained in the TSF to provide sufficient reclaim water for the process plant, as defined by MPMC, and to provide a minimum pond depth of approximately 3 m for the operation of the reclaim barge. The maximum normal operating water level has been set as 1.5 million m^3 plus the 1 in 200 year return period freshet volume.

An Inflow Design Flood (IDF) with a return period of 1 in 1,000 years is recommended based on CDA (2014) guidelines for a Significant consequence classification during operations, and the PMF during closure. The Probable Maximum Flood (PMF) has been selected as the IDF during both operations and closure.

Adequate freeboard will be included in the design. CDA (2013) provides the following definitions to calculate freeboard requirements:

- **Normal Freeboard** is such that the dam is protected against overtopping by 95% of the waves caused by the most critical wind with a return period of 1 in 1,000 years with the pond at its maximum normal operating water level.
- **Minimum Freeboard** is such that the dam is protected against overtopping by 95% of the waves caused by the most critical wind (depending on the consequence classification), with the pond at the maximum normal operating water level plus the IDF.

The results are summarised in Table 6.

Table 6: Inflow Design Flood and Minimum Freeboard Assessment

Normal freeboard		**0.2 m**
Minimum Freeboard	IDF	1.0 m
	Wave run-up and wind set-up	0.1 m
	Total	**1.1 m**

The freeboard assessment is based on the following assumptions:

- the IDF is based on the PMP rainfall combined with the 1 in 2 year snowmelt;
- a minimum beach slope of 0.03 m/m was assumed for the purpose of the wave run-up assessment, which represents the lower bound of slopes that can be represented by the governing wave run-up equations; and
- the critical wind return period was set at 1 in 2 years.

6.0 TAILINGS DEPOSITION

A mine plan has been developed by MPMC to determine the tailings placed in the TSF till the second quarter of 2020, and is shown in Table 7. After the second quarter of 2020 the tailings discharge rate will be approximately 22,000 tonnes per day. Tailings deposition in the TSF is planned to start in May 2016 but will be dependent on the permit application.

Table 7: Tailings Deposition into the TSF

Period	Tailings Discharged from the Mill (tonnes)	Tailings Removed from Springer Pit (Tonnes)	Total Placed in the TSF (Tonnes)
May 2016	681,859	-	681,859
June 2016	660,074	-	660,074
July 2016	682,109	-	682,109
August 2016	682,167	-	682,167
September 2016	660,085	-	660,085
October 2016	677,567	-	677,567
November 2016	607,450	-	607,450
December 2016	620,353	-	620,353
2017 Quarter 1	1,862,828	-	1,862,828
2017 Quarter 2	2,001,286	-	2,001,286
2017 Quarter 3	2,024,059	-	2,024,059
2017 Quarter 4	1,902,329	138,000	2,040,329
2018 Quarter 1	1,861,629	900,000	2,761,629
2018 Quarter 2	2,001,286	1,900,000	3,901,286
2018 Quarter 3	2,023,733	1,100,000	3,123,733
2018 Quarter 4	1,902,200	-	1,902,200

Period	Tailings Discharged from the Mill (tonnes)	Tailings Removed from Springer Pit (Tonnes)	Total Placed in the TSF (Tonnes)
2019 Quarter 1	1,861,998	-	1,861,998
2019 Quarter 2	2,001,934	-	2,001,934
2019 Quarter 3	2,023,807	-	2,023,807
2019 Quarter 4	1,901,942	-	1,901,942
2020 Quarter 1	1,862,361	-	1,862,361
2020 Quarter 2	1,476,862	-	1,476,862

REFERENCES

CDA. (Canadian Dam Association) 2013. *Dam Safety Guidelines 2007 (Revised 2013)*.

CDA. 2014. *Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams*.

Golder. (Golder Associates Ltd.) 2015. *Site Wide Water Balance*. Prepared for Mount Polley Mining Corporation. Submitted May 29, 2015. Document No. 1411734-031-R-Rev0-12000.

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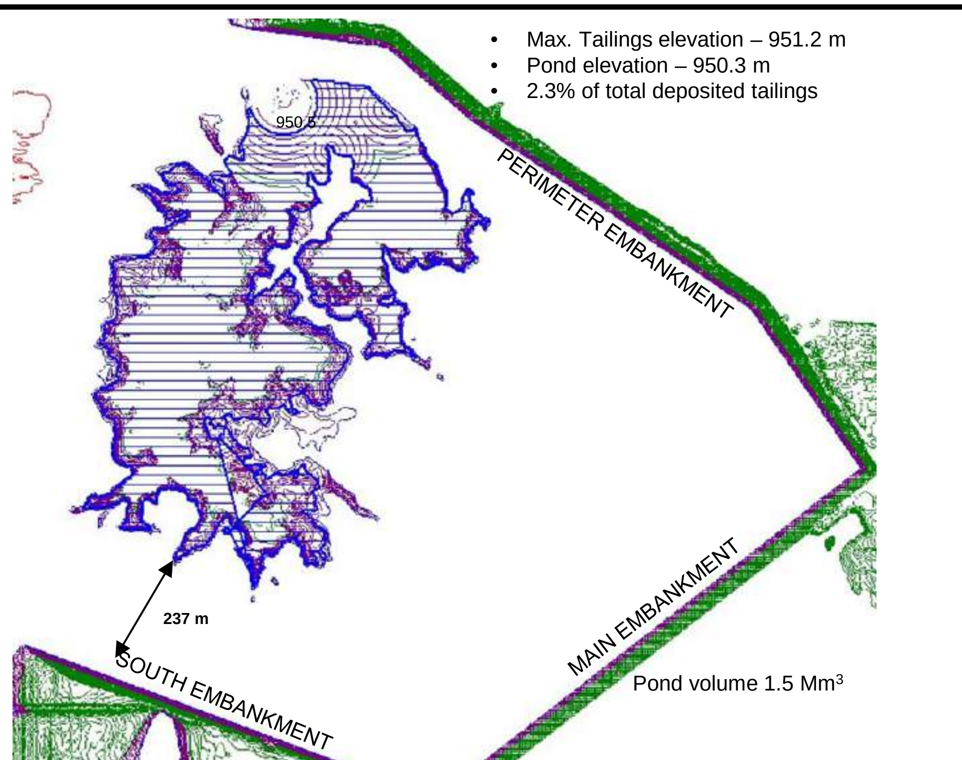
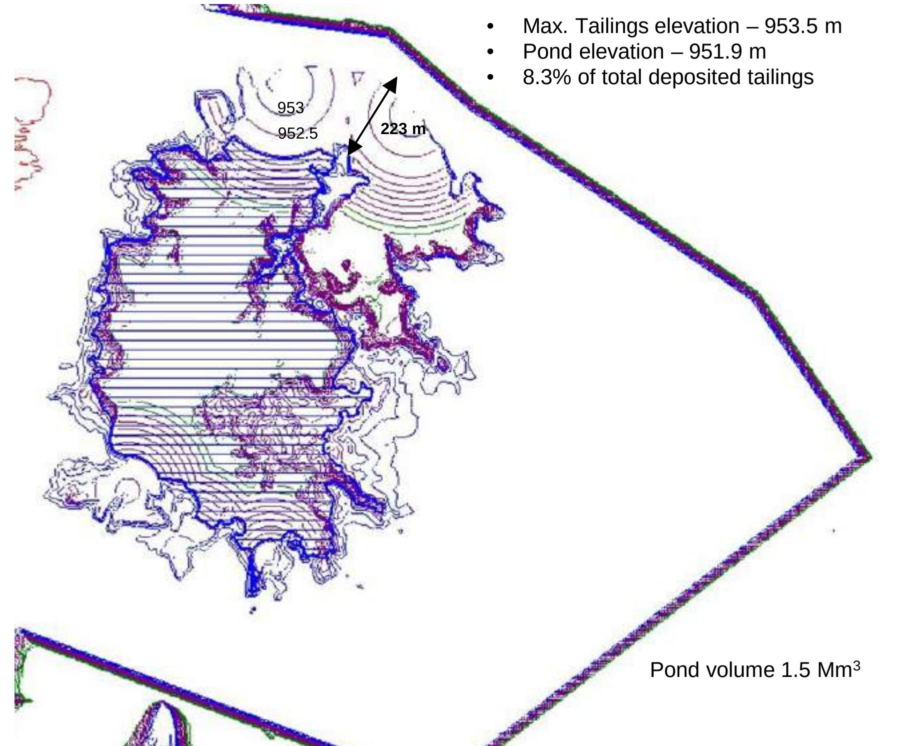
APPENDIX D

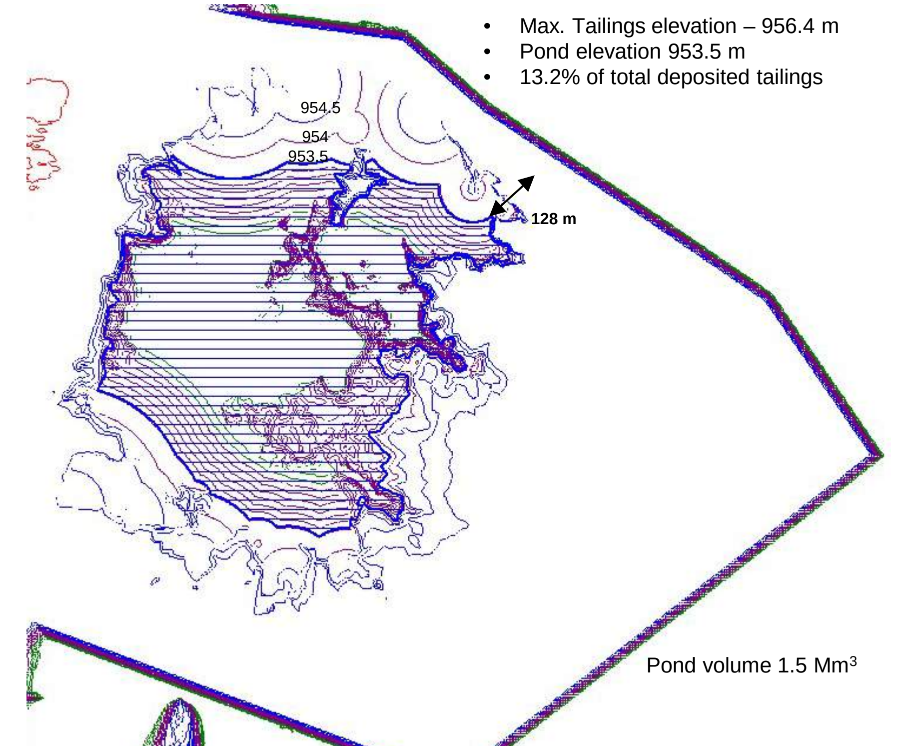
Tailings Deposition



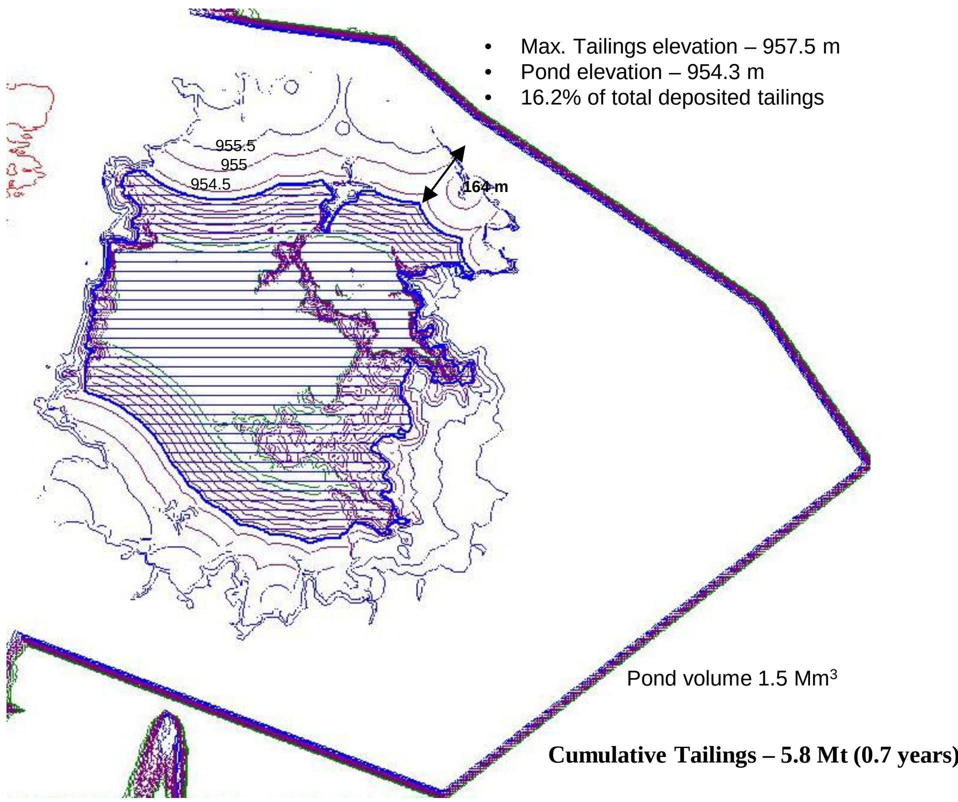
Cumulative Tailings – 1.1 Mt (0.1 years)



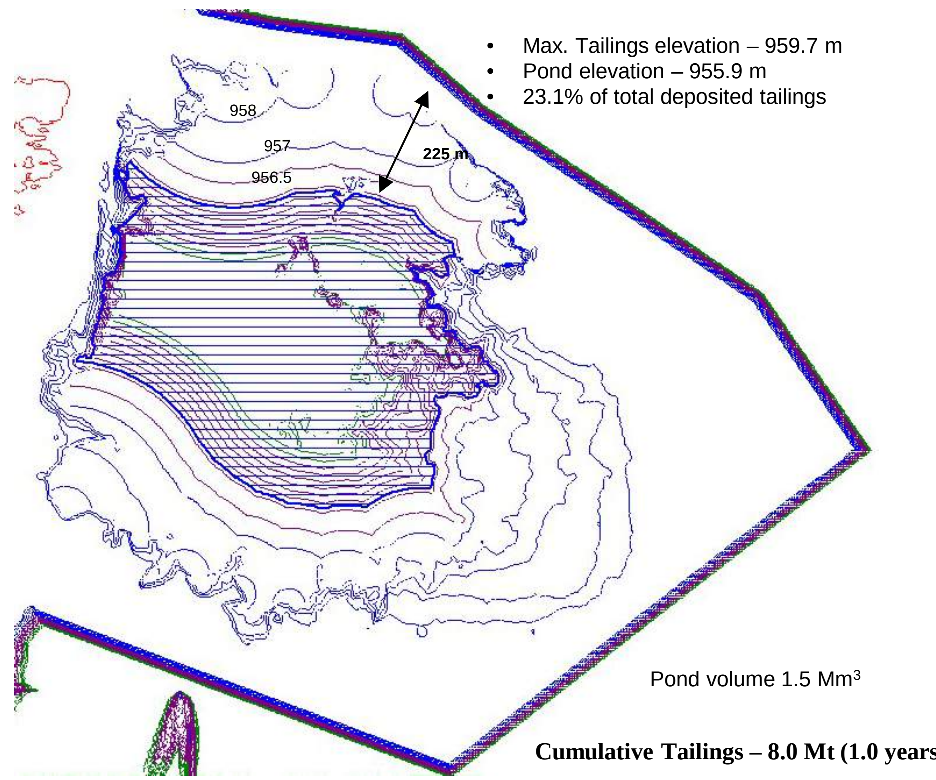
Cumulative Tailings – 3.1 Mt (0.4 years)



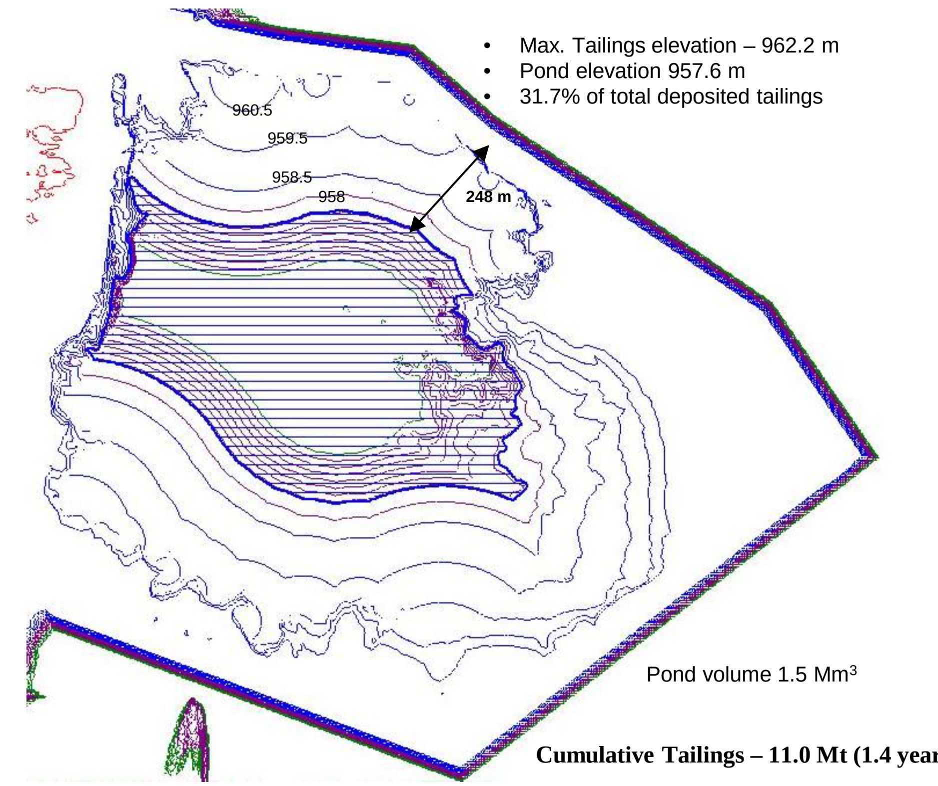
Cumulative Tailings – 4.8 Mt (0.6 years)



Cumulative Tailings – 5.8 Mt (0.7 years)



Cumulative Tailings – 8.0 Mt (1.0 years)



Cumulative Tailings – 11.0 Mt (1.4 years)

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LEGEND:

Tailings Pond

Sub-aerial beach length

NOTES:

1. The survey taken on May 27, 2015 was used as the base survey.
2. Pond capacity of 1.5 million m³ is shown, and is reduced nearing closure to shape the tailings basin for the closure configuration.
3. Sub-aerial Beach slope = 1% and sub-aqueous Slope = 3%. Maximum 4 m depth of pond.
4. Timeline is based on MPMC Mine Plan received October 13, 2015.
5. In place dry density of 1.35 tonnes /m³ assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **TAILINGS DEPOSITION MODELLING**
1% SUB-AERIAL BEACH SLOPE
3% SUB-AQUEOUS BEACH SLOPE

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
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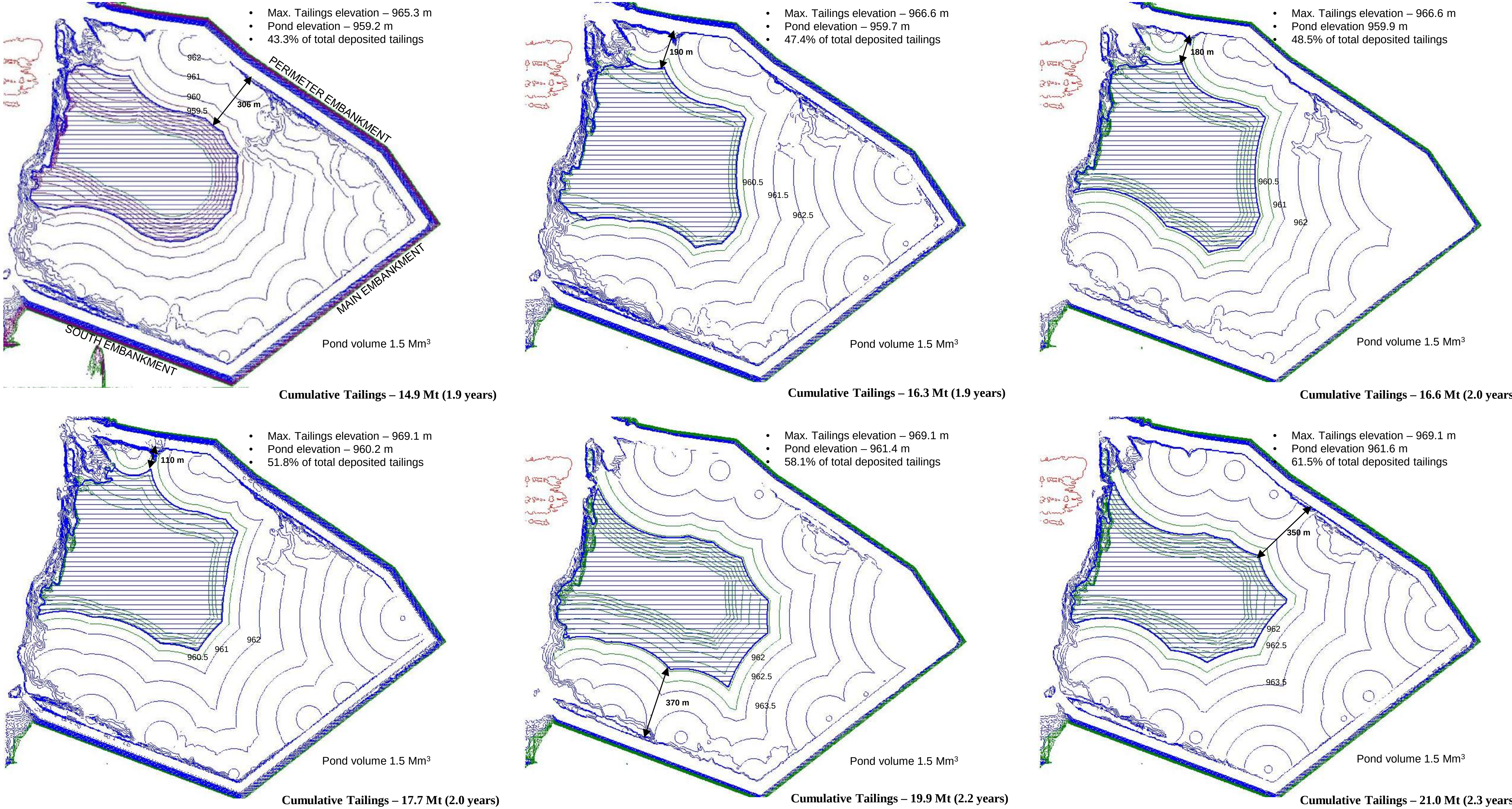
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	



LEGEND:

Tailings Pond

Sub-aerial beach length

NOTES:

1. The survey taken on May 27, 2015 was used as the base survey.
2. Pond capacity of 1.5 million m^3 is shown, and is reduced nearing closure to shape the tailings basin for the closure configuration.
3. Sub-aerial Beach slope = 1% and sub-aqueous Slope = 3%. Maximum 4 m depth of pond.
4. Timeline is based on MPMC Mine Plan received October 13, 2015.
5. In place dry density of 1.35 tonnes /m^3 assumed.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN
TITLE	TAILINGS DEPOSITION MODELLING 1% SUB-AERIAL BEACH SLOPE 3% SUB-AQUEOUS BEACH SLOPE

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
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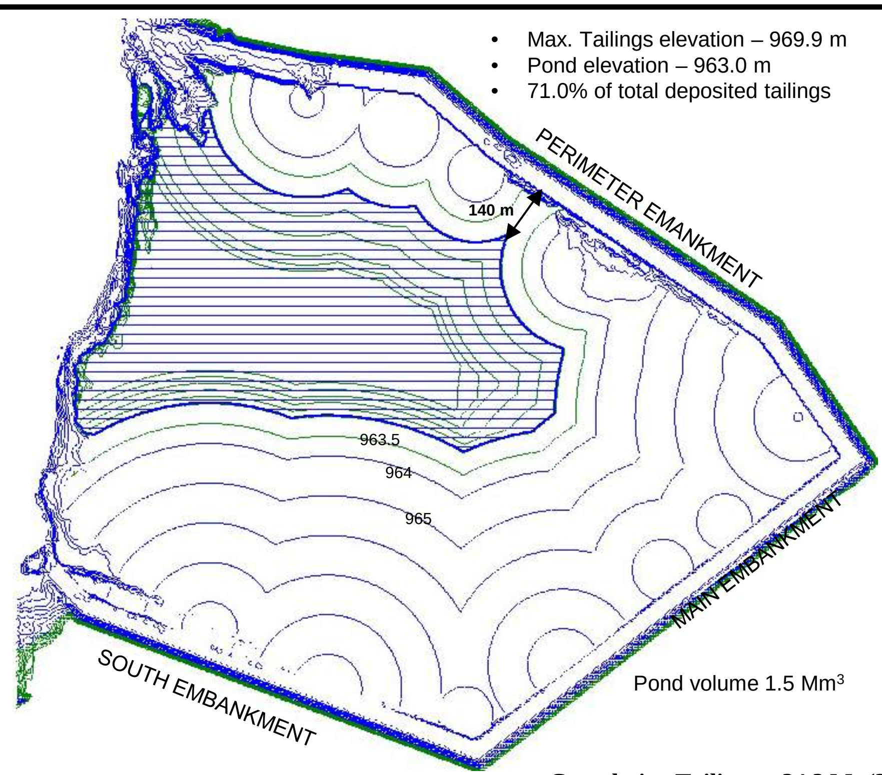
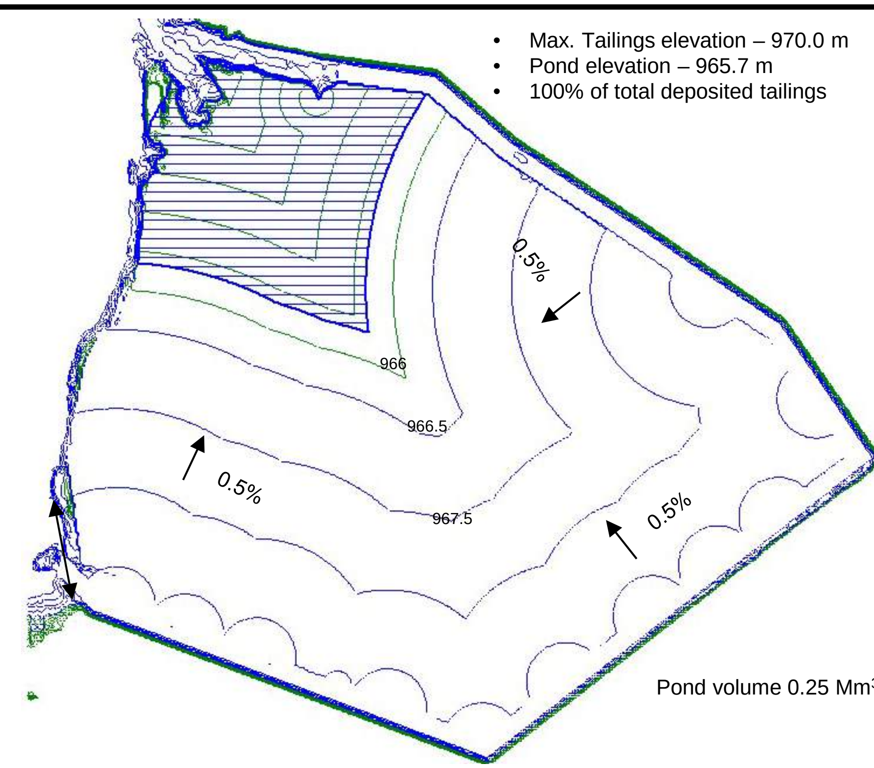


Cumulative Tailings – 24.2 Mt (2.6 years)



Cumulative Tailings – 33.9 Mt (3.8 years)

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LEGEND:

Tailings Pond

Sub-aerial beach length

NOTES:

1. The survey taken on May 27, 2015 was used as the base survey.
2. Pond capacity of 1.5 million m^3 is shown, and is reduced nearing closure to shape the tailings basin for the closure configuration.
3. Sub-aerial Beach slope = 1% and sub-aqueous Slope = 3%. Maximum 4 m depth of pond.
4. Timeline is based on MPMC Mine Plan received October 13, 2015.
5. In place dry density of 1.35 tonnes /m^3 assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **TAILINGS DEPOSITION MODELLING**
1% SUB-AERIAL BEACH SLOPE
3% SUB-AQUEOUS BEACH SLOPE

Golder Associates

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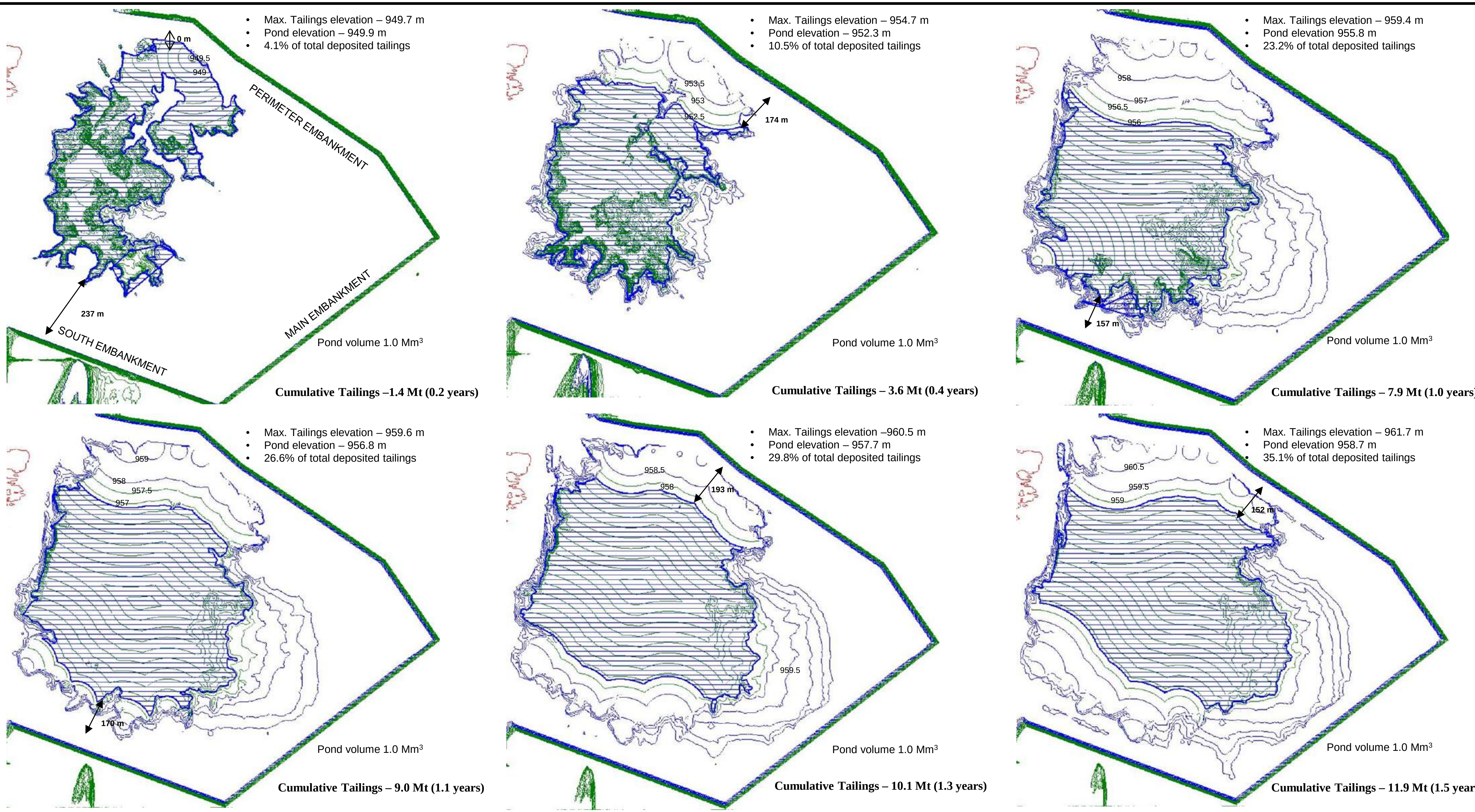

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LEGEND:

Tailings Pond

Sub-aerial beach length

NOTES:

1. The survey taken on May 27, 2015 was used as the base survey.
2. Pond capacity of 1.0 million m³ is shown, and is reduced nearing closure to shape the tailings basin for the closure configuration.
3. Sub-aerial Beach slope = 1% and sub-aqueous Slope = 1%.
4. Timeline is based on MPMC Mine Plan received October 13, 2015.
5. In place dry density of 1.35 tonnes /m³ assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TAILINGS DEPOSITION MODELLING 1% BEACH SLOPE**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
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REVIEW	TLE	30OCT15		

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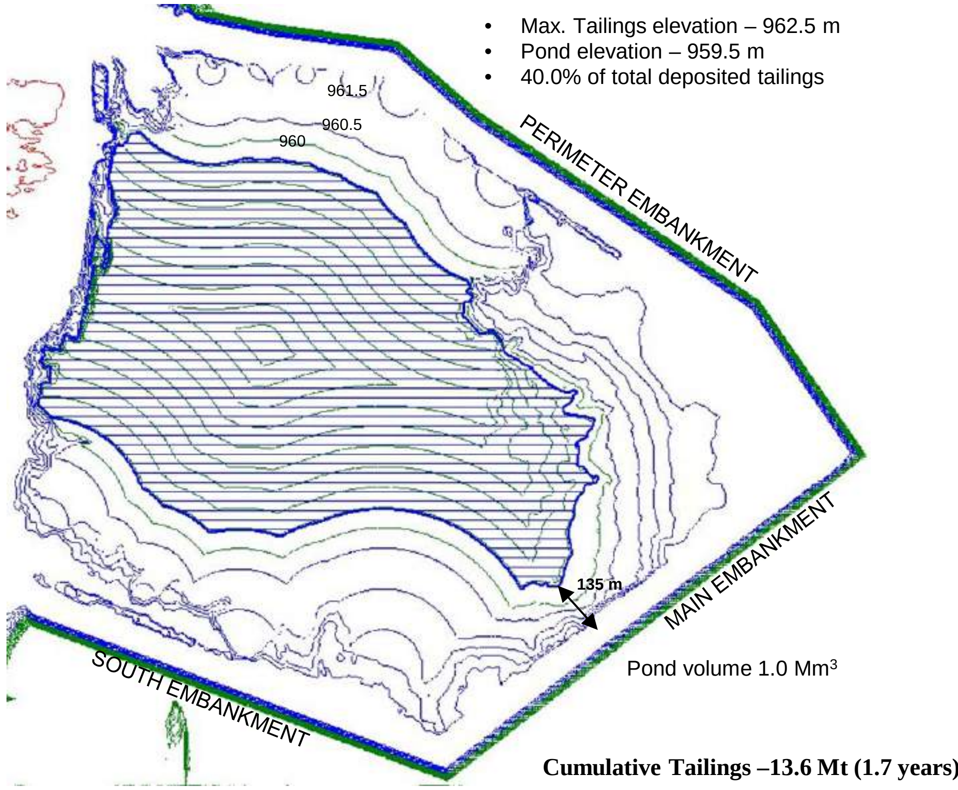

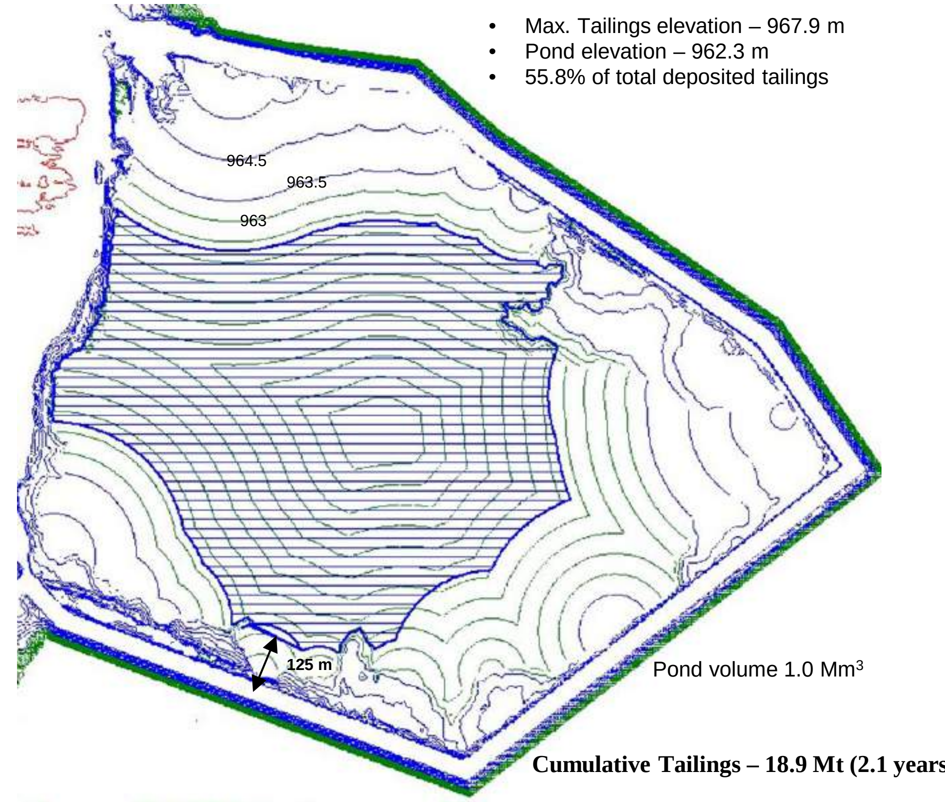

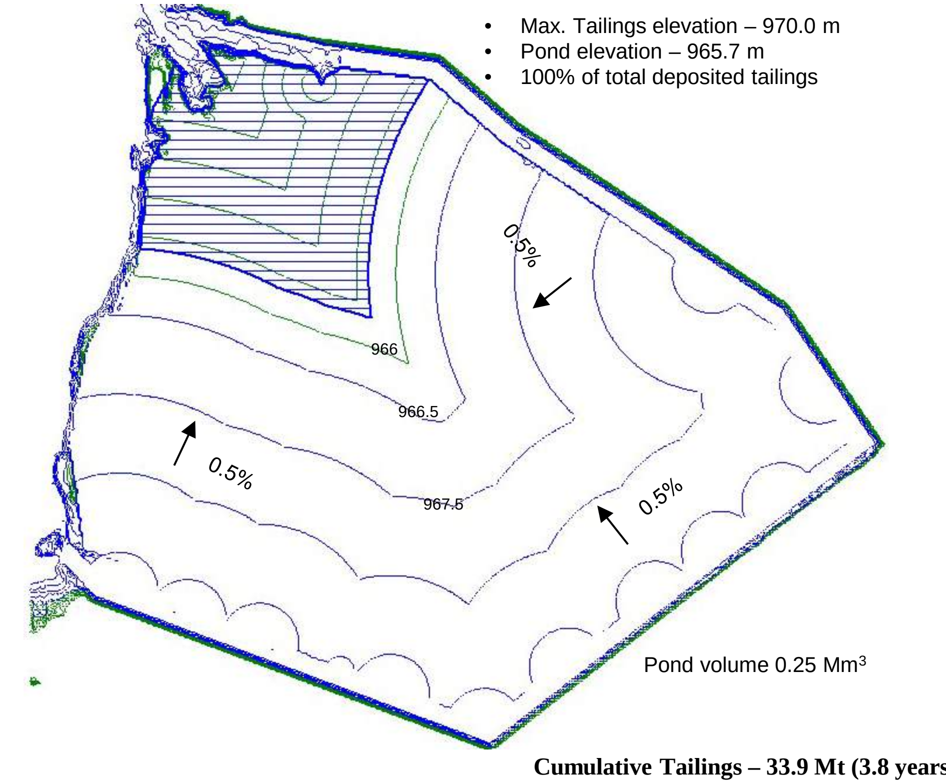

LEGEND:

Tailings Pond

Sub-aerial beach length

NOTES:

1. The survey taken on May 27, 2015 was used as the base survey.
2. Pond capacity of 1.0 million m^3 is shown, and is reduced nearing closure to shape the tailings basin for the closure configuration.
3. Sub-aerial Beach slope = 1% and sub-aqueous Slope = 1%.
4. Timeline is based on MPMC Mine Plan received October 13, 2015.
5. In place dry density of 1.35 tonnes /m^3 assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
TAILINGS DEPOSITION MODELLING
1% BEACH SLOPE

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
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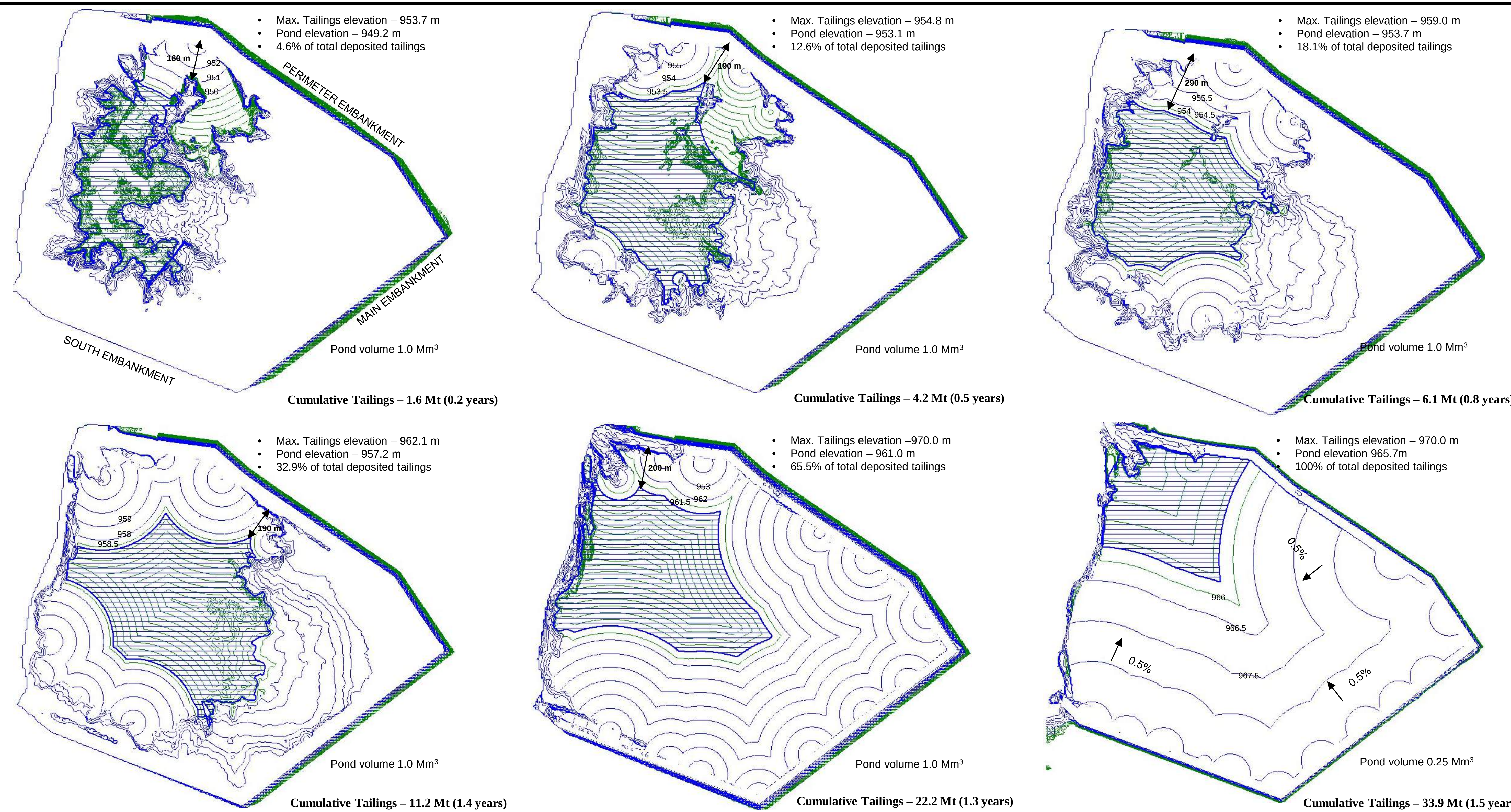

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LEGEND:

Tailings Pond

Sub-aerial beach length

NOTES:

1. The survey taken on May 27, 2015 was used as the base survey.
2. Pond capacity of 1.0 million m³ is shown, and is reduced nearing closure to shape the tailings basin for the closure configuration.
3. Sub-aerial Beach slope = 1.5% and sub-aqueous Slope = 1.5%.
4. Timeline is based on MPMC Mine Plan received October 13, 2015.
5. In place dry density of 1.35 tonnes /m³ assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TAILINGS DEPOSITION MODELLING 1.5% BEACH SLOPE**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
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REVIEW	TLE	30OCT15		

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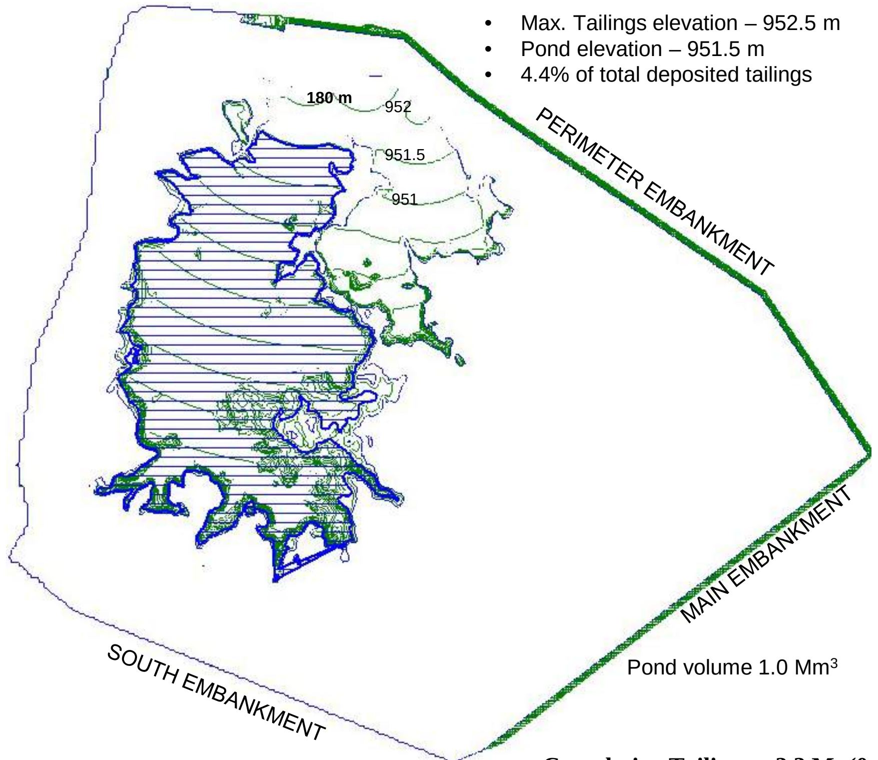
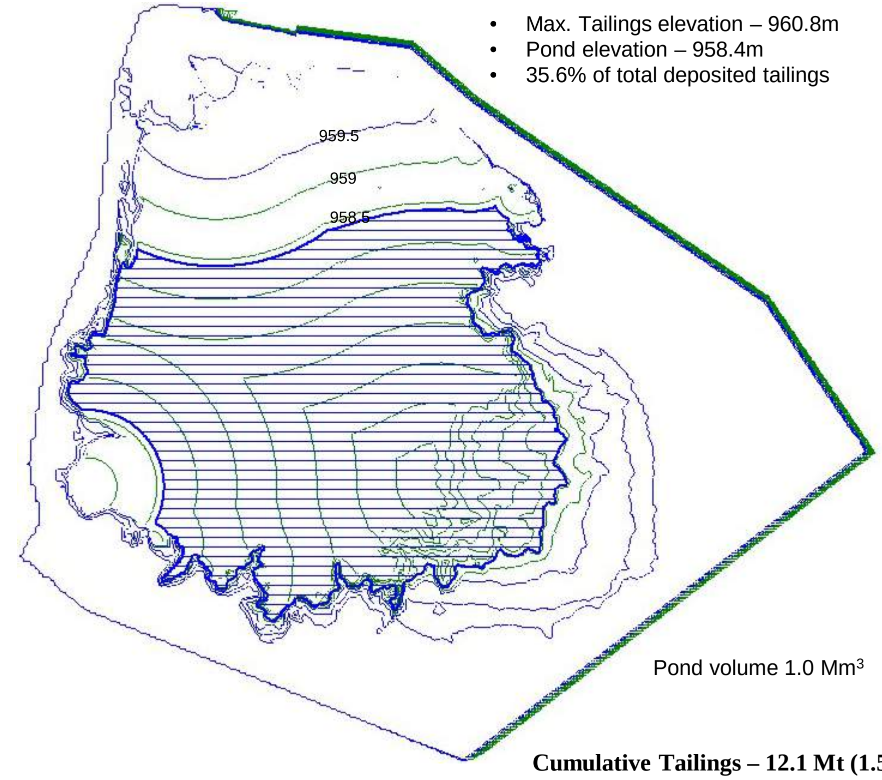
- Max. Tailings elevation – 952.5 m
- Pond elevation – 951.5 m
- 4.4% of total deposited tailings



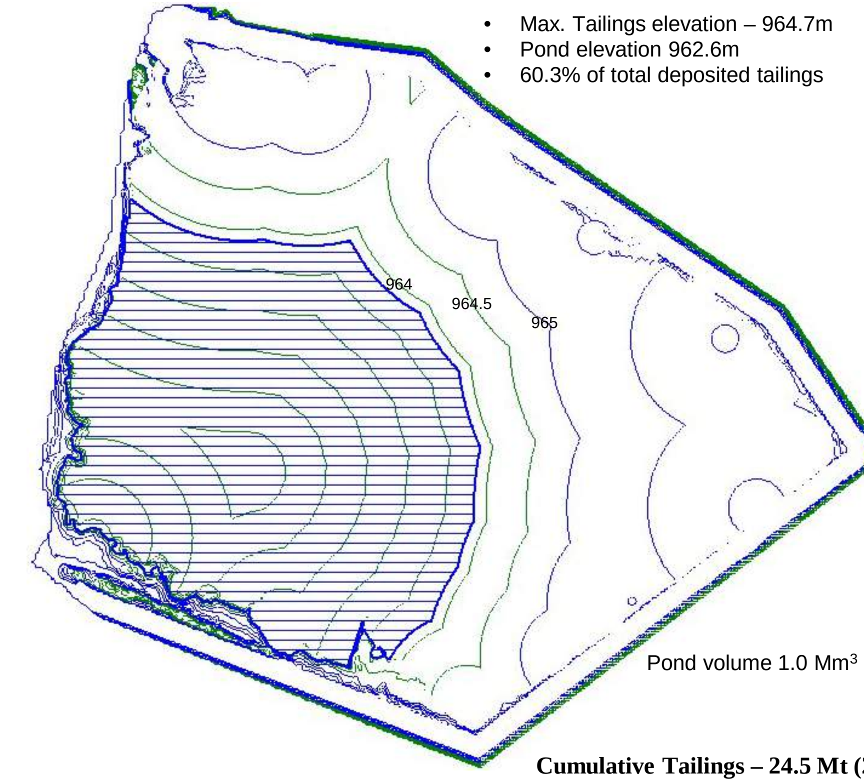
Cumulative Tailings – 3.3 Mt (0.4 years)

- Max. Tailings elevation – 960.8m
- Pond elevation – 958.4m
- 35.6% of total deposited tailings



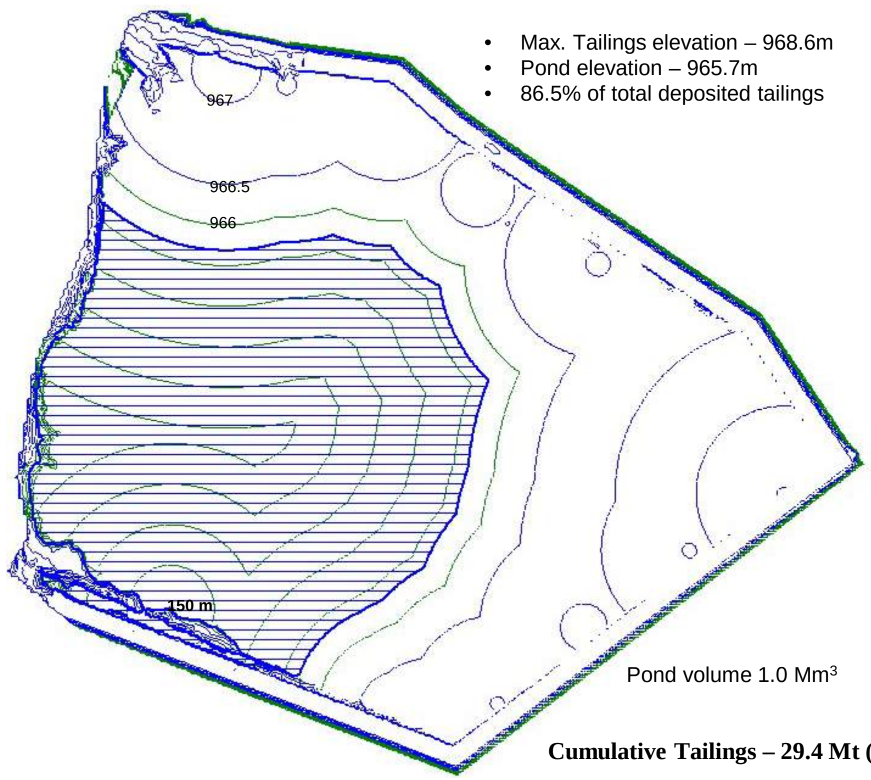
Cumulative Tailings – 12.1 Mt (1.5 years)

- Max. Tailings elevation – 964.7m
- Pond elevation 962.6m
- 60.3% of total deposited tailings



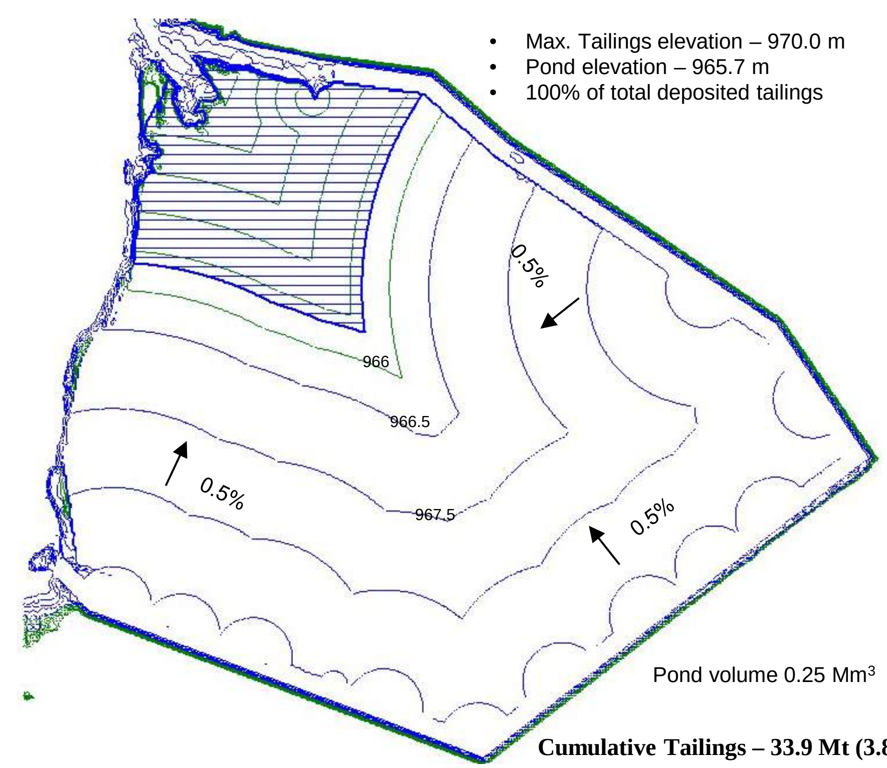
Cumulative Tailings – 24.5 Mt (2.6 years)

- Max. Tailings elevation – 968.6m
- Pond elevation – 965.7m
- 86.5% of total deposited tailings



Cumulative Tailings – 29.4 Mt (3.2 years)

- Max. Tailings elevation – 970.0 m
- Pond elevation – 965.7 m
- 100% of total deposited tailings



Cumulative Tailings – 33.9 Mt (3.8 years)

- Max. Tailings elevation – 970.0 m
- Pond elevation 965.7m
- 100% of total deposited tailings

LEGEND:

Tailings Pond

Sub-aerial beach length

NOTES:

1. The survey taken on May 27, 2015 was used as the base survey.
2. Pond capacity of 1.0 million m^3 is shown, and is reduced nearing closure to shape the tailings basin for the closure configuration.
3. Sub-aerial Beach slope = 0.5% and sub-aqueous Slope = 0.5%.
4. Timeline is based on MPMC Mine Plan received October 13, 2015.
5. In place dry density of 1.35 tonnes /m^3 assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TAILINGS DEPOSITION MODELLING 0.5% BEACH SLOPE**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
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REVIEW	TLE	30OCT15		

APPENDIX E

Seepage Analyses

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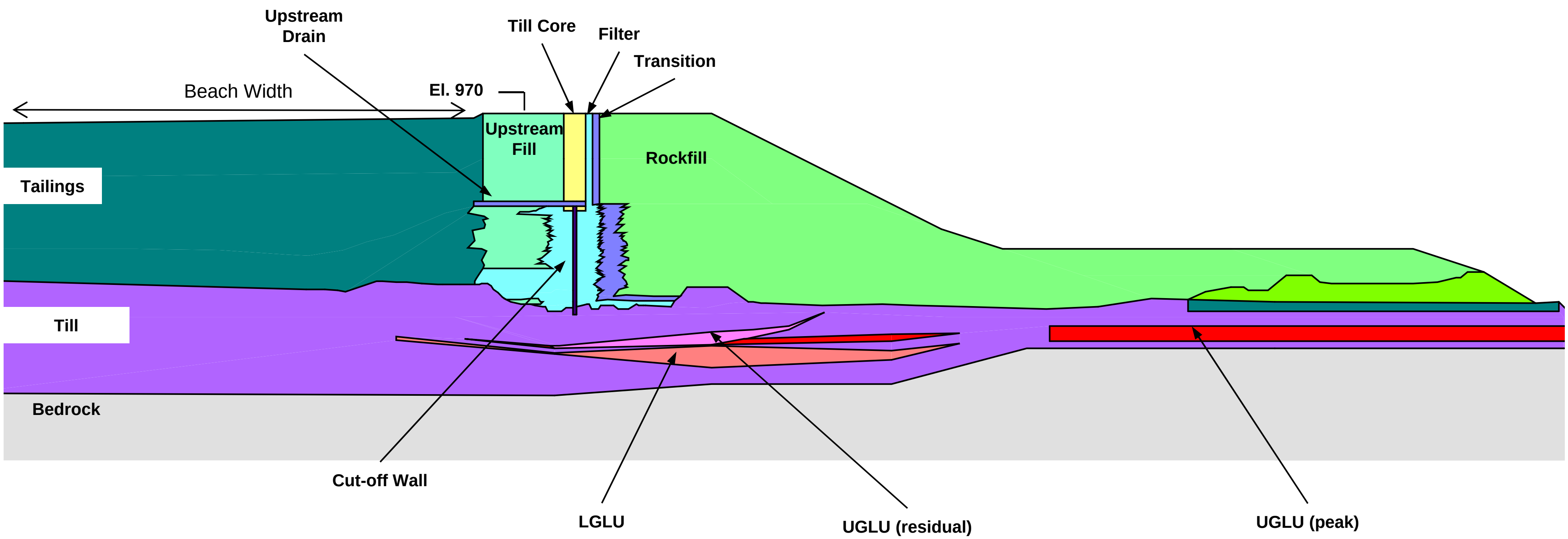

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	1×10^{-8}
Glaciolacustrine Unit (GLU)	5×10^{-10}
Rockfill, Filter, Transition; Upstream Drain	1×10^{-2}
Tailings	1×10^{-6}
Cut-off Wall	1×10^{-8}
Upstream Fill	1×10^{-5}

Notes:
1. Section at Stn. 20+240

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
CORNER 1 PERIMETER EMBANKMENT
SECTION CONFIGURATION

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	27OCT15	SCALE NTS	REV.0
CADD	CTM	27OCT15	FIGURE - E1	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

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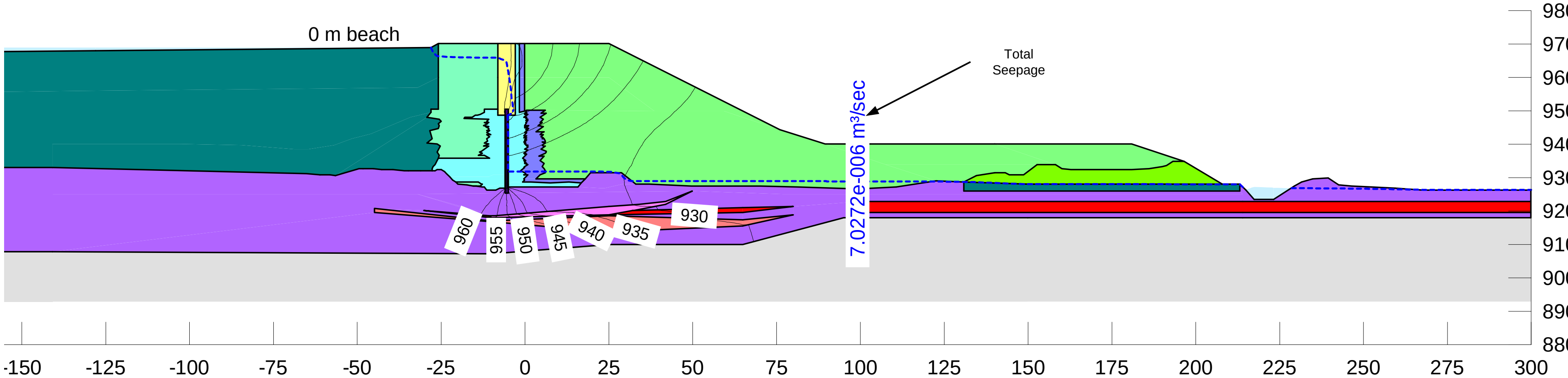
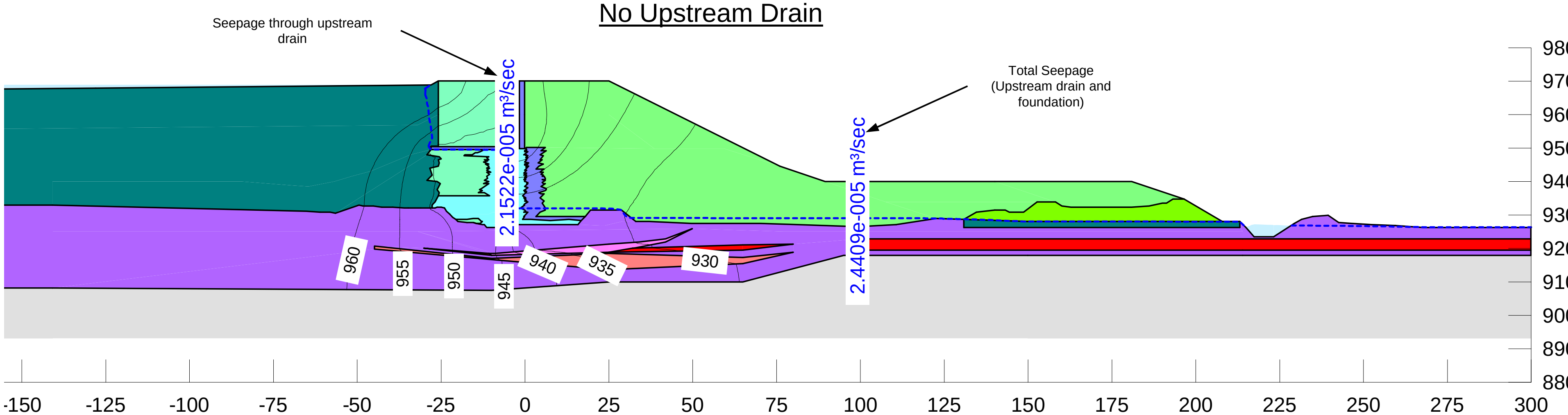


No Upstream Drain



With Upstream Drain

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	$1x10^{-8}$
Glaciolacustrine Unit (GLU)	$5x10^{-10}$
Rockfill, Filter, Transition; Upstream Drain	$1x10^{-2}$
Tailings	$1x10^{-6}$
Cut-off Wall	$1x10^{-8}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 20+240
2. Contours show elevation head, 5 m contour interval.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **SEEPAGE ANALYSIS RESULTS**
CORNER 1 PERIMETER EMBANKMENT
0 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS REV.0
CADD	CTM	27OCT15	**FIGURE - E2**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

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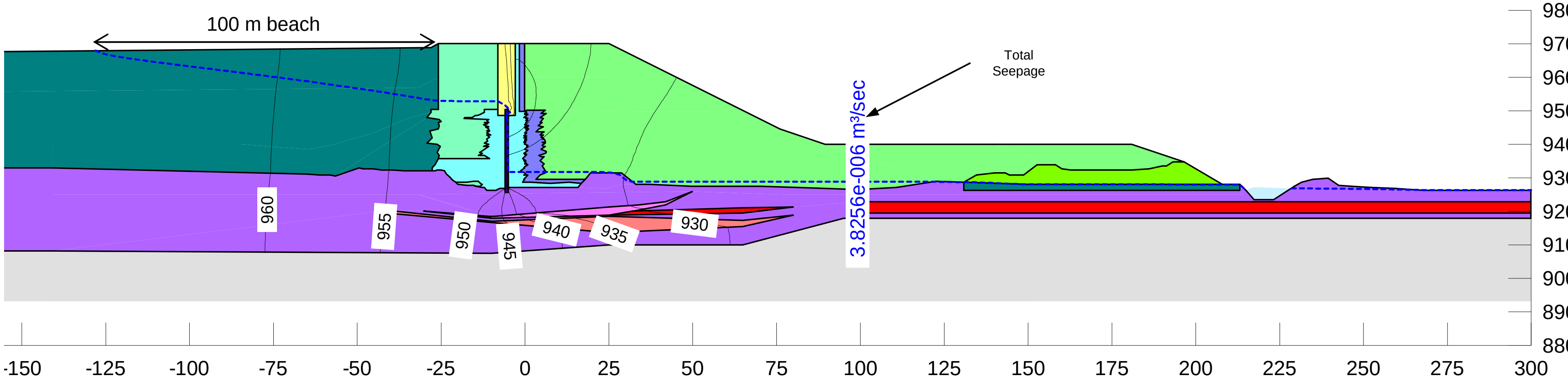
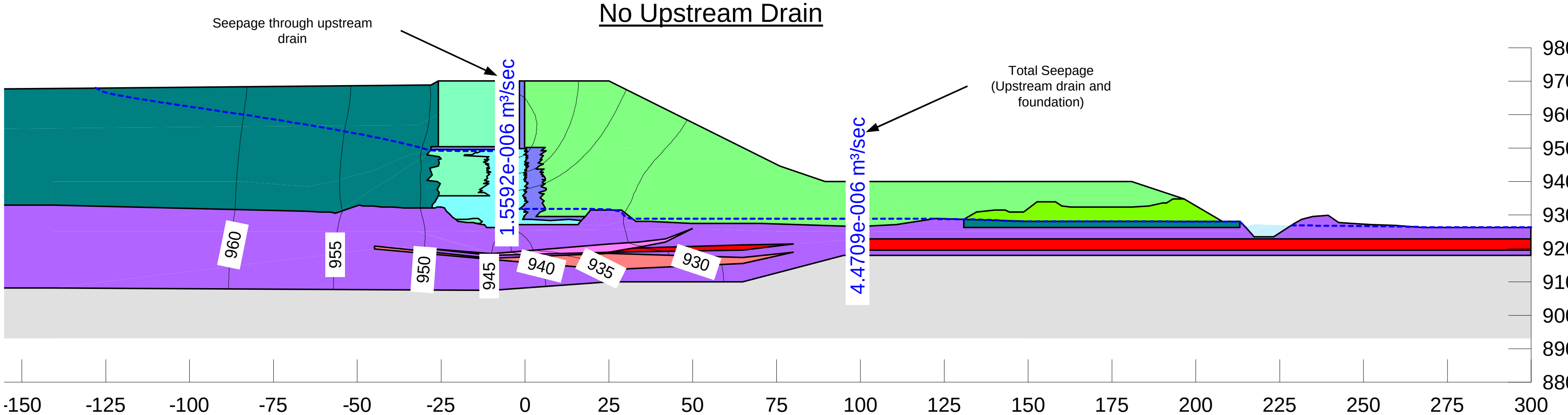


No Upstream Drain



With Upstream Drain

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	$1x10^{-8}$
Glaciolacustrine Unit (GLU)	$5x10^{-10}$
Rockfill, Filter, Transition; Upstream Drain	$1x10^{-2}$
Tailings	$1x10^{-6}$
Cut-off Wall	$1x10^{-8}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 20+240
2. Contours show elevation head, 5 m contour interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
CORNER 1 PERIMETER EMBANKMENT
100 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS — REV.0
CADD	CTM	27OCT15	**FIGURE - E3**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

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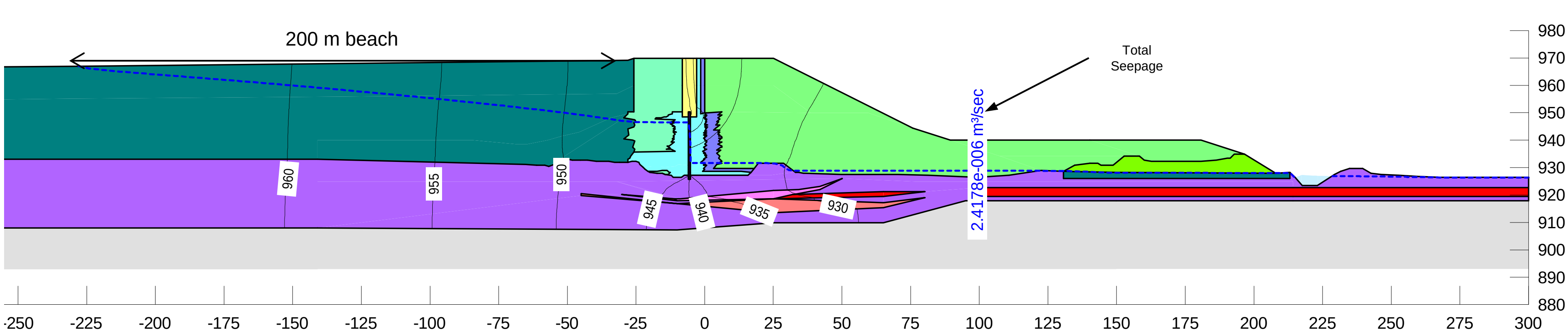
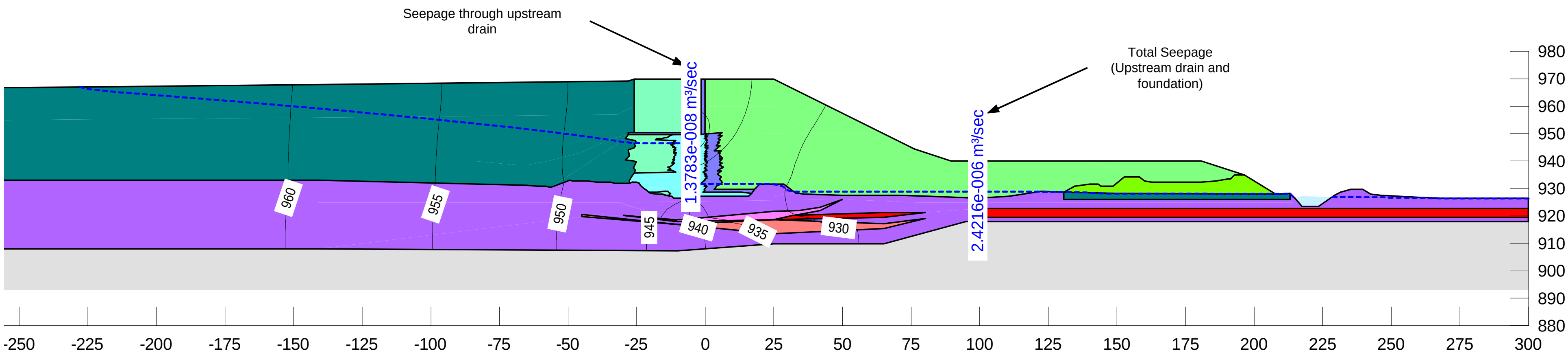


No Upstream Drain



With Upstream Drain

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	$1x10^{-8}$
Glaciolacustrine Unit (GLU)	$5x10^{-10}$
Rockfill, Filter, Transition; Upstream Drain	$1x10^{-2}$
Tailings	$1x10^{-6}$
Cut-off Wall	$1x10^{-8}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 20+240
2. Contours show elevation head, 5 m contour interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
CORNER 1 PERIMETER EMBANKMENT
200 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS REV.0
CADD	CTM	27OCT15	**FIGURE - E4**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

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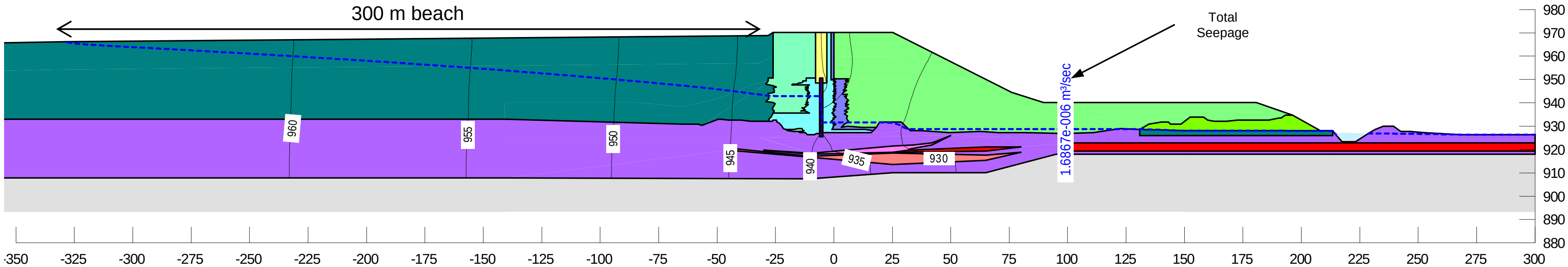
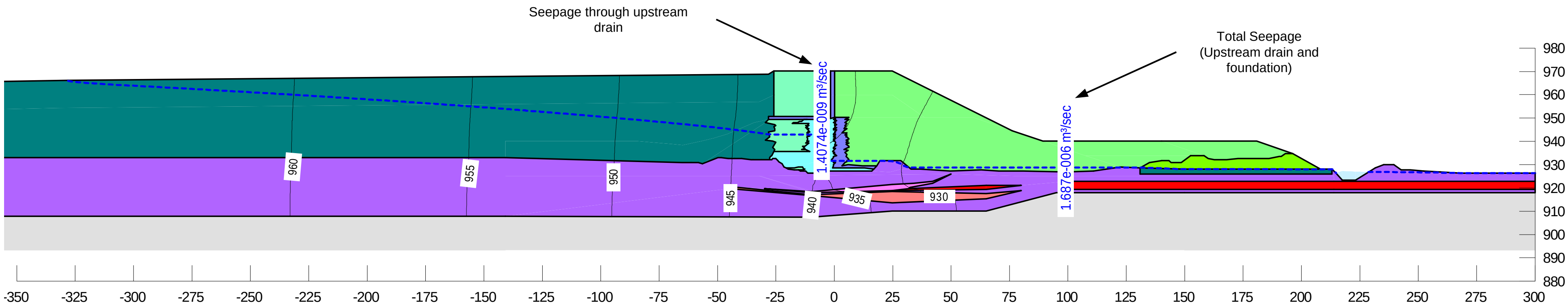


No Upstream Drain



With Upstream Drain

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	$1x10^{-8}$
Glaciolacustrine Unit (GLU)	$5x10^{-10}$
Rockfill, Filter, Transition; Upstream Drain	$1x10^{-2}$
Tailings	$1x10^{-6}$
Cut-off Wall	$1x10^{-8}$
Upstream Fill	$1x10^{-5}$

Notes:

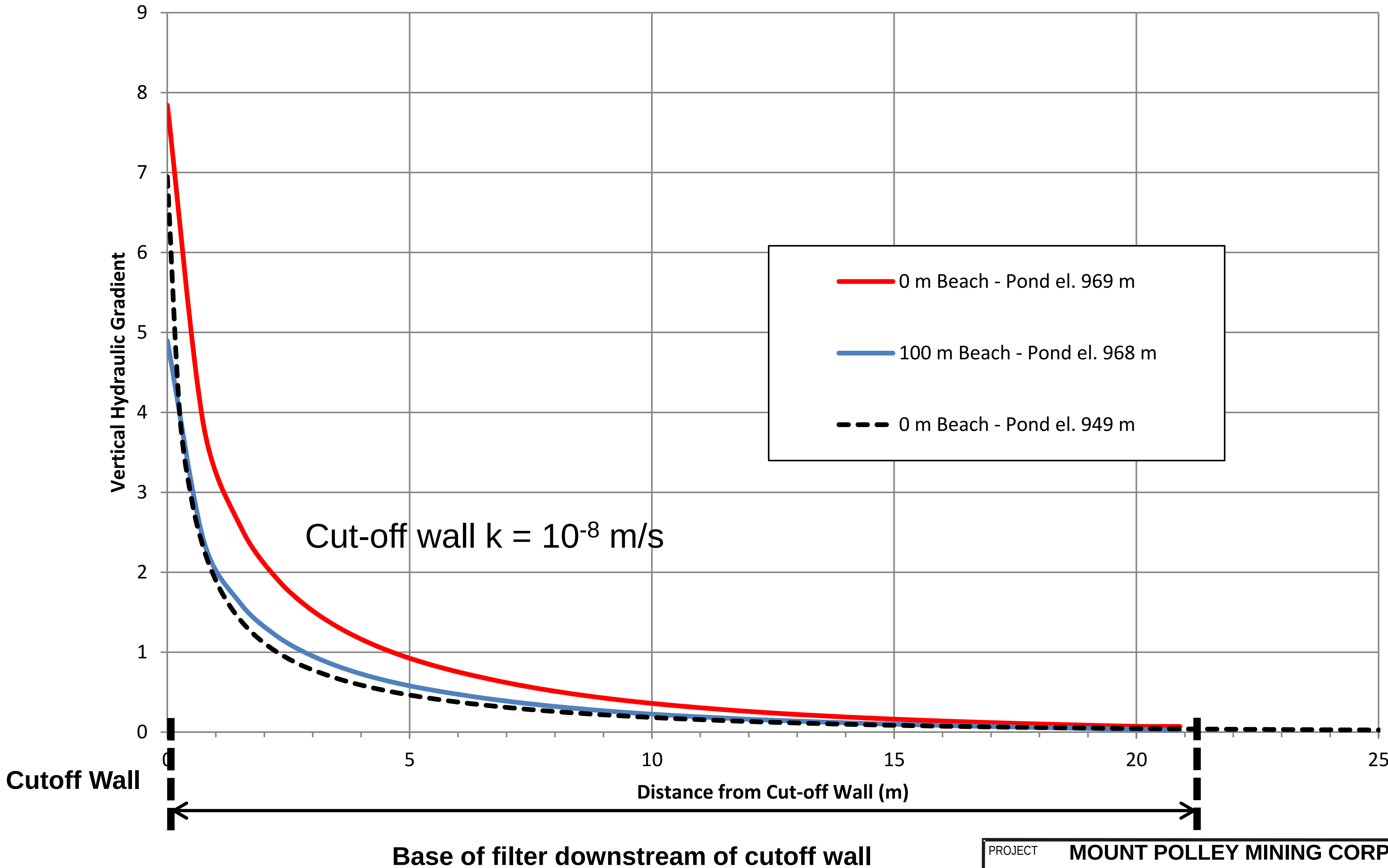
1. Section at Stn. 20+240
2. Contours show elevation head, 5 m contour interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
CORNER 1 PERIMETER EMBANKMENT
300 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS REV.0
CADD	CTM	27OCT15	**FIGURE - E5**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	



PROJECT **MOUNT POLLEY MINING CORPORATION**
2015 FRESHET MANAGEMENT
ELEVATION 970 DESIGN

TITLE **CORNER 1 PERIMETER EMBANKMENT**
SEEPAGE ANALYSIS RESULTS
VERTICAL HYDRAULIC GRADIENT

Golder Associates

PROJECT No. 1413803		
DESIGN	CTM	26OCT15
CADD	CTM	26OCT15
CHECK	GJ	30OCT15
REVIEW	TLE	30OCT15

PHASE No. 9000
SCALE NTS REV.0

FIGURE - E6

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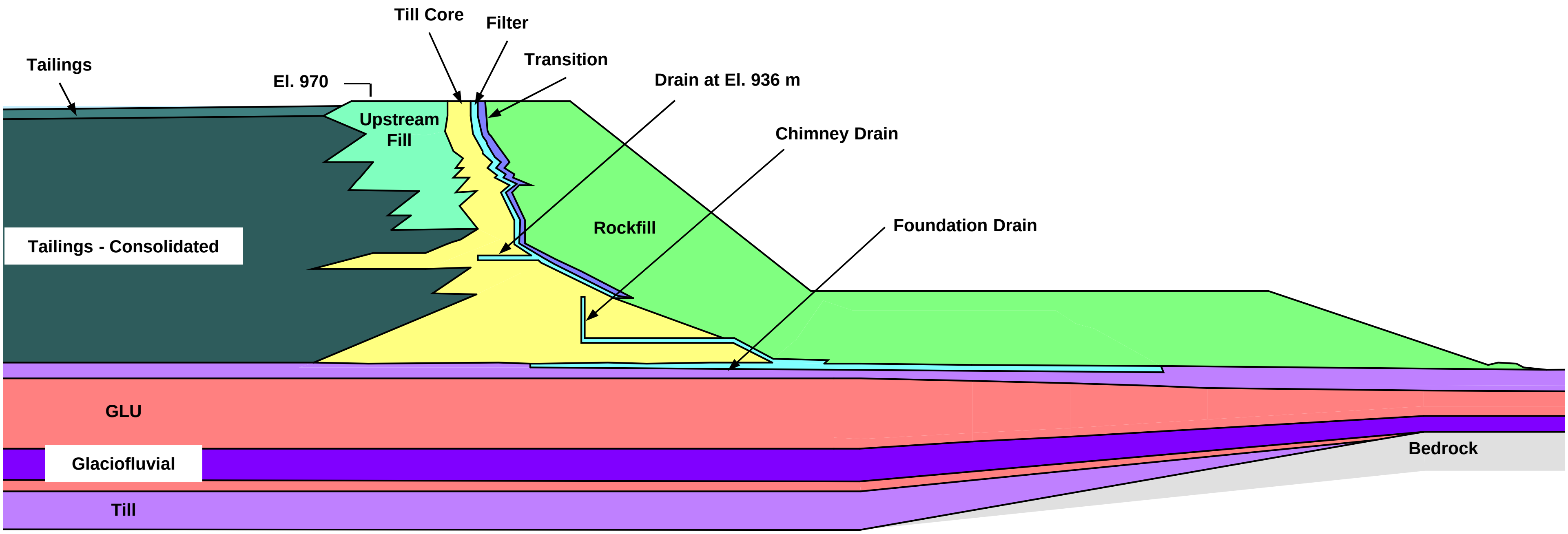

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	1×10^{-8}
Glaciolacustrine Unit (GLU)	5×10^{-10}
Rockfill, Filter, Transition; Upstream Drain	1×10^{-2}
Tailings	1×10^{-6}
Tailings - Consolidated	1×10^{-8}
Upstream Fill	1×10^{-5}

Notes:
1. Section at Stn. 2+240

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
SECTION CONFIGURATION

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS REV.0
CADD	CTM	27OCT15	
CHECK	GJ	30OCT15	**FIGURE - E7**
REVIEW	TLE	30OCT15	

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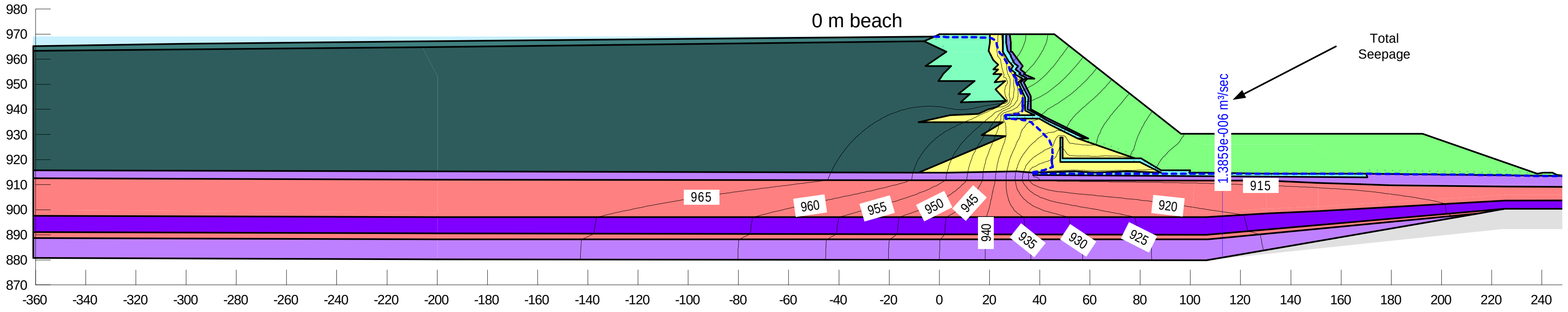
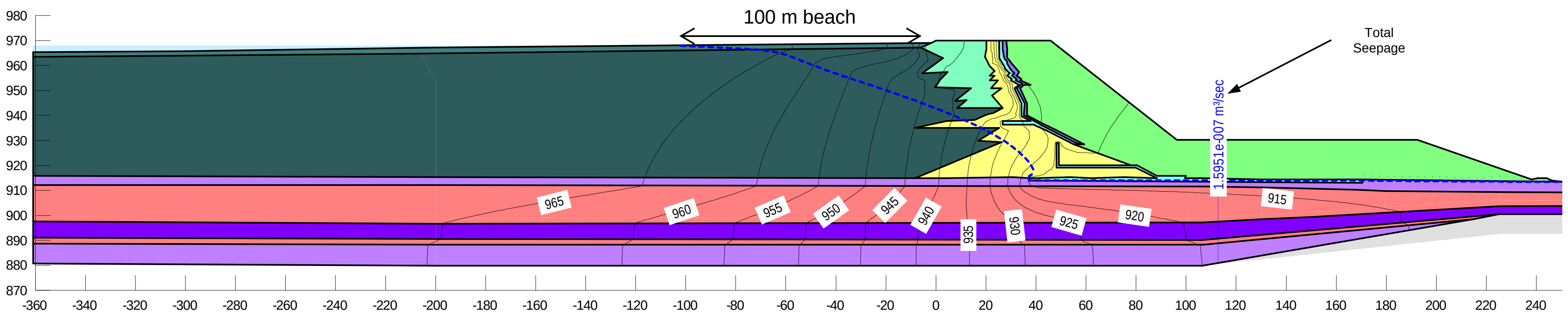


0 m Beach



100 m Beach

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	1×10^{-8}
Glaciolacustrine Unit (GLU)	5×10^{-10}
Rockfill, Filter, Transition; Upstream Drain	1×10^{-2}
Tailings	1×10^{-6}
Tailings - Consolidated	1×10^{-8}
Upstream Fill	1×10^{-5}

Notes:
1. Section at Stn. 2+240
2. Contours show elevation head, 5 m contour interval.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN
TITLE	SEEPAGE ANALYSIS RESULTS MAIN EMBANKMENT 0 AND 100 m SUB-AERIAL BEACH

Golder Associates

PROJECT No.	1413803		PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS — REV.0
CADD	CTM	27OCT15	FIGURE - E8
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

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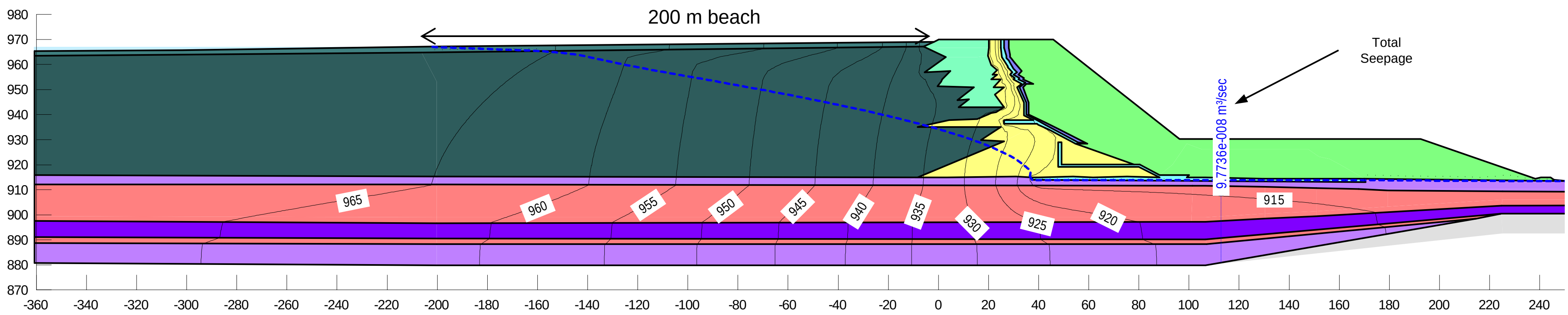
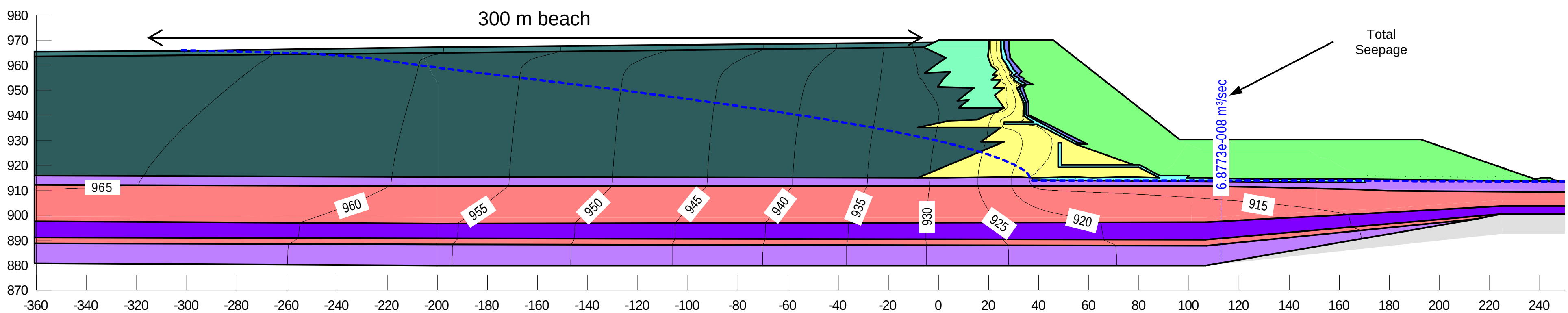


200 m Beach



300 m Beach

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	$1x10^{-8}$
Glaciolacustrine Unit (GLU)	$5x10^{-10}$
Rockfill, Filter, Transition; Upstream Drain	$1x10^{-2}$
Tailings	$1x10^{-6}$
Tailings - Consolidated	$1x10^{-8}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 2+240
2. Contours show elevation head, 5 m contour interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
200 AND 300 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	27OCT15	SCALE NTS	REV.0
CADD	CTM	27OCT15	**FIGURE - E9**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

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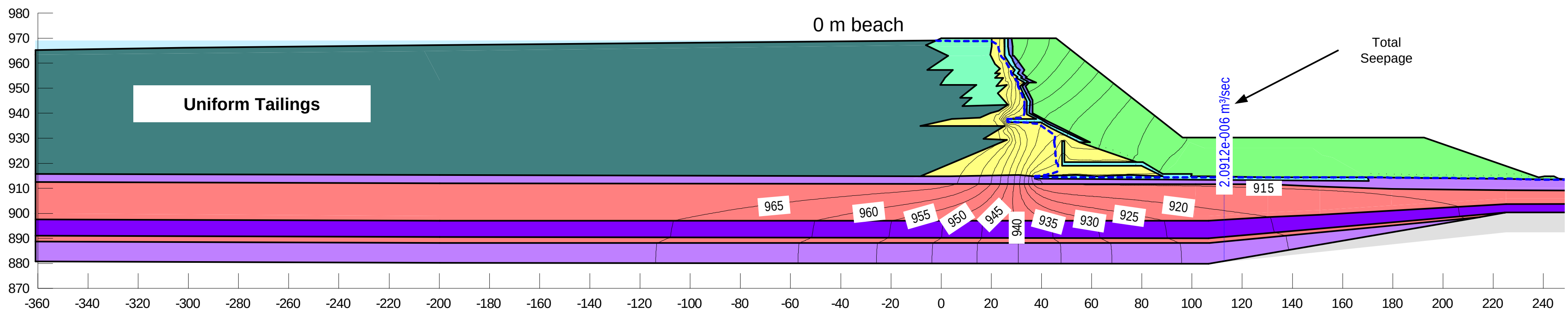
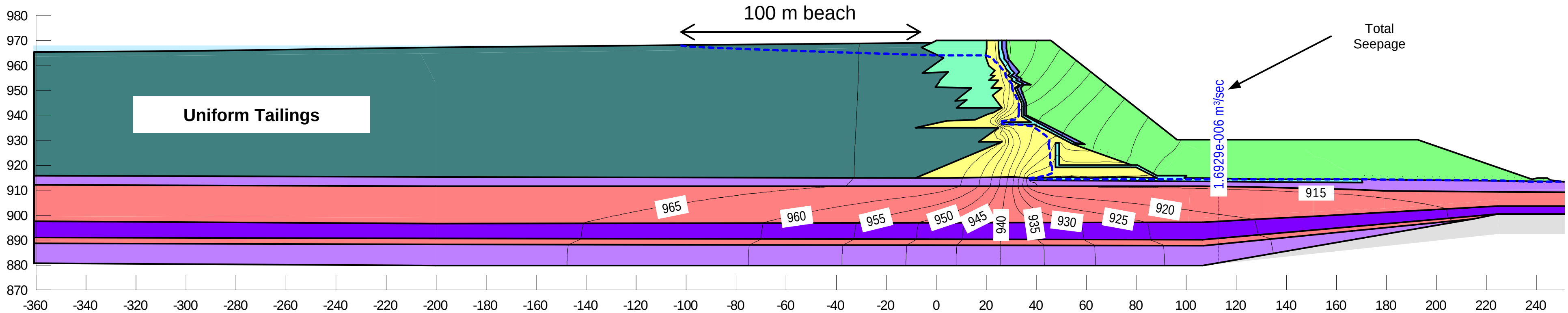


0 m Beach



100 m Beach

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	$1x10^{-8}$
Glaciolacustrine Unit (GLU)	$5x10^{-10}$
Rockfill, Filter, Transition; Upstream Drain	$1x10^{-2}$
Tailings	$1x10^{-6}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 2+240
2. Contours show elevation head, 5 m contour interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
0 AND 100 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS REV.0
CADD	CTM	27OCT15	**FIGURE - E10**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

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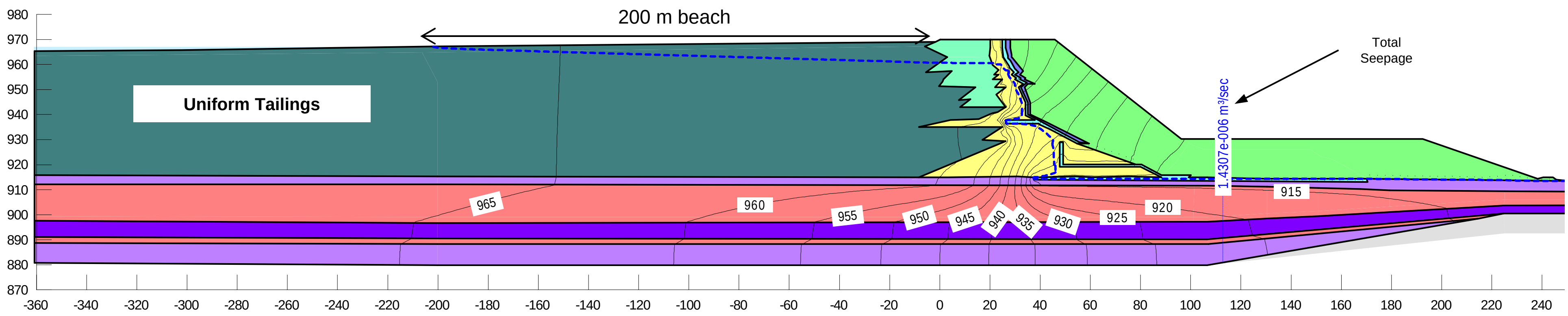
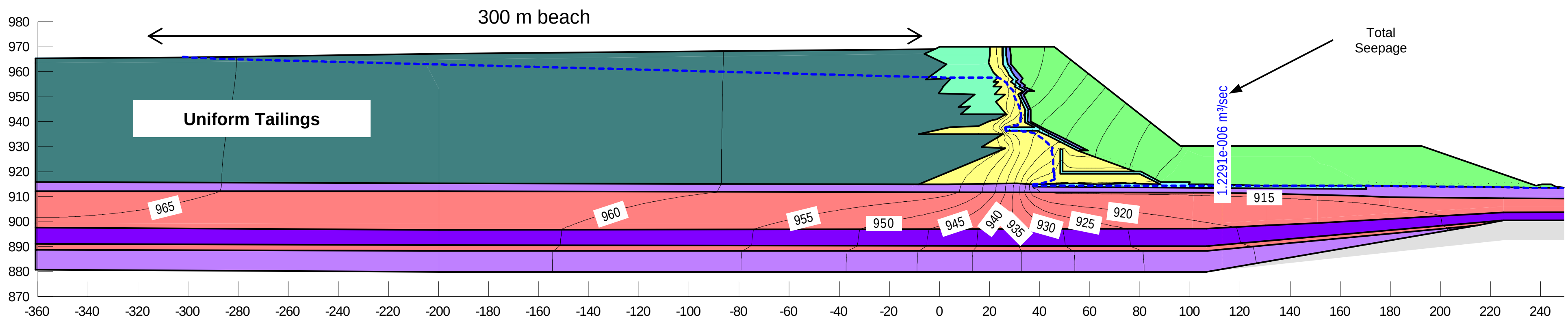


200 m Beach



300 m Beach

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	$1x10^{-8}$
Glaciolacustrine Unit (GLU)	$5x10^{-10}$
Rockfill, Filter, Transition; Upstream Drain	$1x10^{-2}$
Tailings	$1x10^{-6}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 2+240
2. Contours show elevation head, 5 m contour interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
200 AND 300 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	27OCT15	SCALE NTS	REV.0
CADD	CTM	27OCT15	**FIGURE - E11**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

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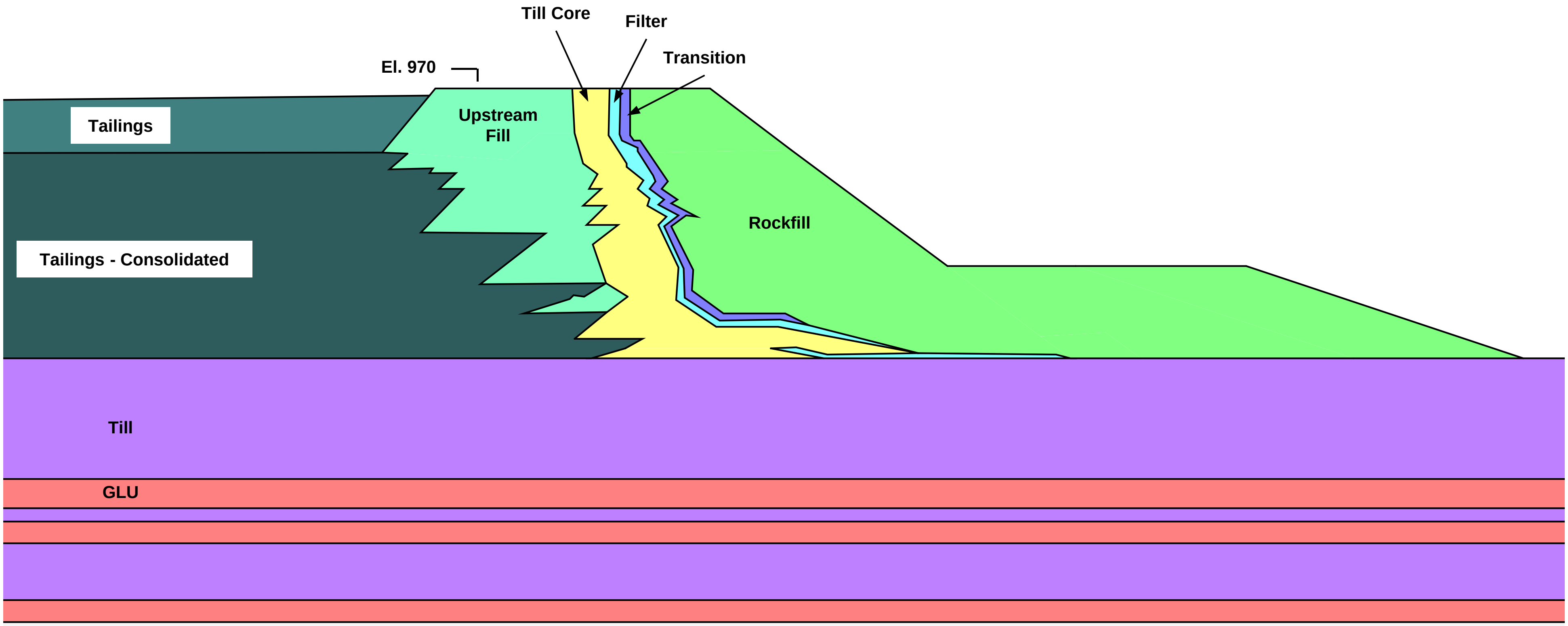

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	1×10^{-8}
Glaciolacustrine Unit (GLU)	5×10^{-10}
Rockfill, Filter, Transition; Upstream Drain	1×10^{-2}
Tailings	1×10^{-6}
Tailings - Consolidated	1×10^{-8}
Upstream Fill	1×10^{-5}

Notes:
1. Section at Stn. 3+950

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
PERIMETER EMBANKMENT
SECTION CONFIGURATION

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS REV.0
CADD	CTM	27OCT15	FIGURE - E12
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

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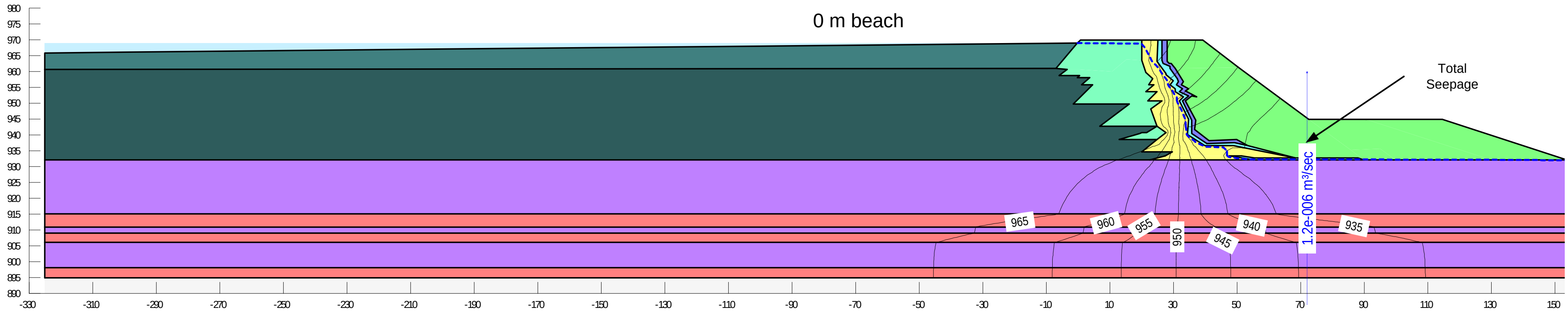
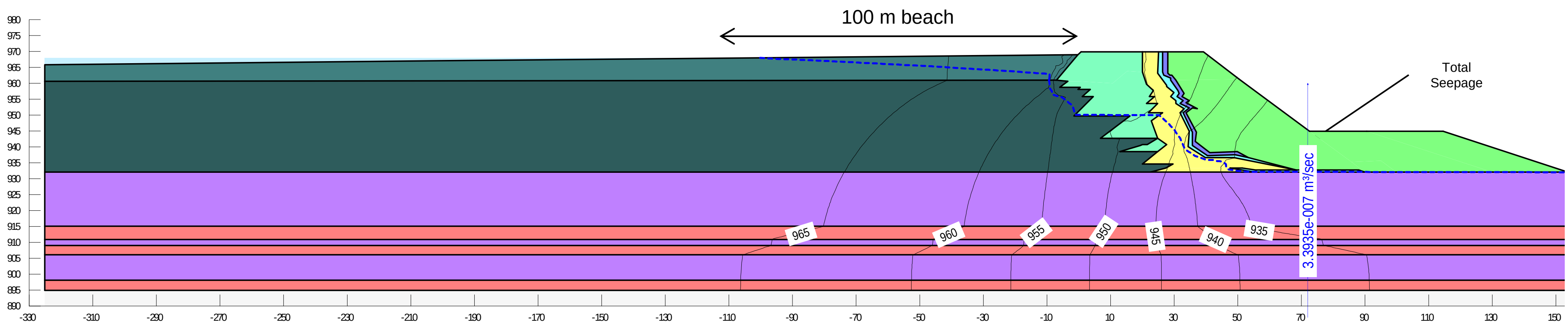


0 m Beach



100 m Beach

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	$1x10^{-8}$
Glaciolacustrine Unit (GLU)	$5x10^{-10}$
Rockfill, Filter, Transition; Upstream Drain	$1x10^{-2}$
Tailings	$1x10^{-6}$
Tailings - Consolidated	$1x10^{-8}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 3+950
2. Contours show elevation head, 5 m contour interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
PERIMETER EMBANKMENT
0 AND 100 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	27OCT15	SCALE NTS	REV.0
CADD	CTM	27OCT15	**FIGURE - E13**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

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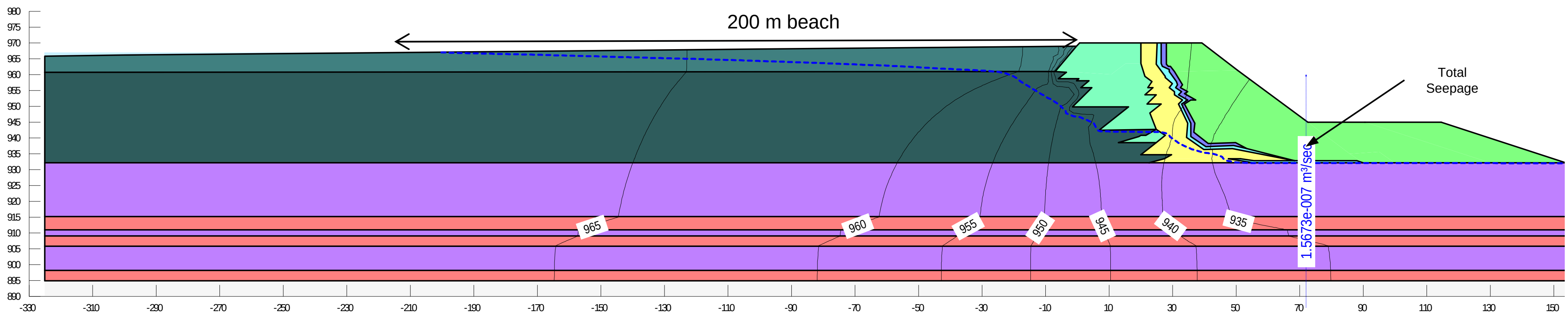
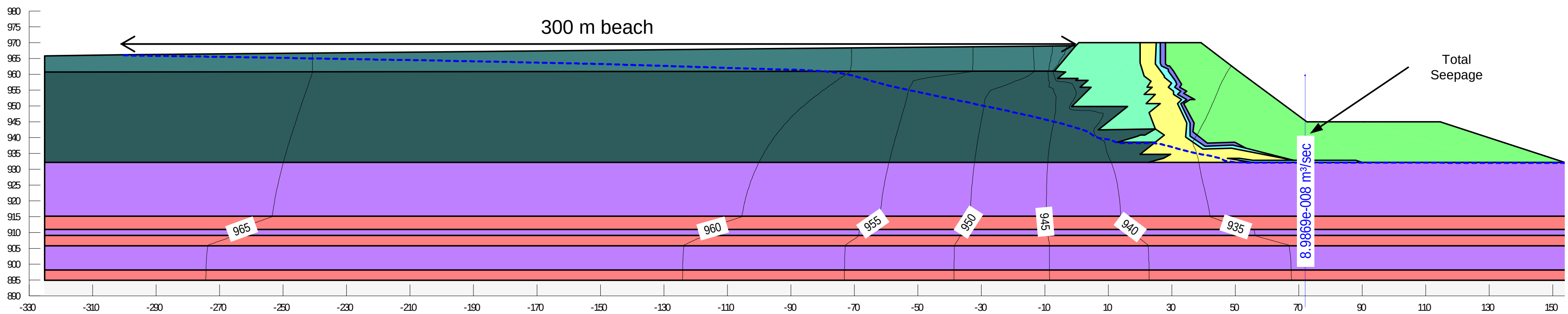


200 m Beach



300 m Beach

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	$1x10^{-8}$
Glaciolacustrine Unit (GLU)	$5x10^{-10}$
Rockfill, Filter, Transition; Upstream Drain	$1x10^{-2}$
Tailings	$1x10^{-6}$
Tailings - Consolidated	$1x10^{-8}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 3+950
2. Contours show elevation head, 5 m contour interval.

PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE SEEPAGE ANALYSIS RESULTS
PERIMETER EMBANKMENT
200 AND 300 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	27OCT15	SCALE NTS	REV.0
CADD	CTM	27OCT15	FIGURE - E14	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

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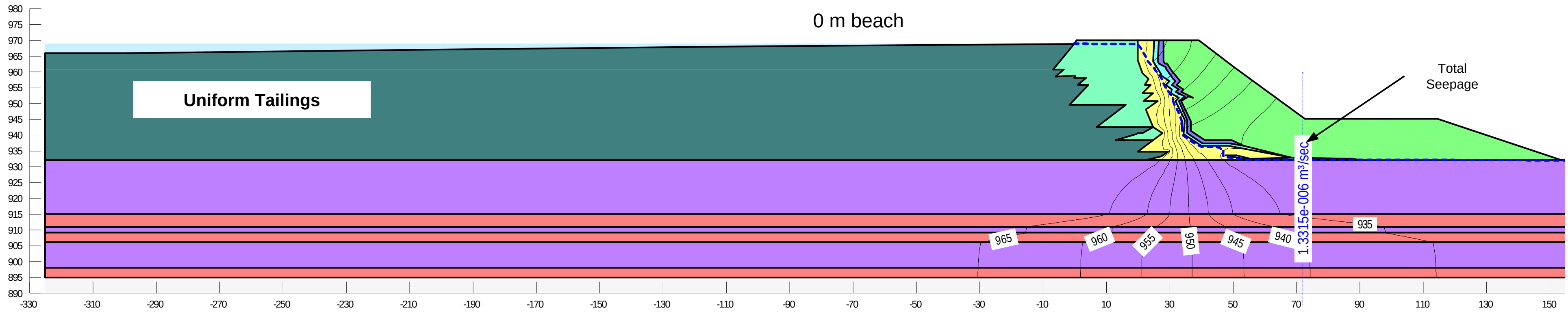
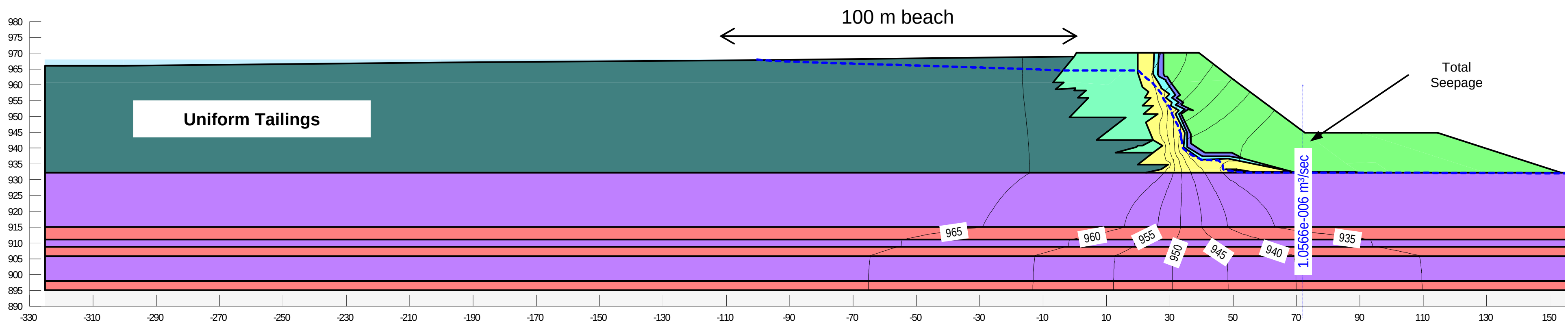


0 m Beach



100 m Beach

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	1×10^{-8}
Glaciolacustrine Unit (GLU)	5×10^{-10}
Rockfill, Filter, Transition; Upstream Drain	1×10^{-2}
Tailings	1×10^{-6}
Upstream Fill	1×10^{-5}

Notes:

1. Section at Stn. 3+950
2. Contours show elevation head, 5 m contour interval.

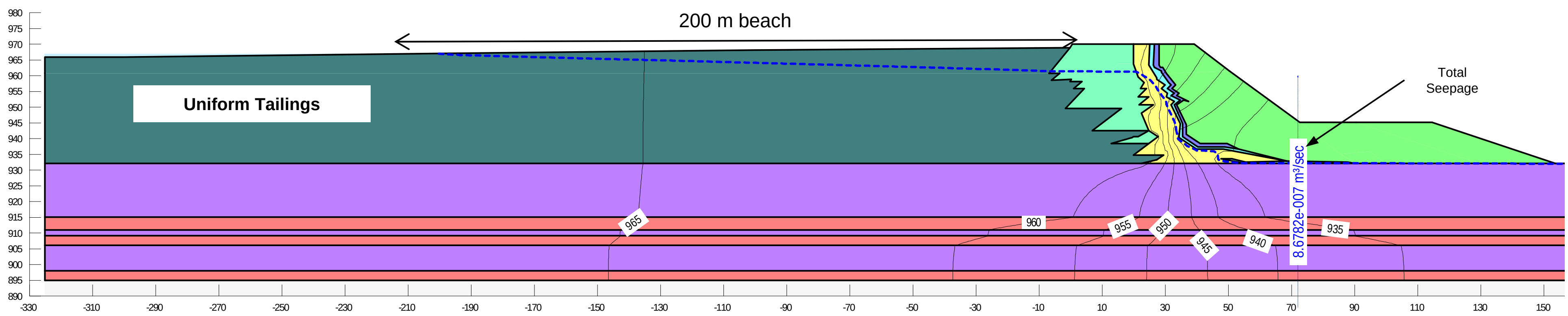
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
PERIMETER EMBANKMENT
0 AND 100 m SUB-AERIAL BEACH

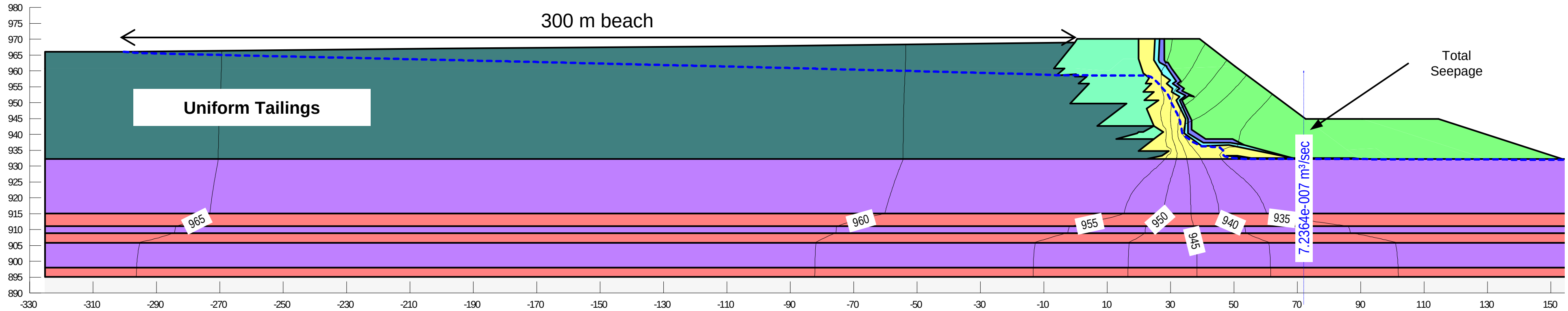
Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS REV.0
CADD	CTM	27OCT15	**FIGURE - E15**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Freshet EL 970\Design Seepage



200 m Beach



300 m Beach

Material	Saturated Hydraulic Conductivity, (m/s)
Foundation Till, Glaciofluvial, Till core	1×10^{-8}
Glaciolacustrine Unit (GLU)	5×10^{-10}
Rockfill, Filter, Transition; Upstream Drain	1×10^{-2}
Tailings	1×10^{-6}
Upstream Fill	1×10^{-5}

Notes:
1. Section at Stn. 3+950
2. Contours show elevation head, 5 m contour interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
PERIMETER EMBANKMENT
200 AND 300 m SUB-AERIAL BEACH

Golder Associates

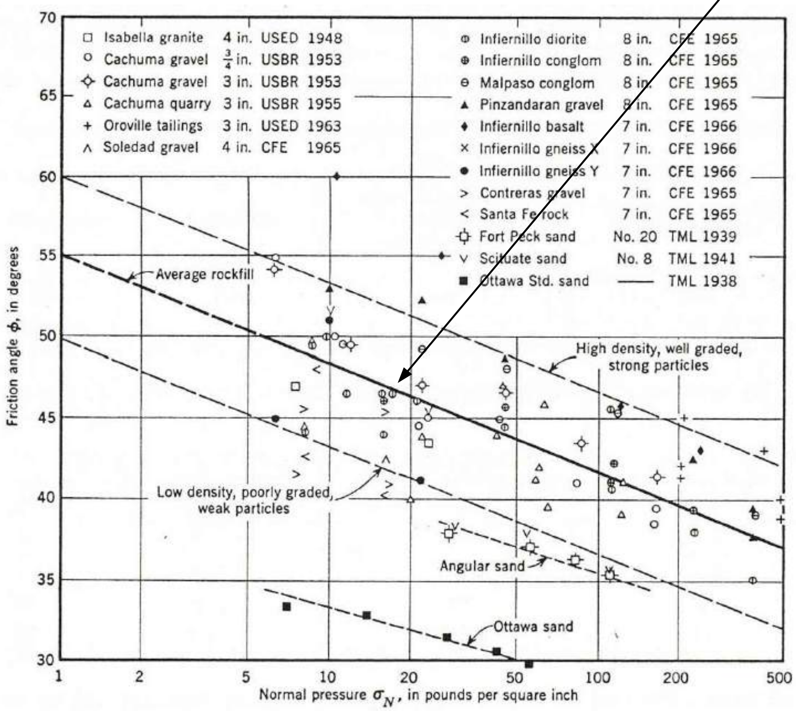
PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	27OCT15	SCALE NTS REV.0
CADD	CTM	27OCT15	**FIGURE - E16**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

APPENDIX F

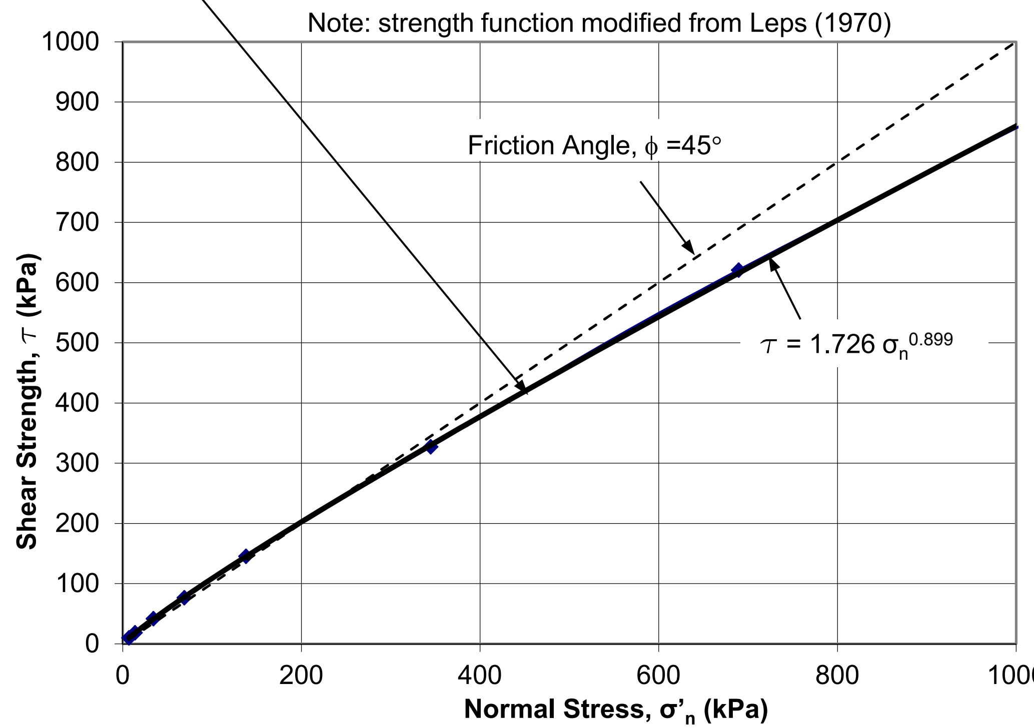
Stability Analyses

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation

Rockfill Strength Function for Stability Analyses

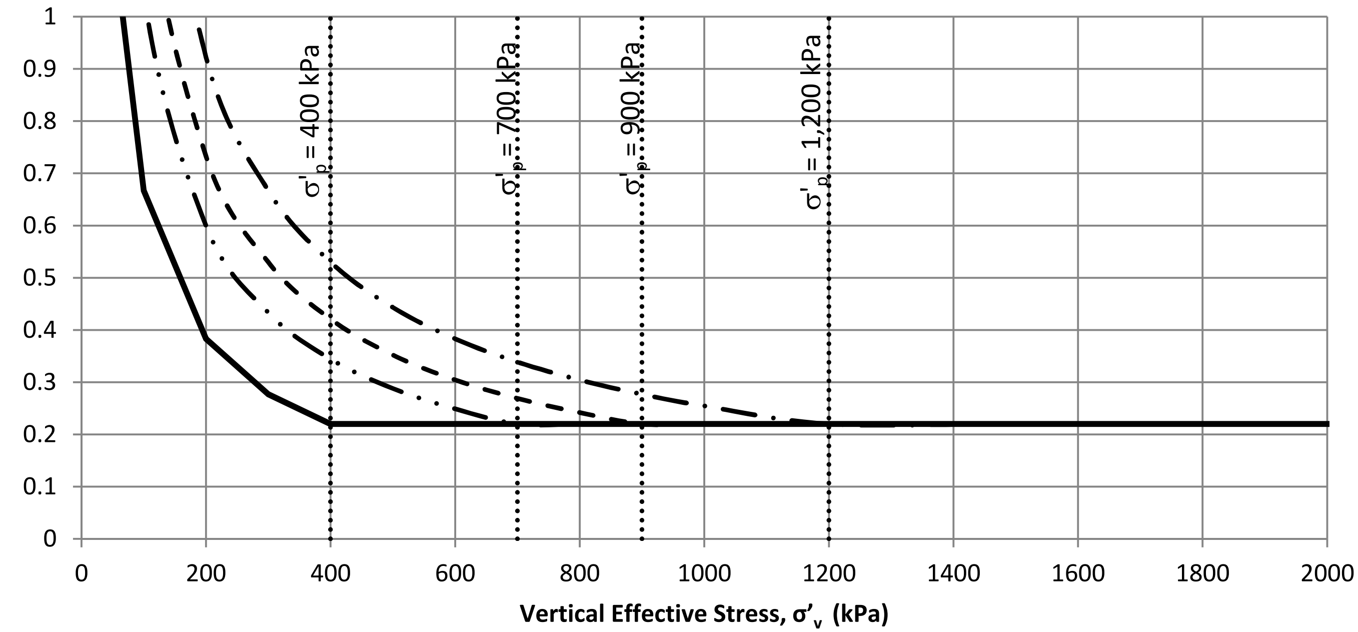


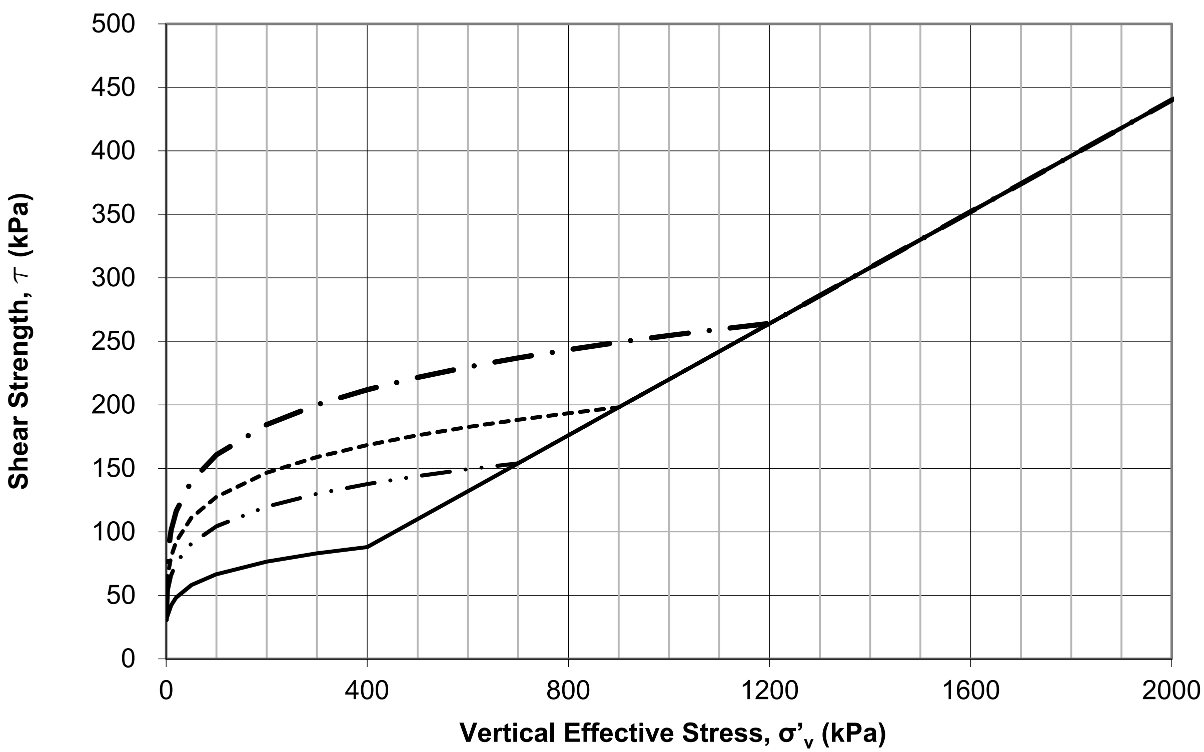
Graph from : Leps, T.M. 1970. *Review of Shearing Strength of Rock Fill*.
Proceedings of the ASCE, Journal of the Soil Mechanics and Foundations Division.
Vol. 96, SM4:1159-1170, July 1970.



PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN			
TITLE	STABILITY ANALYSIS ROCKFILL STRENGTH FUNCTION			
Golder Associates	PROJECT No. 1413803			PHASE No. 3000
	DESIGN	CTM	22OCT15	SCALE NTS REV.0
	CADD	CTM	22OCT15	FIGURE - F1
	CHECK	GJ	30OCT15	
	REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





LEGEND

$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$, $\sigma'_p = 400$ kPa

$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$, $\sigma'_p = 700$ kPa

$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$, $\sigma'_p = 900$ kPa

$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$, $\sigma'_p = 1{,}200$ kPa

σ'_p = preconsolidation stress

PROJECT

MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

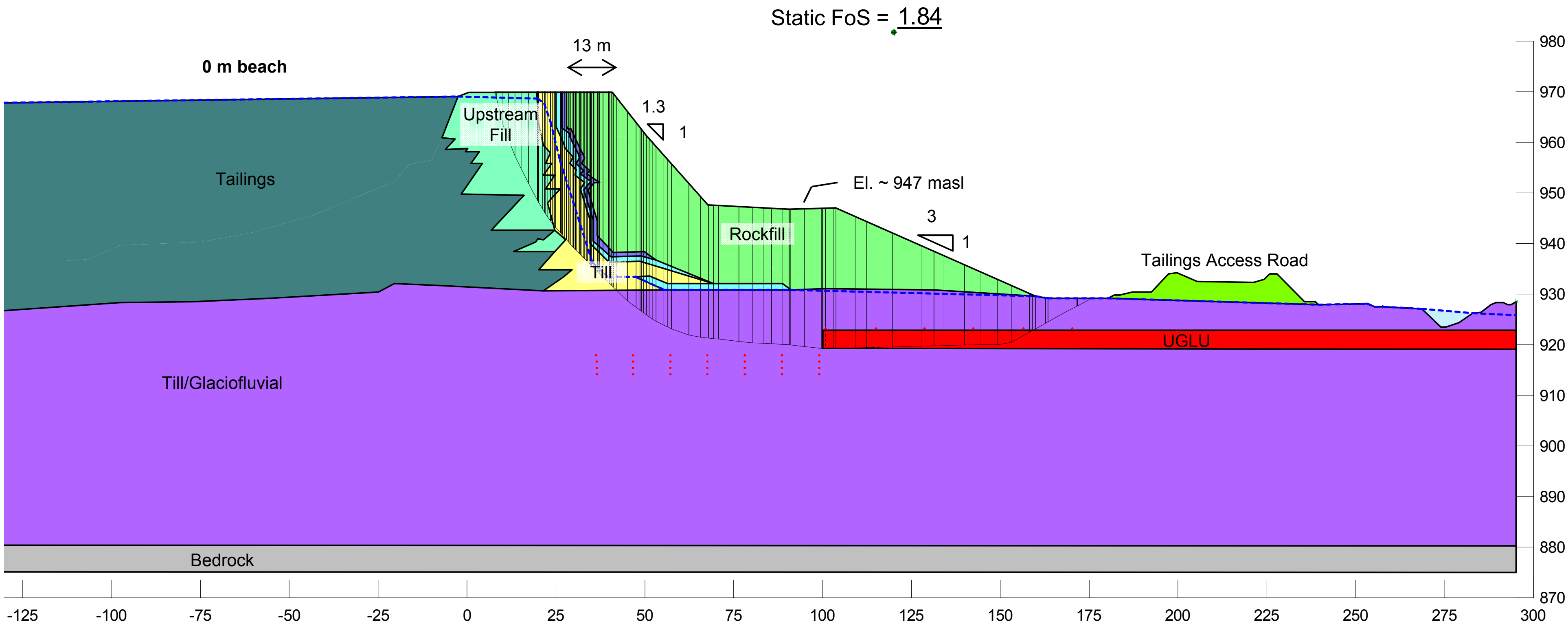
TITLE

STABILITY ANALYSIS
UNDRAINED STRENGTH FUNCTION
GLACIOLACUSTRINE UNITS

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F2**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 400$

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

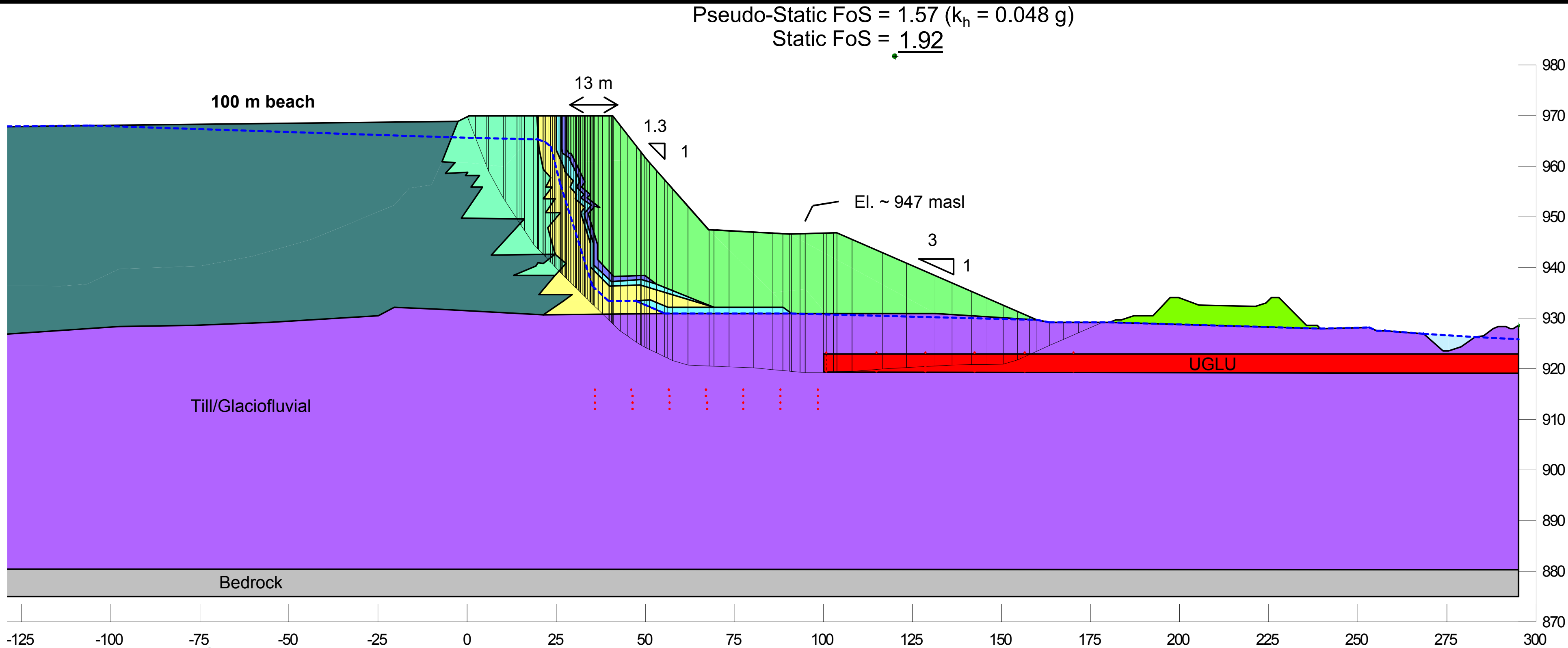
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+005**

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F3**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400

φ'= friction angle; τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

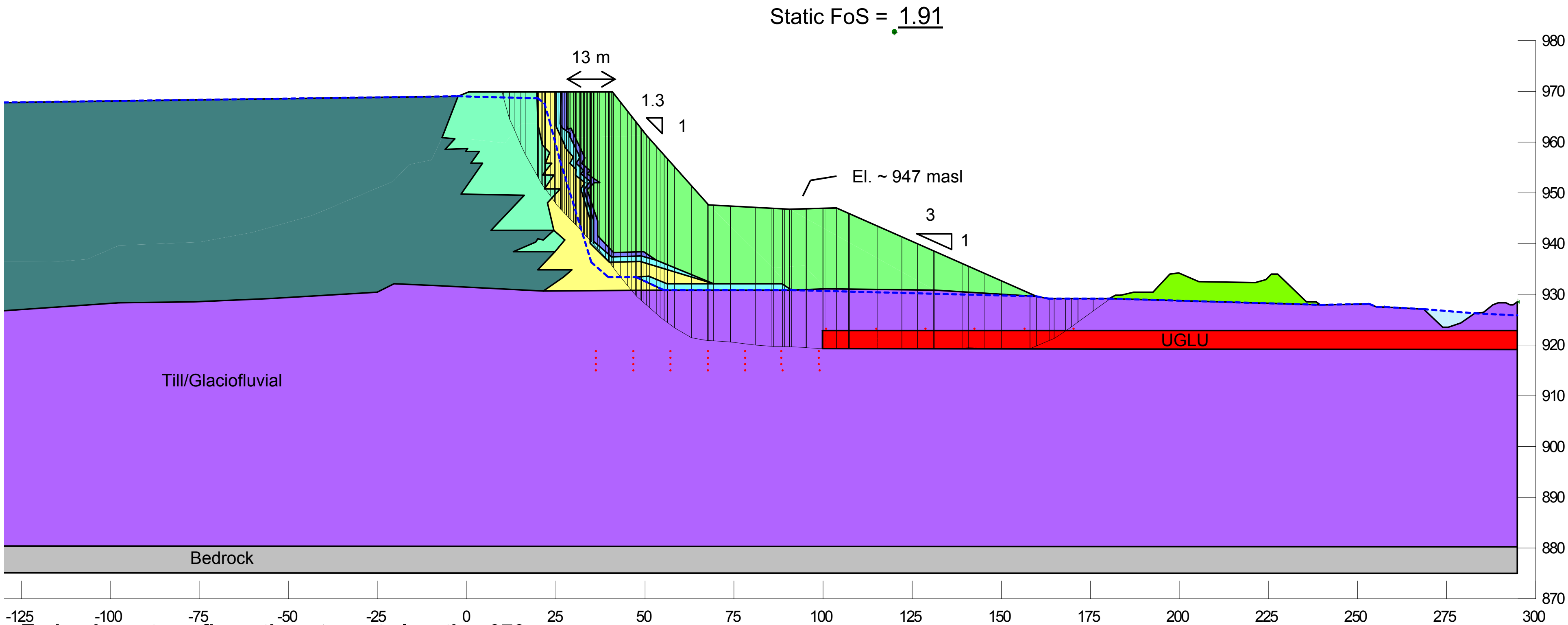
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+005**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F4**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
UGLU	18	φ'=19°, Cohesion = 0 kPa

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

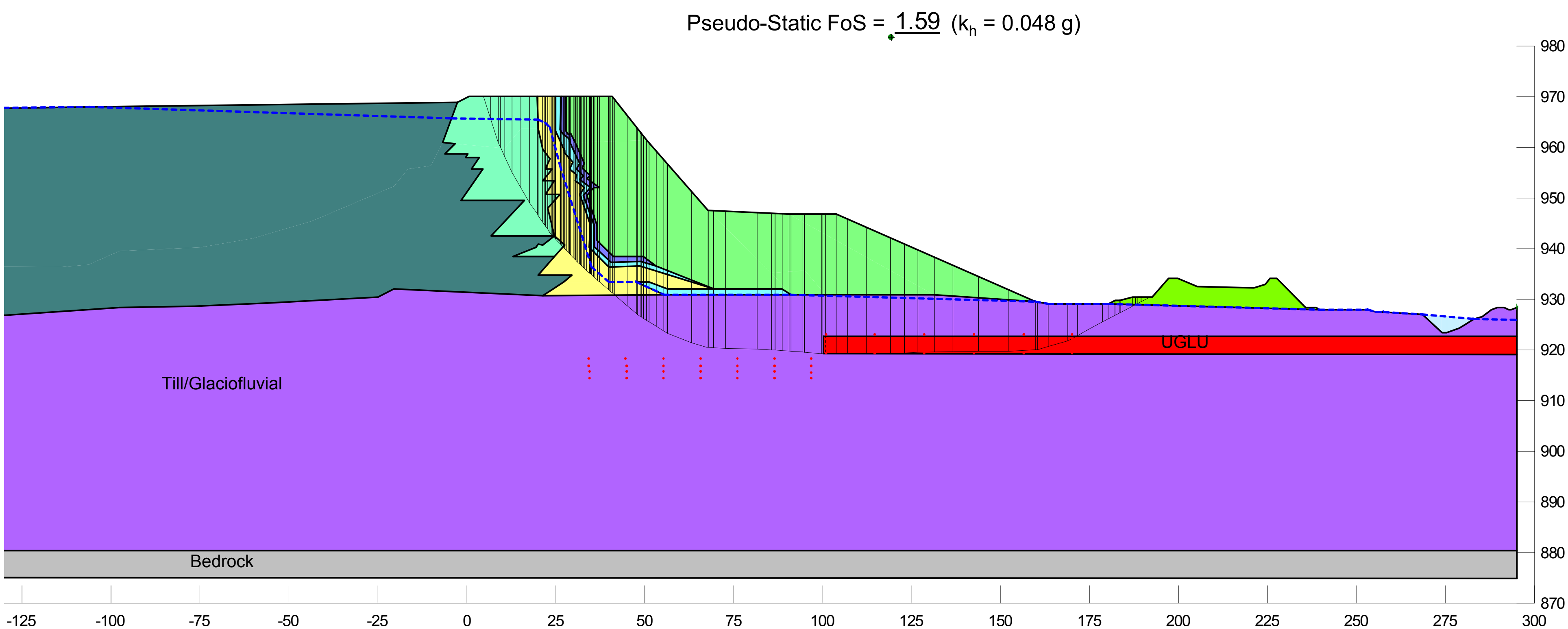
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+005

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F5**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
UGLU	18	φ'=15.2°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

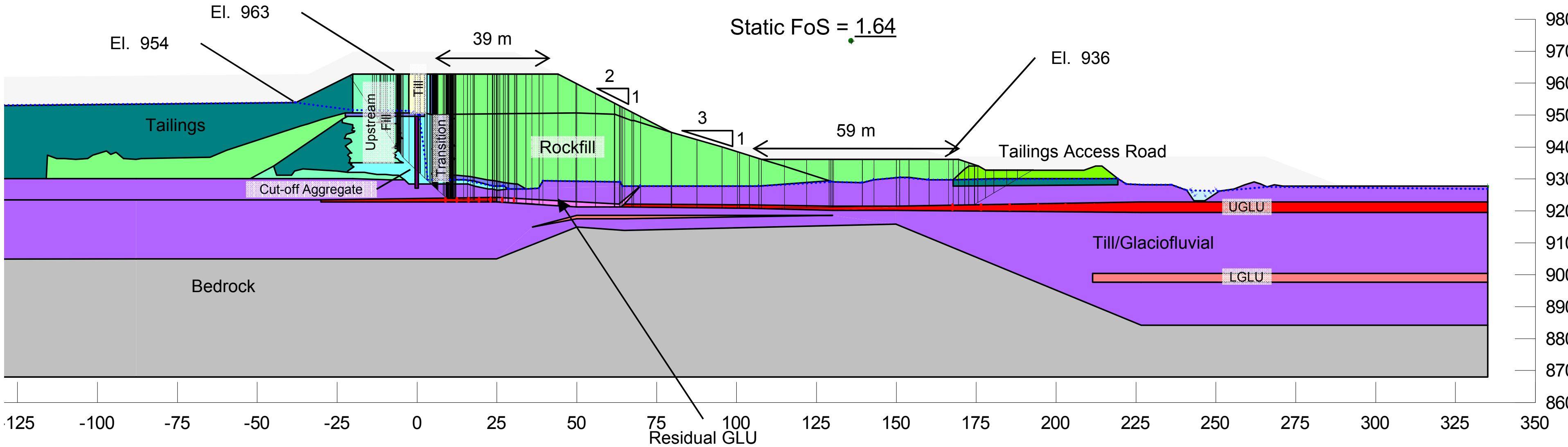
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+005**

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F6**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 954 m
- Tailings surface elevation 954 m

Foundation Material Properties

Material	Unit Weight (kN/m³)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	Impenetrable(2)
UGLU	18	0.46	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 400$
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

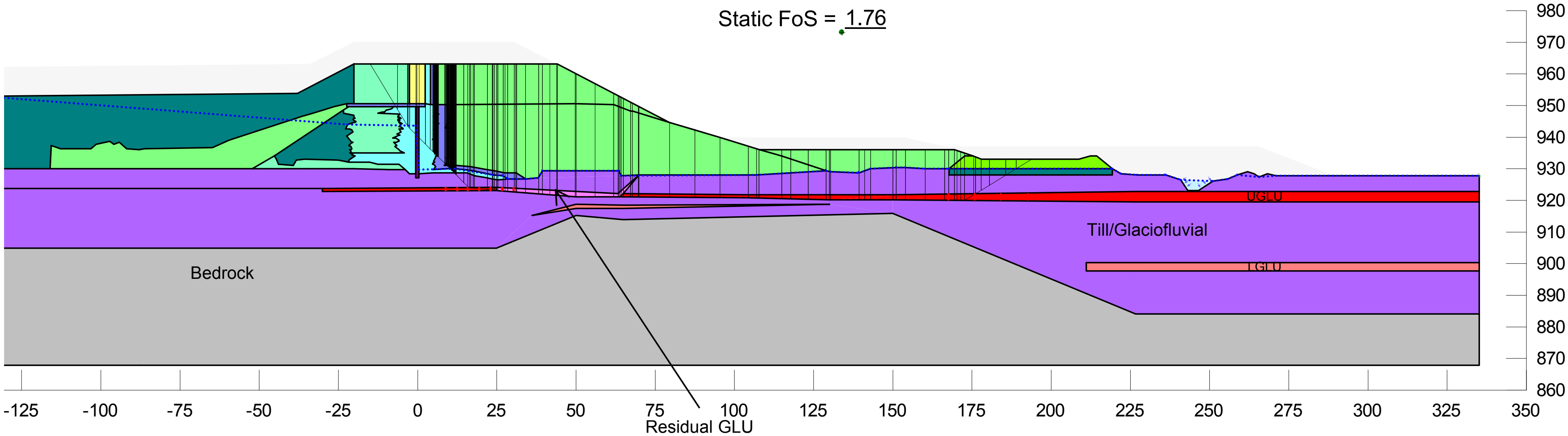
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
TOTAL STRESS STABILITY ANALYSIS
CORNER 1 PERIMETER EMBANKMENT
STN.20+180 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F7**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 953 m
- Tailings surface elevation 954 m

Foundation Material Properties

Material	Unit Weight (kN/m³)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	Impenetrable(2)
UGLU	18	0.46	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 400$
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

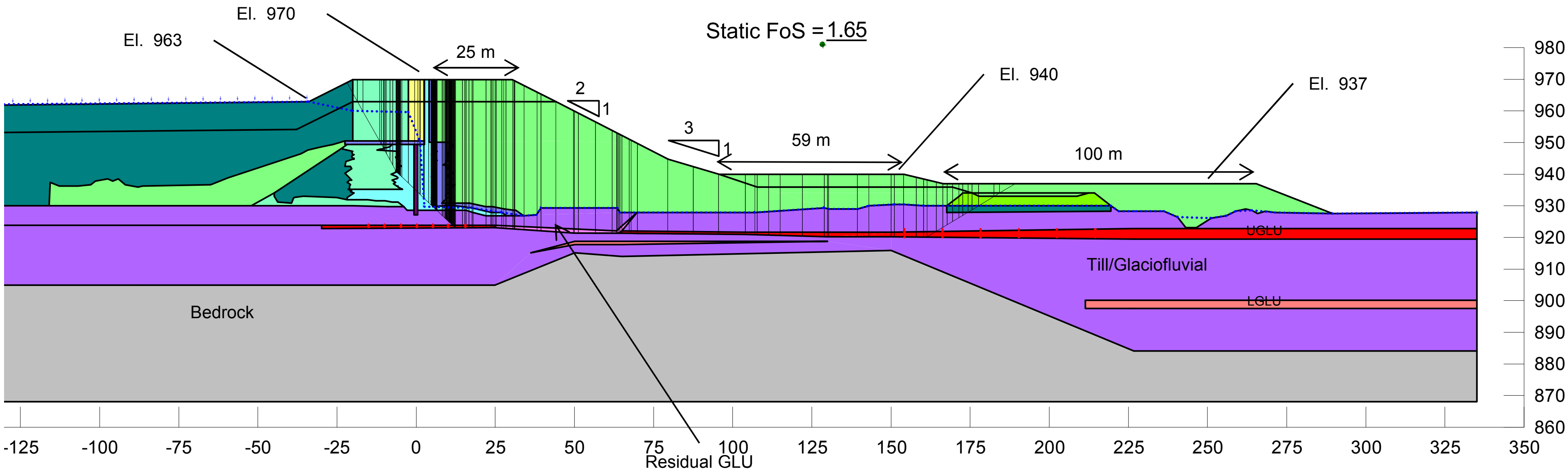
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F8**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 963 m
- Tailings surface elevation 963m

Foundation Material Properties			
Material	Unit Weight (kN/m³)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	Impenetrable(2)
UGLU	18	0.46	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

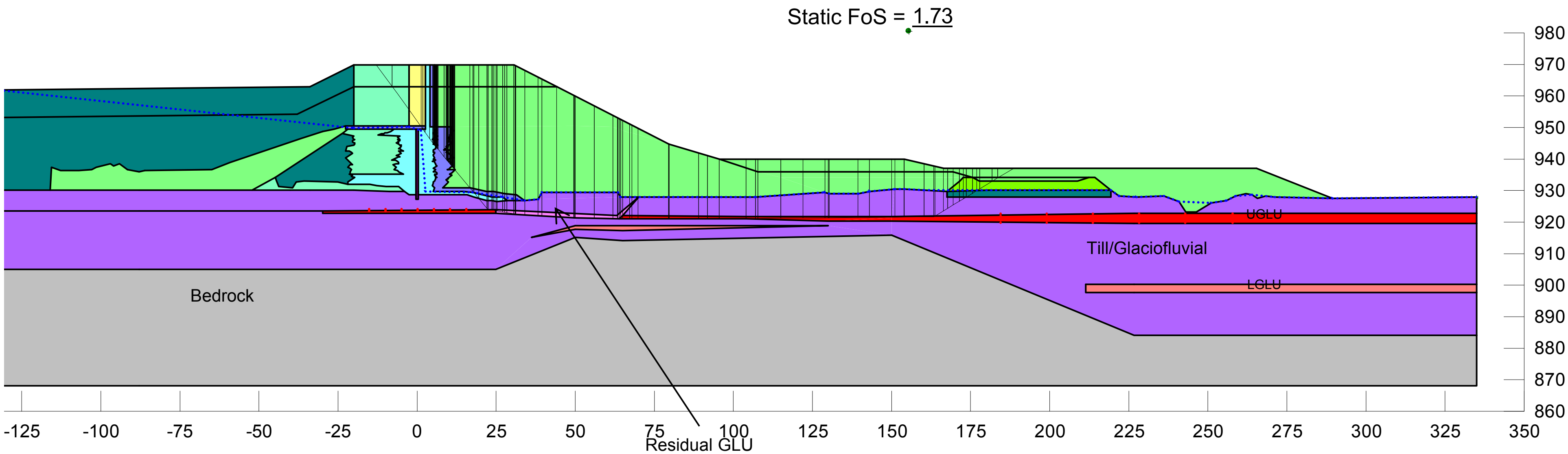
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F9**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 962 m
- Tailings surface elevation 963 m

Foundation Material Properties

Material	**Unit Weight (kN/m^3)**	**B-bar**	**Shear Strength**
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	Impenetrable(2)
UGLU	18	0.46	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 400$
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

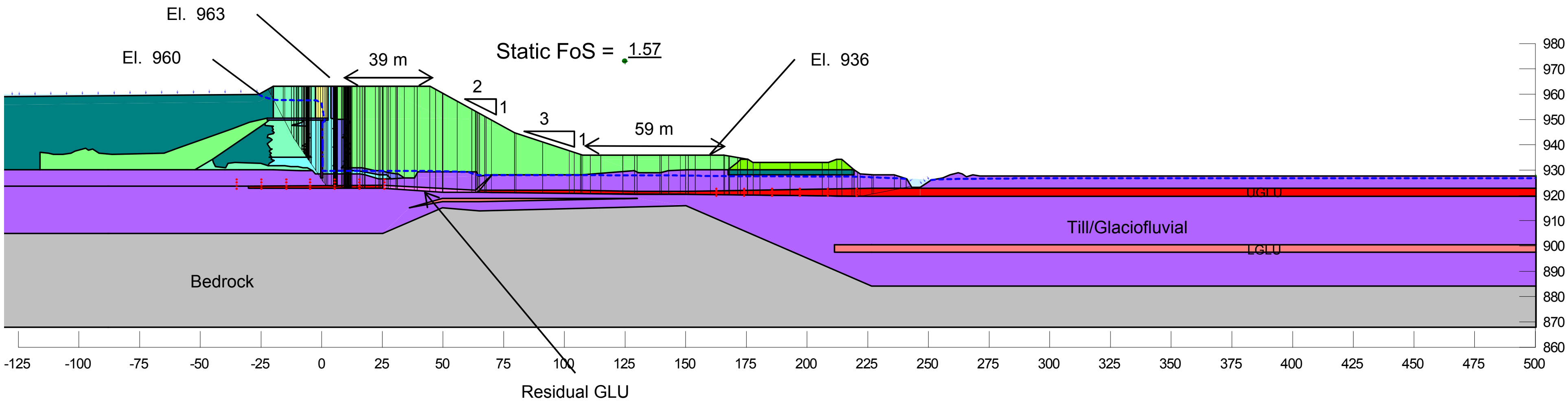
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+180 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F10**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 960 m
- Tailings surface elevation 960 m

Foundation Material Properties

Material	Unit Weight (kN/m^3)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	τ = 0.22 σ_v' $OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

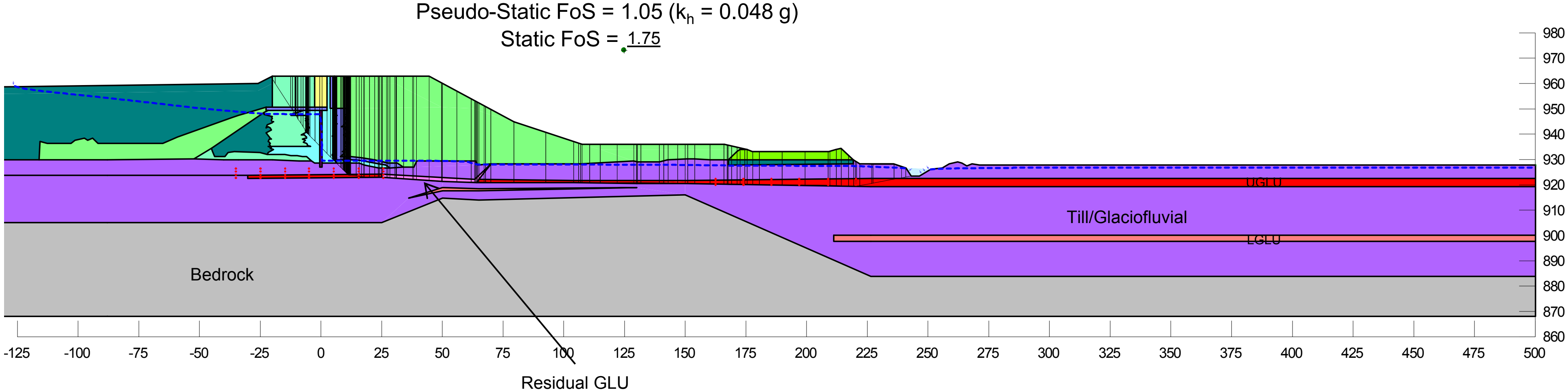
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS — REV.0
CADD	CTM	22OCT15	**FIGURE - F11**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 959 m
- Tailings surface elevation 960 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	τ = 0.22 σ_v' OCR$^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

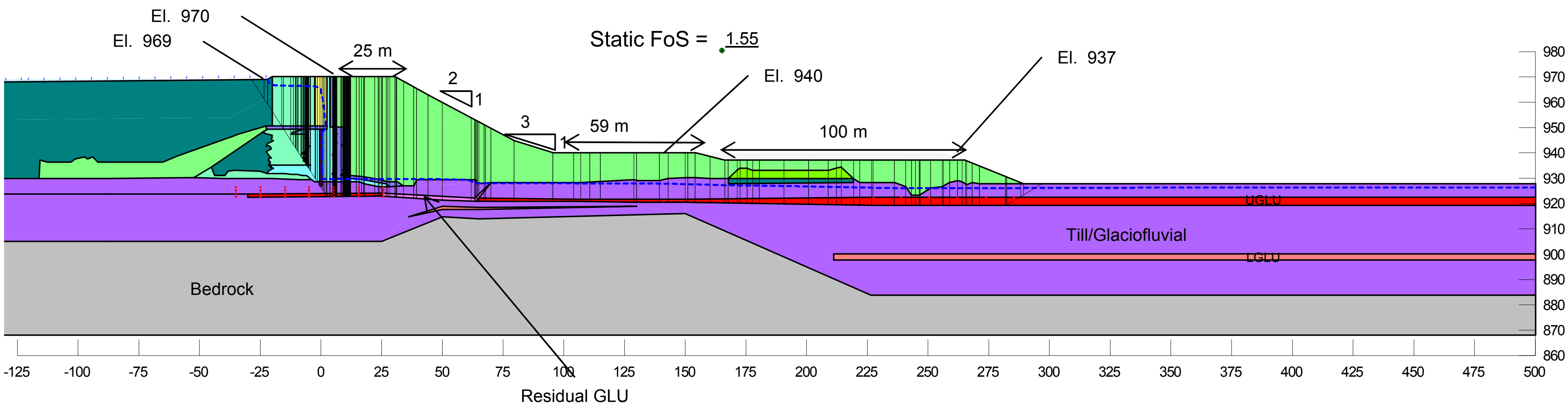
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+180 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS / REV.0
CADD	CTM	22OCT15	**FIGURE - F12**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 400$
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

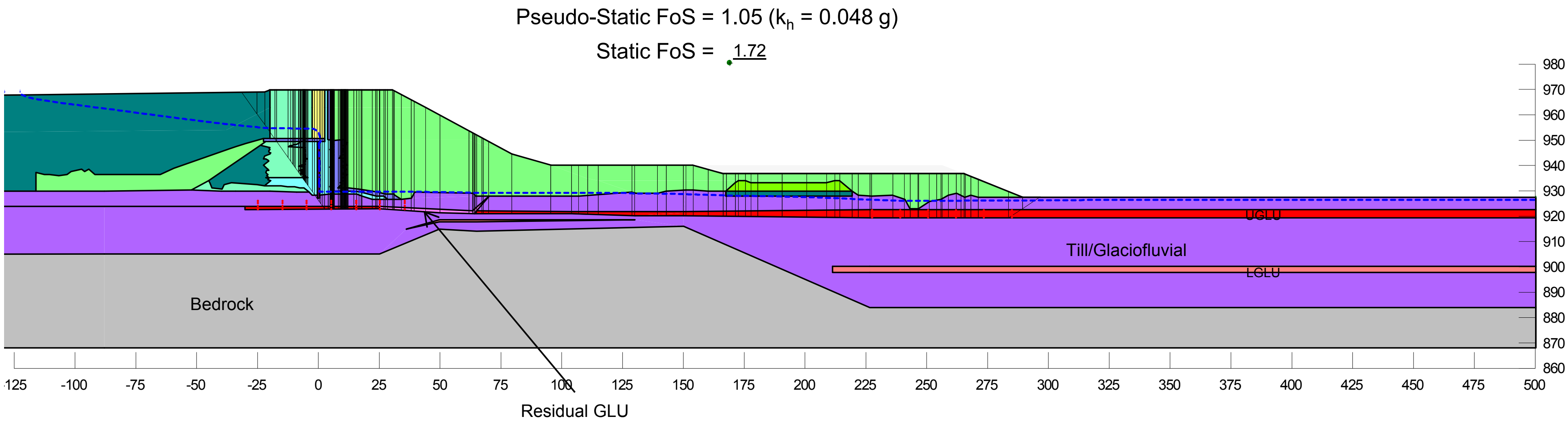
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F13**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m^3)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	Τ = 0.22 σ_v' OCR$^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

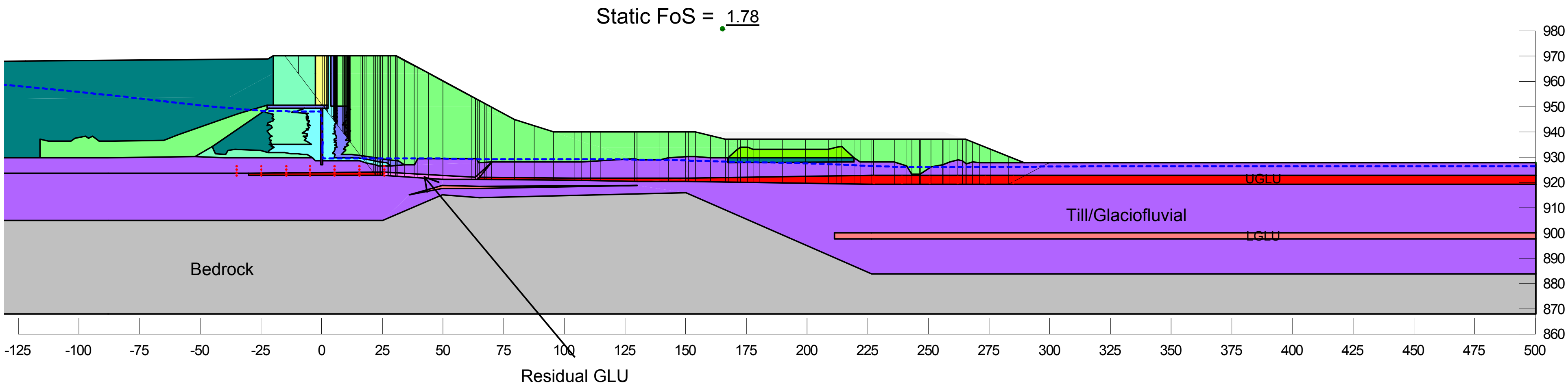
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F14**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 200 m sub-aerial beach; pond elevation 967 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	τ = 0.22 σ_v' OCR$^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

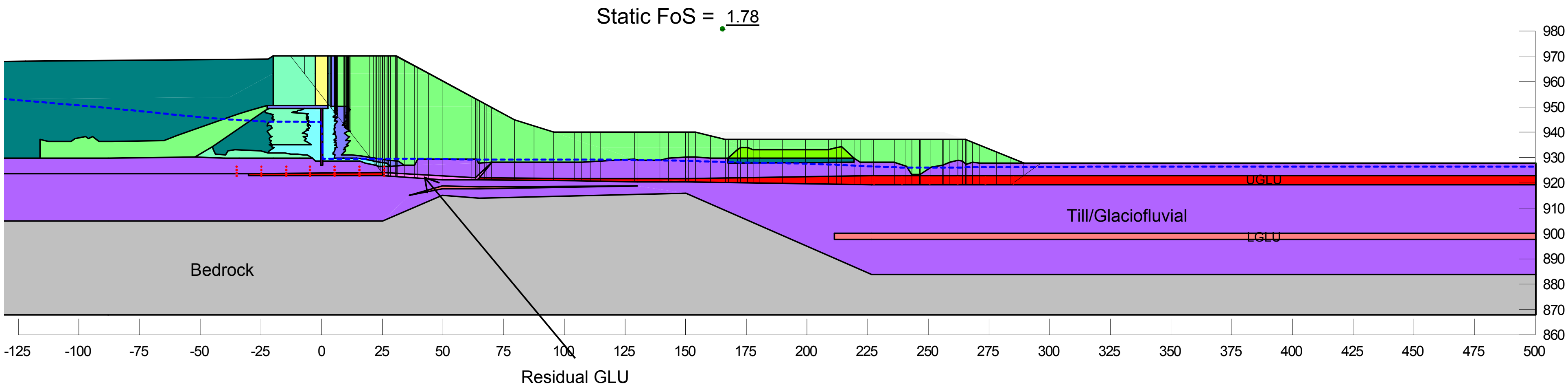
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+180 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F15**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 300 m sub-aerial beach; pond elevation 966 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m^3)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable[(2)]
UGLU	18	$\tau = 0.22\,\sigma_v'\,OCR^{0.8}$ where $\sigma_p' = 400$
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; Ƭ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

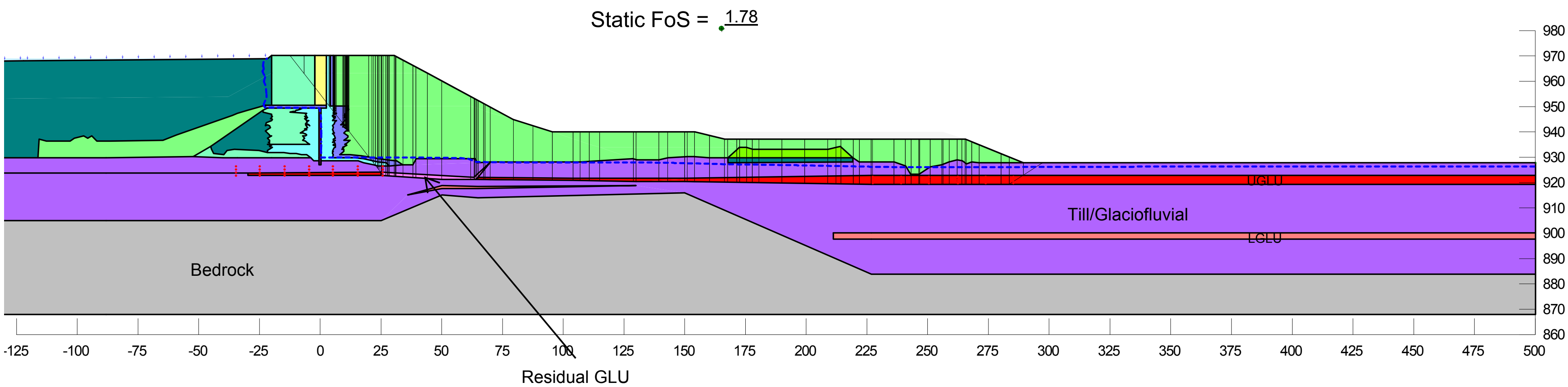
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
TOTAL STRESS STABILITY ANALYSIS
CORNER 1 PERIMETER EMBANKMENT
STN.20+180 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F16**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain functioning
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m^3)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 400$
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

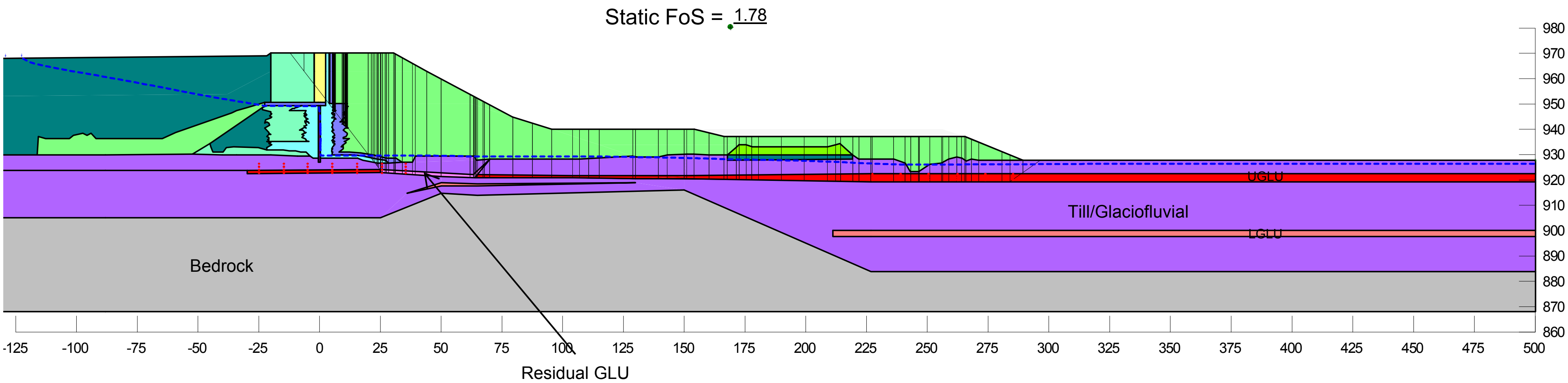
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F17**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain functioning
- 100 m sub-aerial beach: pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	τ = 0.22 σ_v' OCR$^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

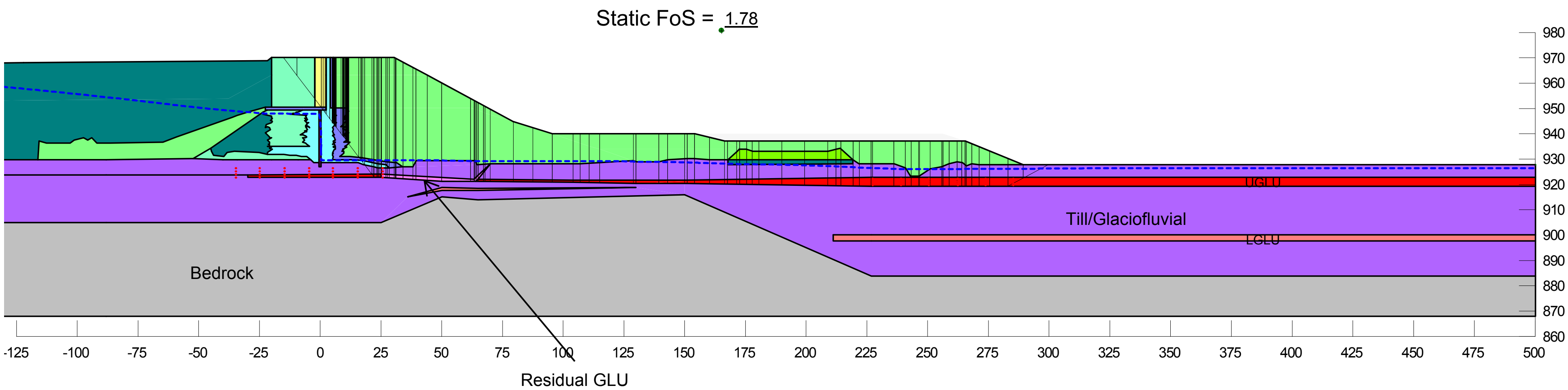
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F18**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain functioning
- 200 m sub-aerial beach; pond elevation 967 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

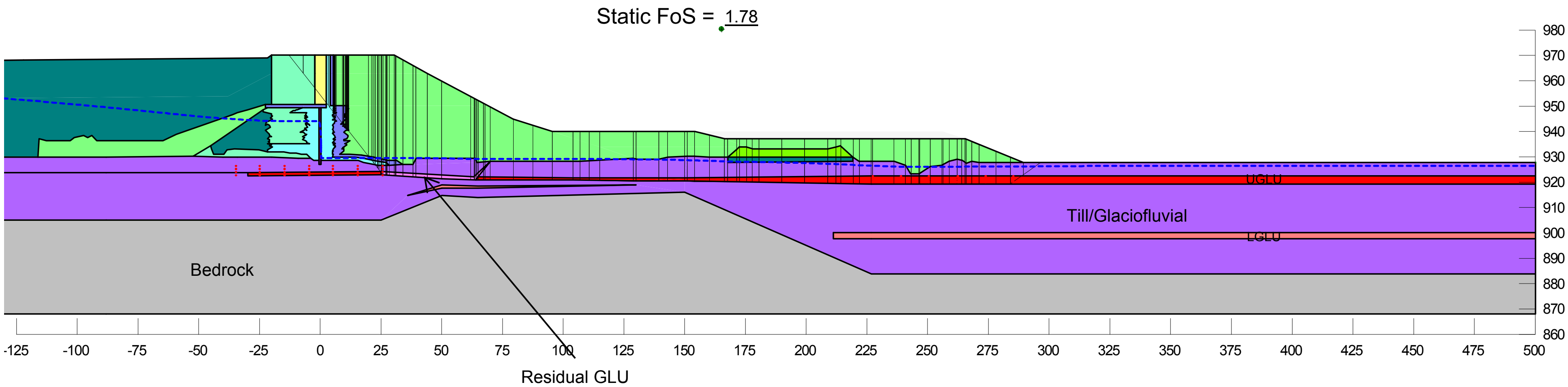
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F19**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain functioning
- 300 m sub-aerial beach; pond elevation 966 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

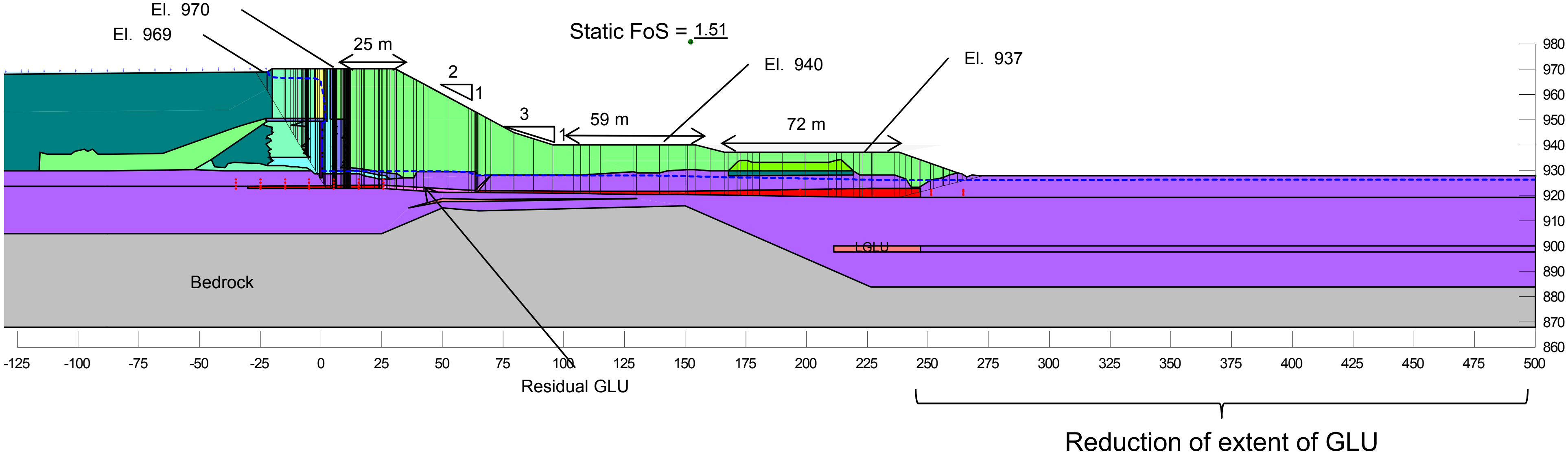
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+180 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F20**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	Impenetrable(2)
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 400$
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

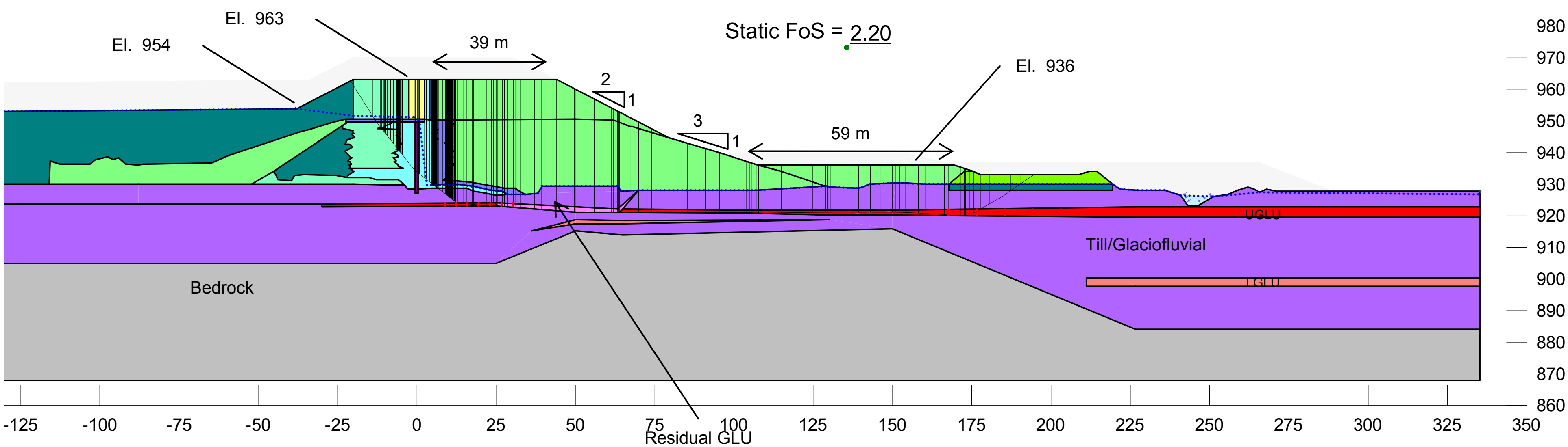
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MINIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	FIGURE - F21
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 954 m
- Tailings surface elevation 954 m

Foundation Material Properties			
Material	**Unit Weight (kN/m³)**	**B-bar**	**Shear Strength**
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	Impenetrable[(2)]
UGLU	18	0.46	φ'=19°, Cohesion = 0 kPa
Residual GLU	18	N/A	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

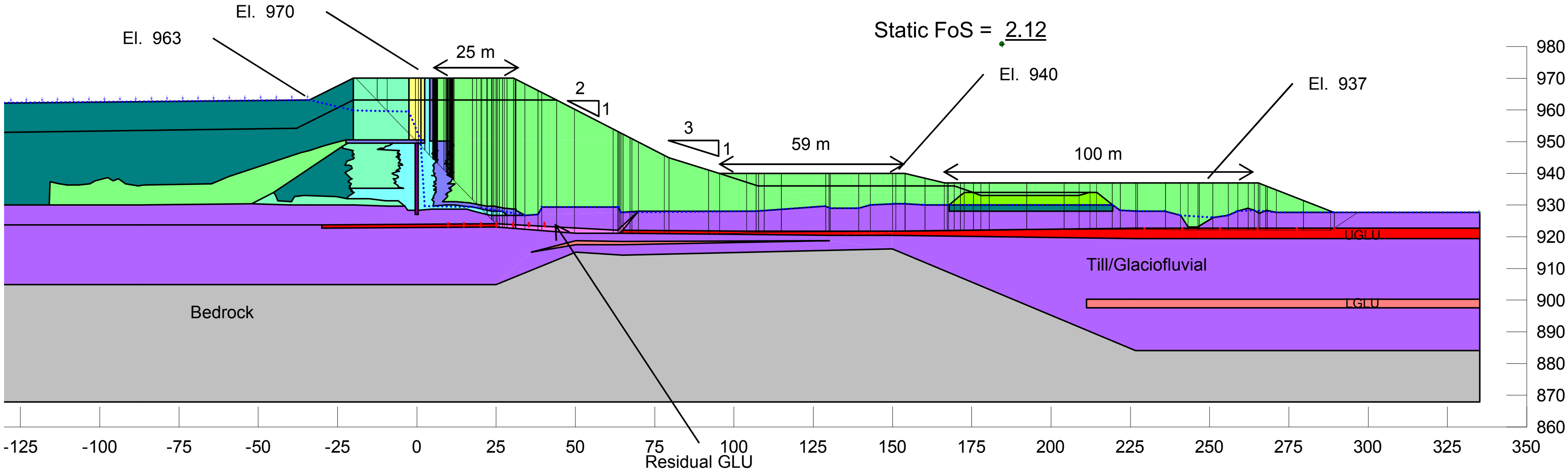
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F22**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 963 m
- Tailings surface elevation 963m

Foundation Material Properties			
Material	**Unit Weight (kN/m³)**	**B-bar**	**Shear Strength**
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	Impenetrable(2)
UGLU	18	0.46	φ'=19°, Cohesion = 0 kPa
Residual GLU	18	N/A	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

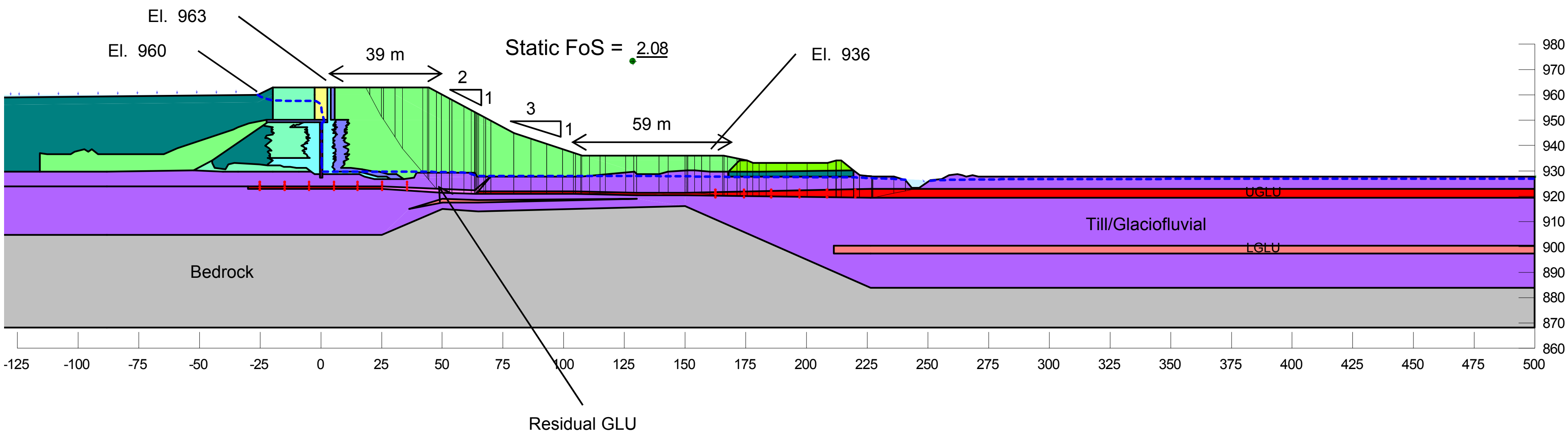
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F23**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 960 m
- Tailings surface elevation 960 m

Foundation Material Properties		
Material	**Unit Weight (kN/m^3)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	Impenetrable(2)
UGLU	18	φ'=19°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

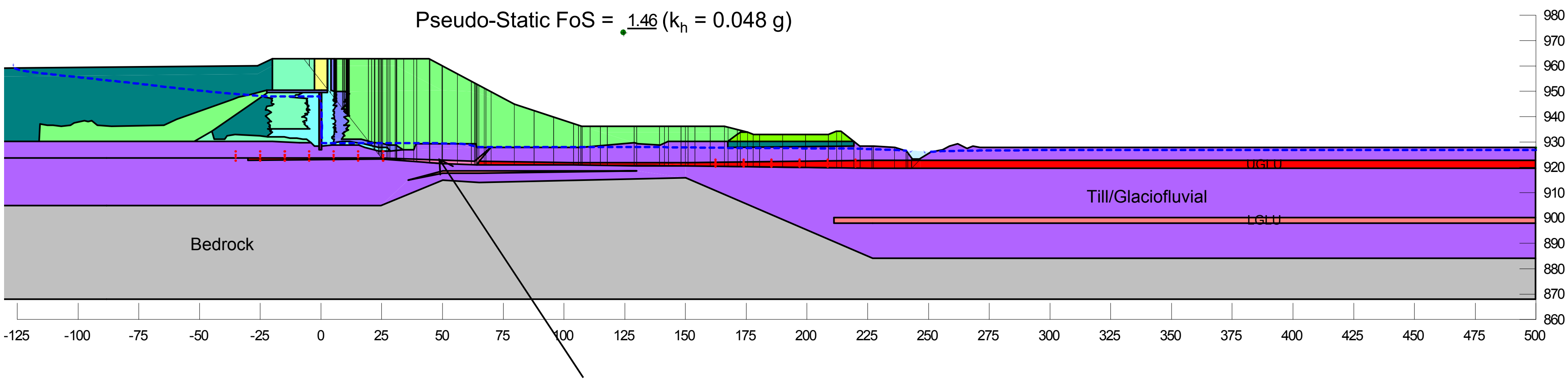
PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE EFFECTIVE STRESS STABILITY ANALYSIS
CORNER 1 PERIMETER EMBANKMENT
STN.20+180 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	FIGURE - F24	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 959 m
- Tailings surface elevation 960 m

Foundation Material Properties		
Material	**Unit Weight (kN/m^3)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	Impenetrable(2)
UGLU	18	φ'=15.2°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

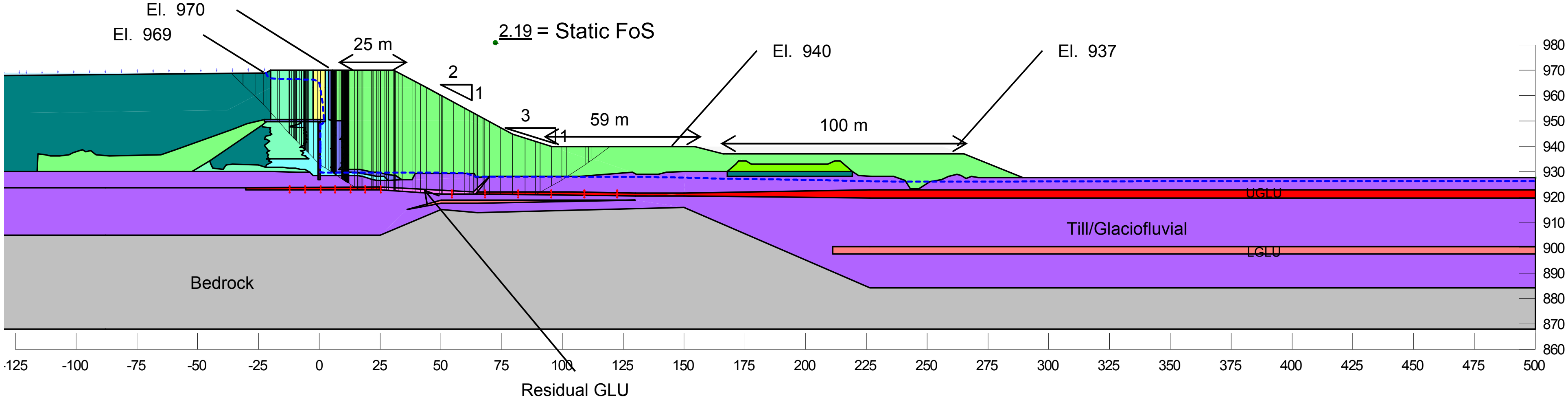
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F25**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



<u>Embankment configuration at crest elevation 970 m – Long Term</u>

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings surface elevation 969 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	Impenetrable(2)
UGLU	18	φ'=19°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+180 – MAXIMUM ASSUMED GLU

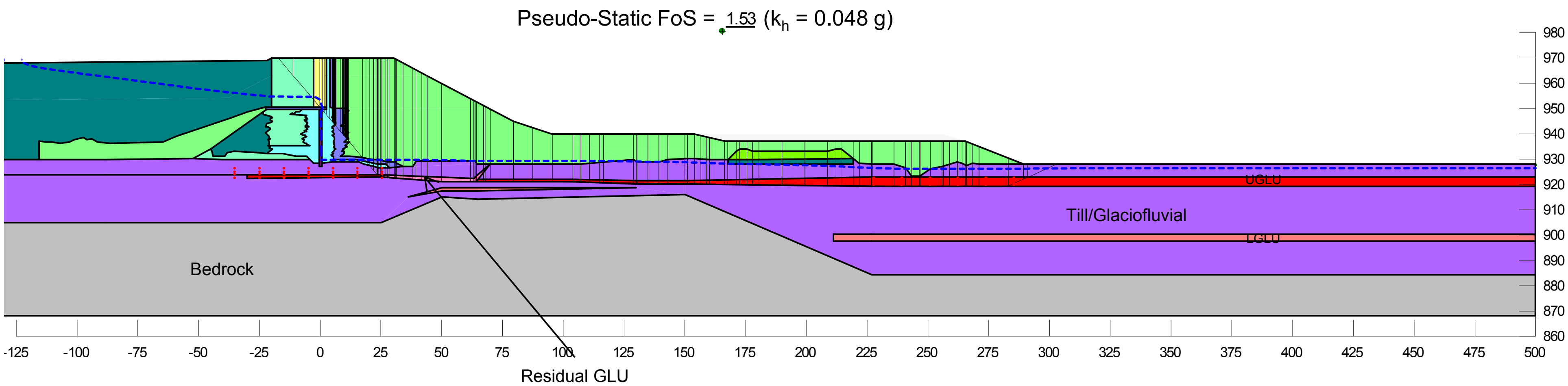
Golder Associates

PROJECT No. 1413803		
DESIGN	CTM	22OCT15
CADD	CTM	22OCT15
CHECK	GJ	30OCT15
REVIEW	TLE	30OCT15

PHASE No. 3000
SCALE NTS REV.0

FIGURE - F26

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings surface elevation 969 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	Impenetrable(2)
UGLU	18	φ'=15.2°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

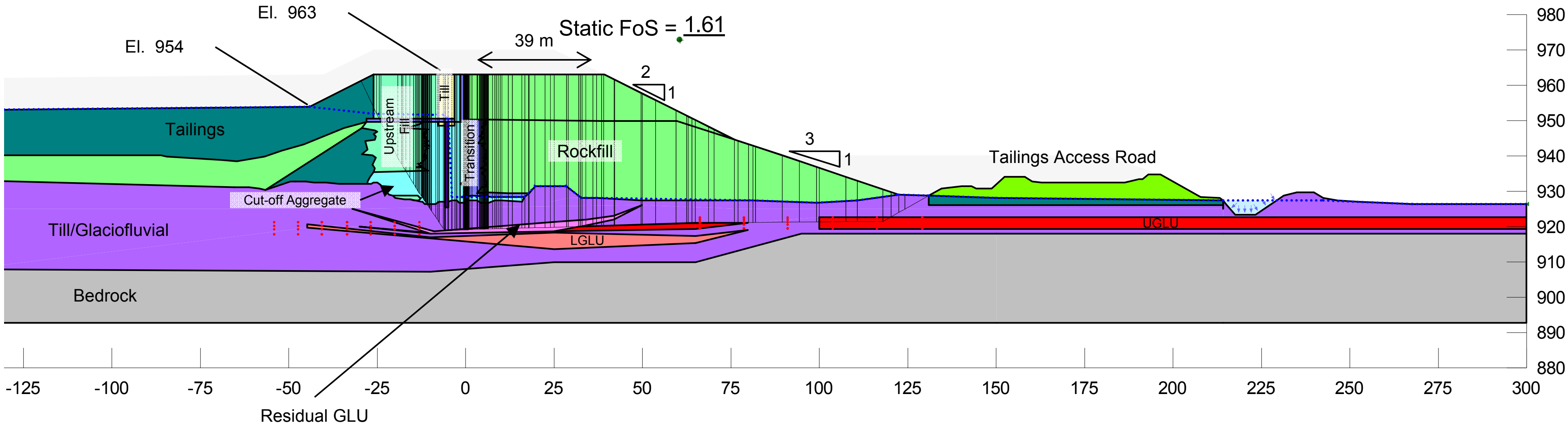
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+180 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F27**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 954 m
- Tailings surface elevation 954 m

Foundation Material Properties			
Material	**Unit Weight (kN/m³)**	**B-bar**	**Shear Strength**
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
UGLU	18	0.46	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

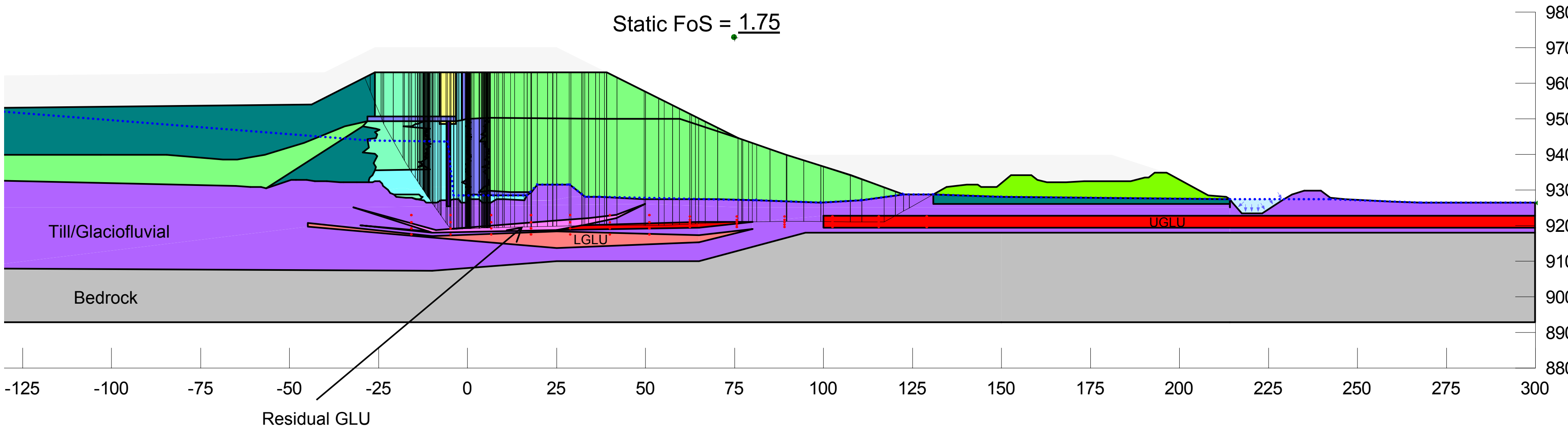
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F28**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 953 m
- Tailings surface elevation 954 m

Foundation Material Properties

Material	Unit Weight (kN/m³)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
UGLU	18	0.46	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

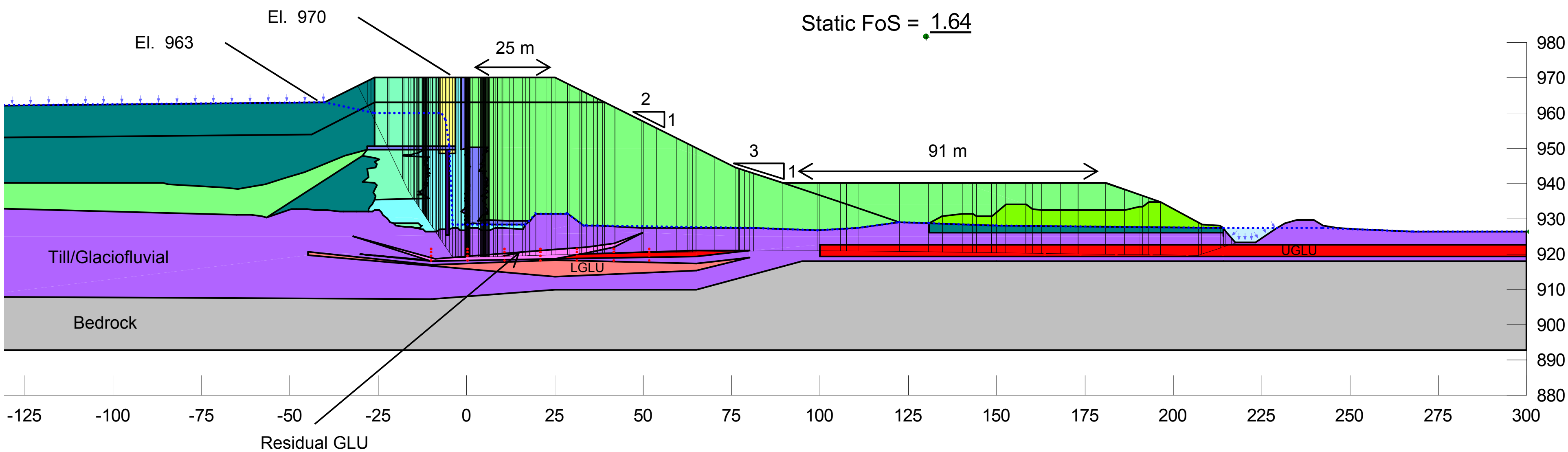
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
TOTAL STRESS STABILITY ANALYSIS
CORNER 1 PERIMETER EMBANKMENT
STN.20+240 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	FIGURE - F29	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 963 m
- Tailings surface elevation 963 m

Foundation Material Properties			
Material	**Unit Weight (kN/m^3)**	**B-bar**	**Shear Strength**
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
UGLU	18	0.46	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

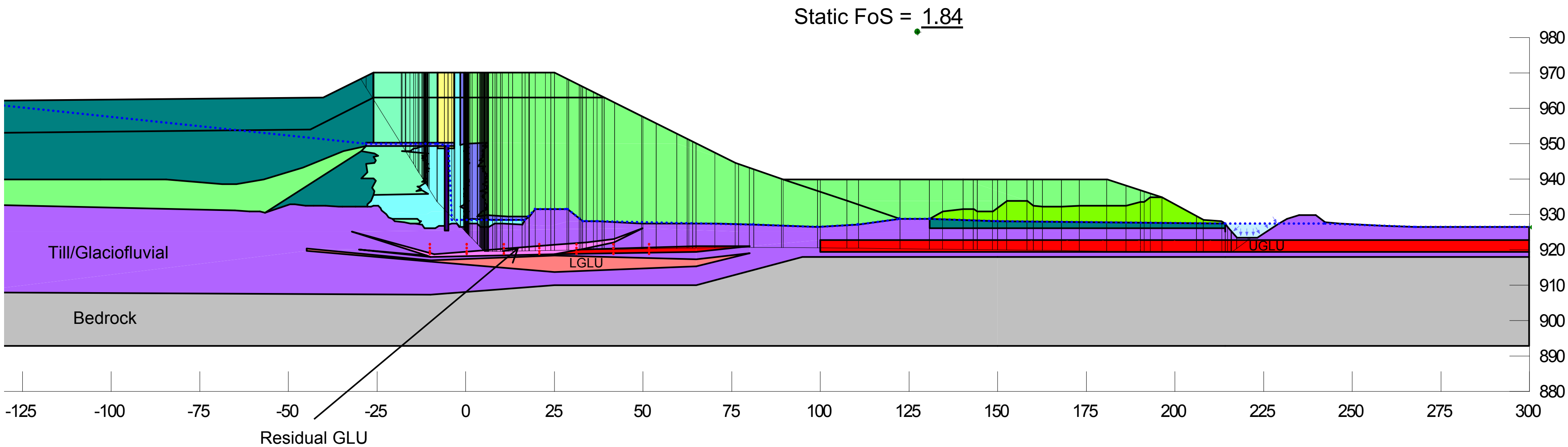
Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN			
TITLE	TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU			
PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	FIGURE - F30	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

Golder Associates

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 962 m
- Tailings surface elevation 963 m

Foundation Material Properties

Material	Unit Weight (kN/m^3)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
UGLU	18	0.46	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

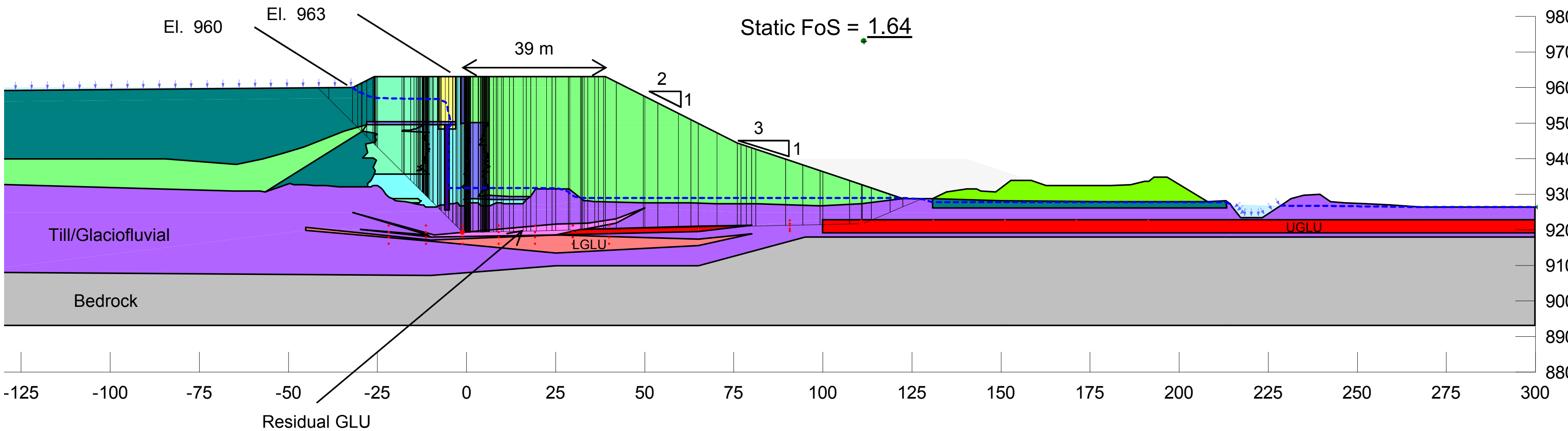
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN			
TITLE	TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU			
Golder Associates	PROJECT No. 1413803		PHASE No. 3000	
	DESIGN	CTM	22OCT15	SCALE NTS / REV.0
	CADD	CTM	22OCT15	FIGURE - F31
	CHECK	GJ	30OCT15	
	REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 960 m
- Tailings surface elevation 960 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 700$
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 400$
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

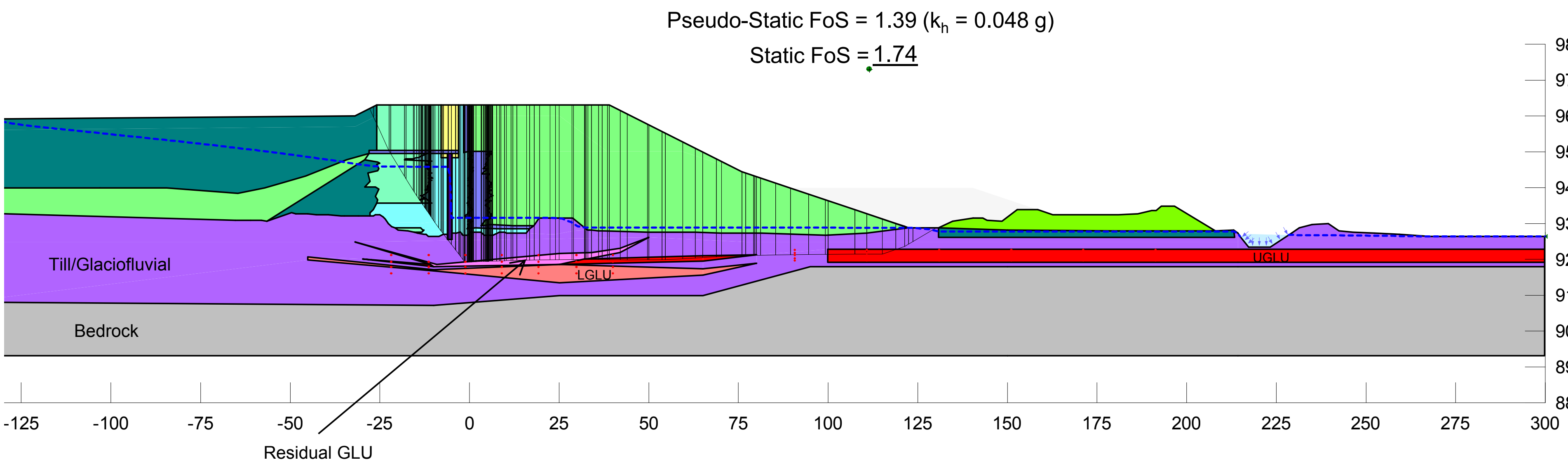
φ'= friction angle; τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT	**MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**			
TITLE	**TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU**			
Golder Associates	PROJECT No. 1413803			PHASE No. 3000
	DESIGN	CTM	22OCT15	SCALE NTS REV.0
	CADD	CTM	22OCT15	**FIGURE - F32**
	CHECK	GJ	30OCT15	
	REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 959 m
- Tailings surface elevation 960 m

Foundation Material Properties		
Material	**Unit Weight (kN/m^3)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

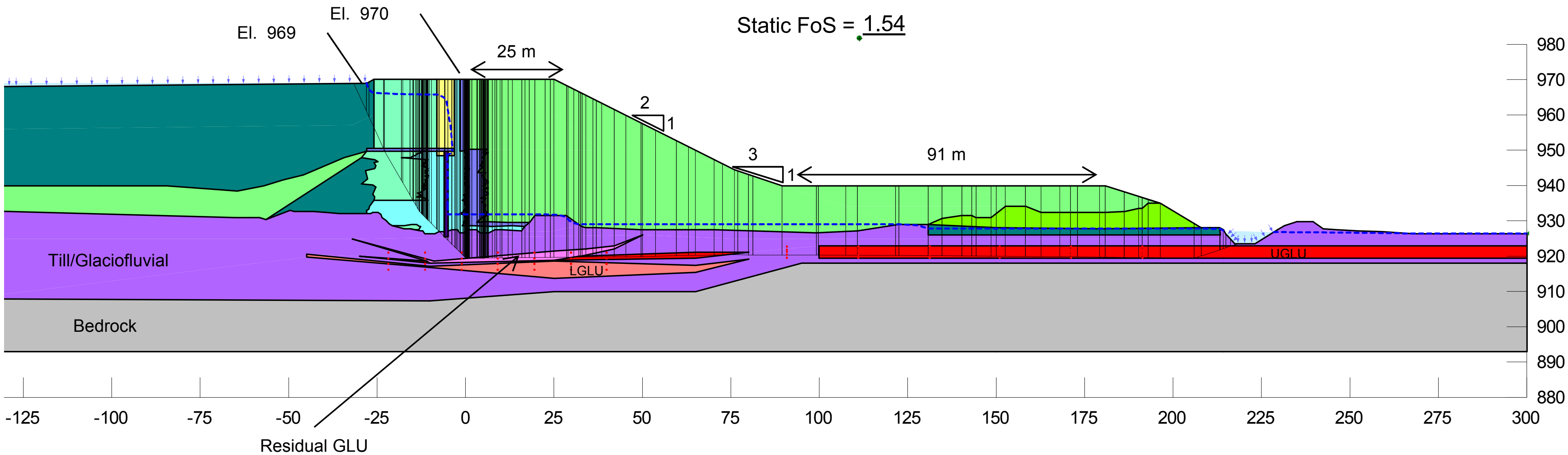
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F33**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings surface elevation 969 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

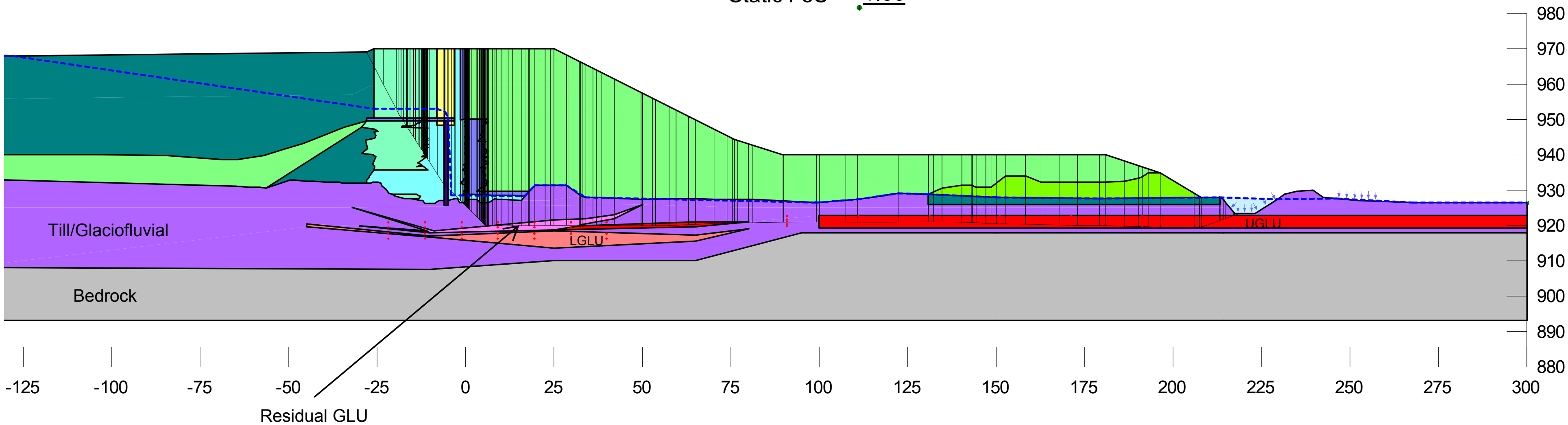
Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN			
TITLE	TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU			
Golder Associates	PROJECT No. 1413803			PHASE No. 3000
	DESIGN	CTM	22OCT15	SCALE NTS REV.0
	CADD	CTM	22OCT15	FIGURE - F34
	CHECK	GJ	30OCT15	
	REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation

Pseudo-Static FoS = 1.16 (k_h = 0.048 g)

Static FoS = 1.85



<u>Embankment configuration at crest elevation 970 m – Long Term</u>

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings surface elevation 969 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
UGLU	18	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 400
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

<u>Notes:</u>
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

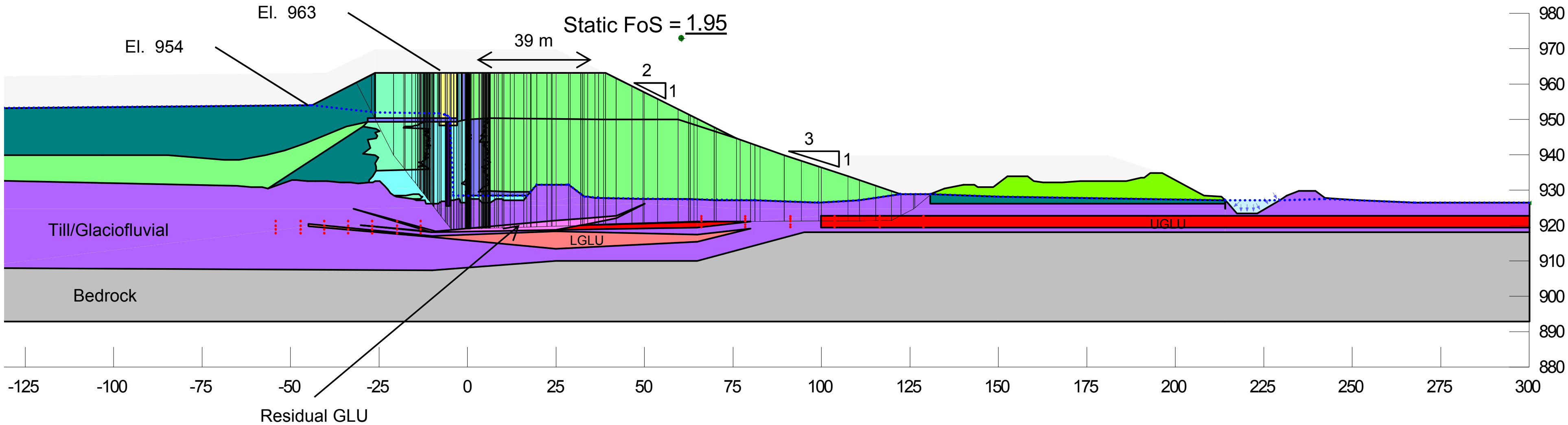
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+240 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F35**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 954 m
- Tailings surface elevation 954 m

Foundation Material Properties			
Material	**Unit Weight (kN/m³)**	**B-bar**	**Shear Strength**
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	φ'=25°, Cohesion = 0 kPa
UGLU	18	0.46	φ'=19°, Cohesion = 0 kPa
Residual GLU	18	N/A	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

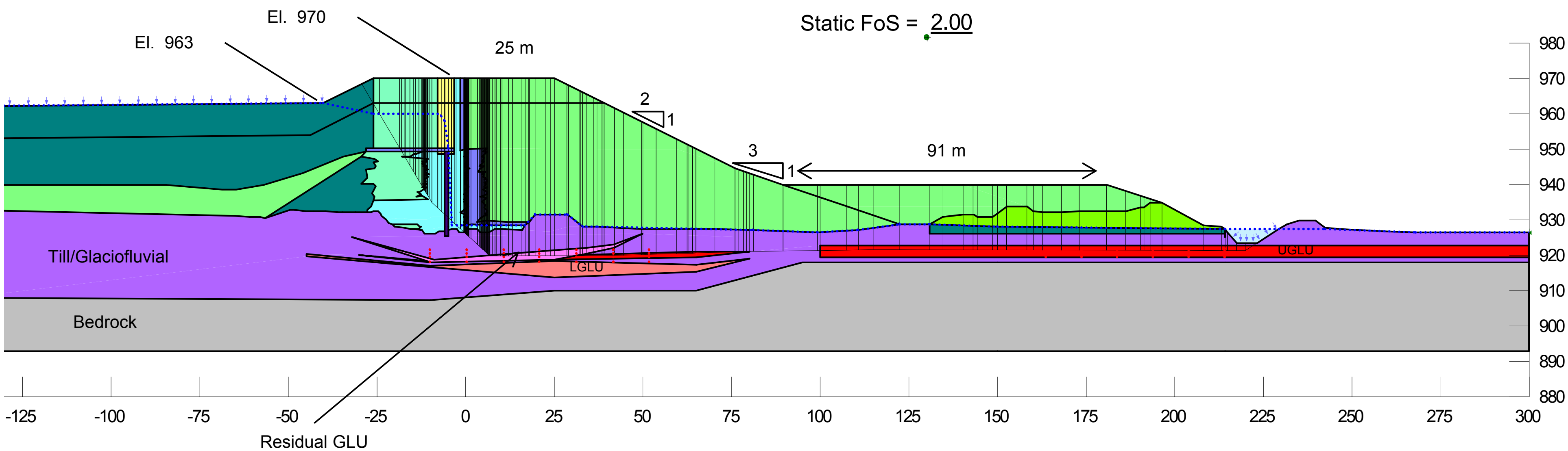
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+240 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F36**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 963 m
- Tailings surface elevation 963 m

Foundation Material Properties			
Material	Unit Weight (kN/m³)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	φ'=25°, Cohesion = 0 kPa
UGLU	18	0.46	φ'=19°, Cohesion = 0 kPa
Residual GLU	18	N/A	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

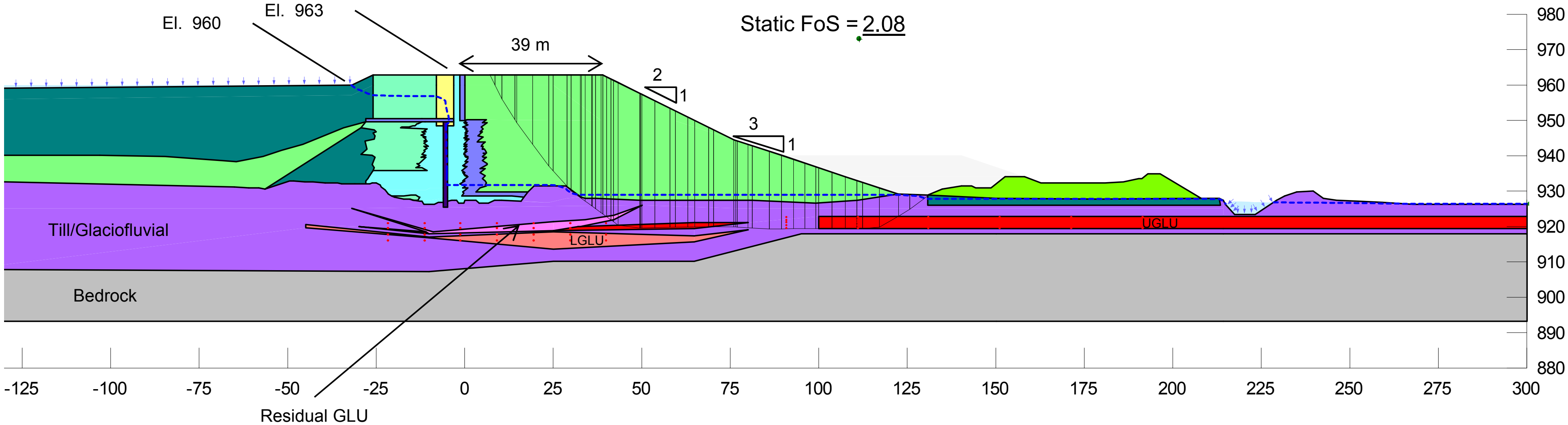
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F37**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 960 m
- Tailings surface elevation 960 m

Foundation Material Properties

Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	Impenetrable(2)
UGLU	18	φ'=19°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

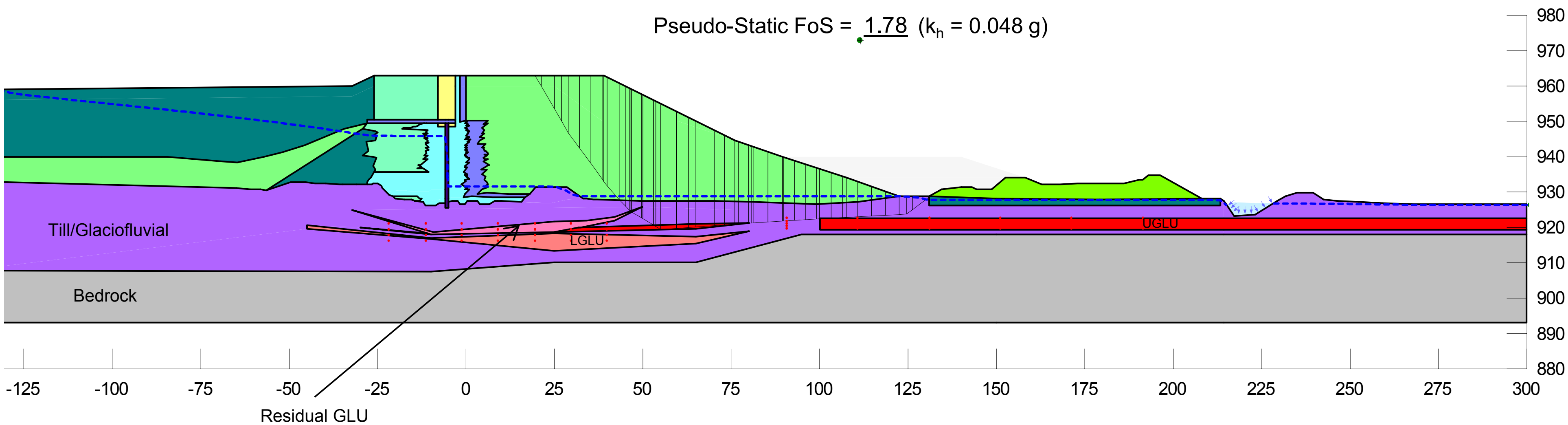
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN			
TITLE	EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU			
Golder Associates	PROJECT No. 1413803		PHASE No. 3000	
	DESIGN	CTM	22OCT15	SCALE NTS REV.0
	CADD	CTM	22OCT15	FIGURE - F38
	CHECK	GJ	30OCT15	
	REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 959 m
- Tailings surface elevation 960 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	Impenetrable(2)
UGLU	18	φ'=15.2°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

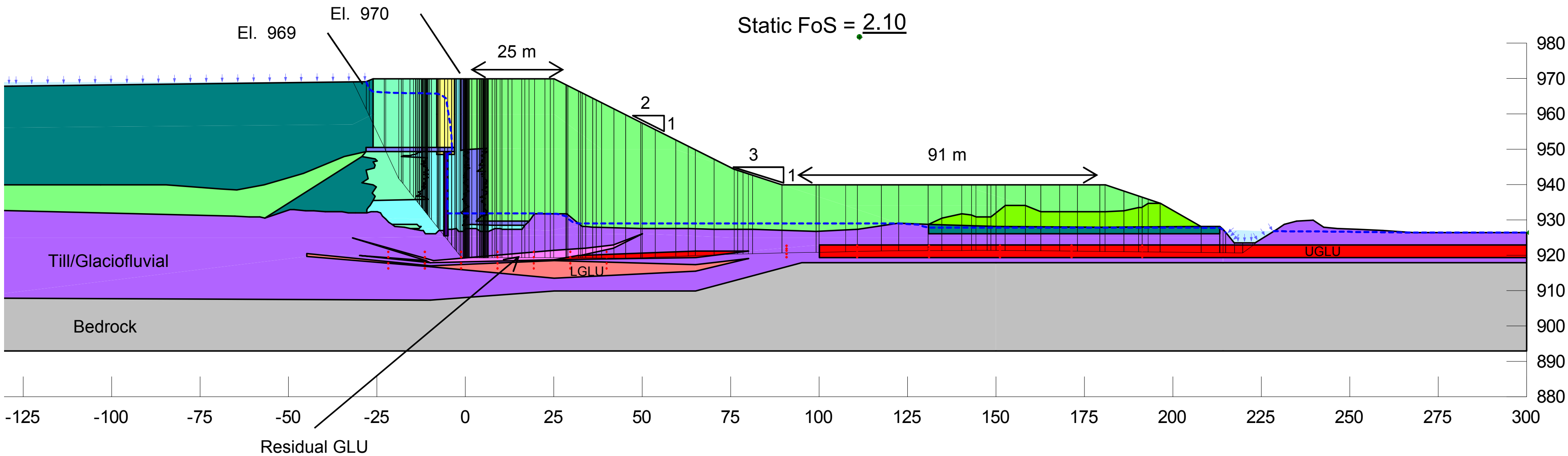
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F39**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	φ'=25°, Cohesion = 0 kPa
UGLU	18	φ'=19°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

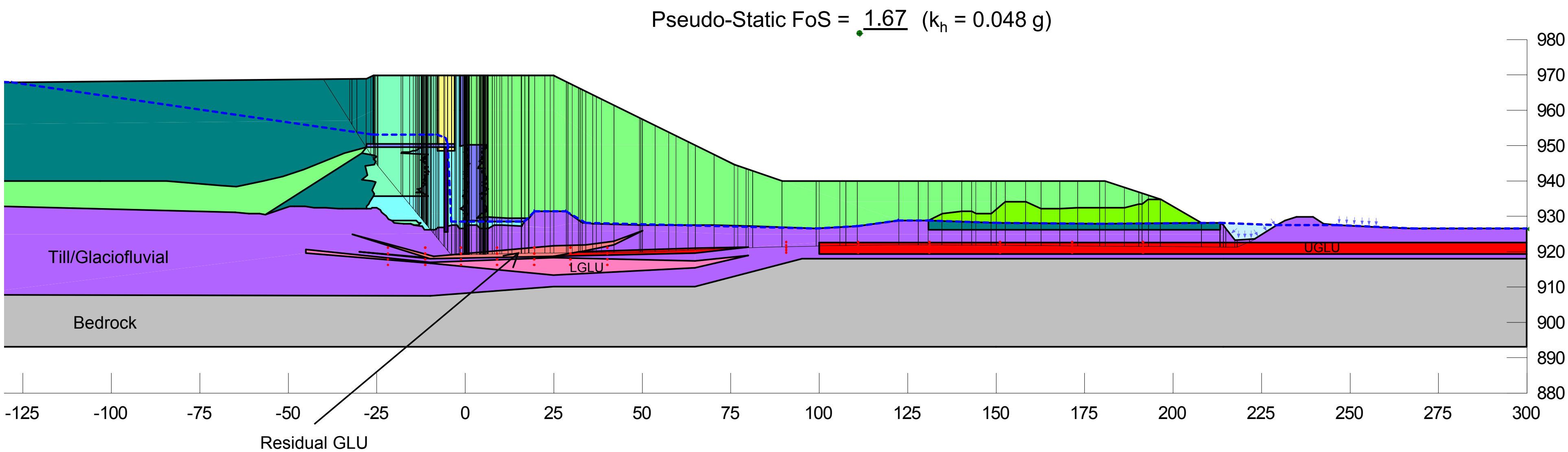
Piezometric Line

PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+240 – MAXIMUM ASSUMED GLU**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F40**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	φ'=25°, Cohesion = 0 kPa
UGLU	18	φ'=15.2°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

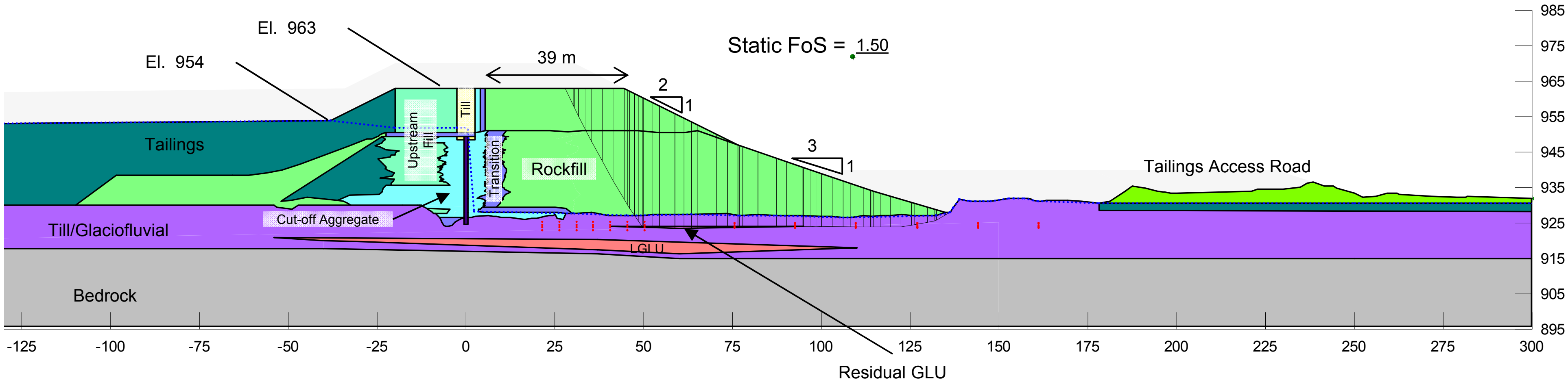
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+240 – MAXIMUM ASSUMED GLU

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F41**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 954 m
- Tailings surface elevation 954 m

Foundation Material Properties			
Material	Unit Weight (kN/m³)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	T = 0.22 σ_v' OCR$^{0.8}$ where σ_p' = 700
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

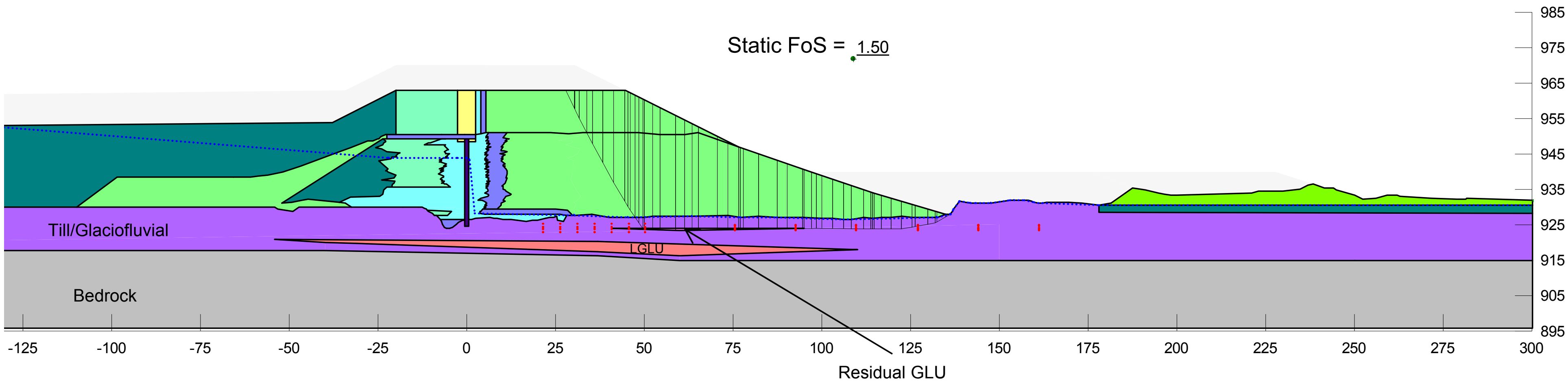
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN			
TITLE	TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295			
Golder Associates	PROJECT No. 1413803			PHASE No. 3000
	DESIGN	CTM	22OCT15	SCALE NTS REV.0
	CADD	CTM	22OCT15	FIGURE - F42
	CHECK	GJ	30OCT15	
	REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 953 m
- Tailings surface elevation 954 m

Foundation Material Properties

Material	Unit Weight (kN/m^3)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	T = 0.22 σ_v' $OCR^{0.8}$ where σ_p' = 700
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

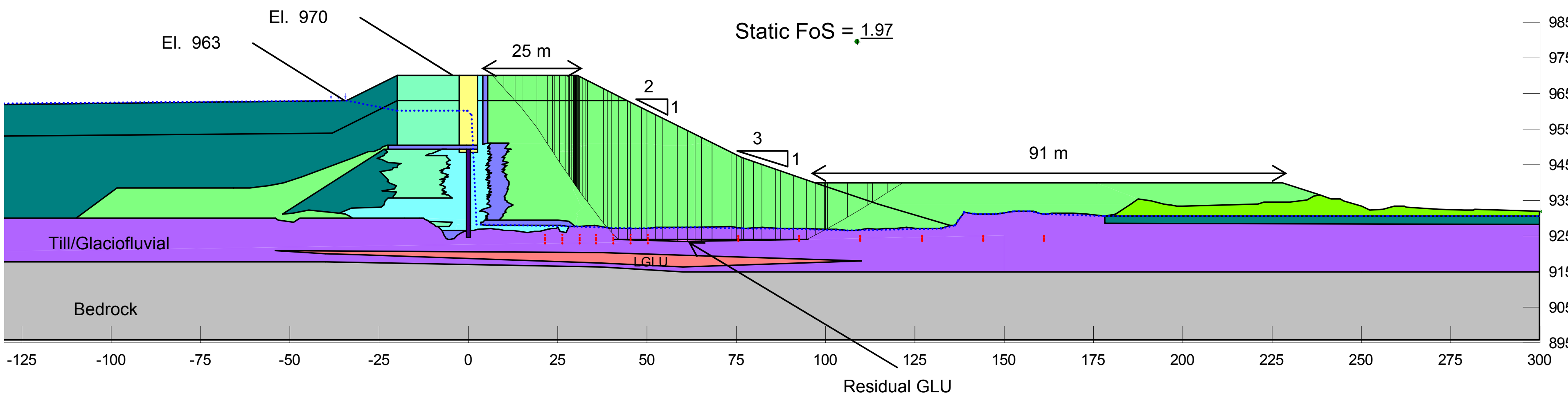
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295**

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F43**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 963 m
- Tailings surface elevation 963m

Foundation Material Properties			
Material	**Unit Weight (kN/m^3)**	**B-bar**	**Shear Strength**
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 700$
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

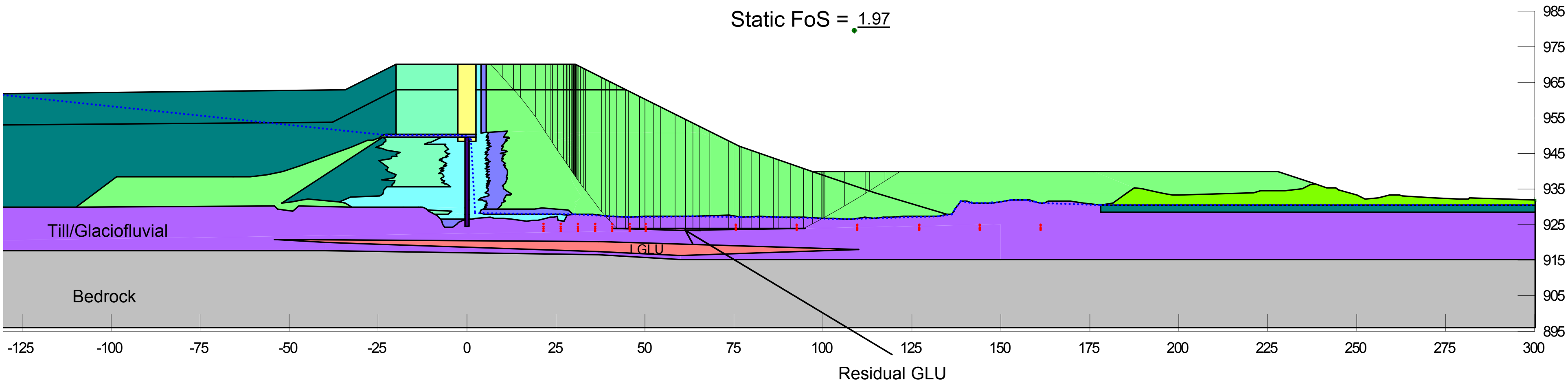
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN			
TITLE	TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295			
Golder Associates	PROJECT No. 1413803		PHASE No. 3000	
	DESIGN CTM	22OCT15	SCALE NTS	REV.0
	CADD CTM	22OCT15	FIGURE - F44	
	CHECK GJ	30OCT15		
	REVIEW TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 962 m
- Tailings surface elevation 963m

Foundation Material Properties

Material	Unit Weight (kN/m³)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
Residual GLU	18	N/A	Undrained (φ'=0°) , Cohesion = 22 kPa

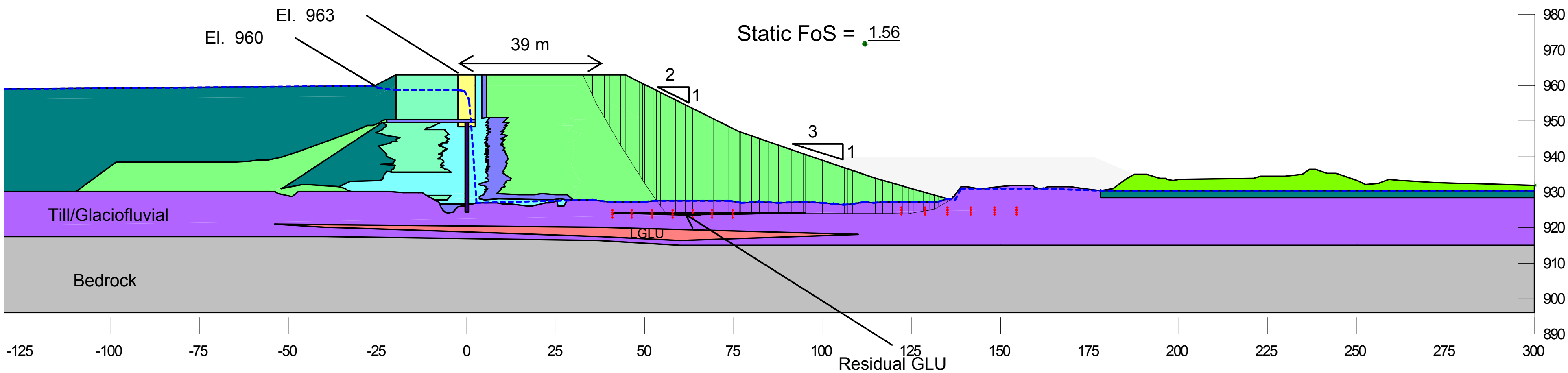
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN				
TITLE	TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295				
Golder Associates	PROJECT No. 1413803			PHASE No. 3000	
	DESIGN	CTM	22OCT15	SCALE NTS	REV.0
	CADD	CTM	22OCT15	FIGURE - F45	
	CHECK	GJ	30OCT15		
	REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 960 m
- Tailings surface elevation 960 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295**

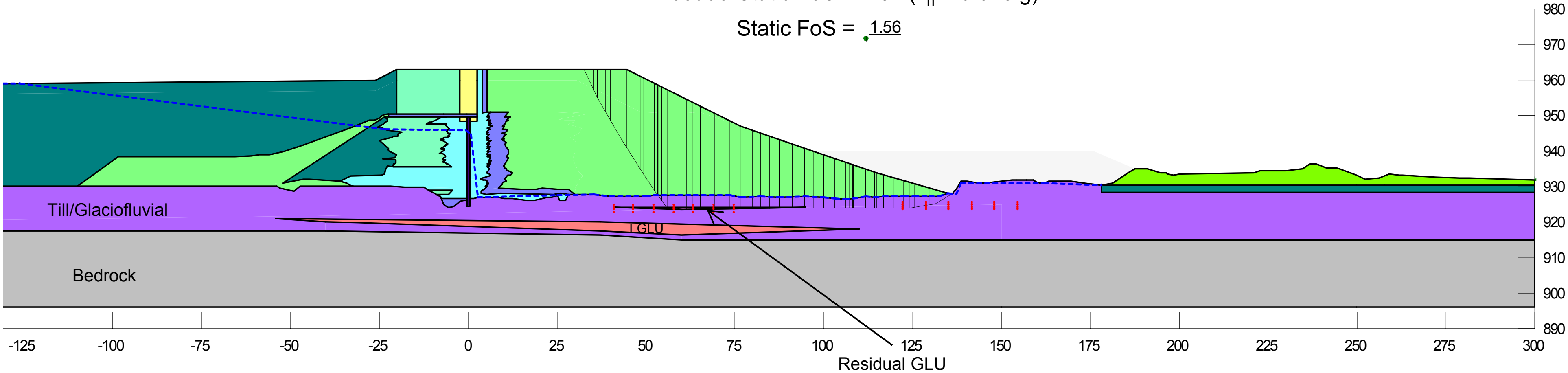
Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F46**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation

Pseudo-Static FoS = 1.34 (k_h = 0.048 g)

Static FoS = 1.56



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 959 m
- Tailings surface elevation 960 m

Foundation Material Properties		
Material	**Unit Weight (kN/m^3)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	$\tau = 0.22\,\sigma_v'\,OCR^{0.8}$ where σ_p' = 700
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

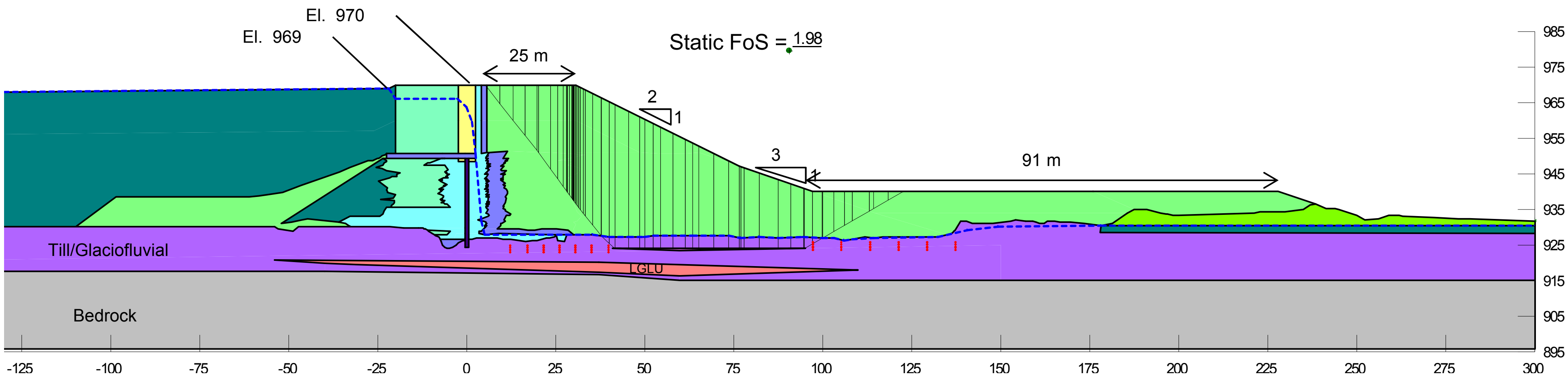
Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN
TITLE	TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	FIGURE - F47
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 700$
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

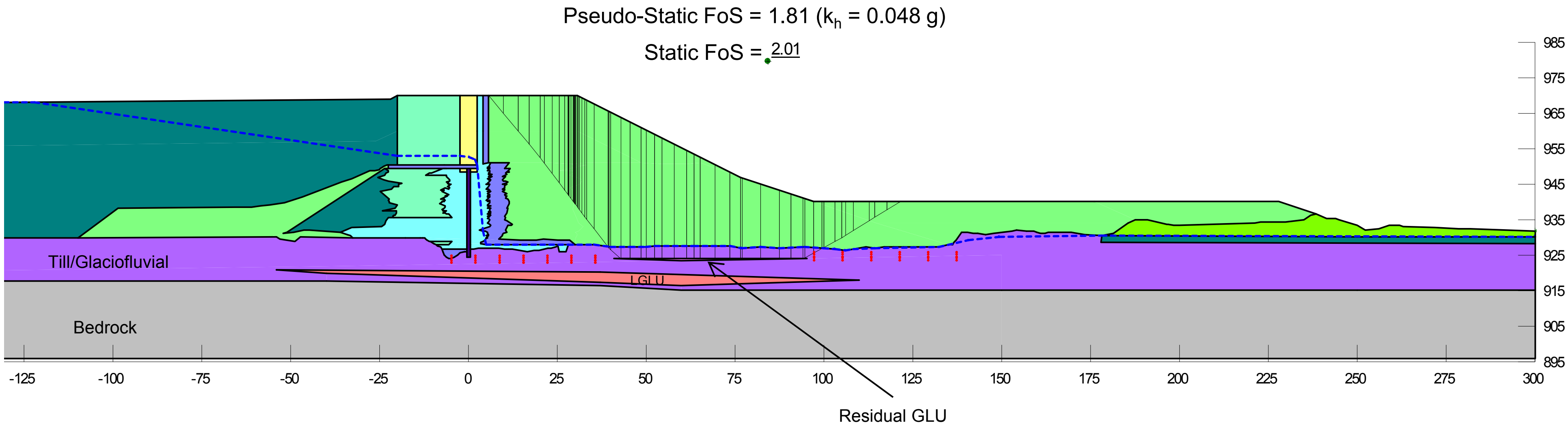
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F48**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	N/A	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 700
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 22 kPa

φ'= friction angle; τ=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

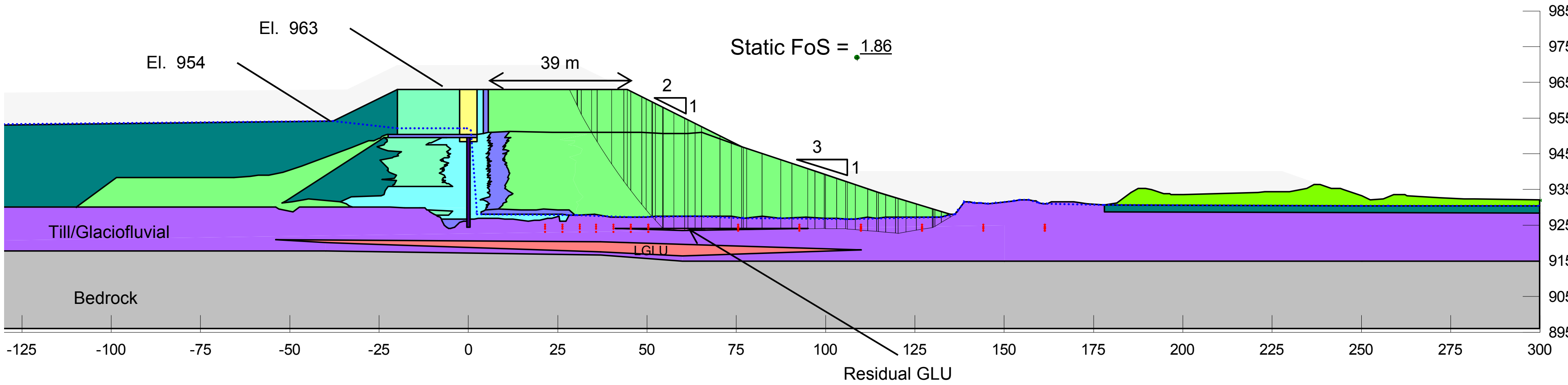
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+295

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F49**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 954 m
- Tailings surface elevation 954 m

Foundation Material Properties

Material	Unit Weight (kN/m³)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	φ'=25°, Cohesion = 0 kPa
Residual GLU	18	N/A	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

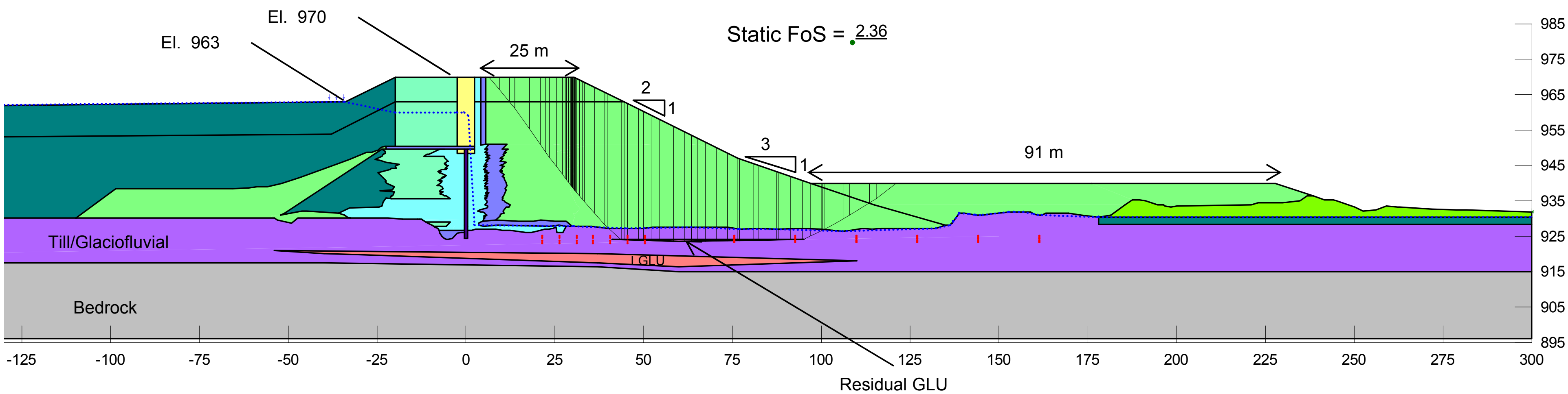
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+295

Golder Associates

PROJECT No.	1413803		PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F50**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – End of Construction

- Partially consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 963 m
- Tailings surface elevation 963m

Foundation Material Properties			
Material	Unit Weight (kN/m³)	B-bar	Shear Strength
Till/Glaciofluvial	22	0.2	φ'=34°, Cohesion = 0 kPa
LGLU	20	0.2	φ'=25°, Cohesion = 0 kPa
Residual GLU	18	N/A	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) Placement of rockfill, transition, filter, upstream fill, and tailings generate excess pore pressure in GLU and Till, and were used in the B_{bar} calculation.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

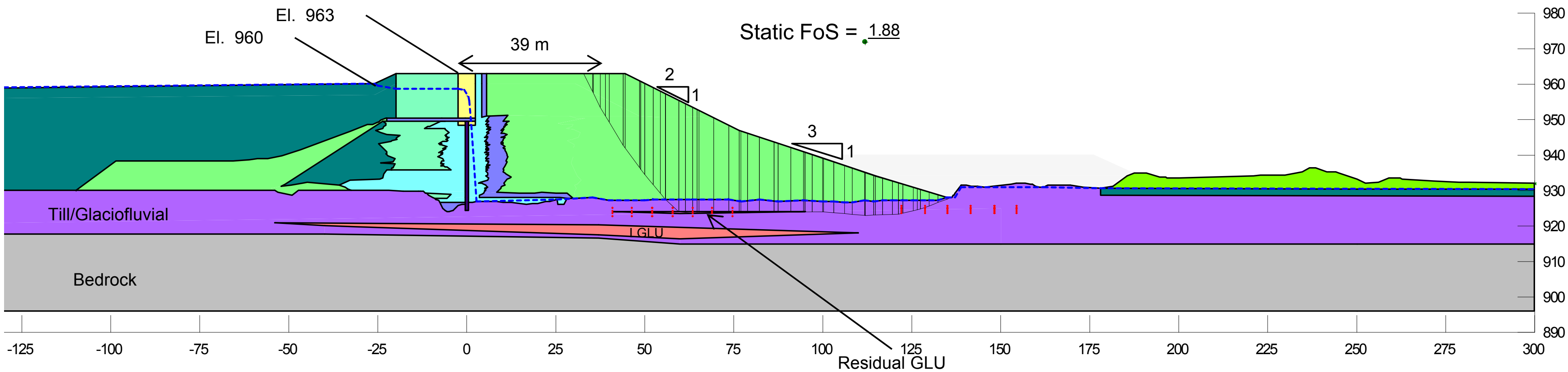
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	FIGURE - F51
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 960 m
- Tailings surface elevation 960 m

Foundation Material Properties

Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	φ'=25°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

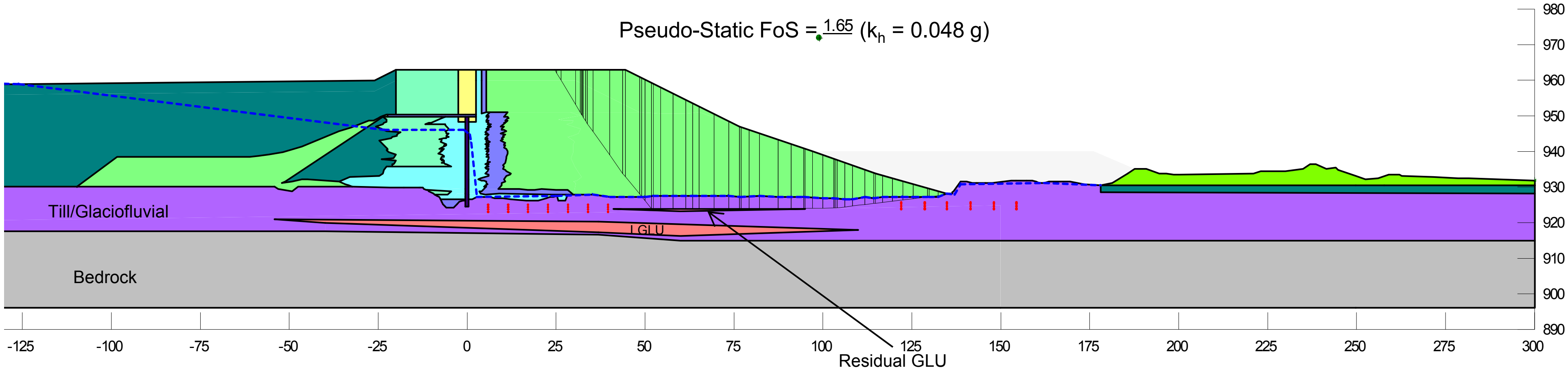
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN				
TITLE	EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295				
Golder Associates	PROJECT No. 1413803			PHASE No. 3000	
	DESIGN	CTM	22OCT15	SCALE NTS	REV.0
	CADD	CTM	22OCT15	FIGURE - F52	
	CHECK	GJ	30OCT15		
	REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 963 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach; pond elevation 959 m
- Tailings surface elevation 960 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	φ'=20°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

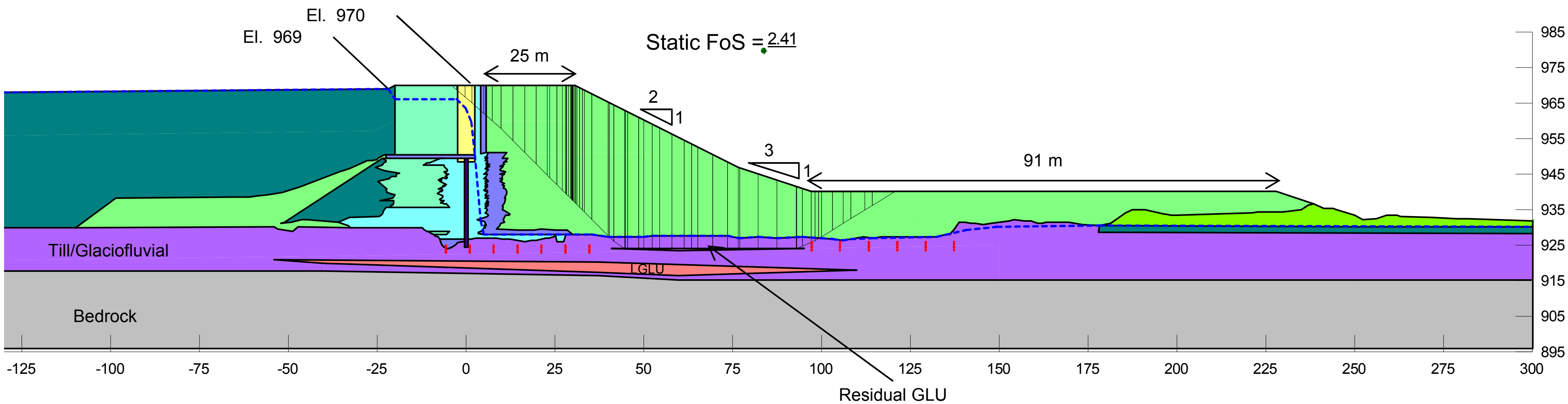
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F53**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 969 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	φ'=25°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

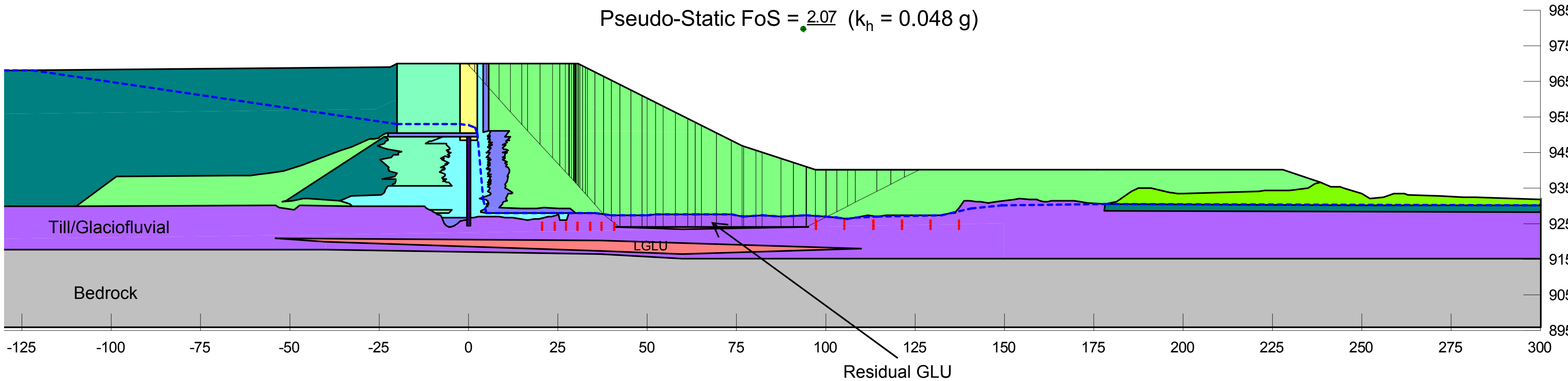
TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295**

Golder Associates

PROJECT No.	1413803	PHASE No.	3000
DESIGN	CTM	22OCT15	SCALE NTS / REV.0
CADD	CTM	22OCT15	
CHECK	GJ	30OCT15	**FIGURE - F54**
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation

Pseudo-Static FoS = 2.07 (k_h = 0.048 g)



Embankment configuration at crest elevation 970 m – Long Term

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	φ'=20°, Cohesion = 0 kPa
Residual GLU	18	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.
2.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.

Piezometric Line

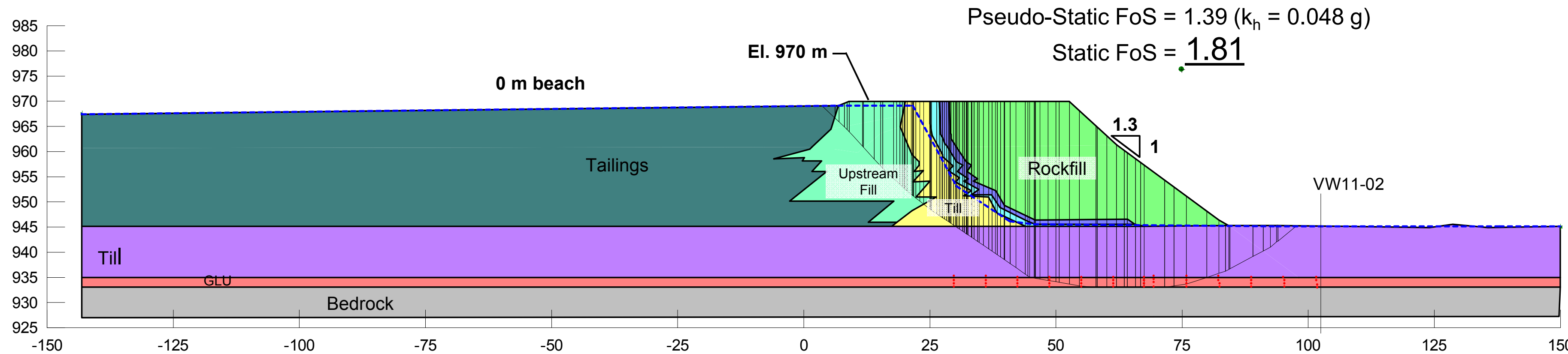
PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

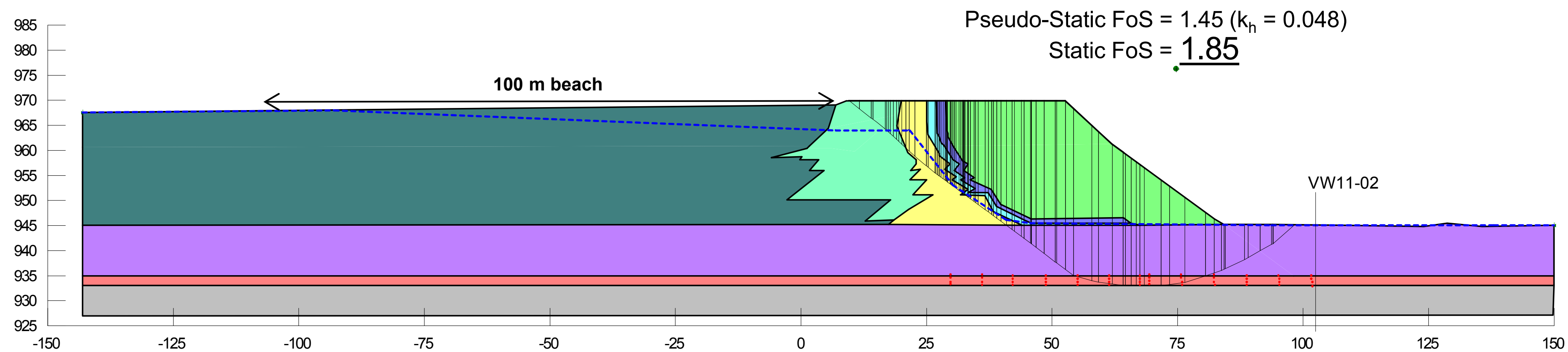
TITLE EFFECTIVE STRESS STABILITY ANALYSIS
CORNER 1 PERIMETER EMBANKMENT
STN.20+295

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	FIGURE - F55	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 1200

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

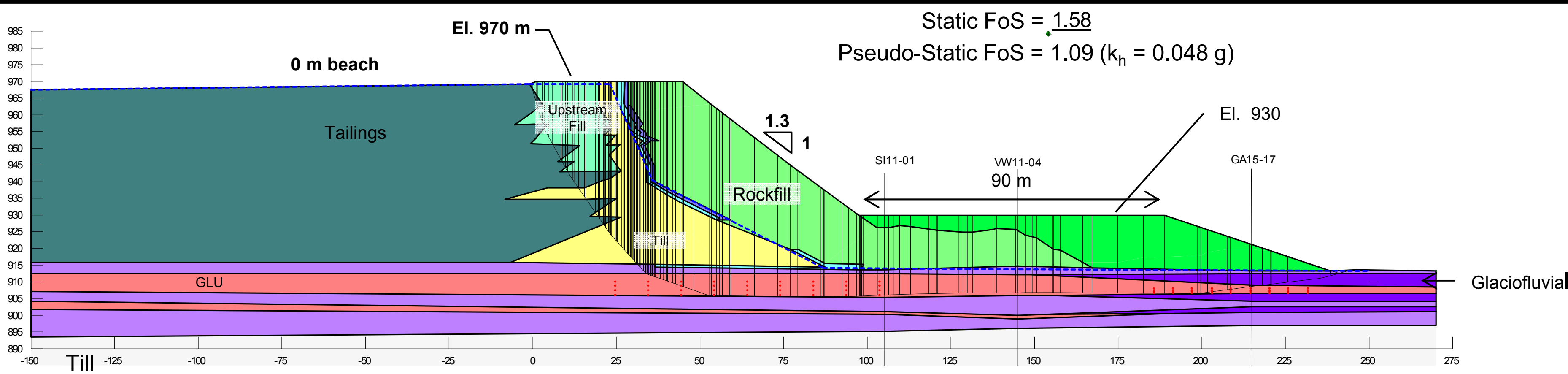
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

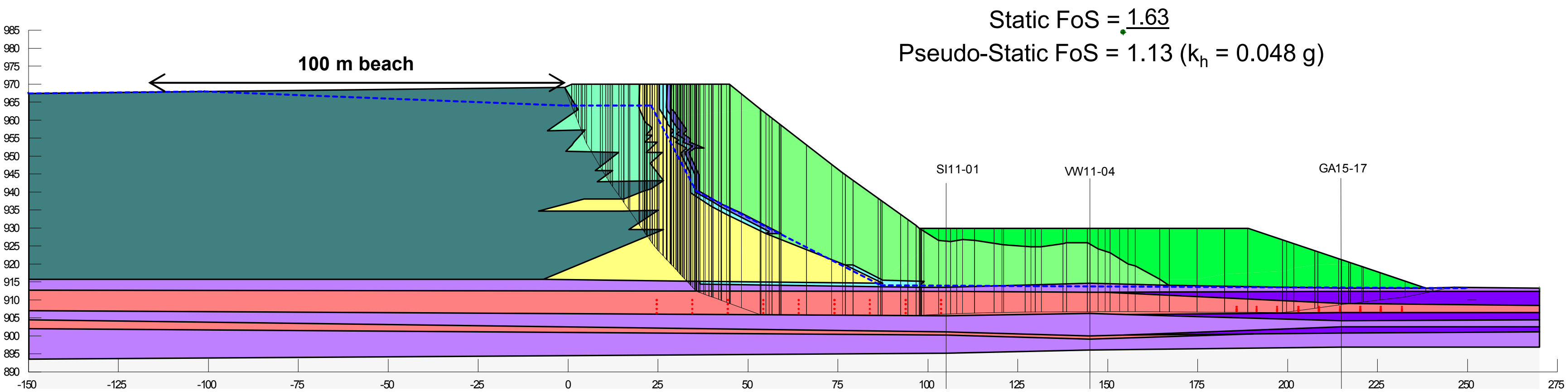
TITLE **TOTAL STRESS STABILITY ANALYSIS SOUTH EMBANKMENT STN.1+100**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F56**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 1200

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

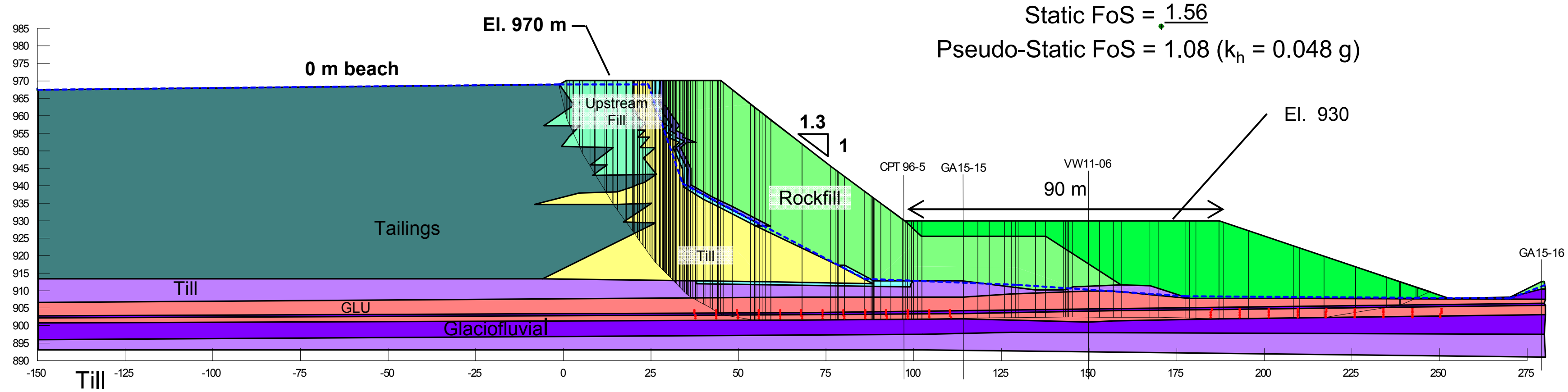
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

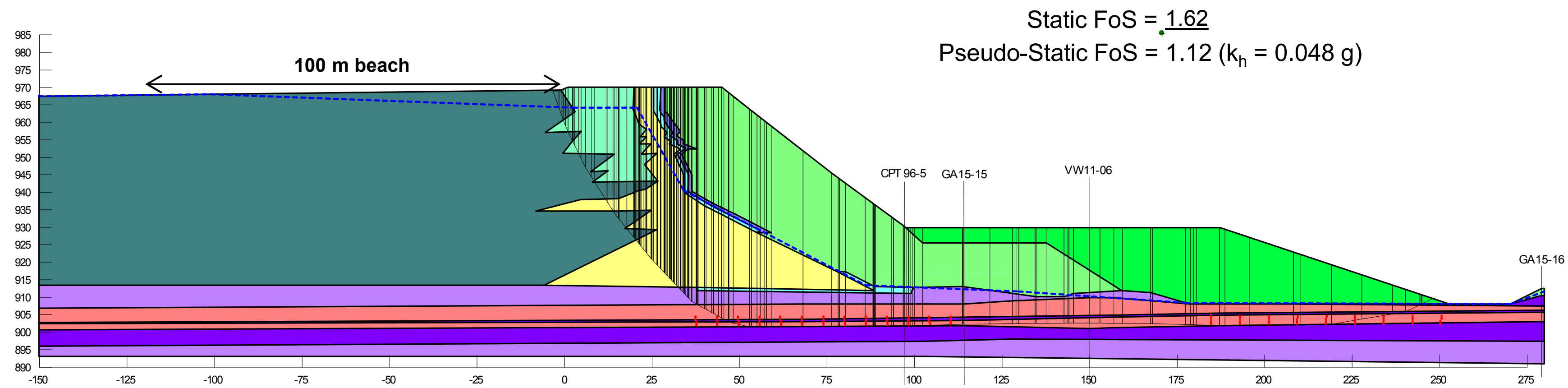
TITLE **TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.1+850**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F57**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	T = 0.22 σ_v' OCR$^{0.8}$ where σ_p' = 1200

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

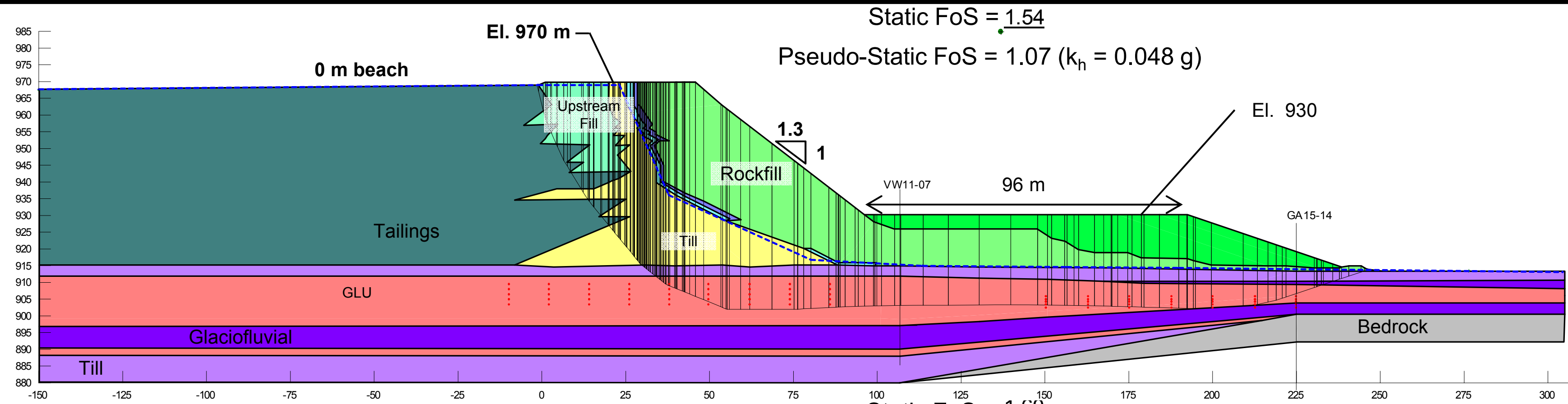
PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

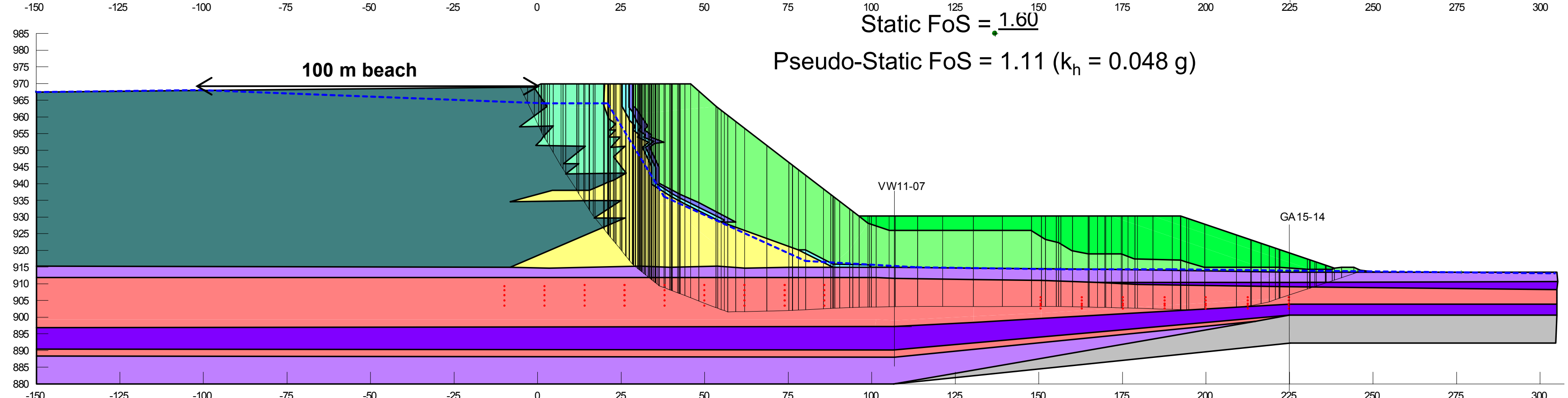
TITLE TOTAL STRESS STABILITY ANALYSIS
MAIN EMBANKMENT STN.2+060

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	FIGURE - F58
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	Unit Weight (kN/m^3)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 1200

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

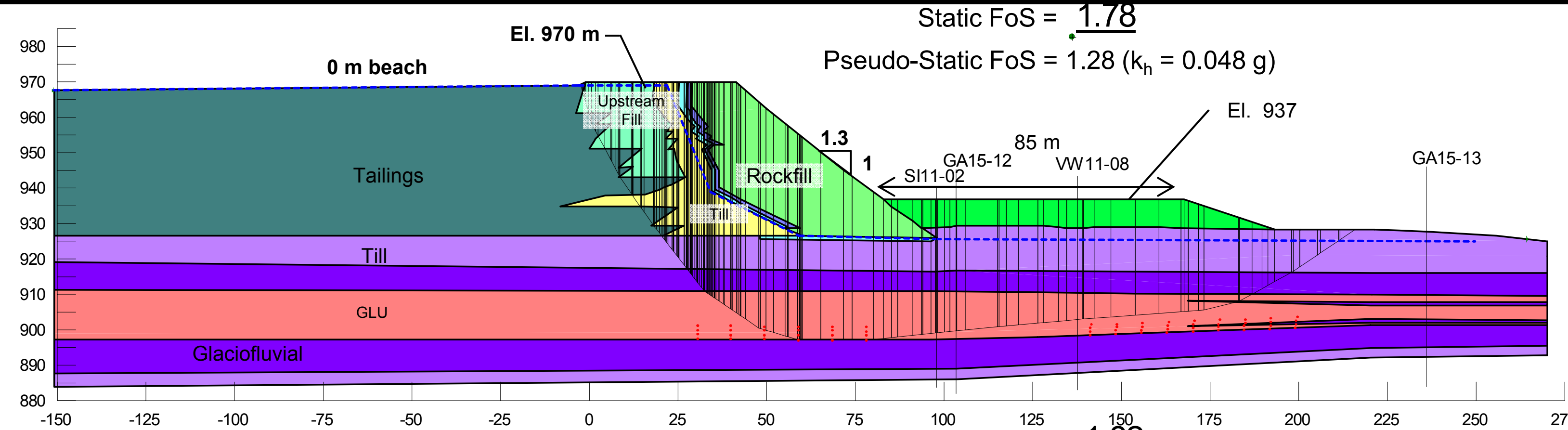
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

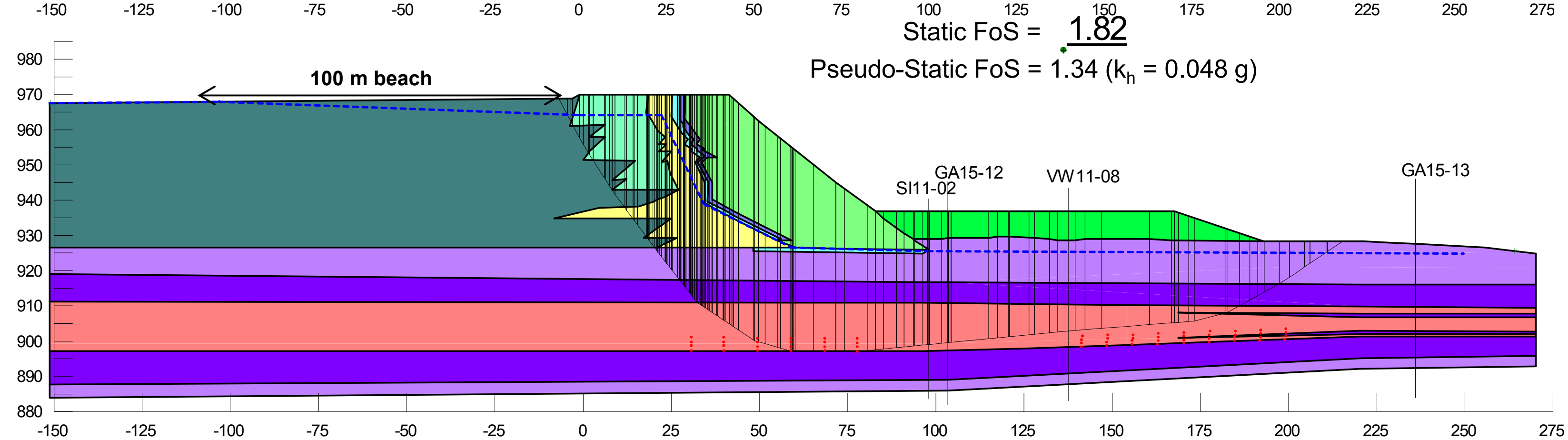
TITLE
TOTAL STRESS STABILITY ANALYSIS
MAIN EMBANKMENT STN.2+240

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F59**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m^3)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 1200

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

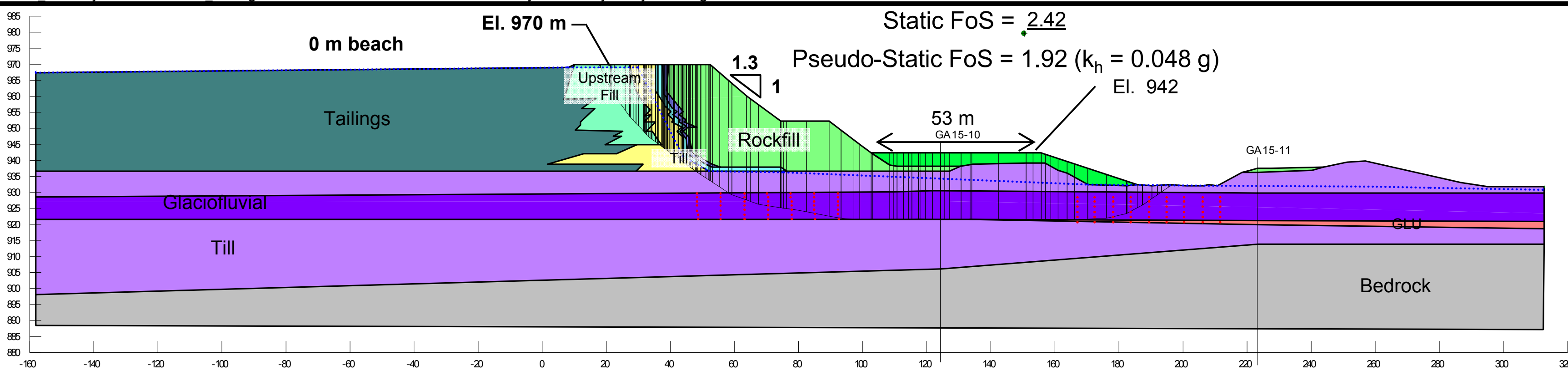
Piezometric Line

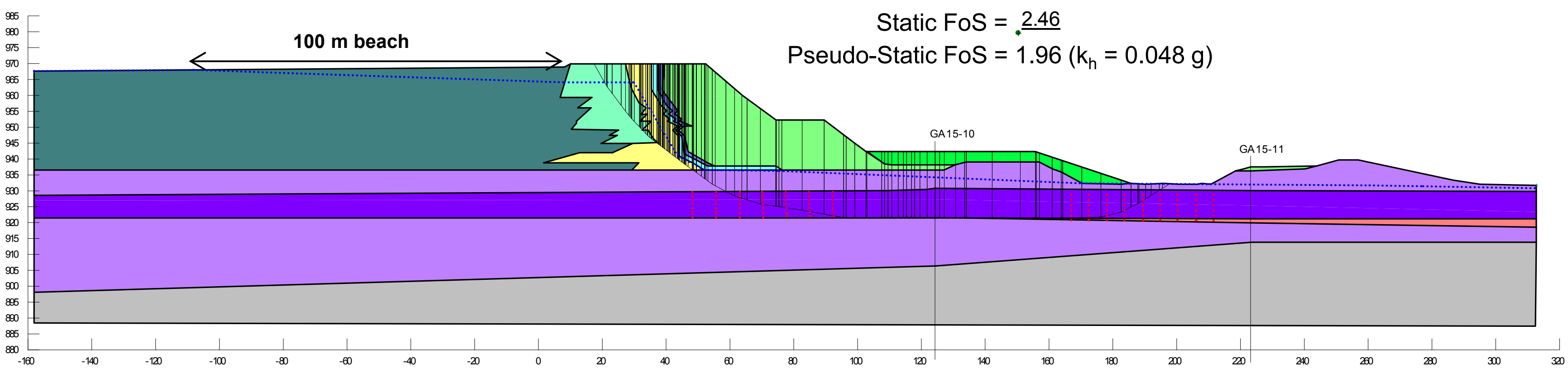
PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN
TITLE	TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+460

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	FIGURE - F60	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	Unit Weight (kN/m^3)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	Τ = 0.22 σ_v' $OCR^{0.8}$ where σ_p' = 1200

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

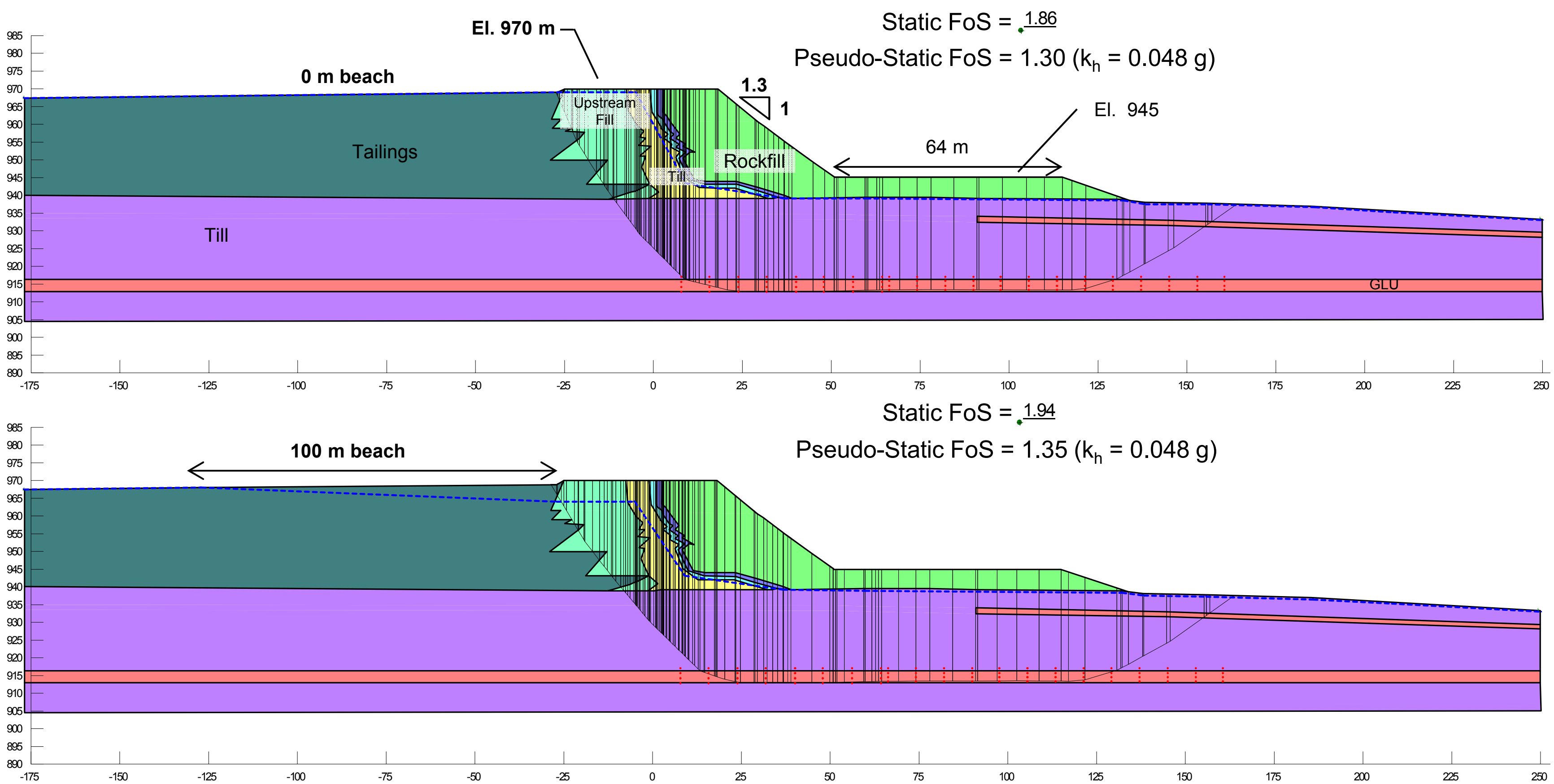
Piezometric Line

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN
TITLE	TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+700

Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	FIGURE - F61
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress;
σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

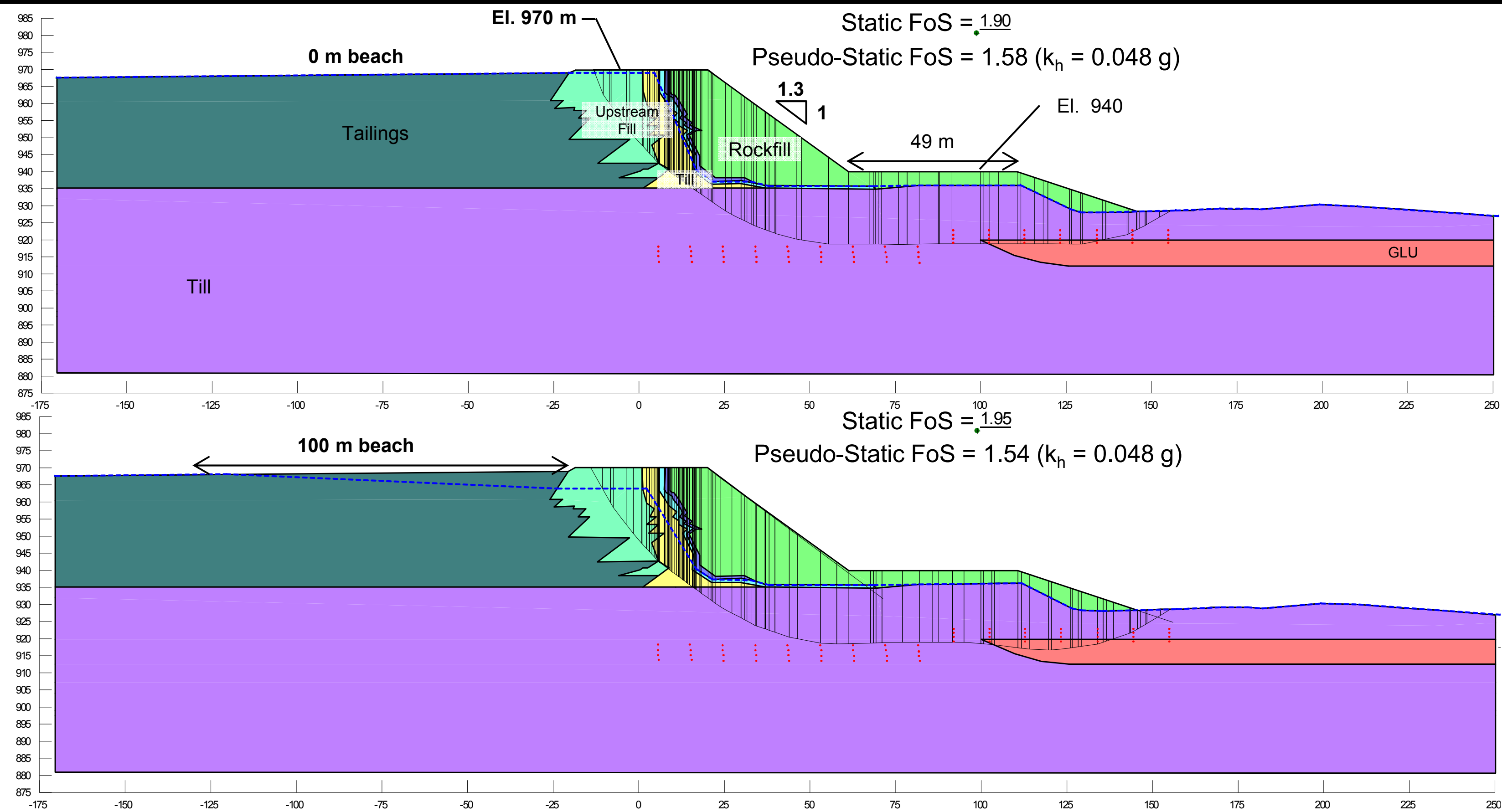
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE
TOTAL STRESS STABILITY ANALYSIS
PERIMETER EMBANKMENT STN.2+850

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	FIGURE - F62	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation



Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties

Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

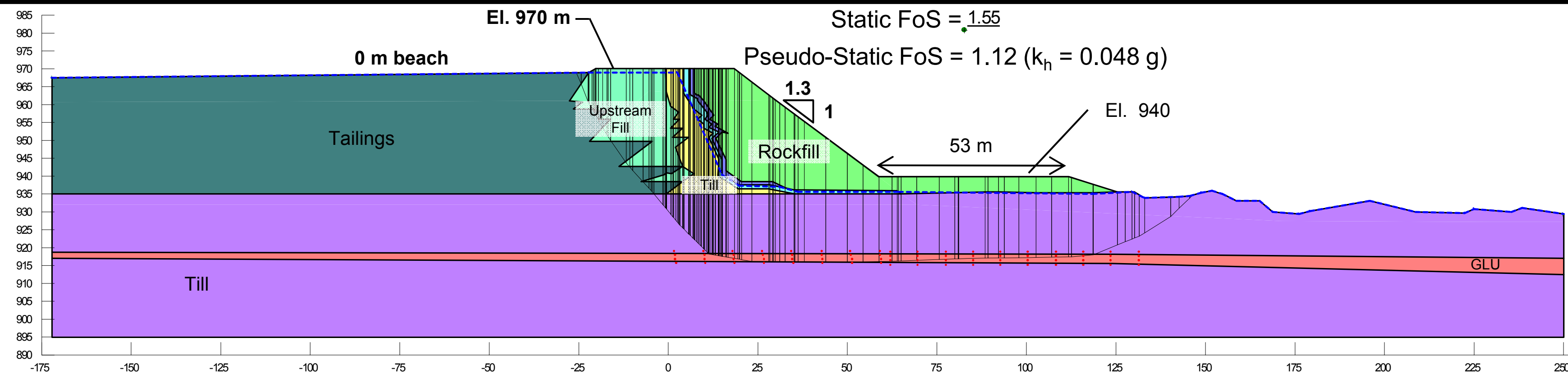
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

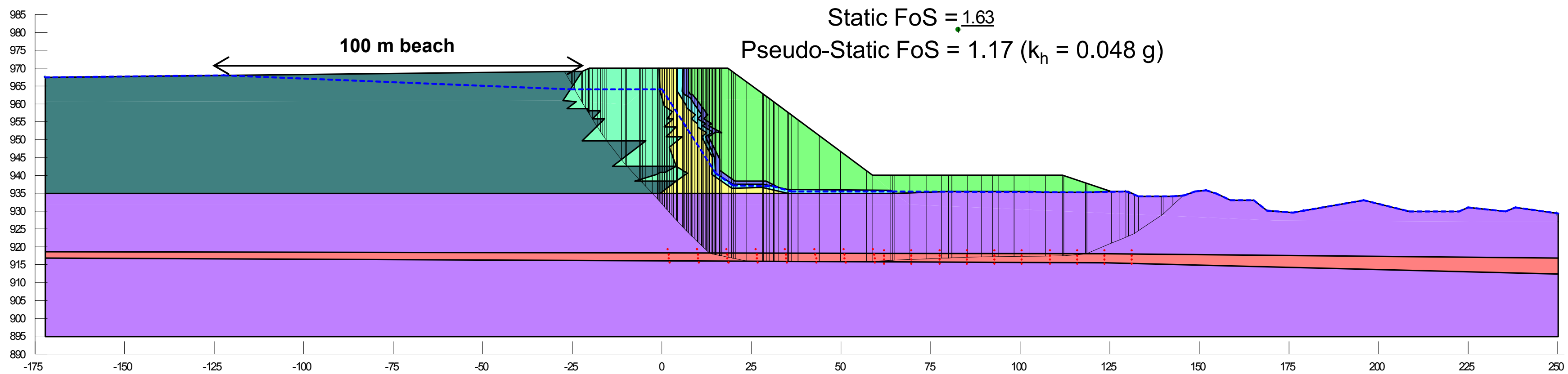
TITLE **TOTAL STRESS STABILITY ANALYSIS PERIMETER EMBANKMENT STN.3+190**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F63**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 900

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS PERIMETER EMBANKMENT STN.3+275**

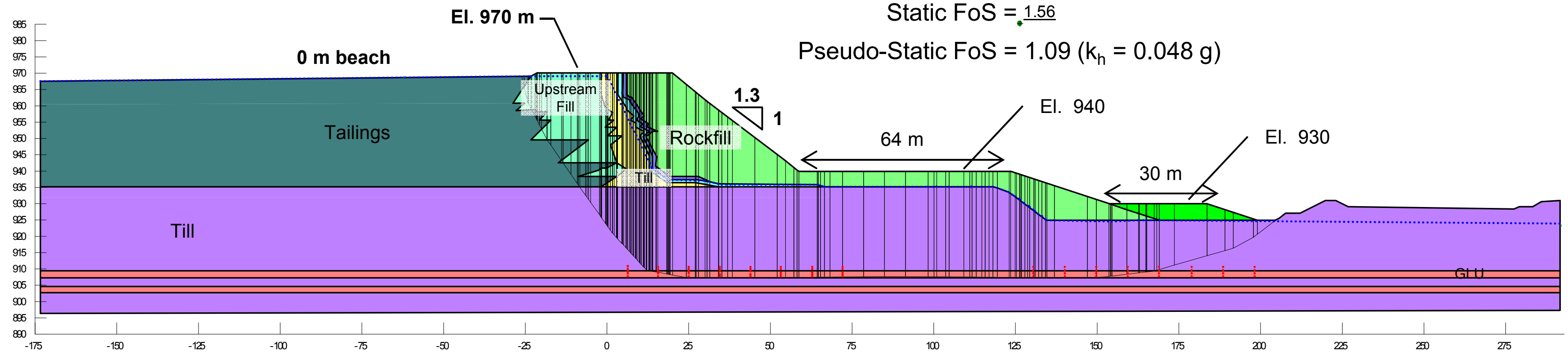
Golder Associates

PROJECT No. 1413803			PHASE No. 3000
DESIGN	CTM	22OCT15	SCALE NTS REV.0
CADD	CTM	22OCT15	**FIGURE - F64**
CHECK	GJ	30OCT15	
REVIEW	TLE	30OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation

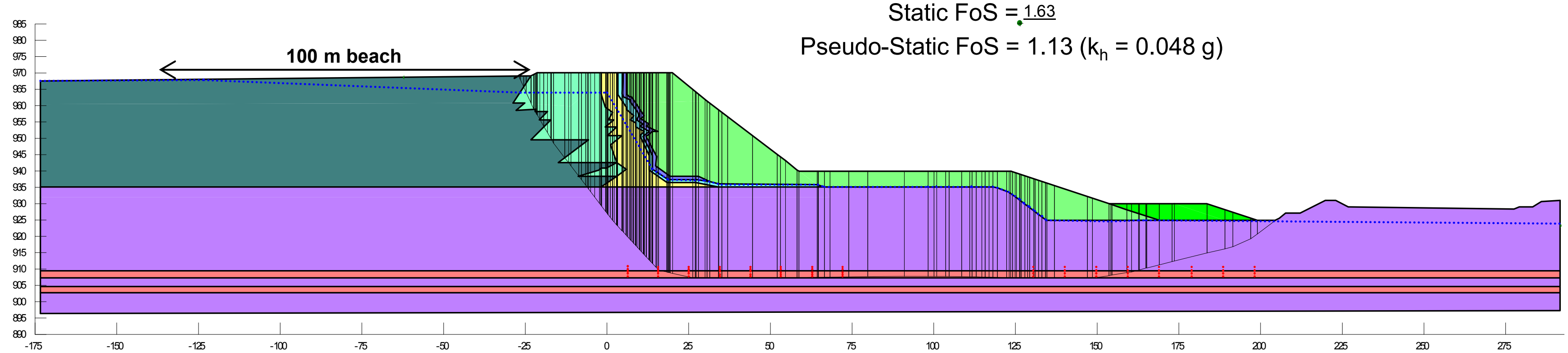
Static FoS = 1.56

Pseudo-Static FoS = 1.09 (k_h = 0.048 g)



Static FoS = 1.63

Pseudo-Static FoS = 1.13 (k_h = 0.048 g)



Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

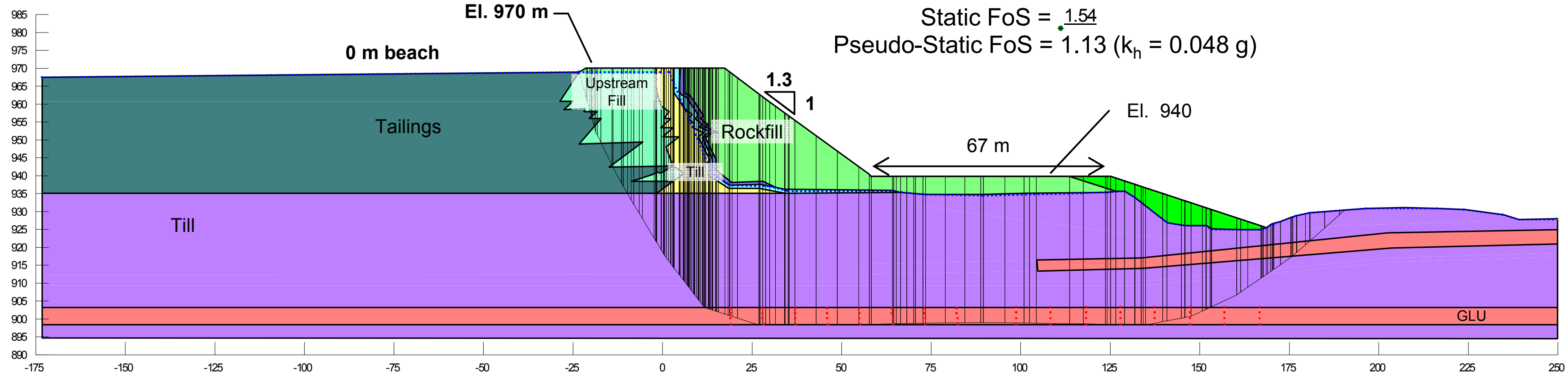
Piezometric Line

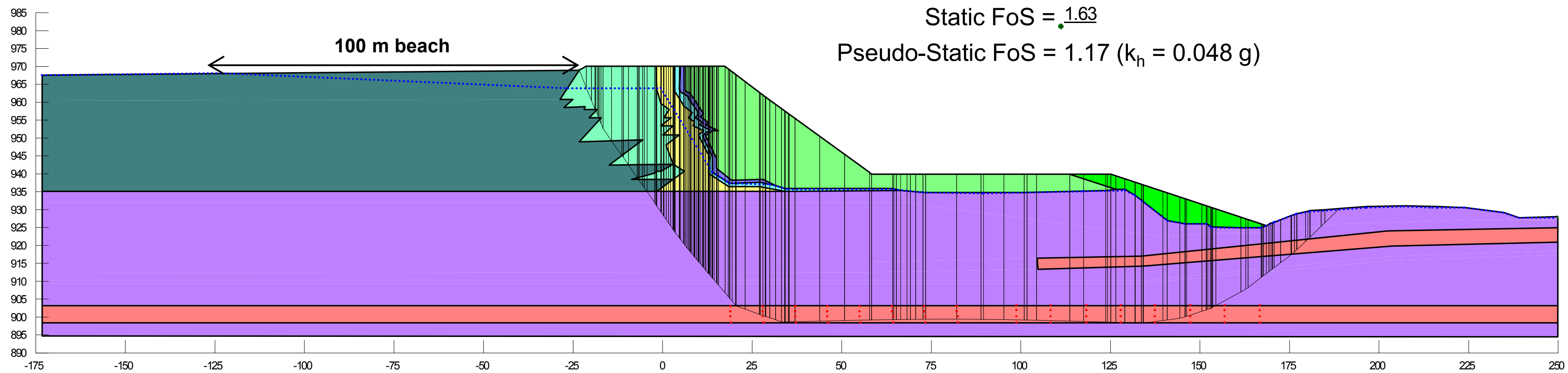
PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN
TITLE	TOTAL STRESS STABILITY ANALYSIS PERIMETER EMBANKMENT STN.3+400

Golder Associates

PROJECT No.	1413803		PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	FIGURE - F65	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	Unit Weight (kN/m^3)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	T = 0.22 σ_v' $OCR^{0.8}$ where σ_p' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

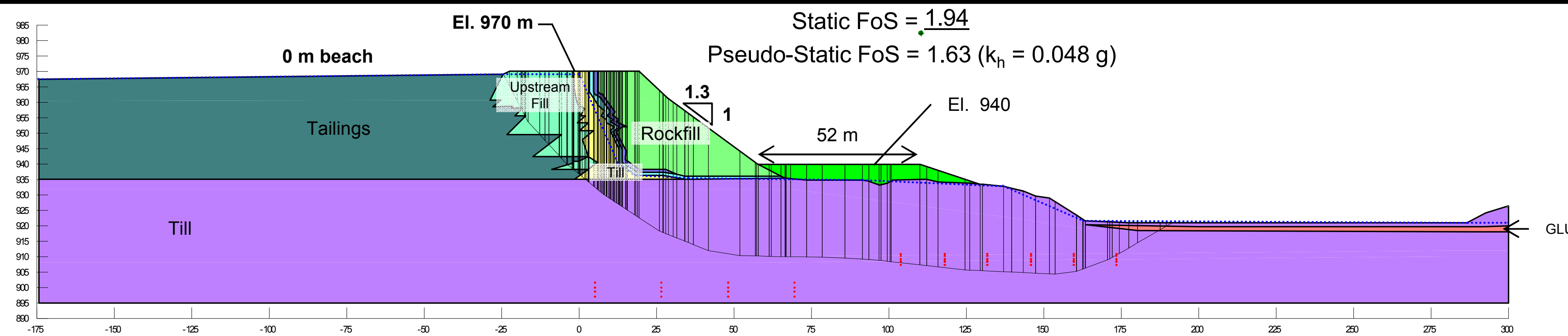
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

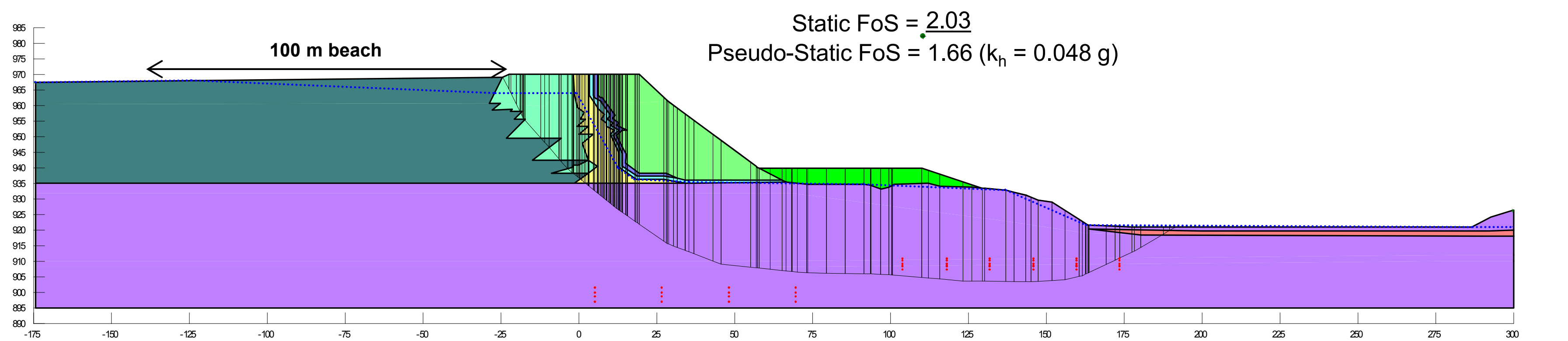
TITLE
TOTAL STRESS STABILITY ANALYSIS
PERIMETER EMBANKMENT STN.3+535

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	FIGURE - F66	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties

Material	Unit Weight (kN/m^3)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	Τ = 0.22 σ_v' OCR$^{0.8}$ where σ_p' = 900

φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

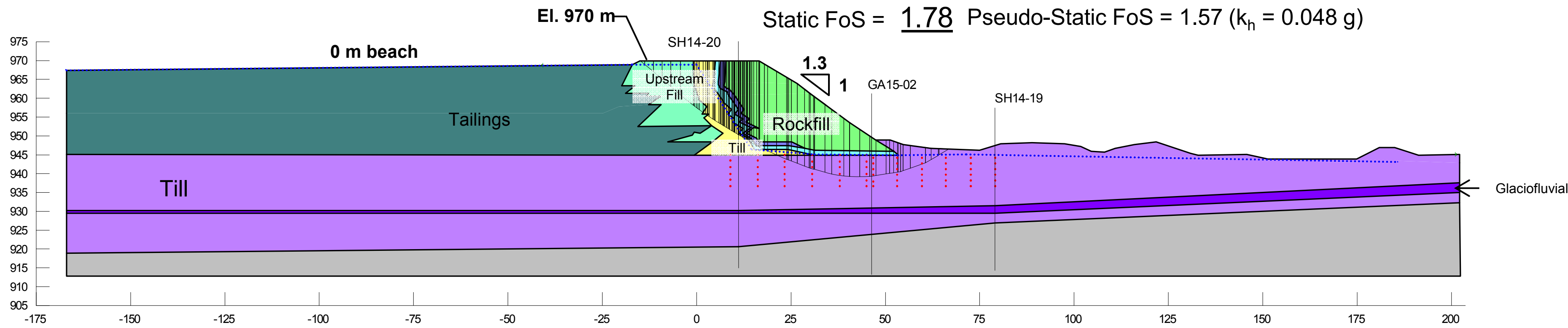
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY ELEVATION 970 DESIGN**

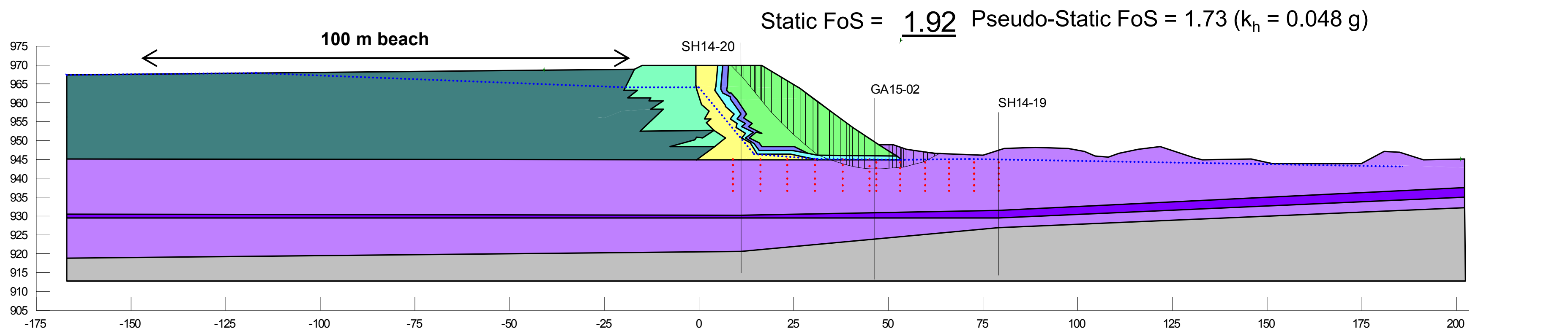
TITLE **TOTAL STRESS STABILITY ANALYSIS PERIMETER EMBANKMENT STN.3+770**

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	**FIGURE - F67**	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Design 970 Elevation





Embankment configuration at crest elevation 970 m

- Consolidated foundation soils
- No upstream drain
- 0 m sub-aerial beach; pond elevation 969 m
- 100 m sub-aerial beach; pond elevation 968 m
- Tailings closure surface (max. el. of 969 m)

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Notes:
1.) No B-Bar applied.

Piezometric Line

PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
ELEVATION 970 DESIGN

TITLE TOTAL STRESS STABILITY ANALYSIS
PERIMETER EMBANKMENT STN.4+525

Golder Associates

PROJECT No. 1413803			PHASE No. 3000	
DESIGN	CTM	22OCT15	SCALE NTS	REV.0
CADD	CTM	22OCT15	FIGURE - F68	
CHECK	GJ	30OCT15		
REVIEW	TLE	30OCT15		

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