November 3, 2015

REPORT

MOUNT POLLEY MINE

Tailings Storage Facility
Life of Mine Feasibility Design

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Executive Summary

Mount Polley Mining Corporation (MPMC) has retained Golder Associates Ltd. to prepare the feasibility design of a tailings storage facility (TSF) at the Mount Polley Mine for the remaining life of the mine. 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.

A review of available technologies for the deposition of tailings has been undertaken. Included in this study was the evaluation of different potential sites for the TSF. An assessment was carried out evaluating alternatives based on environmental, social, technical and economic indicators. Deposition of the tailings as a slurry within the existing facility was identified as the preferred option.

This report presents the feasibility level design of the TSF for an estimated 10 year mine life. The feasibility 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 detained 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;
- Feasibility design of the embankments, including drawings and material specifications;
- Proposed construction schedule for the TSF embankments;
- Stability and seepage analyses; and
- Estimate of construction material quantities.

Planned work to be carried out as part of future design stages is also presented. This includes conducting additional site investigation programs to further characterize the foundation conditions to allow refinement of the buttress design.

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1.0 INTRODUCTION

Mount Polley Mining Corporation (MPMC) has retained Golder Associates Ltd. (Golder) to prepare the feasibility design of a tailings storage facility (TSF) at the Mount Polley Mine for the remaining life of the mine.

The mining operations 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.

This report presents the feasibility level design of the TSF for the estimated 10 year mine life, using best applicable technology (BAT) and best applicable practices (BAP). Included in this report is:

- Design philosophy and criteria;
- Foundation characterization;
- Tailings management alternatives and deposition;
- Water management;
- TSF embankment and buttress design, including material specifications;
- TSF embankment construction sequence;
- Closure and reclamation plan for the TSF;
- Instrumentation and monitoring;
- Stability and seepage analyses;
- Construction material quantity estimate; and
- Planned future work.

Feasibility study design level drawings for the TSF embankment raise to elevation 984 m are provided in Appendix A.

A detailed design for the raise of the TSF, including Corner 1 of the Perimeter Embankment, to an elevation of 970 m is presented under a separate cover (Golder 2015g).

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 a top of cut-off wall 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 2015a). The December 17, 2014 amendment of *Mines Act* 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 2015b). Additional buttressing is required along the Perimeter and Main Embankment. The October 22, 2015 amendment of *Mines Act* Permit M-200 allows construction of this buttress along the Main and Perimeter Embankments Buttress, 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 PHILOSOPHY AND CRITERIA

3.1 Design Philosophy

The design of the TSF follows the principles set out by the Mining Association of Canada in its Towards Sustainable Mining program and the recommendations made by the Independent Expert Engineering Investigation and Review Panel (*IEERP* 2015). Relative to the *IEERP* recommendations, the following approaches have been used for the design of the TSF:

- Limit the amount of surface water to only that required for operation – This will be achieved through maintaining storage capacity within the external water management ponds and ongoing discharge of water from the mine site.
- Promote unsaturated conditions in the tailings – Minimum sub-aerial beach lengths will be maintained and an upstream drain will be constructed to create a zone of unsaturated tailings adjacent to the embankments.
- Achieve dilatant conditions throughout the tailings deposit – The existing tailings within the TSF have now drained and consolidated. The tailings will therefore have a reduced risk for liquefaction. Cone Penetration Tests (CPT) are planned prior to future tailings deposition from the Main and South Embankments to confirm the current condition of the tailings.
- Reduce the hydraulic gradient across the till core – This will be achieved through maintaining sub-aerial beaches along the embankments and the construction of upstream drains.

3.2 Design Criteria

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

- Climate data;
- Embankment Consequence Classification;
- Seismicity;
- Slope Stability Criteria; and
- Freeboard.

Table 1: TSF Design Criteria

Design Criteria		Value	Source / Comment
General			
Tailings Storage Facility Capacity	970 m Crest Elevation	36 million tonnes	At 1.35 tonnes / m^3 Additional to the existing tailings in the TSF
	984 m Crest Elevation	70 million tonnes	At 1.35 tonnes / m^3
Dam Classification		Significant	Refer to Appendix B
Minimum Factor of Safety	Static (End of construction)	1.5	CDA (2013), 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 B
	Minimum	1.1 m	Incorporates wave run-up, wind set-up, and IDF Refer to Appendix B
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
Spillway	Closure Operating Spillway	Corner 5	PMF design flow
Tailings Characteristics			
Disposal Method	Conventional (unthickened) slurry		
Nominal Tailings Production Rate		22,000 tonnes/day	Mine plan up to Q2 of 2020 developed by MPMC, refer to Appendix B. The plan includes 4 million tonnes of tailings to be moved from Springer Pit to the TSF.
Tailings in Place Dry Density	Future Deposited Tailings	1.35 tonnes/m^3	Assumed by Golder 1.36 tonnes/ m^3 in Knight Piésold (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 SITING STUDY AND DEPOSITION TECHNOLOGY REVIEW

This section provides a summary on the selection of a site for future tailings management at the Mount Polley mine site and on best applicable technology (BAT) and best applicable practices (BAP) for tailings deposition as it relates to the Mount Polley Mine. A discussion is provided in Appendix C.

The goal of tailings management is to provide permanent physical stability of the tailings while maintaining chemical stability. The design of the embankments for Mount Polley will use the maximum potential tailings and water levels to calculate the loads on the embankments so that under all conditions the embankments will be stable. The operating rules for the facility will be developed so that under operating conditions the loads imposed on the embankments will be less than the design values.

In selecting potential locations and technologies for the storage of tailings, the following objectives are to be met:

- provide secure and permanent storage;
- minimize additional land disturbance;
- minimize environmental impact (e.g., wildlife, habitat, water quality and discharge, dust generation);
- minimize social impact (e.g. , disruption of traditional land use, negative public perceptions);
- minimize the time to restart mining (this includes time to carry out site characterization studies and geotechnical and hydrogeological investigations, to design the facility, to obtain the required permits, and to procure the required equipment and construct the facility); and,
- minimize cost (this includes the costs for investigation, design, procurement, construction, operation and closure).

The fifth objective is fundamental in selection of the tailings disposal options. Extensive delays in restarting to full operation will negatively impact the economics of the operation, and may lead to the mine being placed under care and maintenance and ultimately closed.

4.1 Potential Sites

The potential sites identified for the TSF include:

- Existing TSF;
- New TSF location, four potential locations have been identified;
- Lake deposition, which could include Polley Lake, Bootjack Lake, and Quesnel Lake;
- Open pit deposition into one of the three existing pits on the Mount Polley Mine site;
- Underground disposal; and
- Co-disposal with waste rock.

The existing Mount Polley open pits and underground workings are eliminated from further consideration as these are the active mining areas. A discussion of the potential sites is included in Appendix C.

4.2 Tailings Management Technologies

The available tailings management technologies are differentiated primarily by the water content of the tailings, which determines the transportation method and the deposition method.

The following technologies are available:

- Low solids content slurry deposition, commonly called Conventional Tailings, or unthickened tailings;
- Thickened (non-segregating) Tailings;
- Paste Tailings;
- Filtered Tailings; and
- Hydro-cyclone Classified Tailings.

A detailed description and comparison of each technology is provided in Appendix C.

One of the advantages of paste or filtered tailings is to reduce the consequence of failure by eliminating the supernatant pond that forms when water is released from the tailings, and to increase the placed density of the tailings which reduces the total storage volume required and reduces the mobility of the tailings in the event of a failure. If low density slurry tailings are deposited within the existing TSF, the consequence of failure can similarly be reduced by implementing BAP. The risk of a failure is reduced by appropriate design and construction of the retaining embankments. The tailings breach on August 4, 2014, was due to inadequate characterization of the foundation conditions and potential failure mechanisms. The foundation conditions have now been characterized in the forensic investigations carried out after the failure and subsequent investigations by Golder. Additional investigations are recommended prior to raising the embankments above El. 970 m.

4.3 Assessment and Findings

The term Best Applicable Technology does not represent a specific technology that can be applied to all situations. Rather, the technology must be selected for the specific site conditions and the mining situation. The purpose of evaluating alternative technologies and potential locations is to identify the preferred method of providing containment of the tailings that will be produced from the remaining life of the Mount Polley Mine (approximately 4 to 10 years).

Five potential sites were evaluated considering BAT for each site and the required objectives identified. The following are the findings of the evaluation:

- The existing TSF is the only location that can be used to meet the timelines of the mine plan, which is a transition into full restart of operations in 2016. The foundation conditions of the existing TSF have been investigated in sufficient detail to allow the detail engineering to be carried out. A new land-based TSF footprint is unlikely to offer advantages over the existing TSF footprint. Using a different land-based site would require significant investigation (such that the foundation conditions could be characterized to sufficient level to enable appropriate design), add significantly to the disturbed area of the mine, and require significantly more work to close and rehabilitate both the existing TSF and the new TSF area.
- Deposition of tailings in deep lakes provides numerous advantages in terms of the physical and chemical stability of tailings; however, the permitting of such facilities is difficult, particularly when the lakes provide habitat for fish.
- Thickened tailings offer limited advantages over low density slurry tailings for Mount Polley. The mine site has an overall positive water balance, and freshet water management would be carried out using the TSF, similar to the low slurry density tailings option.
- The time required to procure, install, and commission a filter plant to allow “dry stacking” of the tailings is estimated at about 36 months. This duration of shutdown is unlikely to be economic. A water management pond would be required to manage the mine site water. This would require a dam with a height of about 20 to 30 m.
- A low density slurry tailings facility with wide buttresses along the embankments reduces the probability of failure while maintaining the tailings pond with only sufficient water to meet the ore processing needs reduces the consequence of failure.

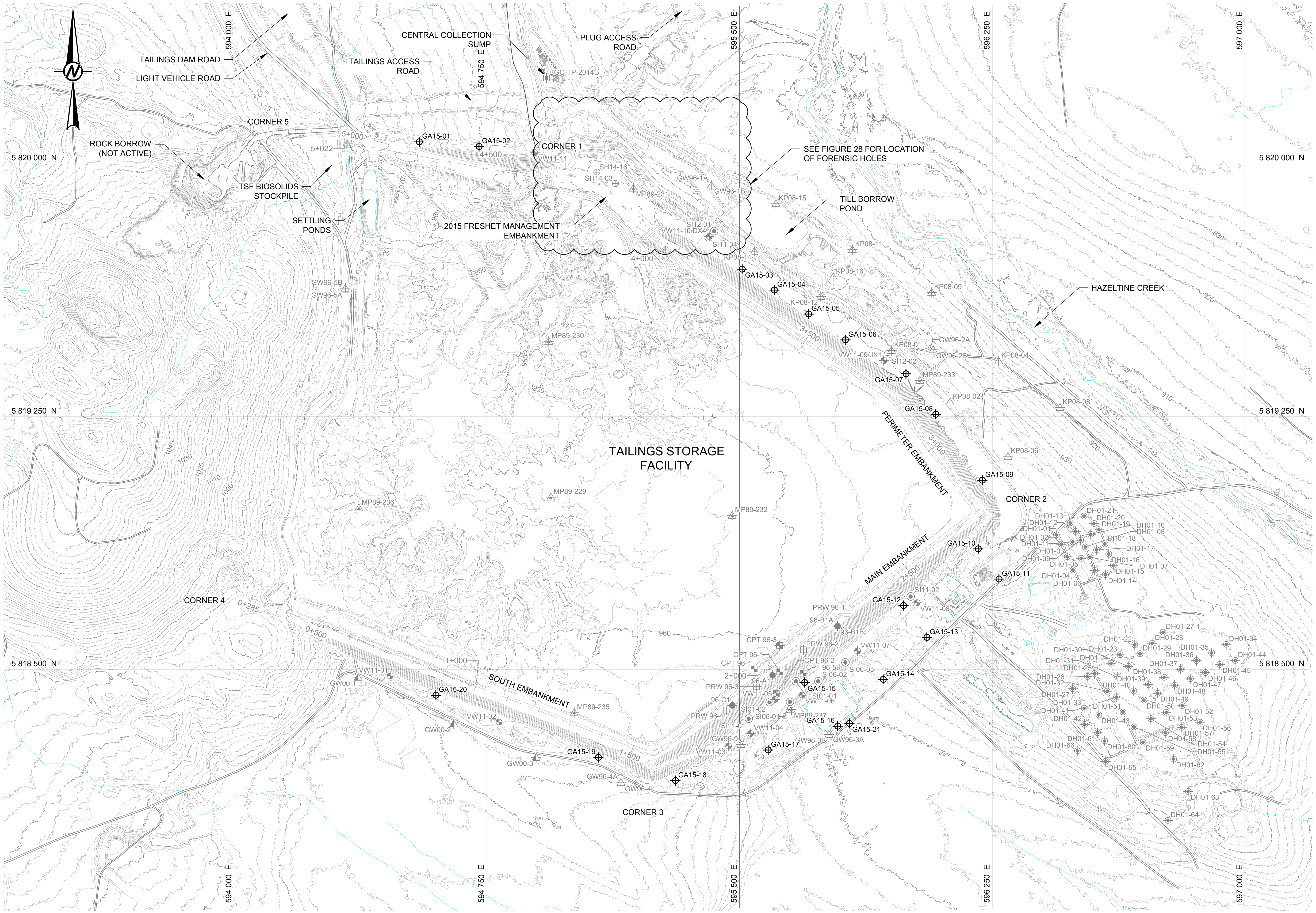
The deposition of low density slurry tailings into the existing TSF (with appropriate buttresses and operating rules) is the preferred option for Mount Polley, provided that ongoing release of water from the mine site is permitted so that year over year accumulation of water does not occur.

5.0 FOUNDATION CONDITIONS

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

- Knight Piésold (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 2015c) 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

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

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 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.

NOT FOR CONSTRUCTION

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CLIENT
MOUNT POLLEY MINING CORPORATION

PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

CONSULTANT
Golder Associates

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

TITLE
SITE INVESTIGATION PLAN

PROJECT No.	PHASE/DOC.#	Rev.	FIGURE
1413803	9000/072	0	2

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5.1 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.

Notes: a) Klohn Crippen Berger (2015a,b)

b) *IEERP* (2015)

c) Golder Associates (2015a)

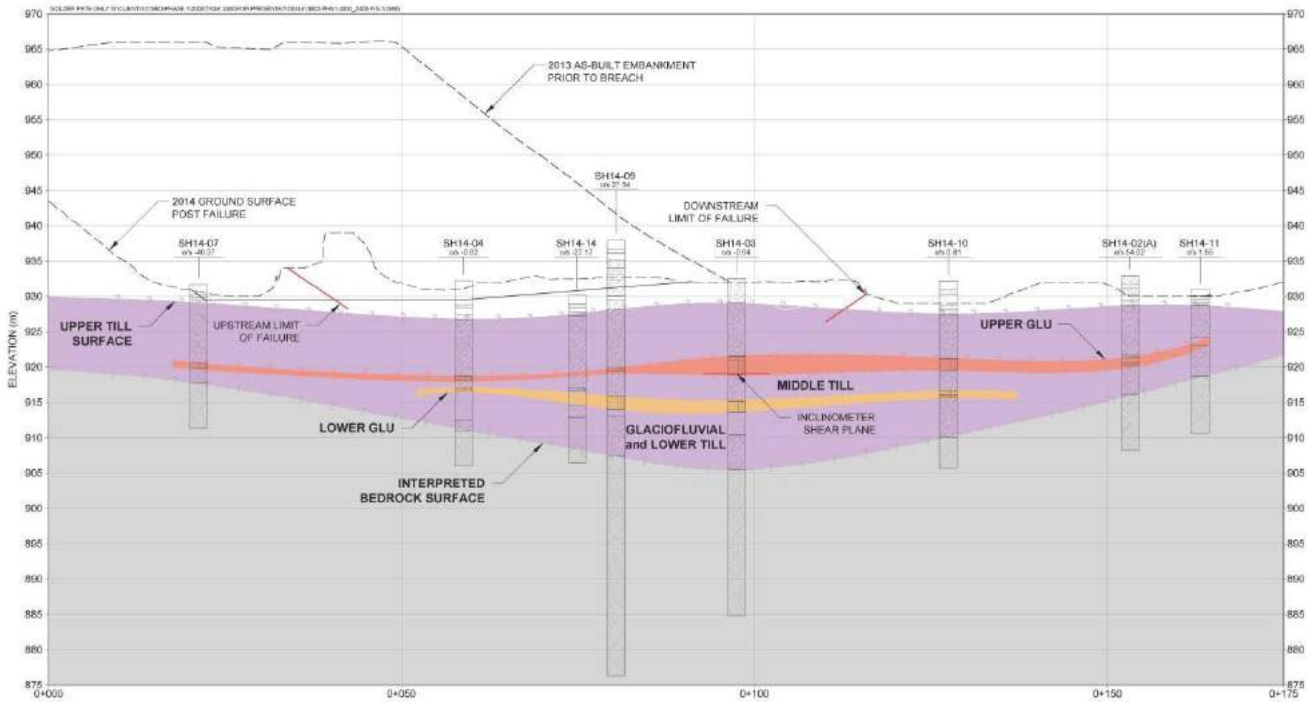


Figure 3: Typical Soil Stratigraphy at Corner 1

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

5.1.1 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 pressuremeter 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 from 6 m to about 10 m.

5.1.2 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.

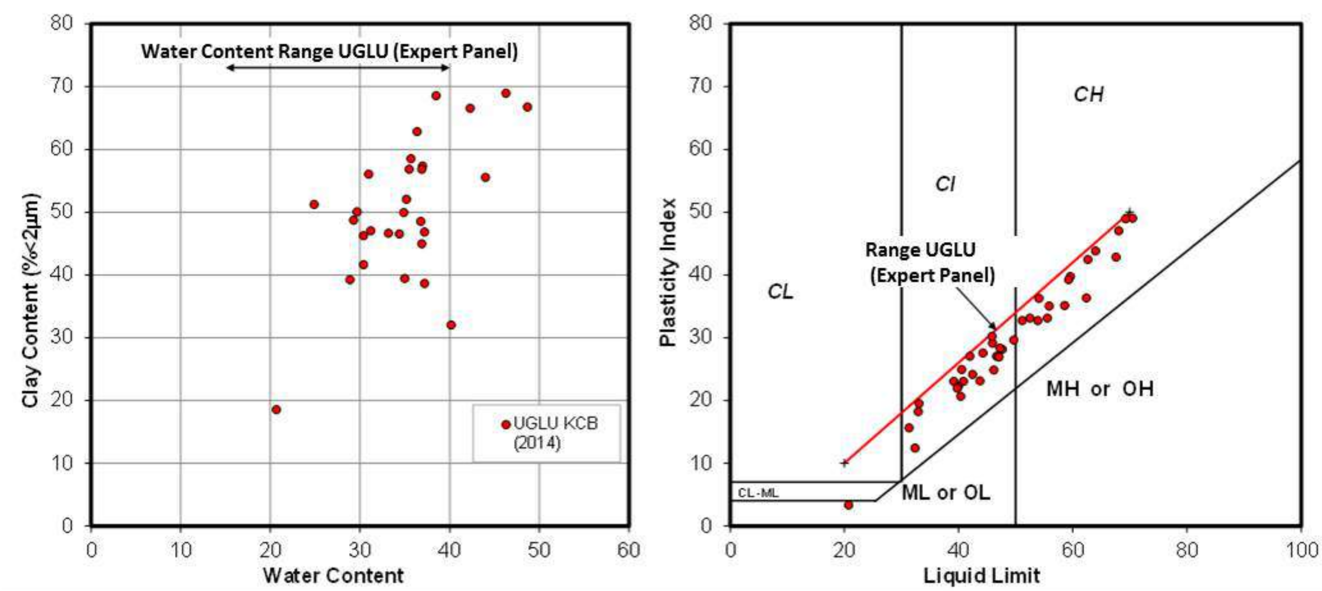


Figure 4: Index Properties of the UGLU (as reported in IEERP (2015) and KCB (2015b))

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 during rockfill placement (using piezometer VST14-03) was $6x10^{-7}$ m^2/s.

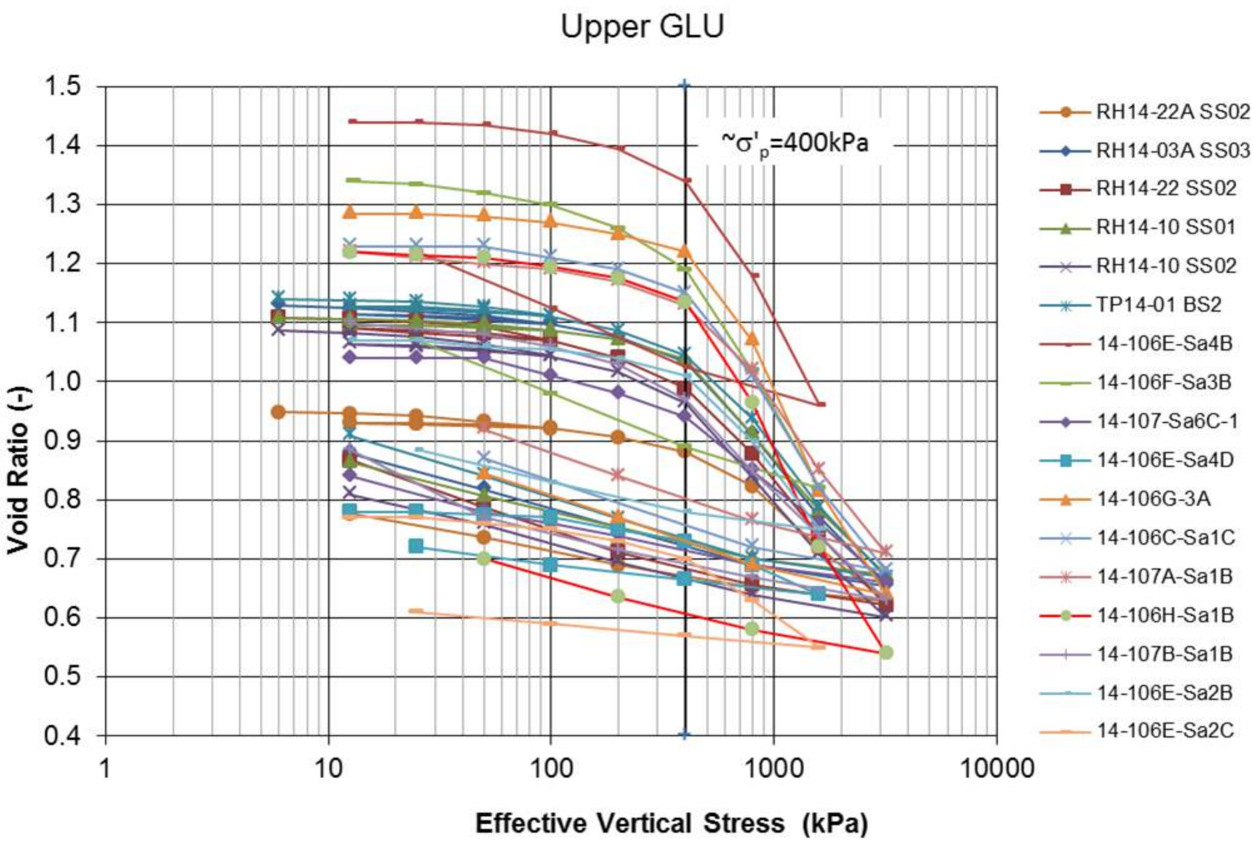


Figure 5: Results from Consolidation Tests on Specimens of UGLU reported by the IEERP (2015) and KCB (2015b)

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.

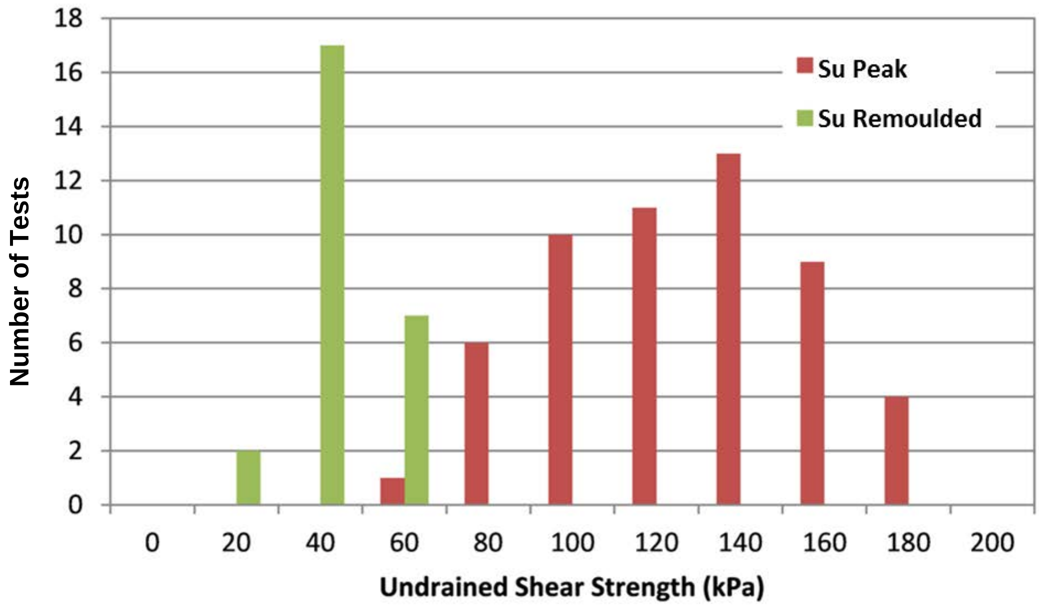


Figure 6: Histogram of Peak and Remoulded Shear Strength for the UGLU

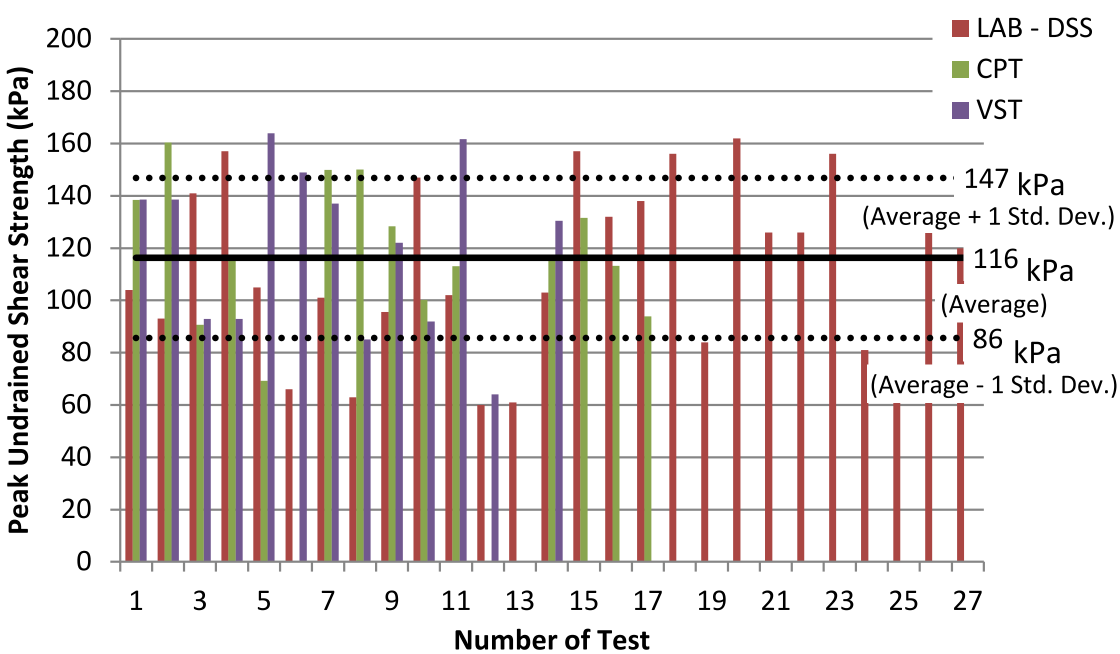


Figure 7: Peak Undrained Shear Strength Estimated for the UGLU from Field Vane, CPT and Simple Shear Tests

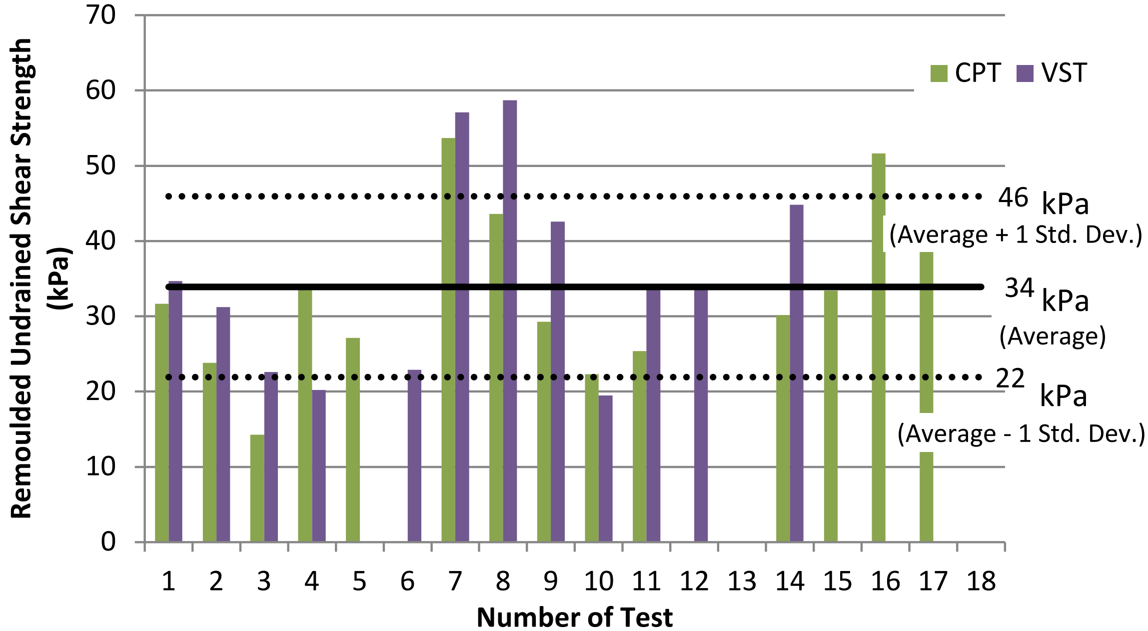


Figure 8: Remoulded Undrained Shear Strength Estimated for the UGLU from Field Vane and CPT

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 Foott 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 $s_u/\sigma'_v = 0.22$.

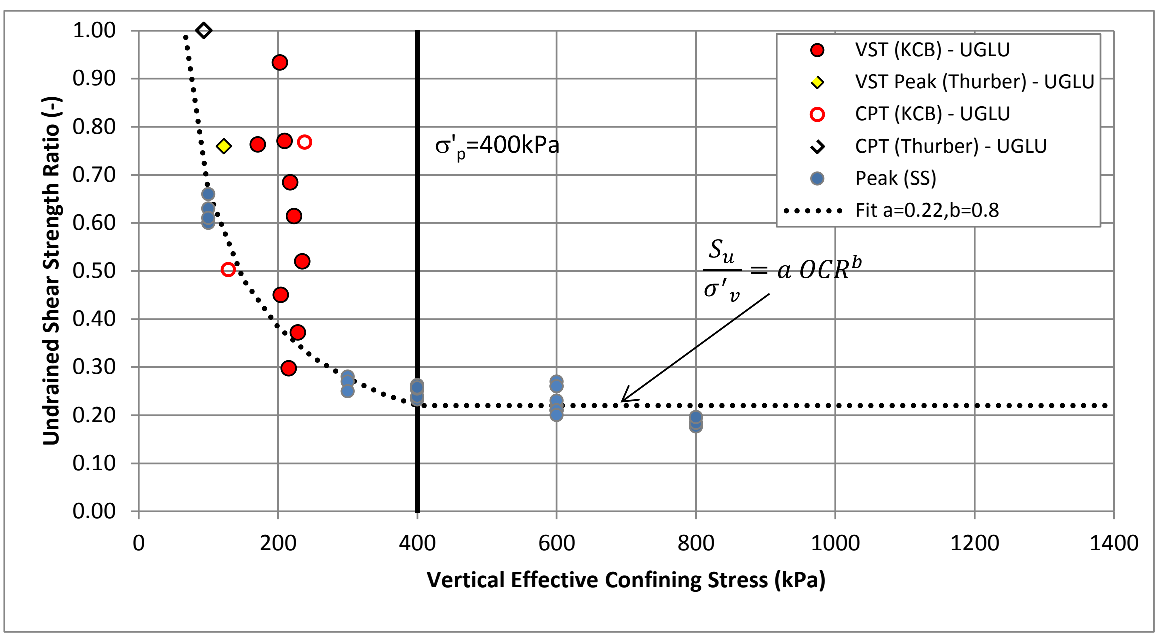


Figure 9: Peak Undrained Shear Strength Ratio Estimated for the UGLU

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 the stress-deformation modelling software 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 UGLU. 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.

5.1.3 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.

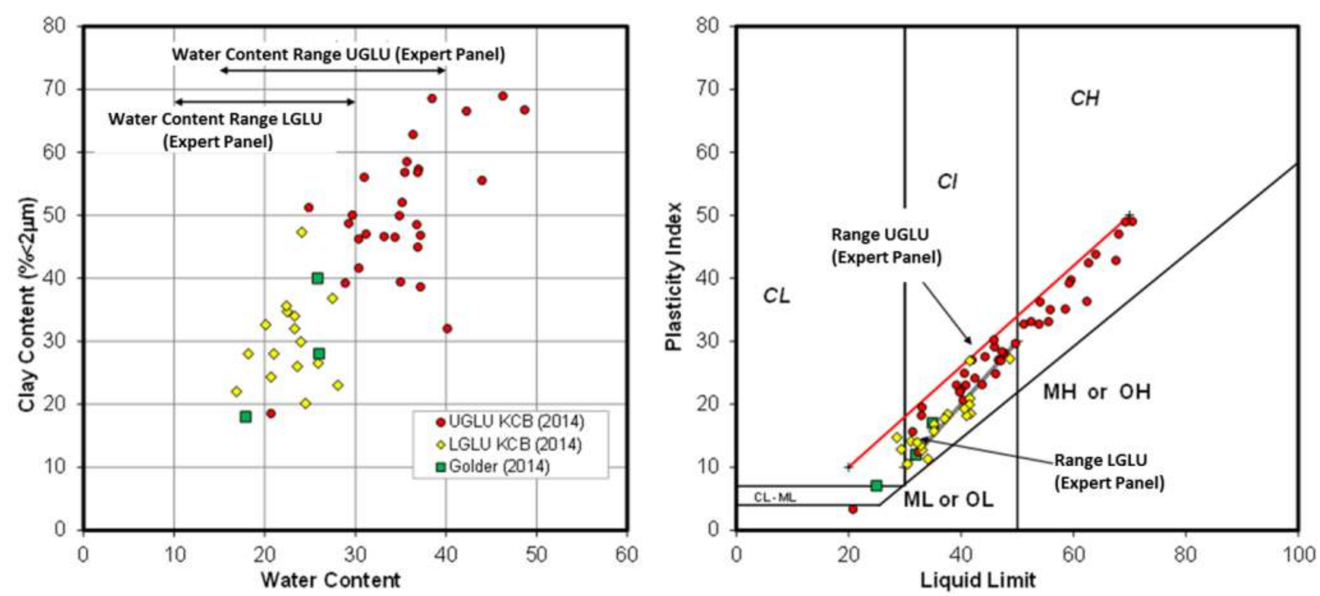


Figure 10: Index Properties of the UGLU and LGLU at the Breach Area reported by the IEERP (2015) and KCB (2015b)

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.

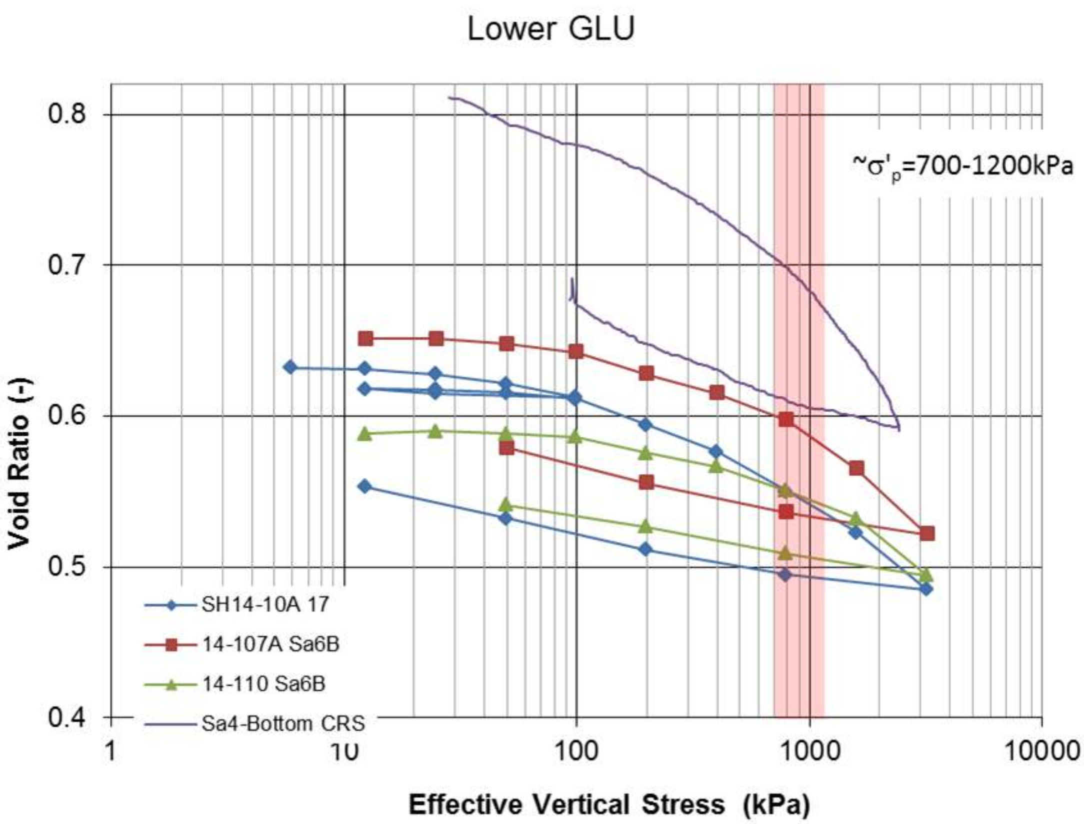


Figure 11: Results from Consolidation Tests on Specimens of LGLU reported by the IEERP (2015) KCB (2015b) and Golder (2014a)

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 $s_u/\sigma'_v = 0.22$.

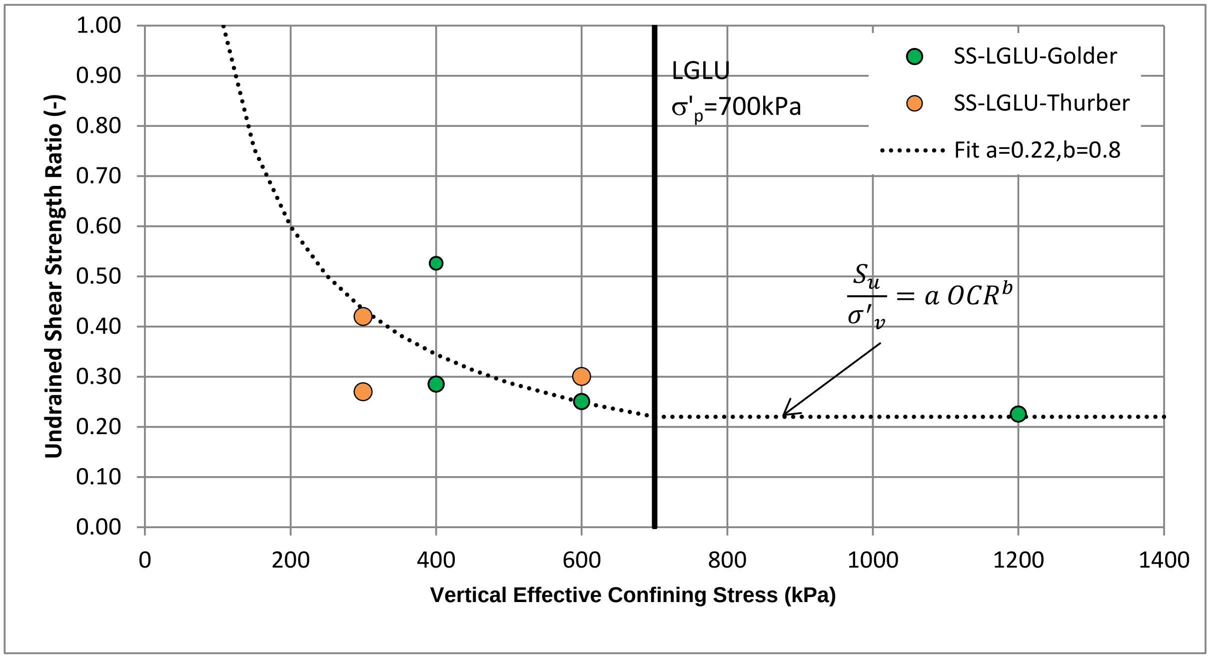


Figure 12: Peak Undrained Shear Strength Ratio Estimated for the UGLU and LGLU

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).

5.1.4 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 2015d).

5.2 Foundation Characterization along the Perimeter, Main and South Embankments

In 2015, Golder completed additional site investigation 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 2015c). 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 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 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.

5.2.1 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 (2015a).

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 breach 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 to 904 m, with measured water contents of around 28%, and plotting in the high plasticity range.

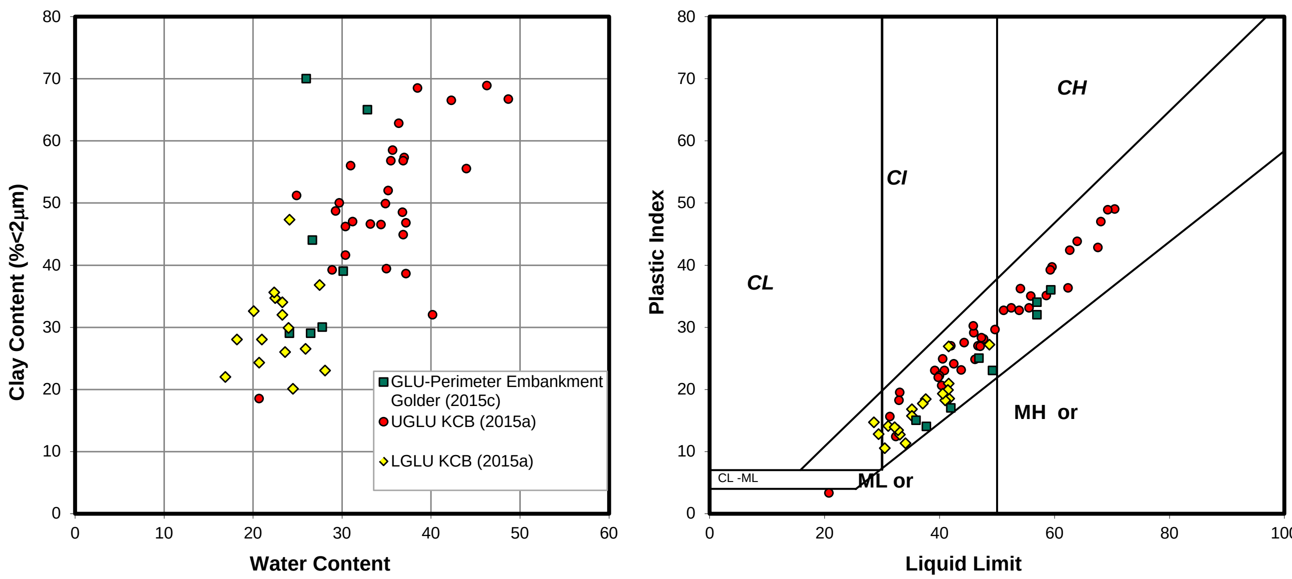


Figure 13: Index Properties of the Perimeter Embankment Glaciolacustrine soils

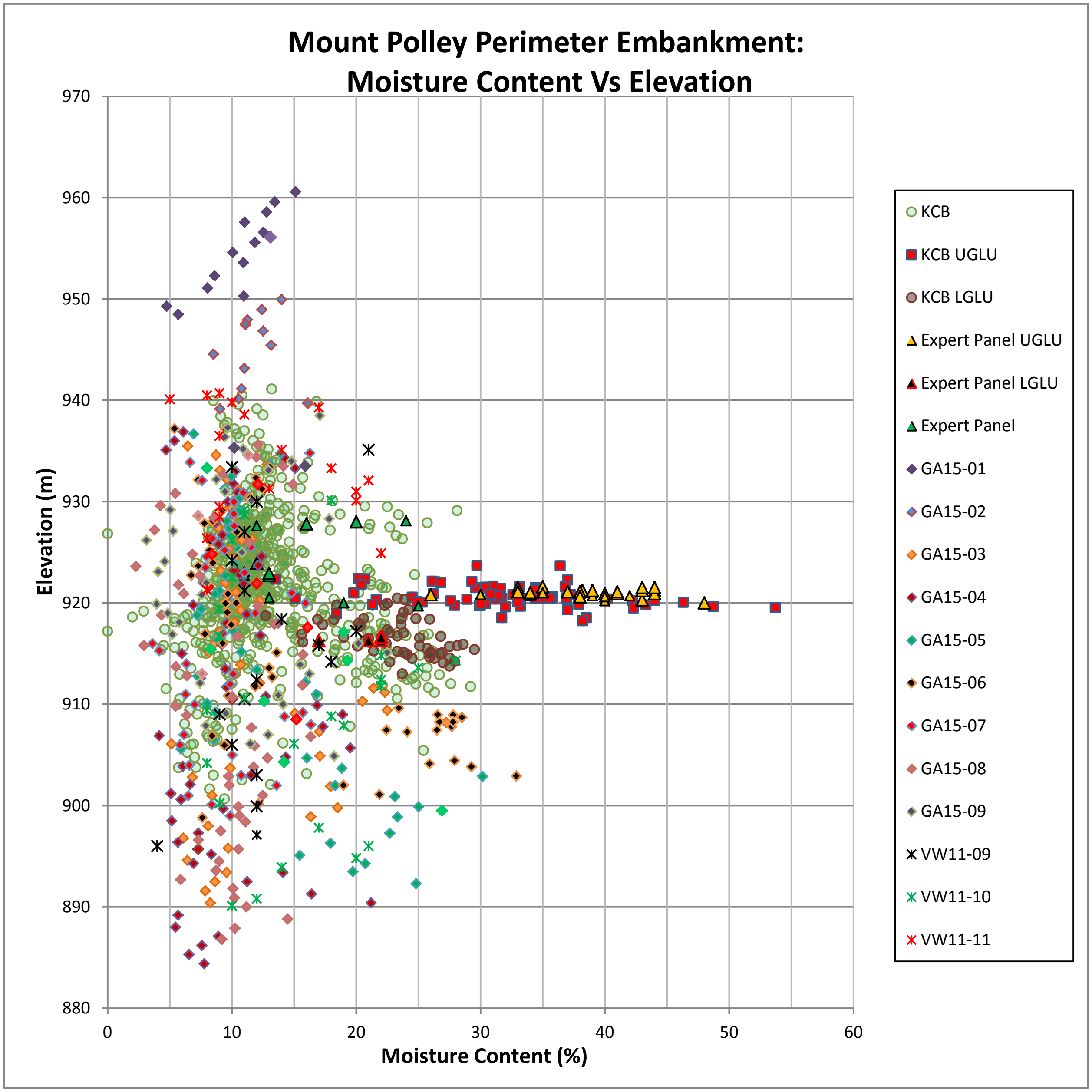


Figure 14: Variation of Water Content with Depth in the Boreholes Located along the Perimeter Embankment

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 2015c). 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 2015c.

5.2.2 Main Embankment

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

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 breach 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 (Breach area), with generally low to intermediate plasticity.

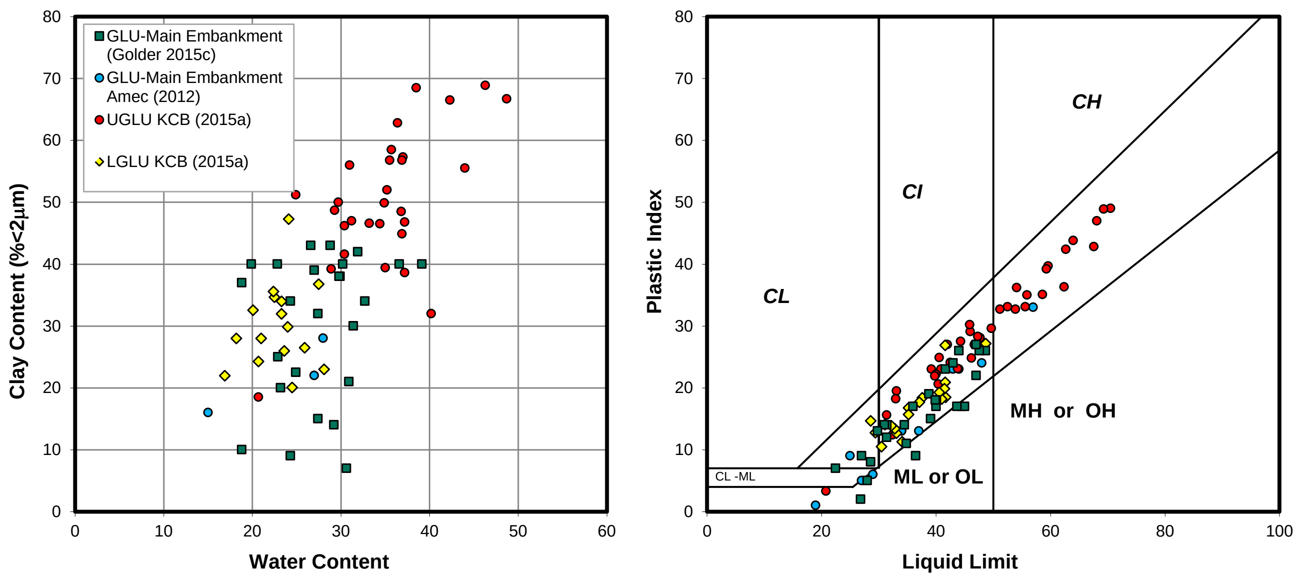


Figure 15: Index Properties of the Main Embankment Glaciolacustrine Soil

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 breach area are included for comparison. The average water content of the glaciolacustrine soil is approximately 27%, and ranges from 16 to 40%.

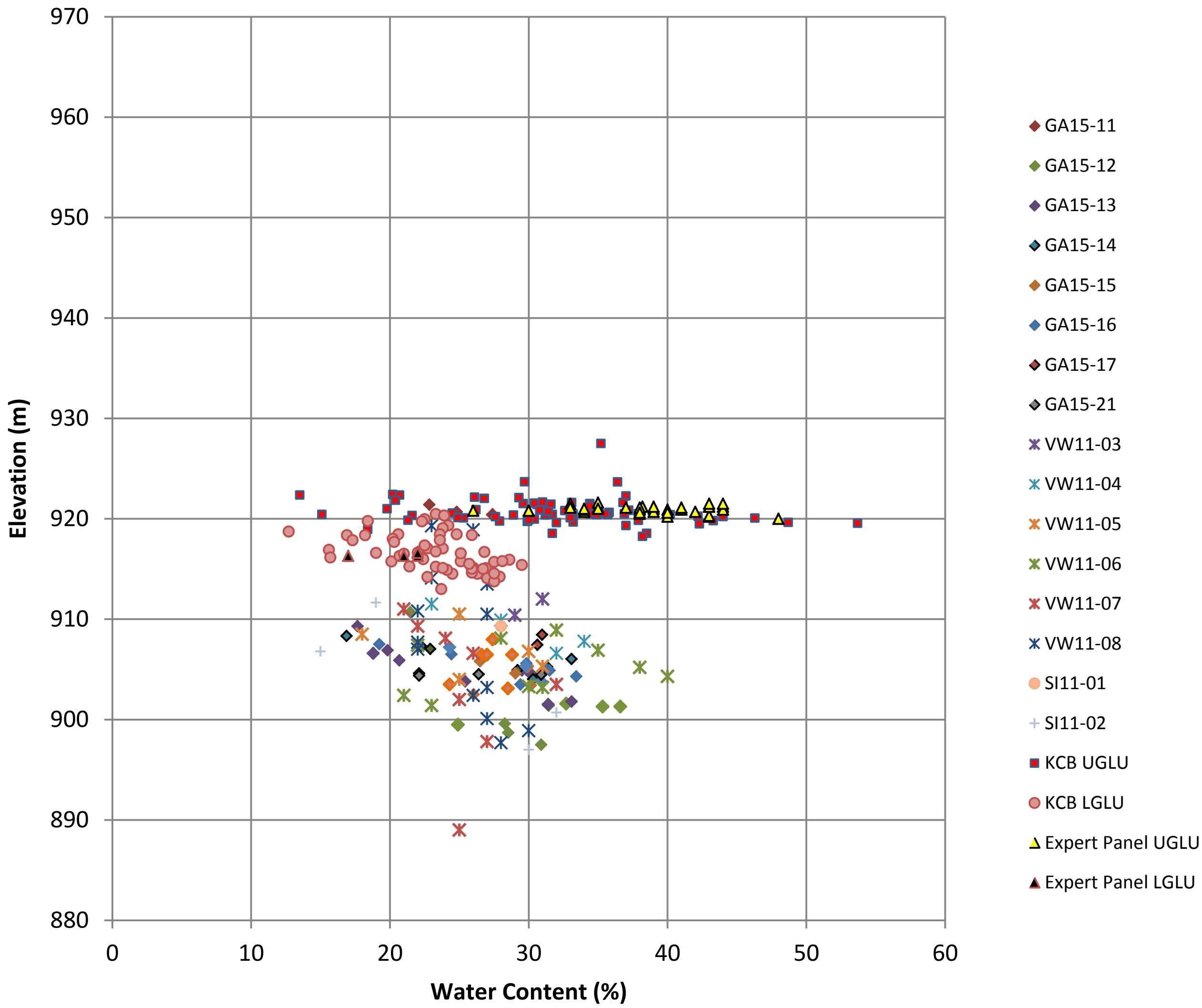


Figure 16: Variation of Water Content with Depth for the glaciolacustrine soil along the Main Embankment

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 (2015c).

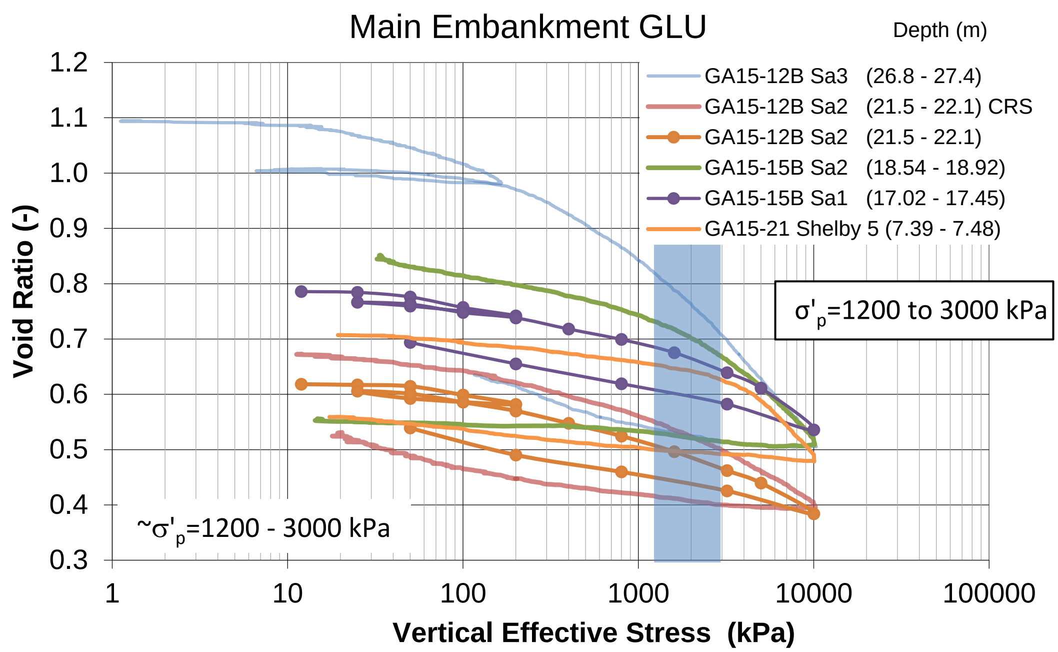


Figure 17: Consolidation Test Results on Main Embankment glaciolacustrine soil Samples

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.

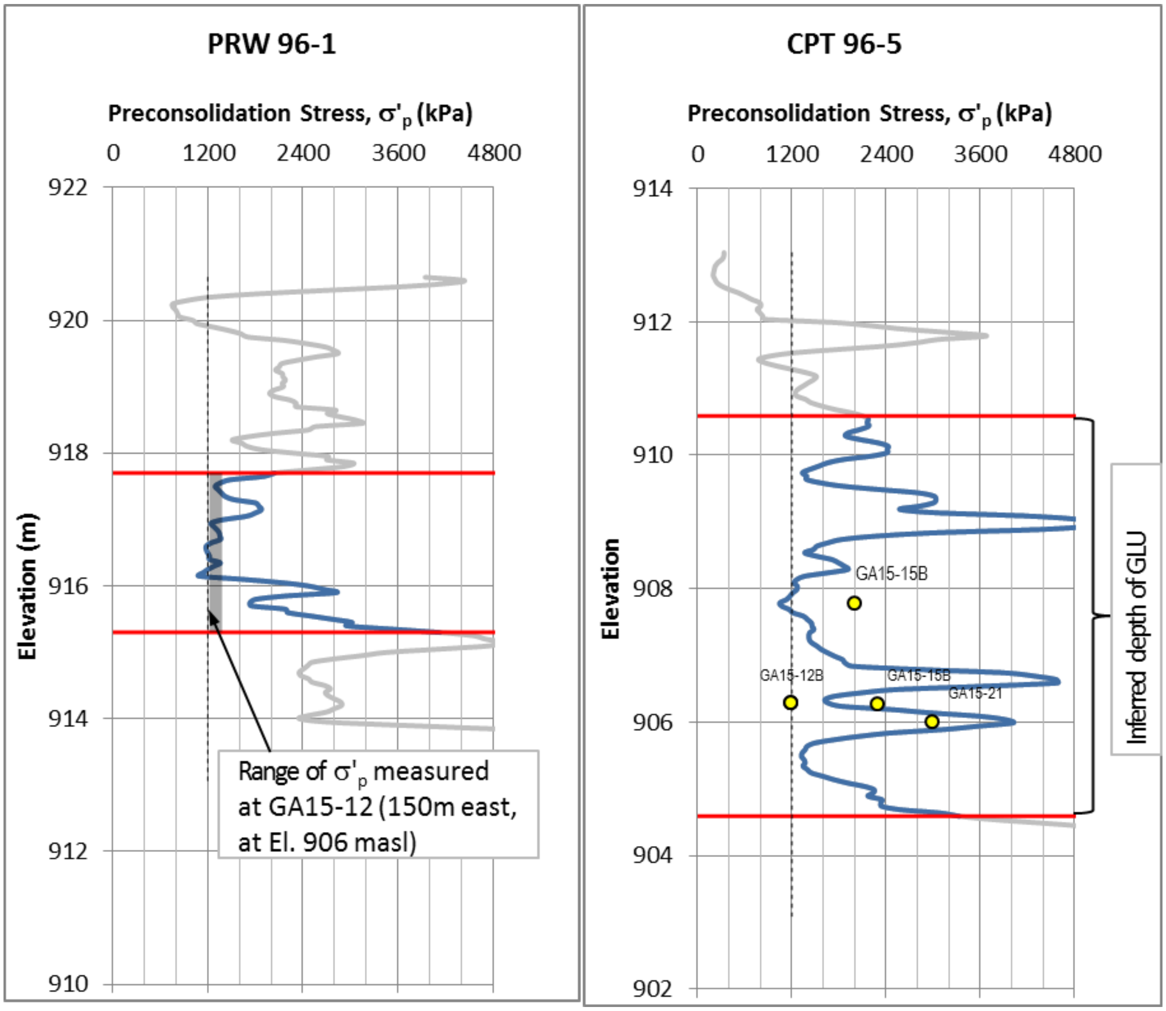


Figure 18: Preconsolidation Stress Comparison between Laboratory and CPT Data (Main Embankment)

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.

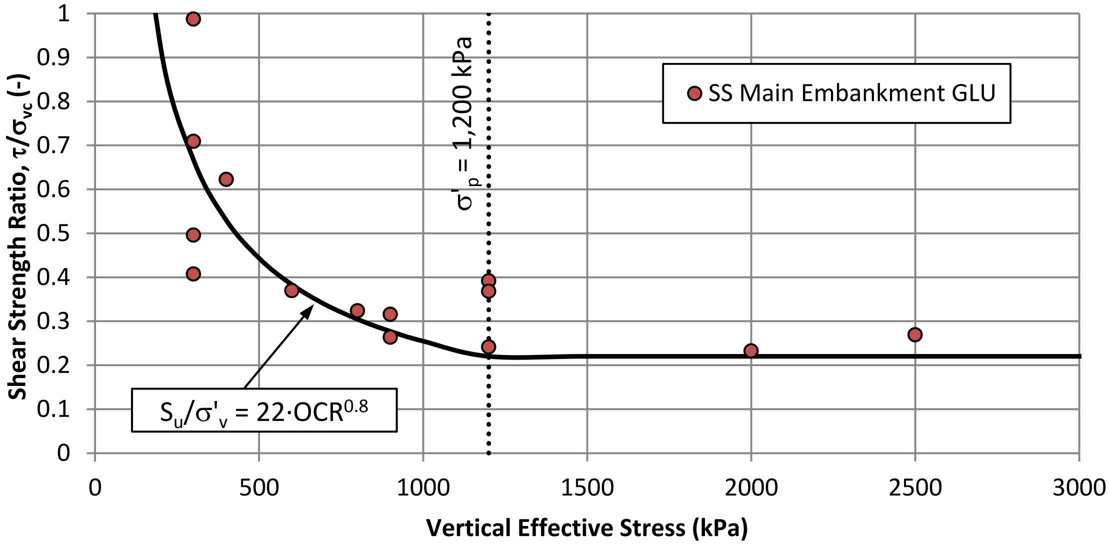


Figure 19: Peak Undrained Shear Strength Ratio Estimated for the Main Embankment glaciolacustrine soil

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).

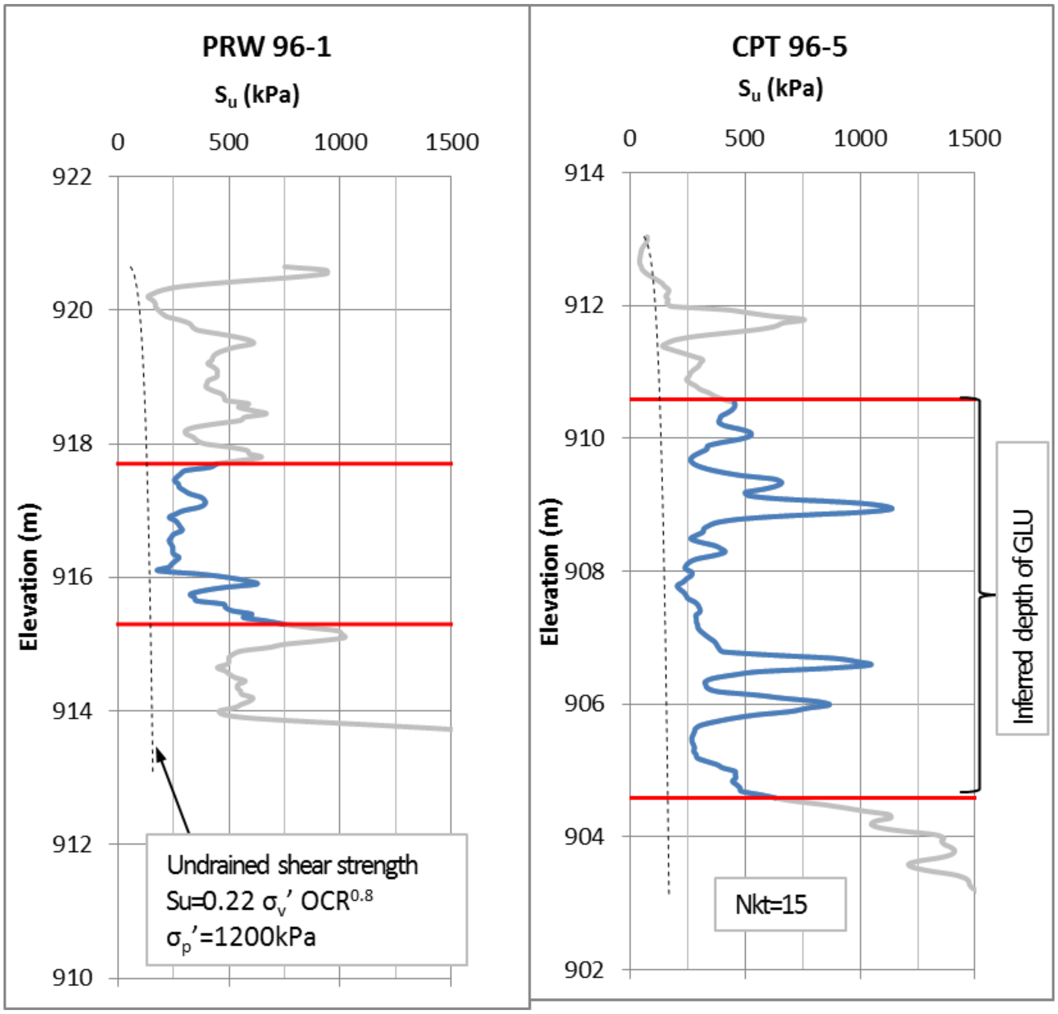


Figure 20: Undrained Shear Strength Estimated from CPT and the SHANSEP Method (Main Embankment)

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).

5.2.3 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.

Additional boreholes will be drilled along the South Embankment to confirm foundation conditions prior to raising the embankment above the 970 m crest elevation.

5.3 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.

6.0 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 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%. A maximum pond depth of 4 m is assumed in the deposition model. Sensitivity analyses were carried out assuming a constant tailings slope to demonstrate the sensitivity of the deposition plan to the actual beach slope achieved.

A minimum water pond volume of one million m^3 will be maintained within the TSF. Deposition of the tailings will be carried out 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 in natural ground 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. A maximum embankment crest elevation of 984 m was assumed. Select stages of the deposition modelling are shown in Appendix D for the average 1% beach slopes, and for 1% sub-aerial beach slope with the steeper sub-aqueous slope of 3%.

The available tailings storage capacity versus tailings elevation is shown in Figure 21. The timeline shown as a secondary axis assumes a constant tailings deposition rate of approximately 22,000 tonnes per day, and a constant settled density of 1.35 tonnes/m^3. Changing the production rate or the date at which production starts changes the date at which a specific configuration is reached, but will not change the planned sequence of deposition. The approximate tailings volume for the varying beach slopes is presented in Table 3. The crest elevation of 984 m will store the tailings produced during the presently defined reserve of the mine (approximately 10 years).

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	4.2	5.7	2.6	3.6	1.7	2.2	2.7	3.6
960	8.1	11.0	6.8	9.2	5.0	6.8	6.0	8.1
965	15.3	20.6	11.0	14.8	9.4	12.7	10.6	14.3
970	24.5	33.1	21.9	29.6	19.0	25.6	20.6	27.8
983	51.6	69.7	43.5	58.7	33.8	45.6	45.2	61.0
984	55.3	74.6	55.3	74.6	55.3	74.6	55.3	74.6

Notes: 1.) Tonnes based on a constant settled density of 1.35 tonnes/m^3

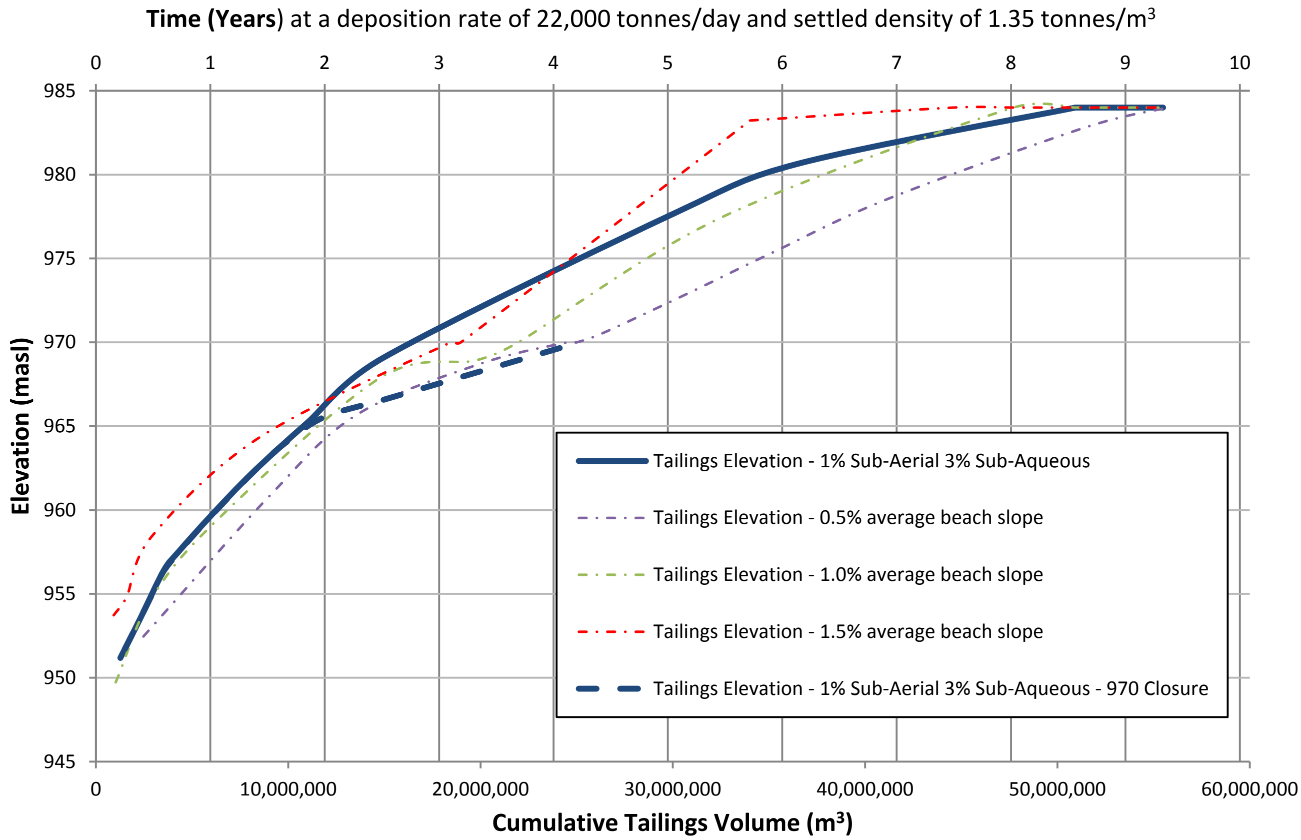


Figure 21: Tailings Storage Curves for Different Beach Slopes

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 and reduce the pond depth and volume. 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 up to the second quarter of 2020 assuming completion of mining under the restricted operations and Phase 4 Cariboo-Springer Pit (four year return to full operations), and is shown in Appendix B. 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. After the second quarter of 2020 the tailings discharge rate is assumed 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 permitting timelines.

7.0 WATER MANAGEMENT

7.1 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). 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 2015f). A brief summary of the water management plan for the TSF is presented below.

The majority of water inflows into the TSF are pumped and are therefore in the direct control of MPMC. 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 the 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 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 MPMC, 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 one million m^3 (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 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. 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 Corner 1 Perimeter Embankment 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 natural topography on the western boundary of the TSF. The planned 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 and at the edge of the embankments.

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

A site-wide operational water balance model was developed by Golder (2015f) 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 may 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 may 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.

7.2 Seepage from the TSF

During the operations prior to the breach, the seepage through the foundations drains was measured and is summarised 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 (KP 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 984 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 11.0.

8.0 TAILINGS STORAGE FACILITY FEASIBILITY DESIGN

The feasibility design of the embankment raise and operation of the TSF is being developed in compliance with the intent of the *Mines Act* M-200 permit amendment that authorized construction of the Freshet Embankment, considering the Mining Association of Canada's Towards Sustainable Mining initiative and considering the findings of the Mount Polley Independent Expert Engineering Investigation and Review Panel (*IEERP* 2015) and its comments related to use of BAT and BAP.

Corner 1 of the Perimeter Embankment (location of the Freshet Embankment) will initially be raised from a crest elevation of 950 m to the pre-breach elevation of 970 m. This Corner 1 Perimeter Embankment will then be raised along with, and in the same manner as, the Main, Perimeter, and South Embankments from elevation 970 m to 984 m. The tailings deposition plan is developed to maintain a tailings beach length of 300 m, with a minimum beach length of 100 m, along the embankments under normal operating conditions.

The embankments are to be raised as solids and water retention structures, incorporating a till core seepage control element. Upstream drains will be constructed to promote drainage and consolidation of the tailings near the embankments and to limit the hydraulic head imposed on the existing core to no more than the head retained by the core prior to the breach. Although the tailings deposition plan is based on maintaining the pond away from the embankments, the embankments have been designed to be stable with the pond directly against the embankments and the upstream drains not functioning.

The embankments will be raised using centreline construction with the till core constructed above the cut-off wall of the Freshet Embankment and the existing till core of the South, Main and Perimeter Embankments. A filter zone and transition zone is to be placed downstream of the till core and will tie into the existing filter and transition zones.

A plan showing the design of the TSF to a crest elevation of 984 m is shown in Drawing 4 in Appendix A. The feasibility level design drawings are included in Appendix A. The detailed design for the raising of the Corner 1 Perimeter Embankment to El. 970 m is presented in a separate report that includes issued for construction drawings and specifications (Golder 2015g).

8.1 Embankment Zoning

The embankments will consist of the following components, listed from downstream to upstream:

- Buttress (Zone C) – Stabilizing buttress constructed along the downstream toe of the embankments, with a 3 horizontal to 1 vertical (3H:1V) downstream face.
- Rockfill embankment (Zone C) – The rockfill will be placed in lifts from the bottom up, to the closure configuration 2H:1V downstream face. The final (upper) approximately 11 m will be placed with a downstream face of 1.3H:1V to provide a wider crest width at the ultimate elevation. This portion will be resloped to 2H:1V as part of closure and rehabilitation of the TSF.
- Filter (Zone F) and transition (Zone T) zones – These zones will tie into the existing filter and transitions zones and are designed to prevent internal erosion and piping of the till core.

- Till core (Zone S) – The central zone and low permeability element to tie into the existing till core or cut-off wall (of the Freshet Embankment).
- Upstream Fil (Zone U) – Coarser compacted tailings or other granular materials which will provide support to the till core. The upstream drain will be constructed on the existing upstream fill.

Typical sections of the embankments are shown in Drawings 5 to 8 in Appendix A.

8.2 Materials

The following subsections provide the details of the materials to be used for the embankment construction. The materials are the same as specified for the construction of the Freshet Embankment. All fill material will be non-potentially acid generating and fall within the specified gradations envelopes, as shown in Figure 22.

Fill materials will be produced, stockpiled, hauled, placed and spread in a manner to minimize segregation. Materials not complying with the specified gradations will not 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 as directed by the design Geotechnical Engineer. The lift thicknesses for the various materials are proposed and will be confirmed during detailed design and construction.

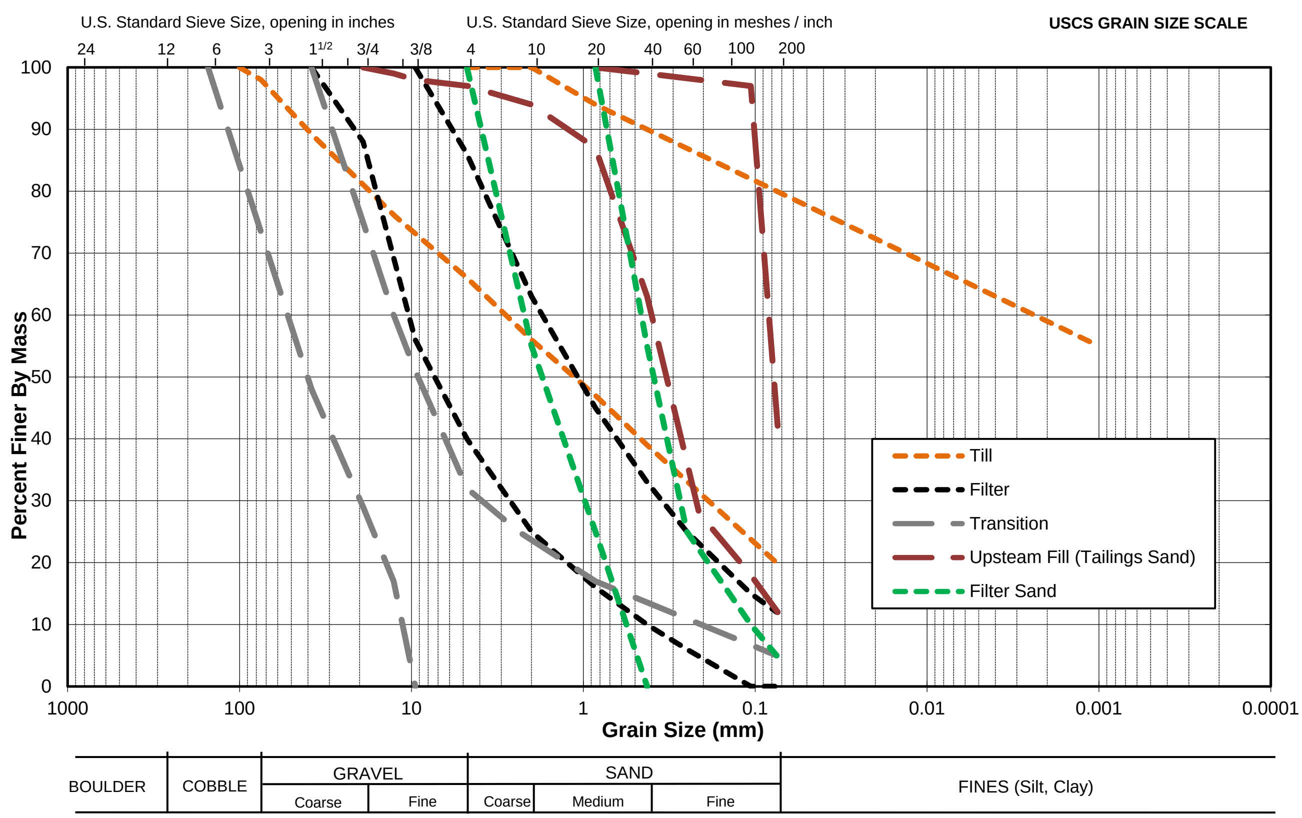


Figure 22: Proposed Construction Material Particle Size Distribution Envelopes

8.2.1 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 22. The till will be sourced from specified borrow areas or from the excavations made during construction 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.

8.2.2 Filter (Zone F)

The filter (Zone F) material will be comprised of sand and gravel that is produced by crushing waste rock. The particle size distribution is shown in Table 6 and in Figure 22.

The filter material has been designed to be filter compatible with the till foundation and 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). Refer to Section 8.3 for further discussion on the filter requirements.

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

Note: USS = United States Standard Sieve Size

The filter material adjacent to till 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.

8.2.3 Transition (Zone T)

The transition (Zone T) material is to be comprised of cobbles, gravel and sand that are formed from crushing waste rock to produce a material with a particle size distribution shown in Table 7 and Figure 22.

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

Note: 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 10-tonne vibratory smooth drum roller or equivalent compactive effort.

8.2.4 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.

8.2.5 Upstream Fill (Zone U)

The upstream fill will consist of tailings deposited in cells from end-of-pipe or spigots. The cells will confine the coarser fraction of the tailings, while allowing the water and finer fraction to overflow into the TSF. The coarser tailings that remain in the cell will be graded with a dozer to achieve uniform distribution within the cell, and provide compaction of the tailings.

This construction was used previously (prior to the breach) with success.

Due to the height of fill required to be placed in a limited time to raise the Corner 1 Perimeter Embankment from elevation 950 m to 970 m, the spigoting of tailings to form the upstream fill will not be possible. Tailings sand excavated from within the TSF will be used as upstream fill for the till core. The tailings will be placed in nominal 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. This is presented in more detail in the Corner 1 Perimeter Embankment design report (Golder 2015g).

8.2.6 Rockfill (Zone C)

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 rockfill within 10 m of the core will be placed and compacted in 1 m lifts. The rockfill outside this zone will be placed in a loose lifts, up to 3 m thick, and nominally compacted by the routing of loaded haul truck traffic on the rockfill.

8.2.7 Drain Rock and Separation Geotextile

Drain rock with a uniform gradation between 150 and 300 mm will be used for the upstream drains. The drain rock will be placed on an 800 g/m^2 non-woven needle punched geotextile, and will be covered with a 340 g/m^2 non-woven needle punched geotextile. The geotextile will reduce the migration of tailings within the drain rock material.

8.3 Filter Compatibility of Embankment Materials

The specified gradation of filter material to be used for future construction is based on testing carried out on similar crushed aggregates by Golder for the Antamina Tailings Facility (Eldridge and Gilmer, 2002).

Laboratory testing to confirm the internal stability of a granular filter composed of crushed aggregates with a similar gradation to the proposed filter material was carried out. This filter material was shown not to erode under hydraulic gradients much greater than those expected in the Mount Polley TSF. Construction of the Antamina tailings dam was started in 1999 and the dam has now been raised to a height greater than 200 m.

The *IEERP* in their report following the breach (*IEERP* 2015) identified that some of the as-placed filter material failed to meet applicable filter criteria and requirements for internal stability of its grading. It was, however, also reported by the *IEERP* that the finer fraction of the filter material was still present within the samples within the breach area. There was no evidence of erosion of the till core within the breach area and it was concluded that internal erosion was not pervasive.

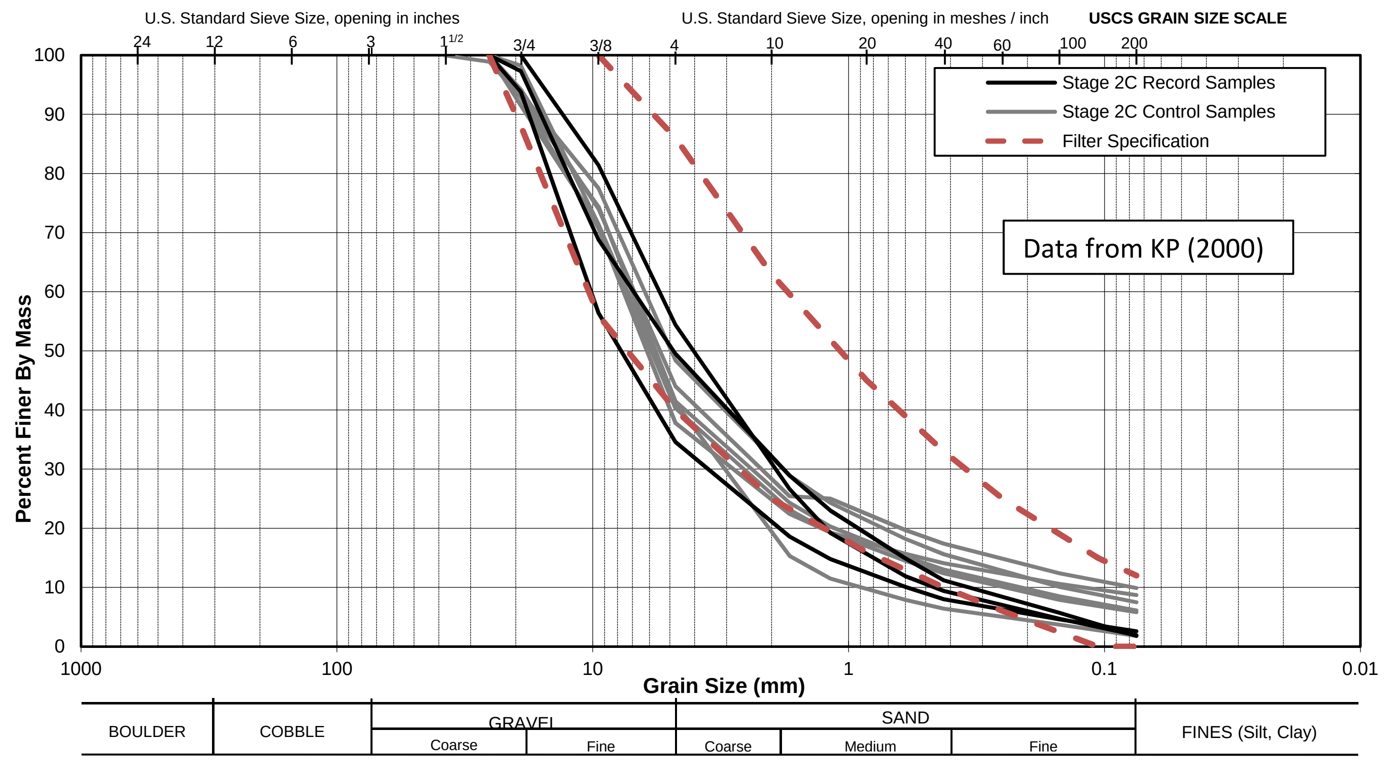
The low level of suspended solids within the seepage water from the TSF provides further evidence against internal erosion of the filter and till core. Seepage water from the TSF is routinely sampled to measure total suspended solids (TSS). This includes sampling water from four toe drains along the Main, Perimeter and South Embankments. The TSS is generally below 2 mg/L. Samples are also taken from the Main and Perimeter Embankment seepage collection ponds, but may not be representative as they also capture external run-off water. The measurements of TSS are summarised in Table 9.

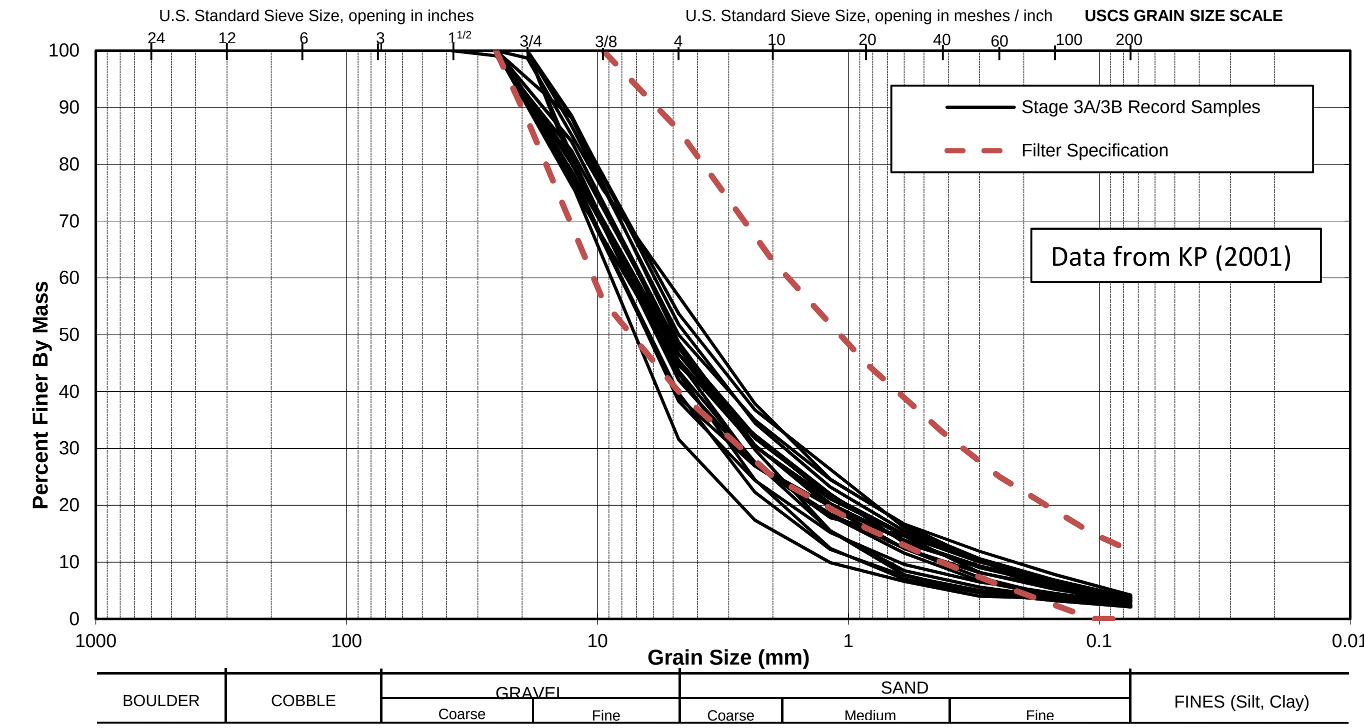
Table 9: Summary of Total Suspended Solids from TSF Seepage Water

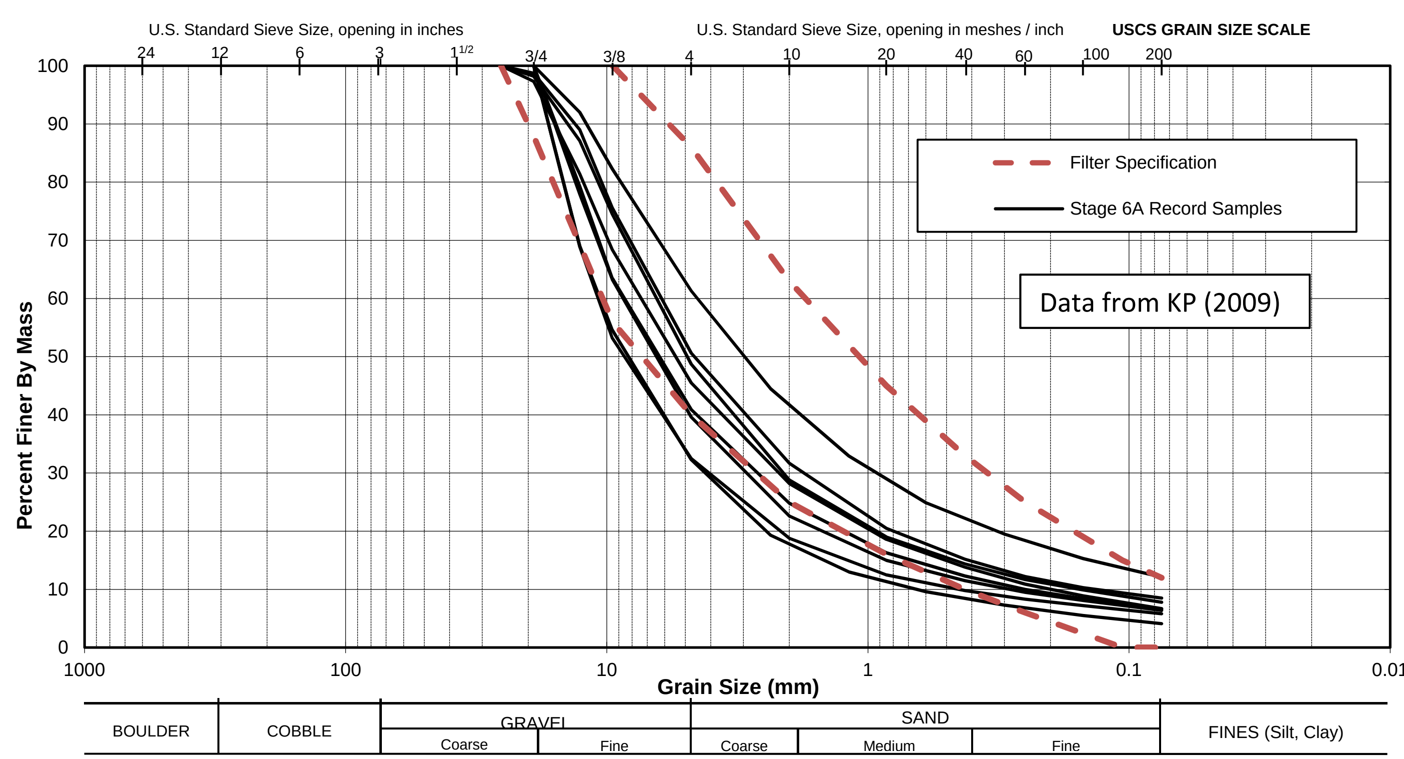
Source	Total Suspended Solids (mg/L)						
	Number of Samples	Minimum	Mean	Median	75th Percentile	95th Percentile	Maximum
East Main Embankment Toe Drain	43	1.5	3.0	1.5	1.5	6.3	33
West Main Embankment Toe Drain	23	1.5	1.5	1.5	1.5	1.5	1.5
Perimeter Embankment Toe Drain	40	1.5	7.6	1.5	1.5	1.5	87
South Embankment Toe Drain	43	1.5	1.8	1.5	1.5	2.0	6.8
TSF Drain Drop Box	119	0.5	2.9	1.5	2.0	4.5	57
Perimeter Pond	92	1.5	10	5.0	12	12	81
Main Embankment Seepage Collection Pond	192	1.0	6.2	2.0	6.2	19	133

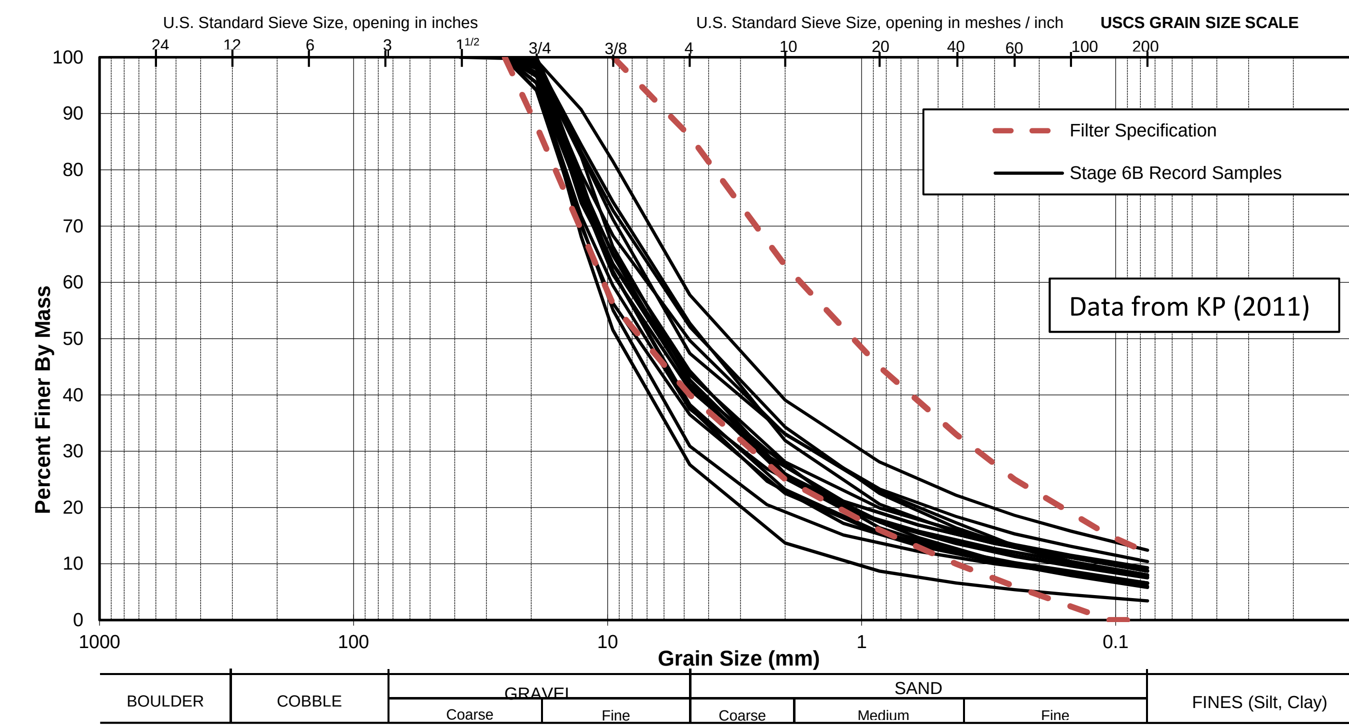
The filter gradations from the construction records have been compared to the filter gradation specified for future construction (Figure 23). A number of samples were outside the specified gradation envelope in each of the construction season reviewed. The potential for localised internal instability of the filter material may exist under some critical hydraulic gradient. The construction of the upstream drains will limit the hydraulic gradient across the till core and filter zone to not more than was experienced prior to the breach.

FILE: \\golder.gds\gal\burnaby\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\07 Deliverables\TSF Feasibility Design (EI984m)









NOTES:

1. Filter specification is proposed for future design.

References:

KP (Knight Piésold Ltd.). 2000. Mount Polley Mine Report on 1999 Construction. Submitted to Mount Polley Mining Corporation August 30, 2000.

KP 2001. Mount Polley Mine Tailings Storage Facility Report on Stage 3 Construction. Submitted to Mount Polley Mining Corporation October 19, 2001.

KP 2009. Mount Polley Mine Tailings Storage Facility Report on Stage 6A Construction. Submitted to Mount Polley Mining Corporation July 10, 2009.

KP 2011. Mount Polley Mine Tailings Storage Facility Report on Stage 6B Construction. Submitted to Mount Polley Mining Corporation January 25, 2011.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
FILTER GRADATION FROM CONSTRUCTION RECORDS

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	GJ	1OCT15	SCALE REV. 0
CADD	CM	1OCT15	
CHECK	AJH	29OCT15	**FIGURE 23**
REVIEW	TLE	29OCT15	

8.4 Toe Buttress

A buttress is generally required along the toe of the embankments. The buttress will increase the length of potential failure surfaces passing the foundation soils, thereby, increasing the resisting force and increasing stability. Rockfill buttresses are already present along the Perimeter and Main Embankments. The feasibility design of the rockfill buttresses are shown in plan and section in the feasibility design drawings in Appendix A.

The design is based on stability analyses conducted on critical sections identified for each embankment (refer to Section 12.0). The design is based on foundation information currently available and will be optimised as part of future design work. Upset conditions, with the supernatant pond extending to the embankment (not sub-aerial beach) and the upstream drains not functioning, have been considered 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 alternative materials, such as till or cyclone tailings sand, are used the buttresses may change depending on the weight and shear strength of the material used.

Prior to the placement of buttress fill material, all organics and material considered by the Geotechnical Engineer to be unsuitable as foundation material for the buttress will be removed.

8.5 Upstream Drain Design

Drainage and consolidation of newly placed tailings will be promoted by the construction of an upstream collection drain to be located upstream of the till core on the current tailings or upstream fill surface. The upstream drains will also limit the hydraulic head imposed on the existing core below the 970 m elevation to a value no greater than the core has previously retained.

The upstream drain at the Corner 1 Perimeter Embankment will be placed on the upstream fill, upstream of the cut-off wall and till core, at an elevation of approximately 950 m. Collection pipes, at approximately 50 m spacing, will convey the water through the till core where it will be collected downstream and discharged into the seepage collection ponds. Filter sand will be placed downstream of the till core where the collection pipes exit the till core.

The upstream drain along the remainder of the embankment will be constructed on the tailings surface, about 100 m upstream of the embankment and running approximately parallel to the embankments. The water collected will be conveyed through the upstream drain into a collection pipe which will pass through the till core at a single location along the Main and Perimeter Embankments. The upstream drain along the Perimeter Embankment will drain to the Corner 1 Perimeter Embankment upstream drain. Along the northern portion of the Perimeter Embankment (between Stn. 4+500 and 5+000), the upstream drain will be constructed on the upstream fill. The tailings surface here has been eroded and does not allow the placement of upstream drain.

Where the drain is on the tailings surface and extends higher than 1 m, the geotextile will only be placed around the top 1 m of drain rock. The lower portion will not be covered with geotextile to allow the tailings to flow through during deposition.

The design of the upstream drain is presented in Drawings 9 and 10 in Appendix A.

8.6 Existing Foundation Drains

Currently foundation drainage pipes exist along the Perimeter, Main and South Embankment. A collection sump is installed at the current toe of the Main Embankment (approximately Stn. 2+500) and will be raised or relocated during future embankment and buttress construction. The approximate locations of the toe drains and sump are shown in Drawing 3 included in Appendix A.

The flow from the toe drains will be directed to the seepage collection ponds. The drainage pipes may be extended or rockfill drains provided to channel the flow.

8.7 Embankment Construction Schedule

The construction of the embankments, with a till core, can only occur within the summer months from approximately May to the end of the September. The placement of Rockfill (Zone C), Transition (Zone T), Filter (Zone F) and Upstream Fill (Zone U) for the embankment and buttress can typically occur all year round provided measures are taken to manage snow, ice and surface water.

A proposed embankment construction schedule has been developed and is shown in Figure 24. The construction schedule is based on the tailings deposition plan presented in Section 5.2, and with a deposition rate of 22,000 tonnes per day. The schedule assumes that construction of the Corner 1 Perimeter Embankment will start in May 2016, and deposition of tailings into the TSF will start following completion of the construction in October 2016. The construction and deposition of tailings will be dependent on MPMC obtaining the required permits.

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 embankment will need to be constructed to elevation 963 m in the first season (2016), and to elevation 970 m in the second season (2017). A crest elevation of 963 m provides a minimum 2 m of freeboard before completion of the construction to elevation 970 m.

The crest elevation of the Perimeter, Main and South Embankment is currently at approximately 968 m. These embankments are to be raised to elevation 970 m in the second construction season (2017). After the second year of construction, assuming a constant deposition rate of 22,000 tpd, the embankments (including the Corner 1 Perimeter Embankment) will be raised approximately 3 m every year, until the last two years when it will be raised 2 m every year.

A minimum freeboard of approximately 1 m will be maintained between the tailings surface and the embankment crest over the operational life of the TSF. In the final year of operation, the tailings deposition will push the pond towards Corner 5. The maximum tailings elevation will approach an elevation of 984 m in locations as the tailings surface is shaped for closure. The minimum required freeboard and water storage capacity will be maintained.

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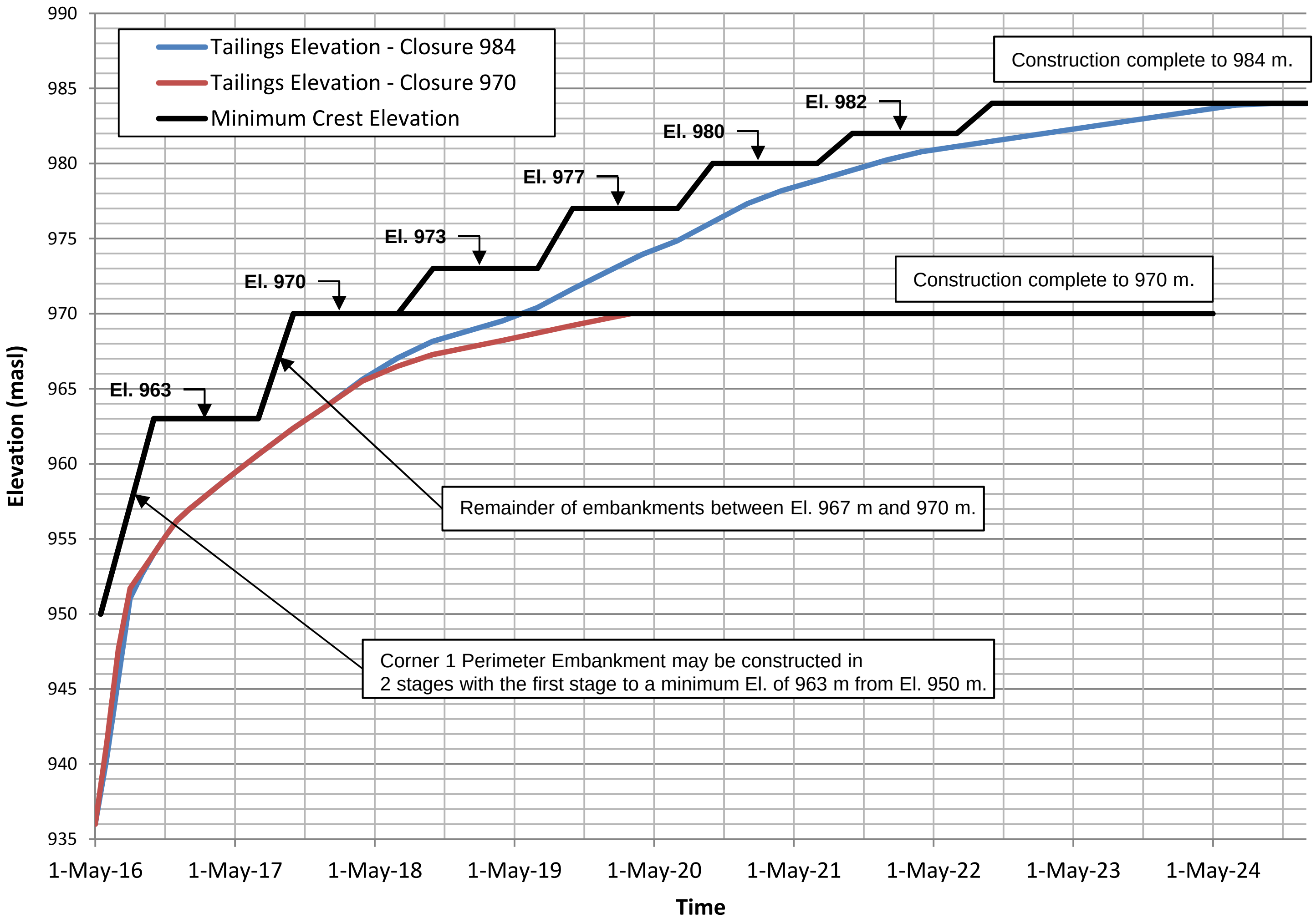


Notes:
1. Deposition rate based on MPMC Mine Plan and a settled density of 1.35 tonnes/m^3.
2. Tailings surface with a 1% sub-aerial and 3% sub-aqueous beach slope.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TSF EMBANKMENT**
CONSTRUCTION SCHEDULE

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	24SEPT15	SCALE NTS REV.0
CADD	CTM	24SEPT15	**FIGURE - 24**
CHECK	AJH	29OCT15	
REVIEW	TLE	29OCT15	

9.0 CLOSURE AND RECLAMATION PLAN

The reclamation plan for the Mount Polley mine is presented in Hallam Knight Piésold (1996). Knight Piésold (2005) provides a summary of the closure and reclamation requirements for the TSF. 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, once resloped, 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 to meet water management objectives and/or until monitoring results indicate that the water quality from the TSF is suitable for direct release to the environment.

The closure requirements for the TSF outlined above are still generally considered applicable.

The tailings deposition plan will be to maintain the supernatant pond at the centre of the TSF, against the natural topography. Within the last year of deposition, prior to closure, the pond volume will be reduced, and the deposition plan will change to push the pond to Corner 5 where the spillway will be located.

The downstream rockfill slopes of the embankment will be placed at the required closure slope of 2H:1V slope. The upper section of the rockfill slopes that are placed at 1.3H:1V will be pushed down to the 2H:1V slope. The downstream rockfill slopes of the buttresses will be placed at 3H:1V. Progressive rehabilitation of the buttress slopes can be implemented during operations.

10.0 INSTRUMENTATION AND MONITORING

10.1 Instrumentation

A large number of monitoring instruments exist around the TSF and are currently being monitored on a regular basis, as defined in the Mount Polley Mine Site Water Management Operations, Maintenance and Surveillance (OMS) Manual. The existing instrumentation consists of:

- 144 Vibrating Wire Piezometers installed within the embankment and the foundation materials;
- 27 Slope Inclinometers installed along the toe of the embankments and within the Freshet Embankment Cut-off wall; and
- Two Shape Accel Array (SAA) installed within the foundation for the Freshet Embankment footprint.

The existing vibrating wire piezometers and SAA will be maintained through the life of the TSF. The cables for each instrument will be extended beyond the embankment and buttress footprint by placing in trenches. Existing slope inclinometers will be maintained, where possible. Where it is impractical to raise the inclinometer casings through the fill, new inclinometer casings will be installed further downstream, or the inclinometers will be converted to SAA. Drawings 11 and 12 in Appendix A show the current and future proposed instrumentation locations.

10.2 TSF Operation and Monitoring

The following will be implemented for the management and monitoring of the TSF:

- Ongoing involvement of the Independent Engineering Review Panel (IERP) for all future designs;
- Regular update of the Mount Polley Mine Site Water Management (OMS) Manual, including the Emergency Response Plan (ERP);
- Recording and review of the geotechnical instrumentation (as laid out in the OMS Manual);
- Annual dam safety inspection of the TSF by the Engineer of Record;
- Dam safety review of the TSF by an external geotechnical engineer (not the Engineer of Record). The next dam safety review will be completed by December 2016, and the subsequent dam safety review would be scheduled for no later than 2026 given the CDA recommended frequency for a Significant classification dam;
- Water balance audits and regular calibration of the water balance model by the design engineer occurring at least on an annual basis; and
- Calibration of the impoundment filling schedule by the design engineer at least on an annual basis using the results of bathymetric and topographic surveys of the TSF.

11.0 SEEPAGE ANALYSIS

Seepage analyses were carried out for typical sections along the Main Embankment and Freshet Embankment to provide an assessment of steady-state seepage through embankments, and assess the effect of the upstream drains.

The seepage analyses were carried out using the computer software SEEP/W, Ver. 7.21, developed by GEO-SLOPE International Ltd. (GEO-SLOPE 2010a).

The Main Embankment section at Stn. 2+240 was used for the analysis. The foundation drain system, located downstream of the Stage 1B Main Embankment and which transfers ground water and seepage water to the seepage collection ponds, has been included in the section. The chimney drain within the till core and upstream toe drain at approximately elevation 936 m has also been included. The model used in the analyses is shown in Figure D1, included in Appendix D. The seepage was calculated for the configuration prior to the breach and compared to the measured seepage flows at that time.

The Freshet Embankment section at Stn. 20+180 was used for the analysis.

The sub-aerial tailings beach length was varied within each analysis to estimate the influence of beach length on the seepage.

11.1 Material Properties

The material properties used in the analyses are shown in Table 10, and are based on the parameters used in previous design reports and the results of the forensic investigation within the breach.

Table 10: Material Properties Used in Seepage Analyses

Material	Saturated Hydraulic Conductivity (m/s)	Notes
Till-Core, Foundation Till, Glaciofluvial	$1x10^{-8}$	Based on basal till (KP 2005) and forensic investigation data
Glaciolacustrine Soil	$5x10^{-10}$	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 (2015a)
Cut-off Wall	$1x10^{-8}$	Golder (2015e) As-built records of the cut-off wall indicate hydraulic conductivity is less than $1x10^{-9}$ to $1x10^{-10}$ m/s

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

The tailings currently present in 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 lower, and is similar to the value assumed by Knight Piésold for consolidation tailings with increased loading (KP 2005).

11.2 Analyses Results

The results of the seepage analyses are presented in Appendix E.

11.2.1 Seepage during Previous Operations

During the operations prior to the breach, the seepage through the foundation drains were measured and are summarised in Table 4 in Section 7.2.

The analysis for the Main Embankment calculated a seepage rate of 1.5 to 2.2 L/s for a sub-aerial beach length from zero to 200 m (and an embankment length of 1,200 m). This is in relative agreement with the measured seepage of 6 L/s.

The higher seepage rates measured along the Perimeter and South Embankments is likely due to greater connectivity of the foundation drains to the tailings.

11.2.2 Seepage at Ultimate Elevation

The seepage rate at the crest elevation of 984 m was modelled for a typical section along the Main Embankment and the Corner 1 Perimeter Embankment. The tailings elevation was set at 983 m. The pond elevation was varied according to the length of the sub-aerial beach. The influence of the upstream drain and length of sub-aerial beach was assessed from the analyses. The upstream drain will be installed at elevation of approximately 964 m for the Main Embankment, and 950 m for the Corner 1 Perimeter Embankment. 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.

The Main Embankment seepage analyses results are presented in Table 11 and shown in Figure 25.

Table 11: Seepage Analyses Results for the Main Embankment at Elevation 984 m

Embankment Configuration	Seepage Through Main Embankment							
	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
Consolidated Tailings Permeability of 10^{-8} m/s								
No Upstream Drain	$2.5x10^{-6}$	3.1	$1.5x10^{-6}$	1.7	$8.8x10^{-7}$	1.1	$5.8x10^{-7}$	0.7
With Upstream Drain	$1.2x10^{-5}$	13.9	$6.4x10^{-6}$	7.7	$1.8x10^{-6}$	2.2	$1.0x10^{-6}$	1.2
Uniform Tailings Permeability of 10^{-6} m/s								
No Upstream Drain	$3.5x10^{-6}$	4.2	$2.8x10^{-6}$	3.4	$2.4x10^{-6}$	2.9	$2.1x10^{-6}$	2.5
With Upstream Drain	$1.2x10^{-5}$	14.6	$7.2x10^{-6}$	8.7	$3.2x10^{-6}$	3.8	$2.3x10^{-6}$	2.8

Notes: 1) Main Embankment length of 1,200 m used to calculate the total seepage

2) The upstream drain located at an elevation of 967 m, 100 m upstream of the embankment

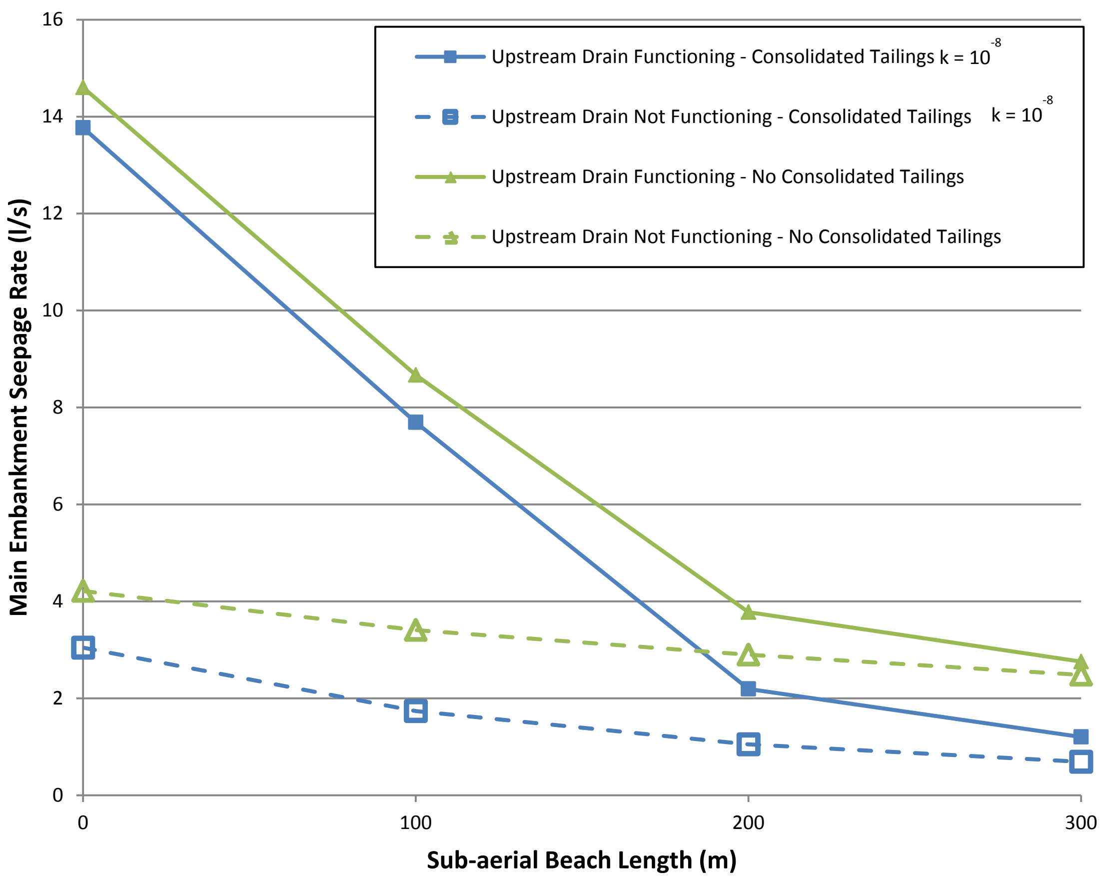


Figure 25: Estimated Seepage Rate Through the Main Embankment at Ultimate Height (Elevation 984 m)

The analysis shows that the anticipated seepage from the Main Embankment is unlikely to increase noticeably from the seepage observed prior to the breach. If a minimum beach length is maintained, the seepage values may decrease depending on the permeability of the existing consolidated tailings.

The analyses also show that the upstream drains will be effective in reducing heads at the embankment, again depending on the beach length and permeability of the consolidated tailings, but with increased total seepage through the embankment (beneath the embankment, through the embankment core and through the upstream drain).

The Corner 1 Perimeter Embankment seepage analyses results are presented in Table 12 and shown in Figure 26.

Table 12: Seepage Analyses Results for the Corner 1 Perimeter Embankment at Elevation 984 m

Embankment Configuration	Seepage Through Corner 1 Perimeter Embankment							
	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
No Upstream Drain	1.1×10^{-5}	3.3	6.6×10^{-6}	2.1	4.5×10^{-6}	1.4	3.3×10^{-6}	1.1
With Upstream Drain	3.9×10^{-5}	12.1	1.0×10^{-5}	3.2	5.3×10^{-6}	1.7	3.4×10^{-6}	1.1

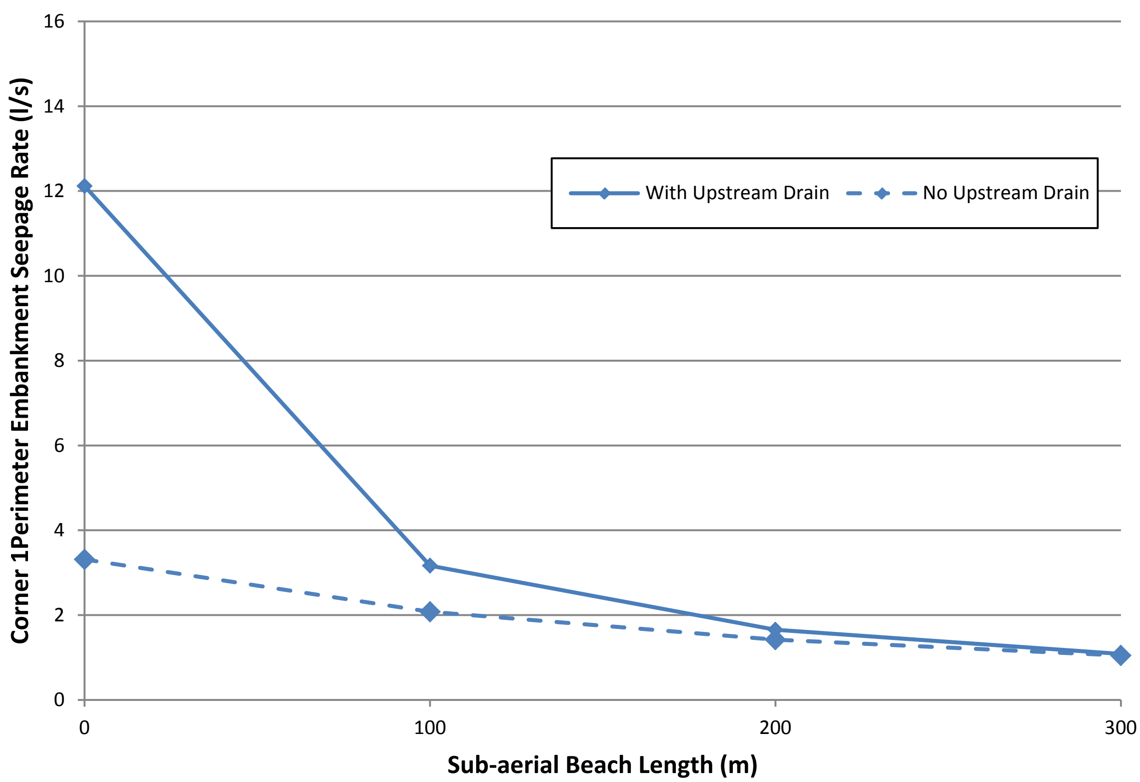


Figure 26: Estimated Seepage Rate Through the Corner 1 Perimeter Embankment at Ultimate Height (Elevation 984 m)

The function of the upstream drain is to reduce the phreatic surface in the tailings adjacent to the embankment. This means that more water must be conveyed through the embankment as seepage through the core and as seepage into and through the drain than the case with no drain.

12.0 STABILITY ANALYSIS

The stability analyses have been carried out using the slope stability computer software program SLOPE/W Ver. 7.21, developed by GEO-SLOPE International Ltd. (GEO-SLOPE 2010). The Morgenstern-Price method was adopted. Slip surfaces penetrating bedrock were not evaluated.

Both total stress and effective stress analyses were completed.

12.1 Analysis Criteria

The minimum FoS required are summarised in Table 13, and are as described in Section 3.0.

Table 13: 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 PGA 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 3.2 and Appendix B). 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).

12.2 Material Parameters

12.2.1 Embankment Fill materials

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 2015c).

The properties used in the stability analyses for tailings and embankment materials are presented in Table 14.

Table 14: 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 2015a).
Rockfill	21.5	Non-Linear Strength Function: $\tau = 1.726\ \sigma_n^{0.899}$	Strength function based on Leps (1970) average rockfill. (Appendix F).
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.

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

12.2.2 Foundation Soils

The properties used in the stability analyses for foundation materials are presented in Table 15.

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 strength of the glaciolacustrine soils has been modelled using 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. Analyses were also carried out by reducing and increasing the undrained shear strength to provide information on the sensitivity of the stability of the embankments to the strength of the glaciolacustrine soils.

Table 15: Foundation Material Parameters for Stability Analyses

Material	Unit Weight (kN/m^3)	Shear Strength: Undrained	Shear Strength: Effective Strength (drained)	Notes
Foundation Till	22	N/A	ϕ' =34° Cohesion = 0 kPa	Triaxial testing of samples of till by *IEERP* and KCB (2015a and 2015b).
Glaciofluvial	22	N/A	ϕ' =34° Cohesion = 0 kPa	Triaxial testing of undisturbed glaciofluvial samples by Golder (Golder 2015c) 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 to 22° Cohesion = 0 kPa ϕ_r' =11 to 15° Cohesion = 0 kPa	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 to 33° Cohesion = 0 kPa	Field and laboratory test programs by *IEERP*, KCB and Golder. Vane shear tests, CPT, Direct Simple Shear, Direct Shear and Triaxial Testing. Consolidation tests indicate range of preconsolidation pressure is from 700 kPa to 1200 kPa. σ'_p = 700 kPa is selected as the design basis.
GLU along remainder of Perimeter Embankment	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ Where σ'_p = 900 kPa	ϕ_p' =25 to 33° Cohesion = 0 kPa	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° Cohesion = 0 kPa	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.

Note: 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; Sur = remoulded undrained shear strength

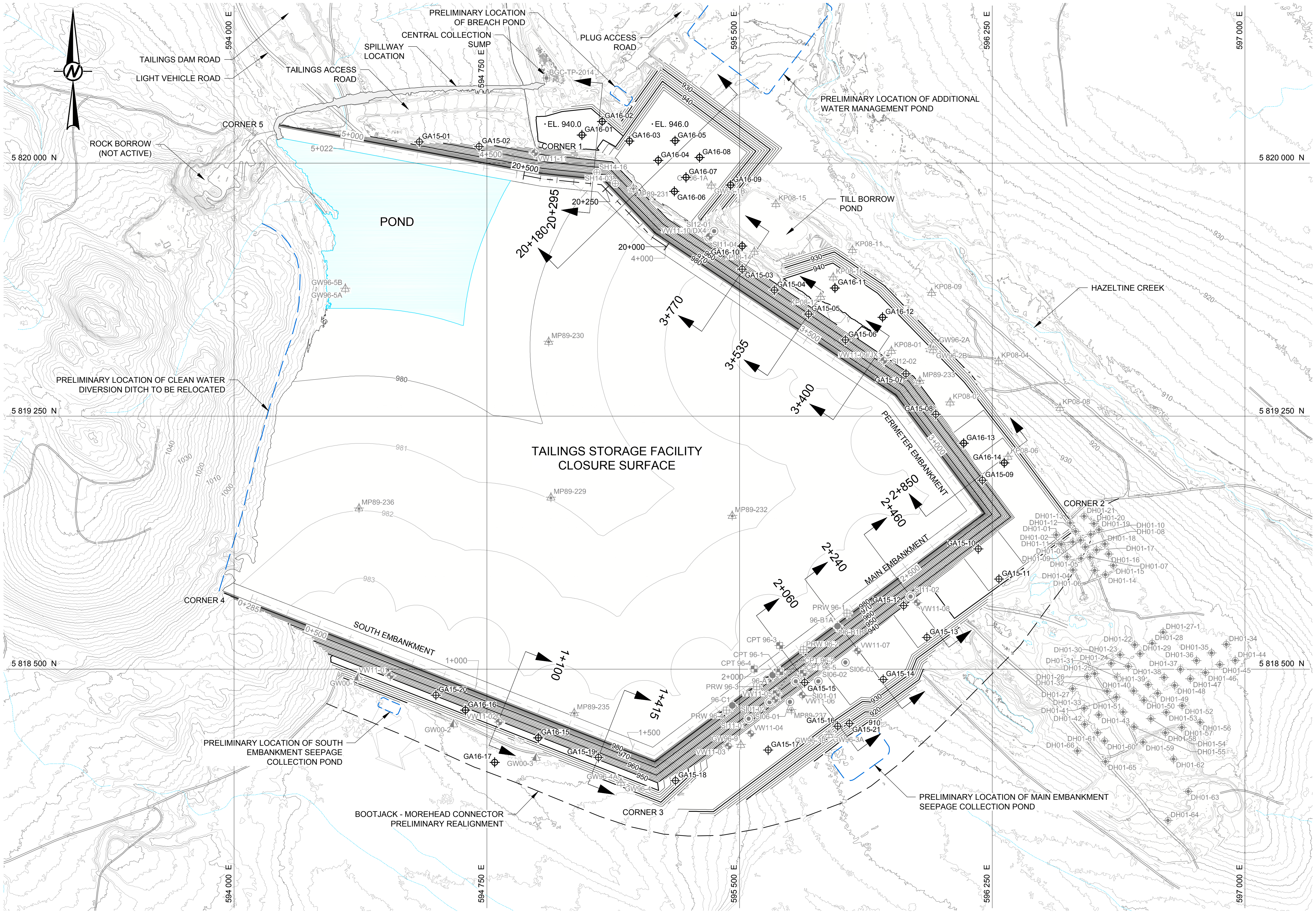
12.3 Stability Sections

A number of sections, identified to be the most critical in terms of stability, were chosen for each embankment. The sections are as follows:

- Stn. 1+100 and Stn. 1+415 along the South Embankment;
- Stn. 2+060, Stn. 2+240 and Stn. 2+460 along the Main Embankment;
- Stn. 2+850, Stn. 3+400, Stn. 3+535 and Stn. 3+770 along the Perimeter Embankment; and
- Stn. 20+180 and Stn. 20+295 along the Corner 1 Perimeter Embankment.

The locations of the stability sections are shown in Figure 27. The location of the boreholes, upon which the foundation conditions are based, is included in Figure 27. Figure 28 shows the location of the boreholes at Corner 1 of the Perimeter Embankment. Where a layer of glaciolacustrine soils was encountered in a single borehole, this was assumed to extend downstream of the embankment unless another borehole identified the limits of the spatial extent of the glaciolacustrine soils.

The embankment configuration used is as shown in the design drawings in Appendix A. The crest elevation was set at 984 m which will provide tailings storage for the processing of the presently defined resource. The maximum tailings elevation was set at 983 m representing the approximate tailings elevation prior to closure of the TSF. The water level in the TSF was set at an elevation 983 m, representing an upset condition with the pond volume exceeding the normal operating water level and the upstream drains not functioning. This is considered to be a conservative condition.



LEGEND

- GA16-17 — 2016 PROPOSED BOREHOLE LOCATIONS (GOLDER)
- 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 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.

NOT FOR CONSTRUCTION

0 200 400
1:6,000 METRES

CLIENT	MOUNT POLLEY MINING CORPORATION	PROJECT	MOUNT POLLEY MINE TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN
CONSULTANT	Golder Associates	TITLE	**TAILINGS STORAGE FACILITY STABILITY SECTION LOCATIONS**
YYYY-MM-DD	2015-11-02		
PREPARED	TAK		
DESIGN	GJ		
REVIEW	AJH		
APPROVED	TLE		

PROJECT No.	PHASE/DOC.#	Rev.	FIGURE
1413803	9000/072	0	27

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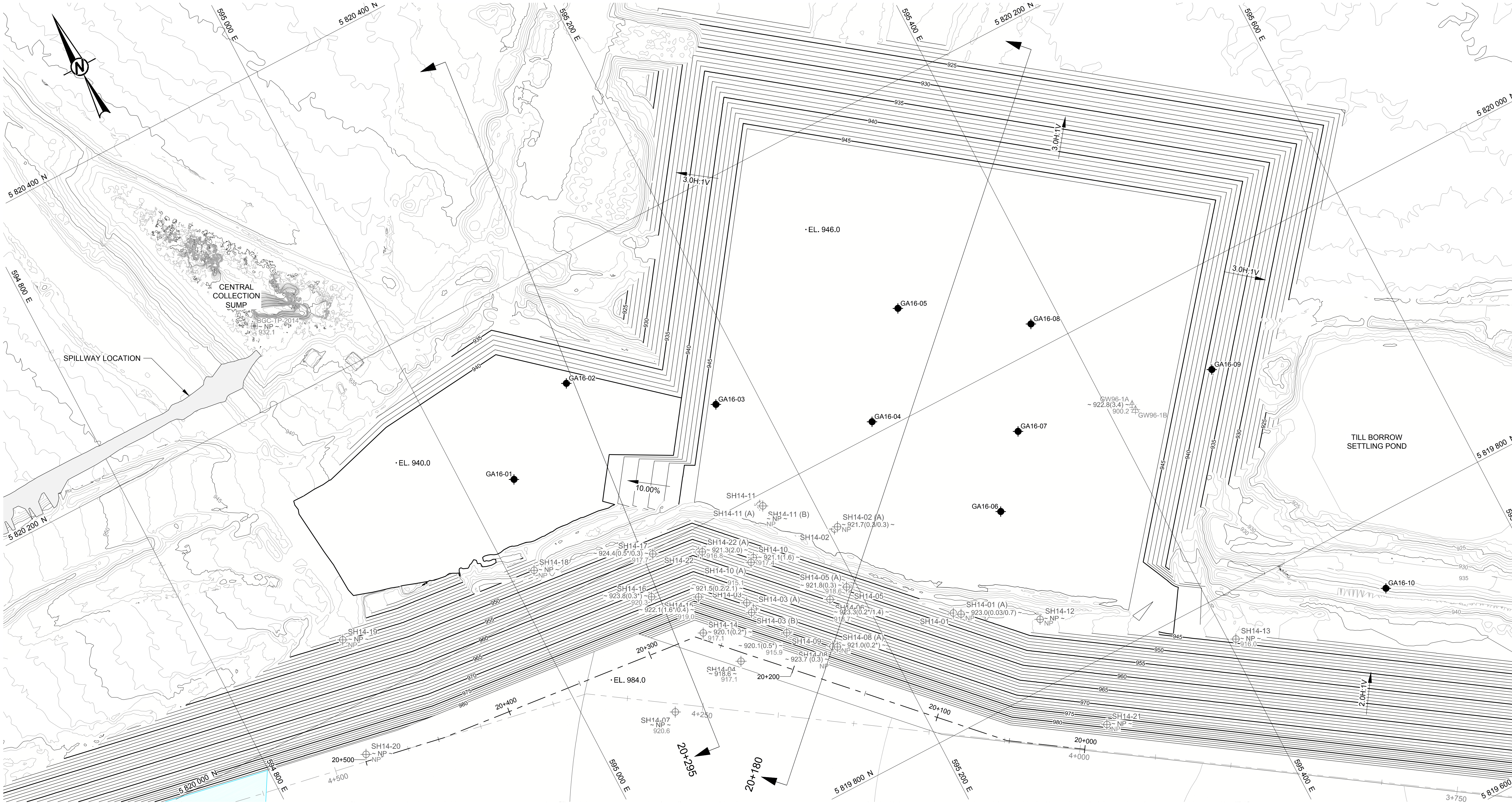

LEGEND

20+000	CORNER 1 PERIMETER EMBANKMENT ALIGNMENT
4+400	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 4
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. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR.
4. 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 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.

NOT FOR CONSTRUCTION

0 50 100
1:1,250 METRES

CLIENT
MOUNT POLLEY MINING CORPORATION

CONSULTANT
Golder Associates

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

PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
CORNER 1 PERIMETER EMBANKMENT STABILITY SECTION LOCATIONS

PROJECT No.	PHASE/DOC.#	Rev.	FIGURE
1413803	9000/072	0	28

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12.4 Analysis Results

Iterative analyses were conducted to design a buttress for the embankments that would achieve a minimum static FoS of 1.5 and pseudo-static value of 1.0, using the GLU preconsolidation pressures defined in Table 15.

The results of the analyses are summarised in Table 16, and presented in Appendix F.

Table 16: Stability Analyses Results

Embankment	Station	Buttress Crest Width and Elevation	Total Stress Analysis		Effective Stress Analysis	
			Static[a]	Pseudo-static [b]	Static [a]	Pseudo-static [b]
South	1+100	20 m wide at El. 950 m	1.5	1.3	1.6	1.3
	1+415	20 m wide at El. 950 m	1.8	1.7	N/A	N/A
Main	2+060	125 m wide at El. 933 m	1.6	1.1	N/A	N/A
	2+240	145 m wide at El. 936 m	1.5	1.1	N/A	N/A
	2+460	120 m wide at El. 939 m	1.5	1.1	2.0	1.4
Perimeter	2+850	110 m wide at El. 945 m	1.5	1.1	N/A	N/A
	3+400	145 m wide at El. 940 m	1.6	1.1	N/A	N/A
	3+535	145 m wide at El. 940 m	1.5	1.1	2.1	1.5
	3+770	19 m wide at El. 940 m [c]	1.7	1.5	N/A	N/A
Corner 1 Perimeter	20+180	270 m wide at El. 946 m	1.5	1.0	2.4	1.6
	20+295	80 m wide at El. 940 m	1.5	1.4	1.9	1.6

Notes: (a) Static Analyses carried out using 0 m beach

(b) Pseudo-static analyses carried out using 100 m beach

(c) Existing buttress, no widening is required

N/A = not analysed.

The pseudo-static FoS values shown also assume a seismic coefficient of 0.048 g and a minimum 100 m beach length during normal operations. The upstream drain was assumed to not be functioning.

The 20 m wide buttress along the length of the South Embankment is based on analysis results at Stn. 1+100 where a layer of glaciolacustrine soil has been observed. The buttress length will be reviewed following completion of the future site investigation required for the 984 m detailed design.

The analyses indicate that no widening of the existing buttress is required in the area of the Perimeter Embankment Till Borrow Pond (Stn. 3+770) as the glaciolacustrine soil was not observed to extend beneath the Perimeter Embankment. Additional boreholes will be drilled in this area to confirm the foundation conditions for construction above the 970 m elevation.

The design of the buttress for the Corner 1 Perimeter Embankment around Stn. 20+290 is based on the assumption that the UGLU extends beyond the toe of the Embankment and Buttress, based on borehole GW96-1(A and B). A very wide buttress is provided in this area. Additional site investigation within the area downstream of the Corner 1 Perimeter Embankment could confirm the extent and characteristics of the glaciolacustrine soils in this area. If the UGLU does not extend into this area, the buttress width could be reduced.

Additional analyses were carried out to determine the sensitivity of the FoS to:

- The elevation of the phreatic level depending on the length of the sub-aerial beach and the upstream drain functioning;
- the glaciolacustrine soil undrained shear strength function;
- the glaciolacustrine soil peak friction angle;
- the extent of the glaciolacustrine soils at Corner 1; and
- artesian pressures within the glaciofluvial material along the Main Embankment.

The results are briefly discussed in the following sections.

12.4.1 Phreatic Elevation

The phreatic elevation used in the design assumes upset conditions with the supernatant pond against the embankment and the upstream drain not functioning. The TSF will be operated with a minimum beach length of 100 m and a typical beach length of 300 m, which will reduce the phreatic level in the tailings upstream of the embankment, and improve the stability.

Analyses varying the beach length and including the upstream drain have been run for a section along the Corner 1 Perimeter Embankment (Stn. 20+180) and Main Embankment (Stn. 2+240), and the results are shown in Figure 28. The FoS with a normal operating pond (300 m beach length) is approximately 1.8. The FoS decreases as the beach length decreases, but remains above 1.5 even when the pond is against the embankment. The upstream drain maintains the FoS at approximately 1.8 even as the beach length reduces to 100 m. The results are shown in Figure 29 for each of the embankments, and the analyses are shown in Appendix F.

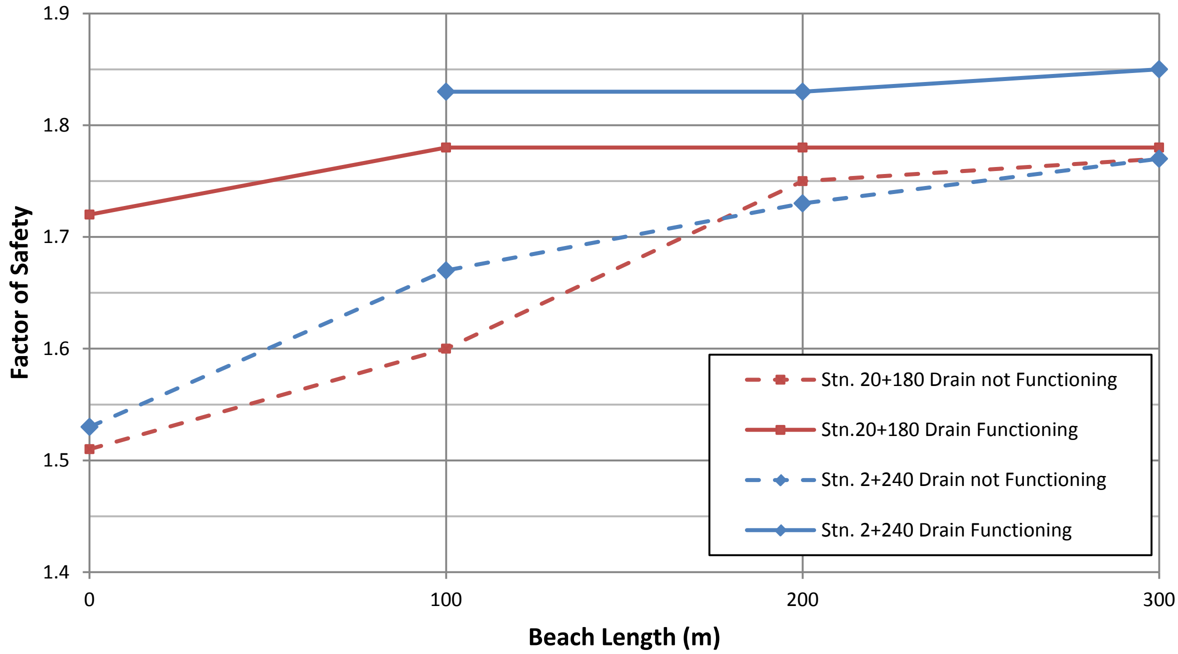

Figure 29: Influence of Beach Length and Upstream Drain Functionality on Embankment Stability

12.4.2 Glaciolacustrine Soil Undrained Shear Strength

The preconsolidation stress of the glaciolacustrine soil has been shown to vary between the glaciolacustrine soil deposits along the TSF embankments. Where the preconsolidation stress is less, the glaciolacustrine soil reaches normally consolidated conditions under lower vertical effective stresses, resulting in a lower average undrained shear strength along the failure surface.

The lowest preconsolidation stress of 400 kPa was calculated for the UGLU at Corner 1, and the maximum of 1,200 kPa along the Main Embankment. The sensitivity of the glaciolacustrine soil preconsolidation stress on the FoS was evaluated for sections along the Perimeter, Main and South Embankments. The results are shown in Figure 30.

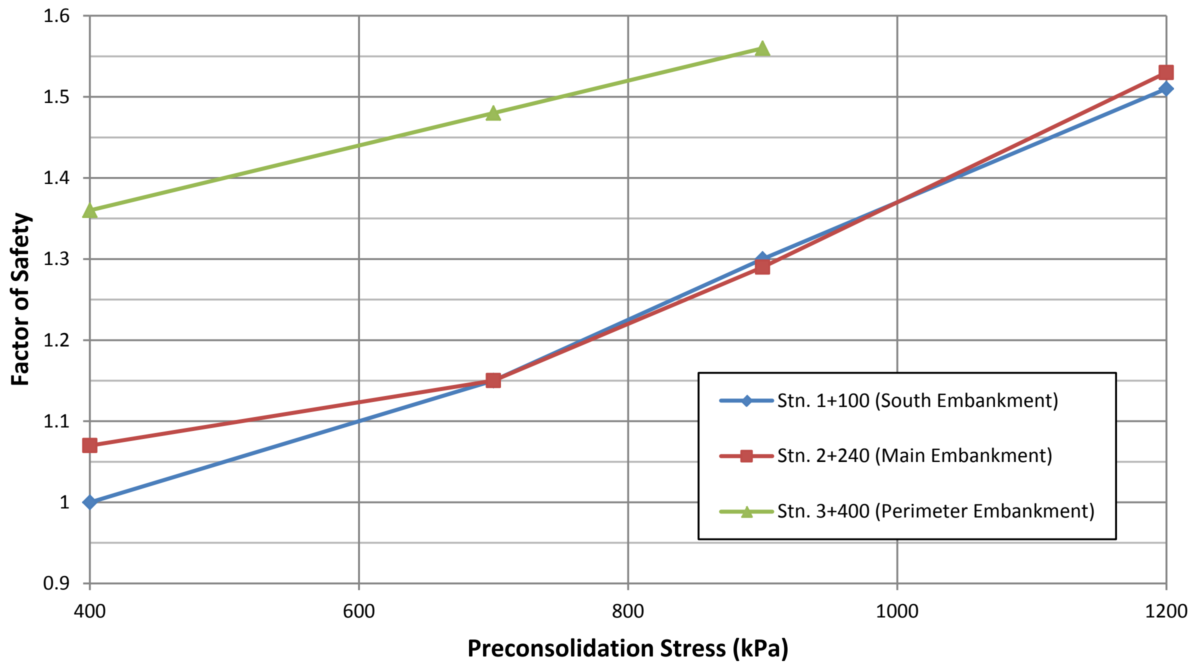

Figure 30: Factor of Safety vs Preconsolidation Stress

12.4.3 Glaciolacustrine Soil Effective Strength

The peak friction angle was varied between 15 and 33 degrees for sections along the Perimeter, Main and South Embankments. The results are shown in Figure 31. The peak friction angle of the glaciolacustrine soil along the Perimeter and Main Embankment varies between 25 to 33 degrees, based on the results of laboratory testing.

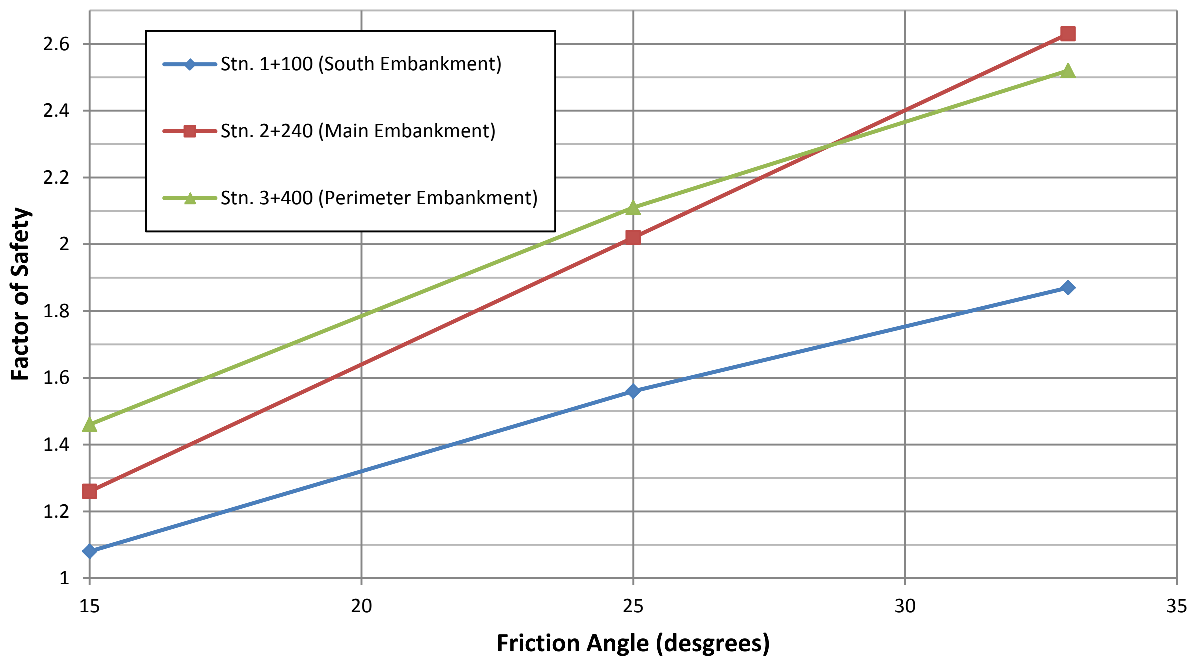

Figure 31: Factor of Safety vs Peak Friction Angle

The peak friction angle of the UGLU along the Corner 1 Perimeter Embankment stability Section (Stn. 20+180) was varied between 8 degrees and 19 degrees (Figure 32). A friction angle of eleven degrees represents the lowest remoulded shear strength measured for the UGLU.

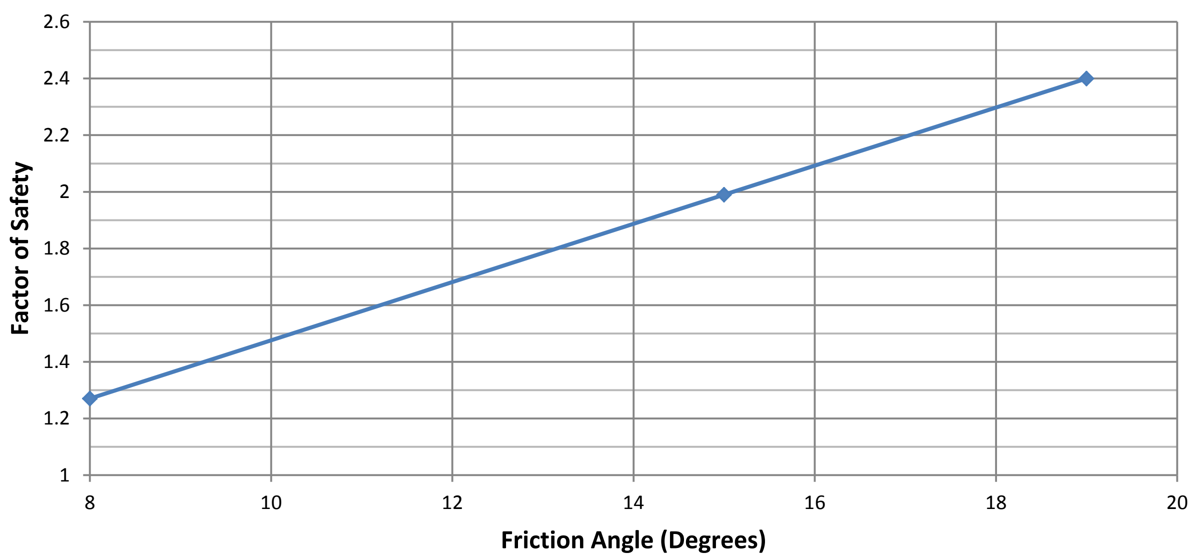

Figure 32: Factor of Safety vs Friction Angle – Corner 1 Perimeter Embankment Stability Section (Stn.20+180)

12.4.4 Glaciolacustrine Soil Extent Downstream of Corner 1 Perimeter Embankment

Limited borehole data is available for the area downstream of the Freshet Embankment. The forensic site investigation following the breach was limited to the area where the breach occurred and directly downstream. Only borehole GW96-1 (approximately Stn. 4+000) and observations from the excavation of the CCS provides information within the footprint of the Corner 1 Perimeter Embankment and Buttress. Figure 28 shows the available borehole data at Corner 1. In designing the buttress, the UGLU has conservatively been assumed to extend downstream of the Corner 1 Perimeter Embankment based on borehole GW96-1, as shown in the stability sections for Stn. 20+180.

If the UGLU does not extend past Borehole GW96-1, the buttress crest width can be reduced by approximately 100 m, as shown in Figure F45 in Appendix F. Confirmation of the extent of the UGLU could be provided by future site investigation work.

12.4.5 Artesian pressures beneath the GLU along the Main Embankment

Artesian pressures were previously observed within the glaciofluvial layer along the Main Embankment, and pressure relief wells were installed (Refer to Section 5.3). An analysis with elevated phreatic level within the glaciofluvial layer shows that the FoS remains above 1.4 (Figure F23 in Appendix F).

12.5 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 33.

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 at the ultimate elevation of 984 m, a fill height of 46 m, and maximum 60 m of soil in the foundation, the settlement of the crest would be less than 10 cm.

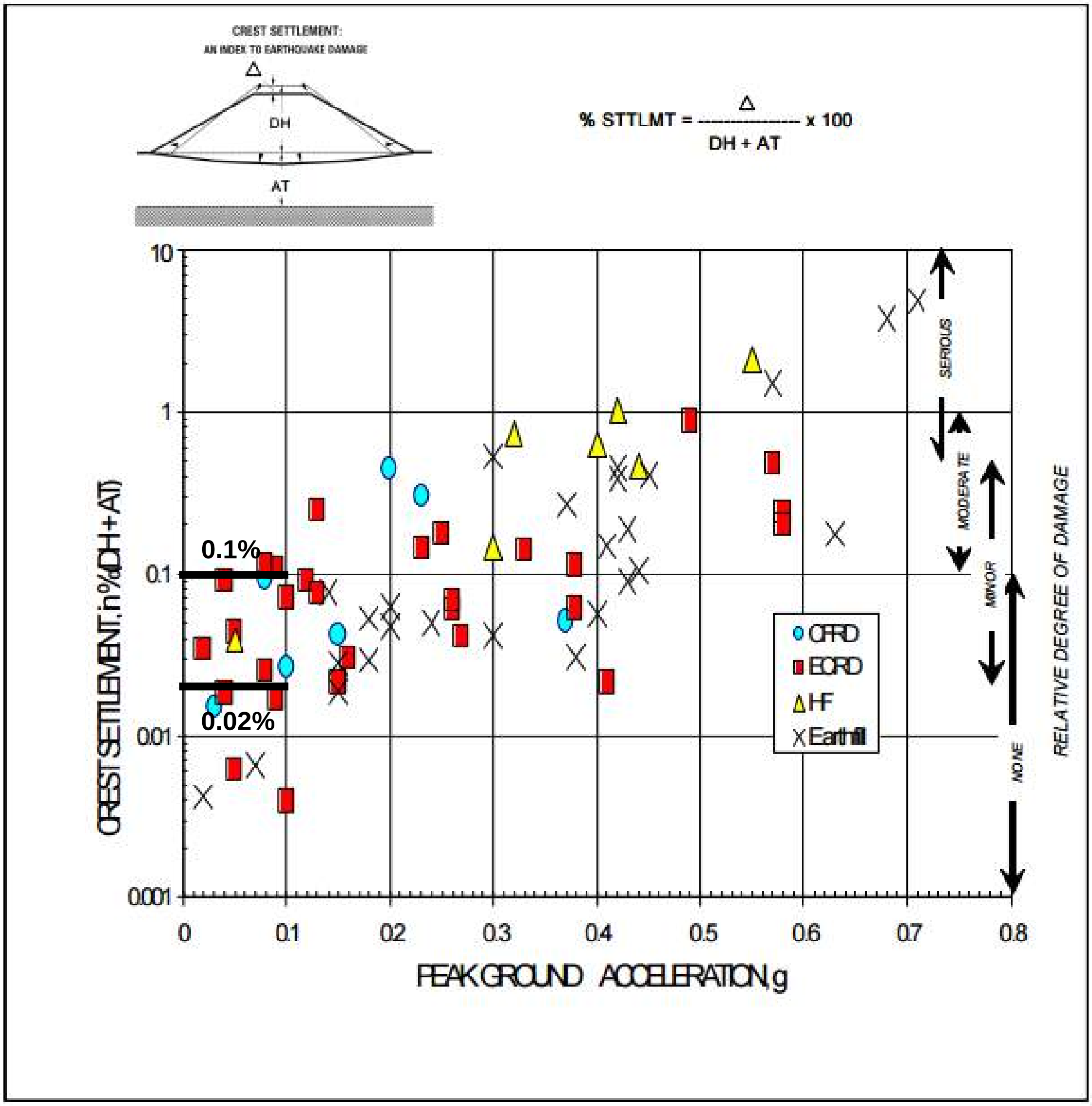

Figure 33: Settlement of Embankment Dams during Earthquakes after Swaisgood (2003)

13.0 CONSTRUCTION QUANTITY ESTIMATE

The estimated in-place quantity of material required for the Corner 1 Perimeter Embankment raise to elevation 970 m, and the raise of the embankment from the current elevation (nominal elevation 970 m) to elevation 984 m (the presently defined operational life of the mine) is summarised in Table 17.

Table 17: Material Quantities – Embankment Raise to Elevation 984 m

Material	Unit	Embankment Raise to El. 970 m[a]	Embankment Raise to El. 984 m[b]
Upstream Fill (coarse tailings)	m^3	424,200	1,541,880
Upstream fill (tailings or rockfill)	m^3	239,750	-
Till	m^3	73,950	361,960
Filter	m^3	30,800	115,660
Transition	m^3	28,100	111,890
Rockfill (embankment)	m^3	531,200	3,579,530
Rockfill (buttress)	m^3	603,100	5,177,950
Drain rock for upstream drain	m^3	10,270	82,660
Separation geotextile	m^2	24,120	56,800
PCPE Perforated and Solid Pipe	m	1,330	1,480

a) Material quantities include Corner 1 Perimeter Embankment, and Main, South and Perimeter Embankment raise to elevation 970 m.

b) Material quantities estimated include Perimeter, South and Main Embankment from elevation 970 m to 984 m.

14.0 PLANNED FUTURE WORK

Additional site investigation programs will be conducted and will include the following:

- Foundation characterization of the area downstream of Corner 1 of the Perimeter Embankment to better define the foundation conditions, and in particular to determine the extent of the UGLU and LGLU. The sensitivity of the buttress size to the extent of the UGLU layer was carried out as part of the stability analyses, and showed the benefit of better defining the foundation conditions. This investigation is required prior to raising the Corner 1 Embankment above 963 m elevation.
- Drilling of additional holes along the Perimeter Embankment to confirm the downstream extent of the glaciolacustrine soils layers and to define the extent of the glaciolacustrine soils at the Till Borrow Pond. This investigation is required prior to raising the Perimeter Embankment above 970 m elevation.
- The drilling of additional geotechnical boreholes is recommended along the South Embankment. Glaciolacustrine soils was only observed in borehole VW11-02 drilled by AMEC. The Golder site investigation program in 2015 encountered no glaciolacustrine soils along the South Embankment. The feasibility buttress design along the South Embankment is based on the foundation conditions encountered in borehole VW11-02. This investigation is required before raising the South Embankment above 970 m elevation.
- CPT soundings are to be conducted through the existing tailings to determine the degree of consolidation and confirm whether the tailings have reached a dilatant condition. This investigation is required before tailings are discharged over the existing tailings beaches adjacent to the embankments.

The locations of the proposed holes are included in Figure 27 and Drawing 4 (Appendix A).

15.0 CLOSURE

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

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

GOLDER ASSOCIATES LTD.

Gerd Janssens, P.Eng.
Geotechnical Engineer

Andy Haynes, P.Eng.
Principal, Senior Engineer

PROFESSIONAL PROVINCE OF T. L. ELDRIDGE BRITISH COLUMBIA ENGINEER

Nov 3/15

Terry Eldridge, P.Eng.
Principal, Engineering Manager

GJ/AJH/TLE/jc

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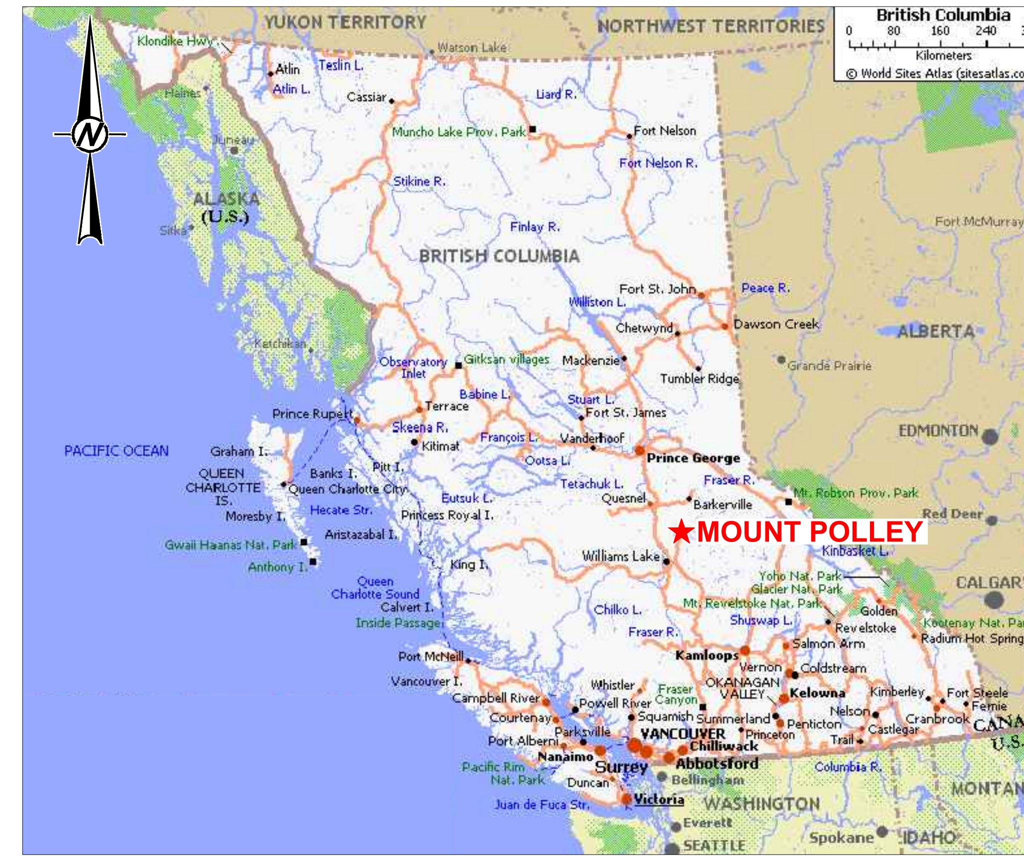
APPENDIX A

TSF Feasibility Design Drawings

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN



PROJECT LOCATION PLAN

NOT TO SCALE

NOT FOR CONSTRUCTION

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B	2015-10-28	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-08	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TITLE SHEET

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
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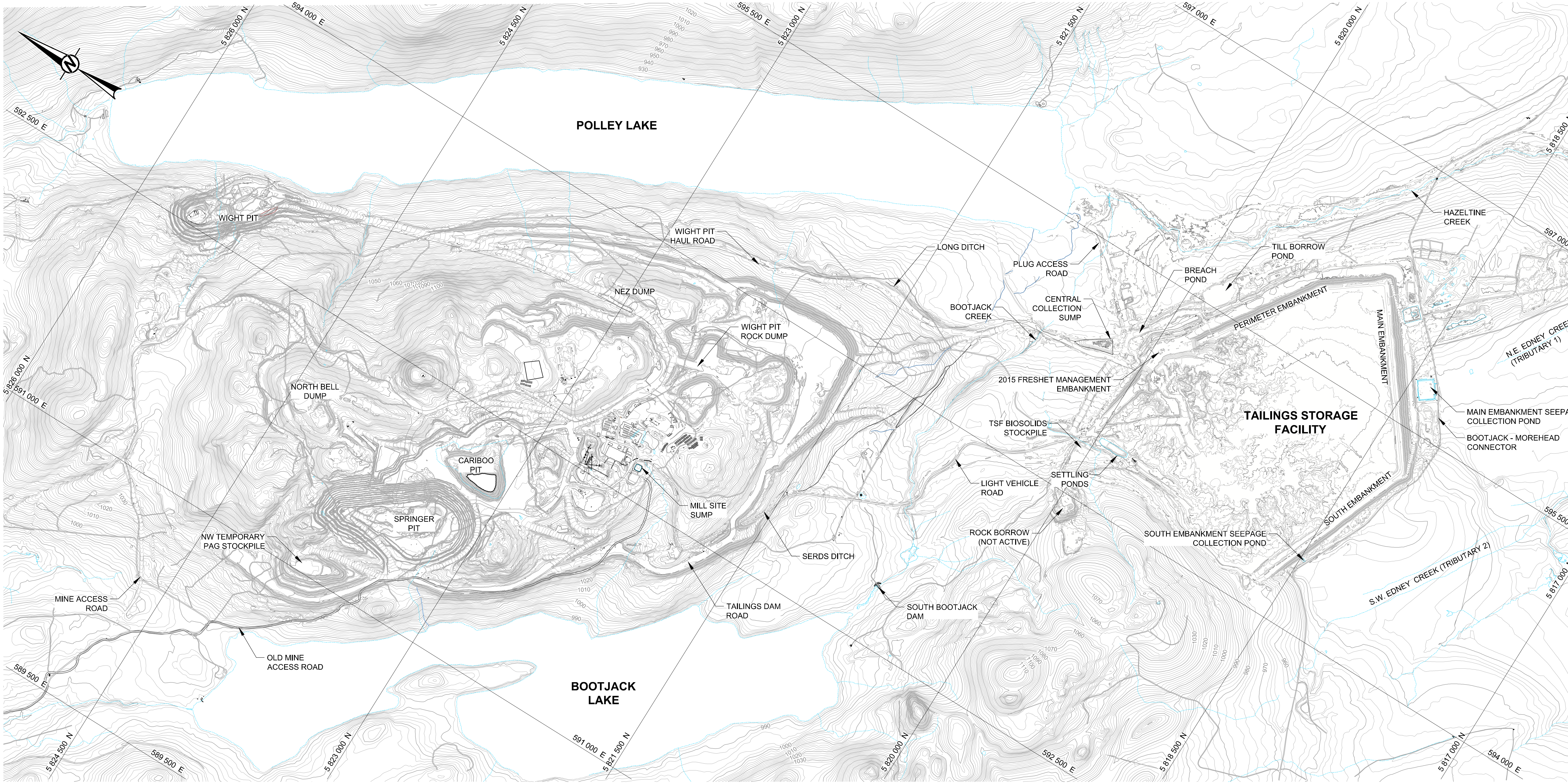

NOT FOR CONSTRUCTION

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.
2. 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).

REFERENCES

1. BASE TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MTPOLLEY2013-DTM.dwg", RECEIVED: OCTOBER 1, 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.

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A	2015-10-08	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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LIFE OF MINE FEASIBILITY DESIGN

TITLE
SITE PLAN

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
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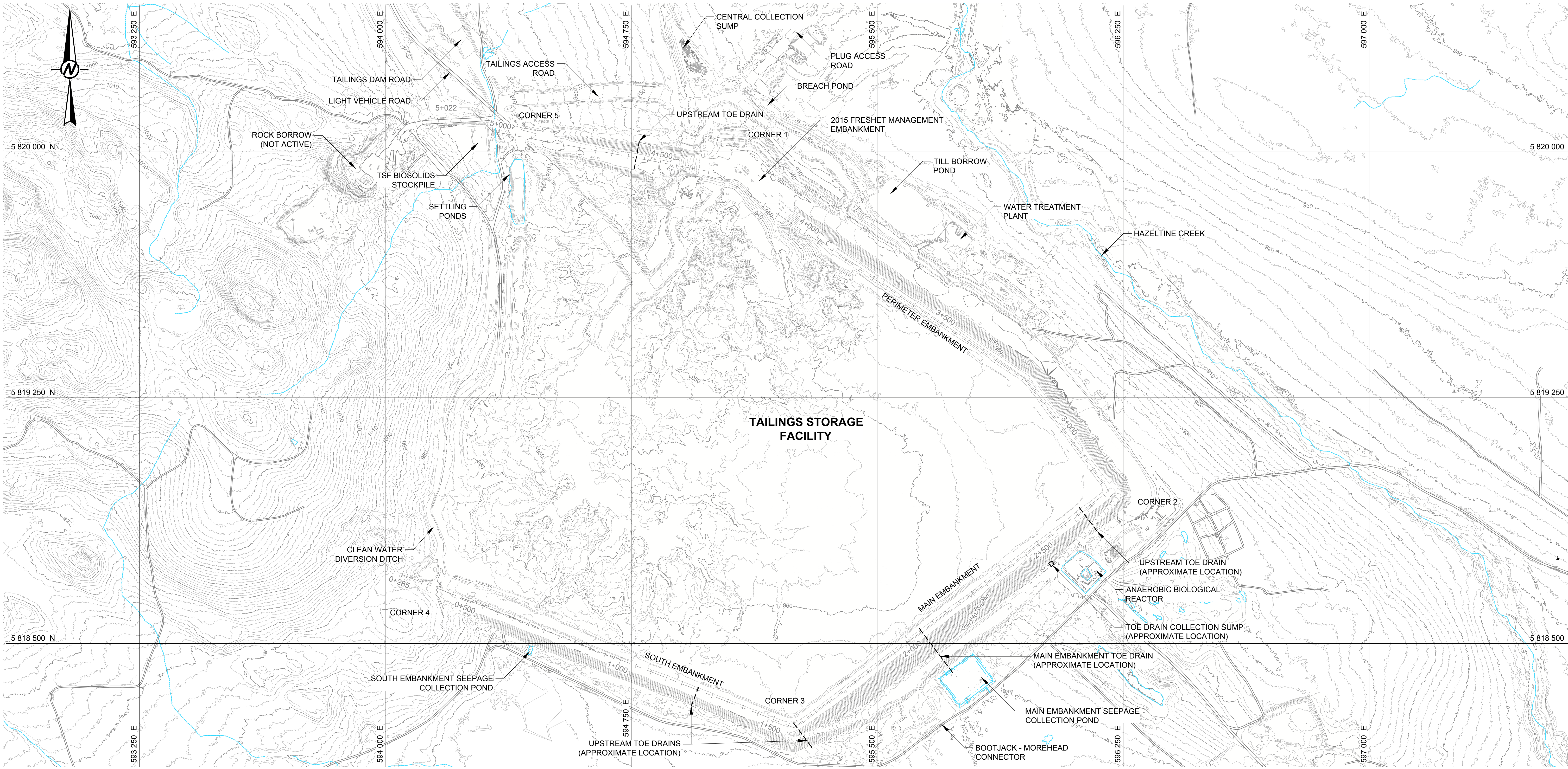

LEGEND

— — — UPSTREAM TOE DRAIN (APPROXIMATE LOCATION)

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.
2. 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).

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" AND FILE: "10cm Hazeltine 3 Reprocessed.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.

NOT FOR CONSTRUCTION

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A	2015-10-08	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TAILINGS STORAGE FACILITY
PRE-CONSTRUCTION CONDITIONS

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
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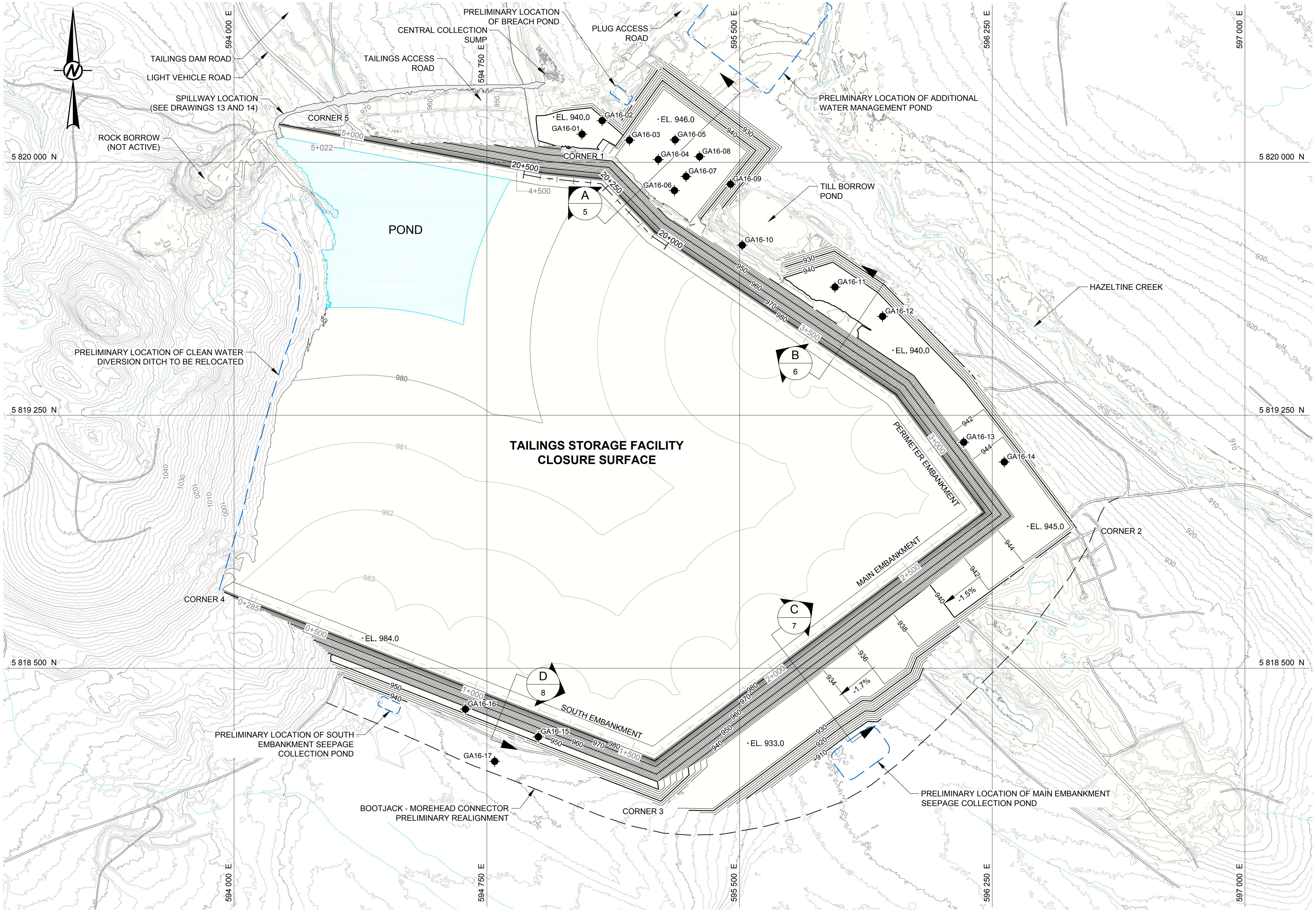

LEGEND

GA16-17	2016 PROPOSED GOLDER BOREHOLES
	PRELIMINARY LOCATION OF WATER MANAGEMENT PONDS
	PRELIMINARY ROAD REALIGNMENT
	EXISTING ROADS
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. CONTOURS INTERVAL OF TAILINGS POND AND TAILINGS STORAGE FACILITY CLOSURE SURFACE 1 m MINOR AND 5 m MAJOR.
5. TAILINGS SURFACE SHOWN IS PROPOSED FOR CLOSURE WITH POND AGAINST CORNER 5, AT THE SPILLWAY LOCATION.
6. THE LOCATION OF THE WATER MANAGEMENT STRUCTURES ARE PROPOSED. THE SIZING AND LOCATION WILL BE DETERMINED AS PART OF DETAILED WATER MANAGEMENT PLAN. WATER TREATMENT STRUCTURES ARE NOT SHOWN.
7. BUTTRESS DESIGN TO BE CONFIRMED BASED ON FURTHER GEOTECHNICAL INVESTIGATION.

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" AND "10cm Hazeltine 3 Reprocessed.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.

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MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
ULTIMATE ELEVATION TAILINGS STORAGE FACILITY DESIGN PLAN

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
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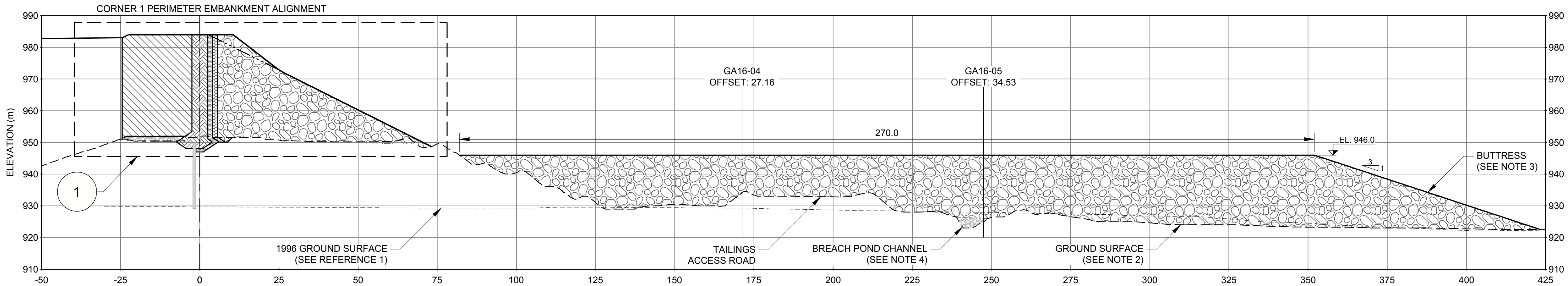
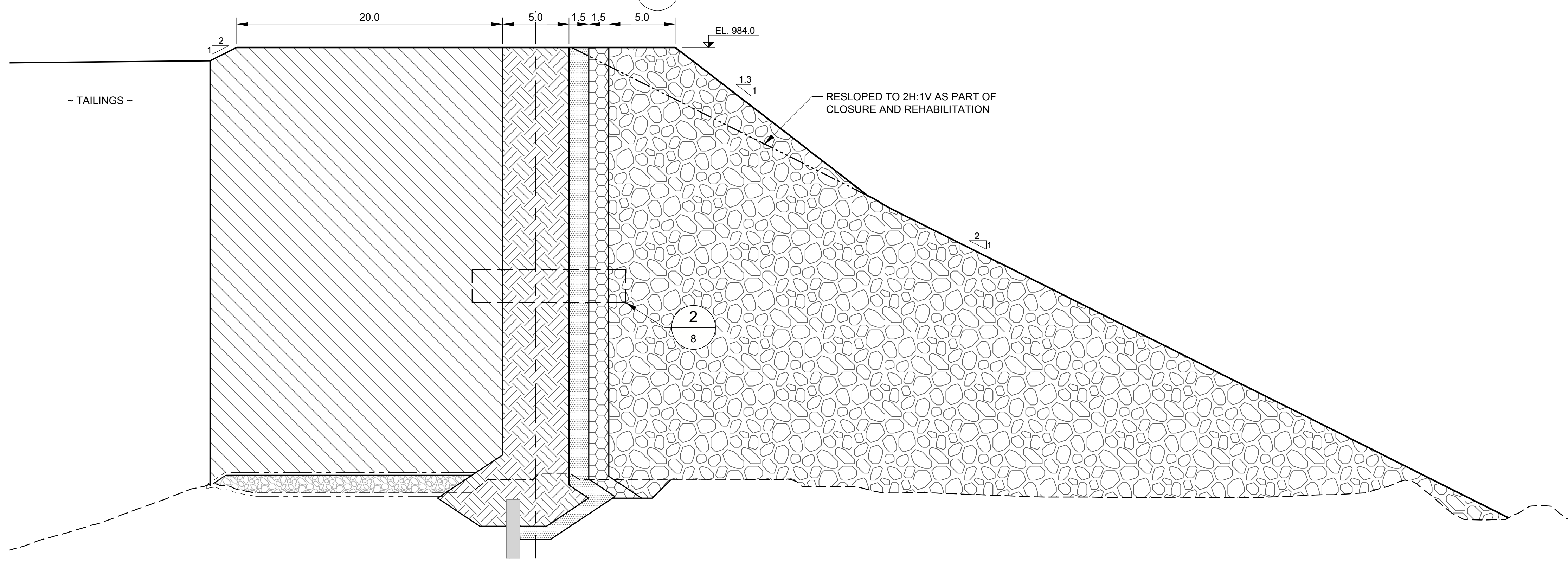


SCALE 1:750 m A 4 CORNER 1 PERIMETER EMBANKMENT STATION: 20+175



SCALE 1:200 m 1 CORNER 1 OF PERIMETER EMBANKMENT RAISE

LEGEND

- GROUND SURFACE (SEE NOTE 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 TAILINGS GRID DATUM.
2. GROUND SURFACE INFORMATION OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WAS COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).
3. BUTTRESS DESIGN TO BE CONFIRMED BASED ON RESULTS OF GEOTECHNICAL INVESTIGATION.
4. DRAIN ROCK TO BE PLACED WITHIN BREACH POND CHANNEL TO FORM A ROCK DRAIN.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "1996 TSF Topo.dxf", RECEIVED: MARCH 11, 2015.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
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NOT FOR CONSTRUCTION

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0 25 50
1:750 METRES

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TITLE
CORNER 1 PERIMETER EMBANKMENT SECTION STATION: 20+175

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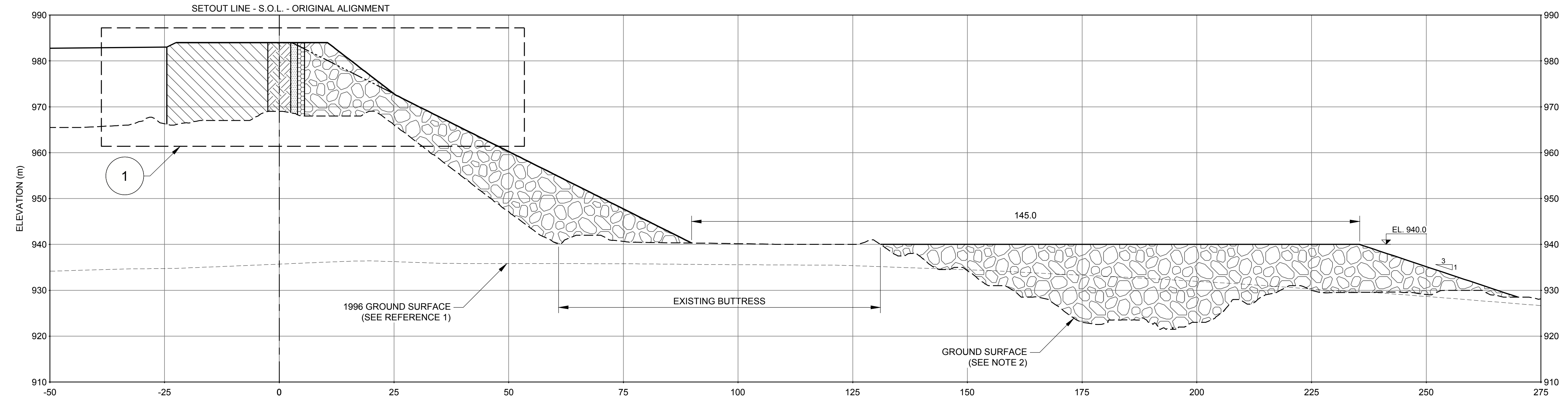

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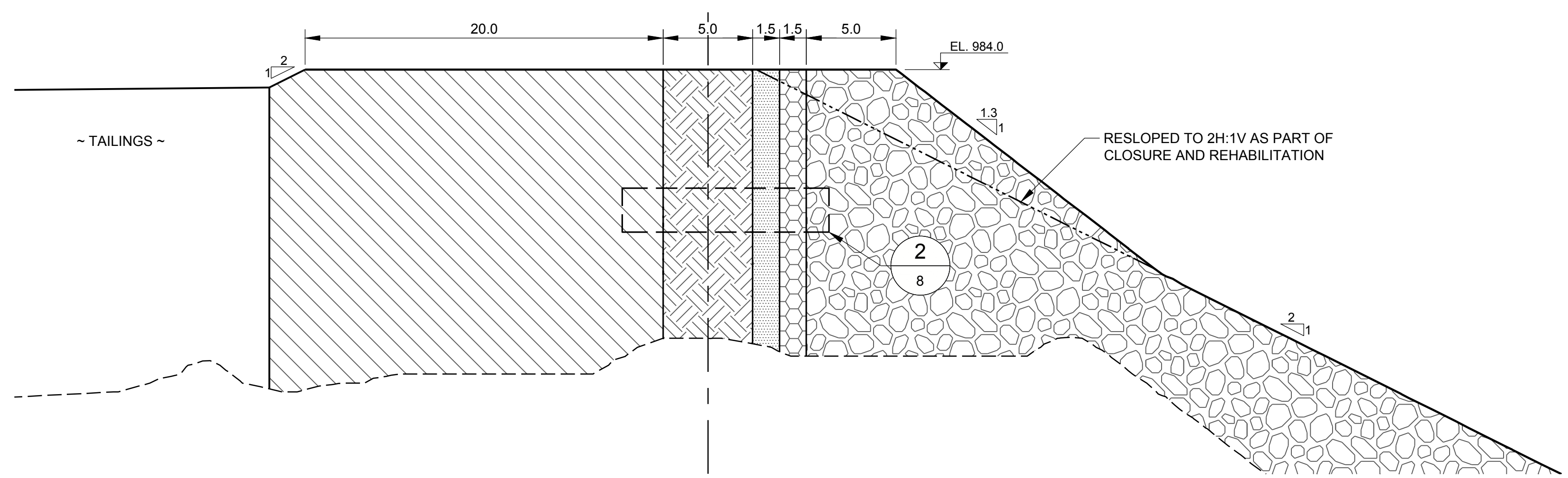

SCALE 1:200 m 1 PERIMETER EMBANKMENT RAISE

LEGEND

- GROUND SURFACE (SEE NOTE 2)
- 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. GROUND SURFACE INFORMATION OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WAS COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC,
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NOT FOR CONSTRUCTION

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0 20 40
1:500 METRES

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A	2015-10-08	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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LIFE OF MINE FEASIBILITY DESIGN

TITLE
PERIMETER EMBANKMENT SECTION
STATION: 3+400

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
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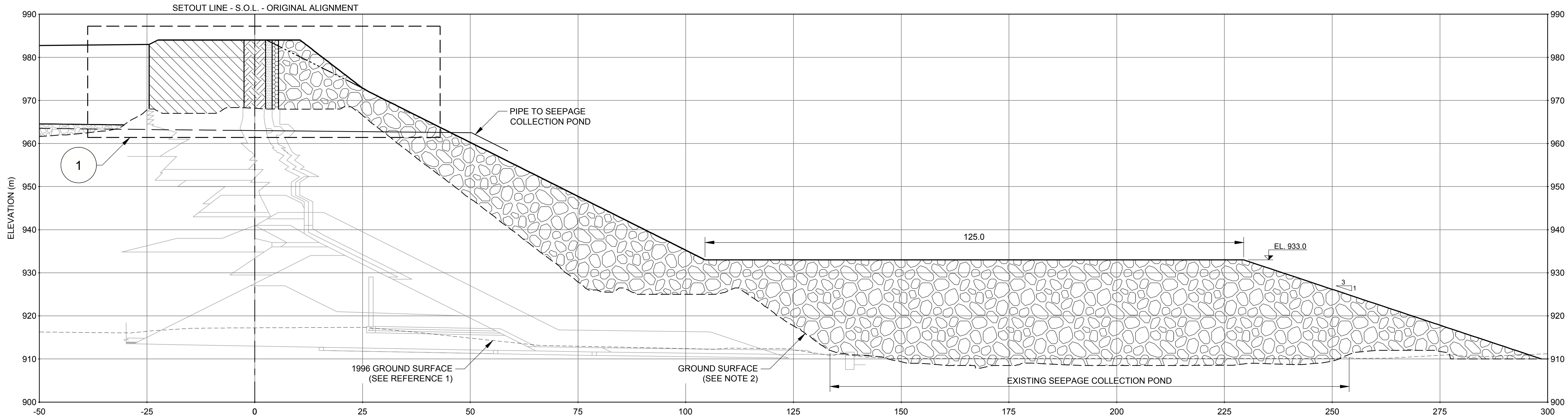

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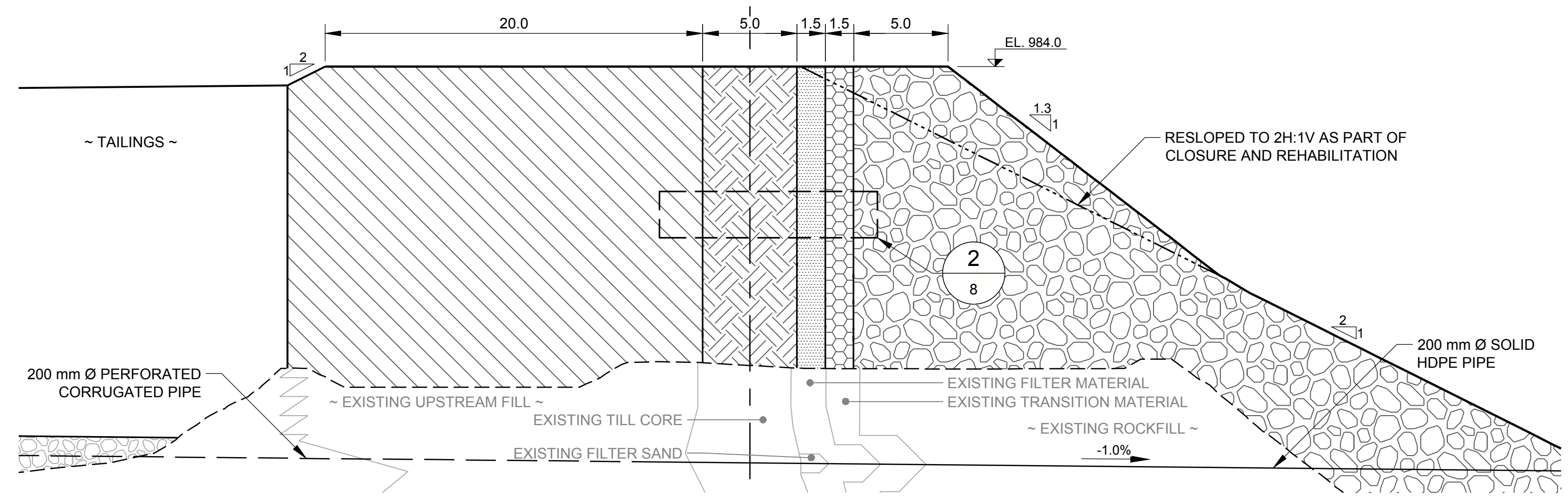

SCALE 1:200 m 1 MAIN EMBANKMENT RAISE

LEGEND

- GROUND SURFACE (SEE NOTE 2)
- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- DRAIN ROCK
- TILL CORE
- UPSTREAM FILL

NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. GROUND SURFACE INFORMATION OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WAS COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).
3. EXCAVATION AND MATERIAL BACKFILL FOR UPSTREAM DRAIN NOT SHOWN FOR CLARITY.

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "1996 TSF Topo.dxf", RECEIVED: MARCH 11, 2015.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
3. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
4. 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

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0 20 40
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B	2015-10-28	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-08	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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PROJECT
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LIFE OF MINE FEASIBILITY DESIGN

TITLE
MAIN EMBANKMENT SECTION
STATION: 2+060

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
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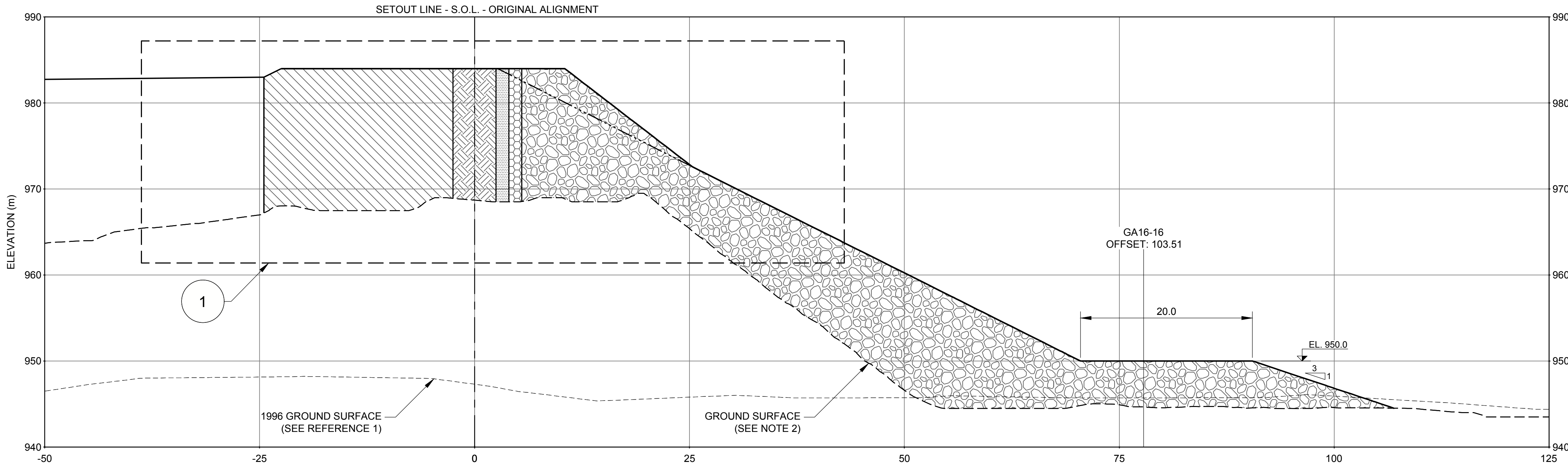
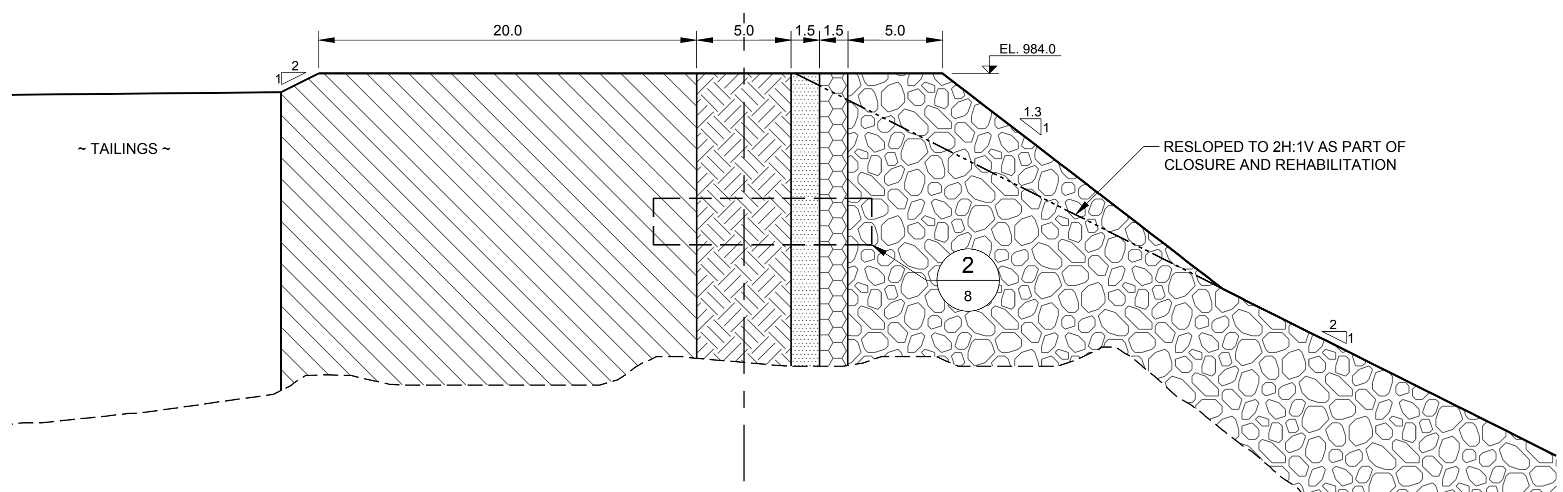
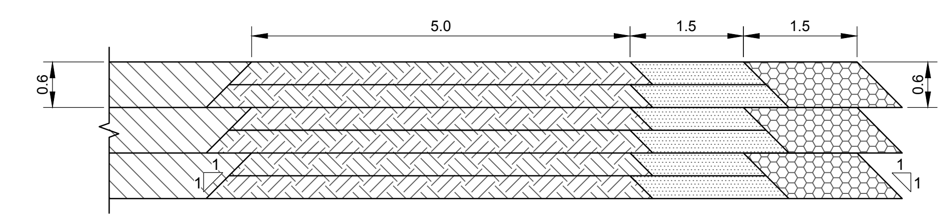


SCALE 1:300 m D 4 SOUTH EMBANKMENT STATION: 1+100



SCALE 1:200 m 1 SOUTH EMBANKMENT RAISE



SCALE 1:50 m 2 5 6 7 8 DETAIL

NOT FOR CONSTRUCTION

LEGEND

- GROUND SURFACE (SEE NOTE 2)
- 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. GROUND SURFACE INFORMATION OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WAS COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).

REFERENCES

1. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "1996 TSF Topo.dxf", RECEIVED: MARCH 11, 2015.
2. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "MtPolley_20140805_1m_LiDAR_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
3. TOPOGRAPHY PROVIDED BY MPMC, FILE NAME: "10cm contours full tailings.dxf", SURVEYED: MAY 27, 2015, RECEIVED: JUNE 11, 2015.
4. 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 10 20
1:200 METRES

0 10 20
1:300 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED AS FINAL	TAK	GJ	AJH	TLE
B	2015-10-28	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-08	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SOUTH EMBANKMENT SECTION
STATION: 1+100

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	9000/9300	0		8

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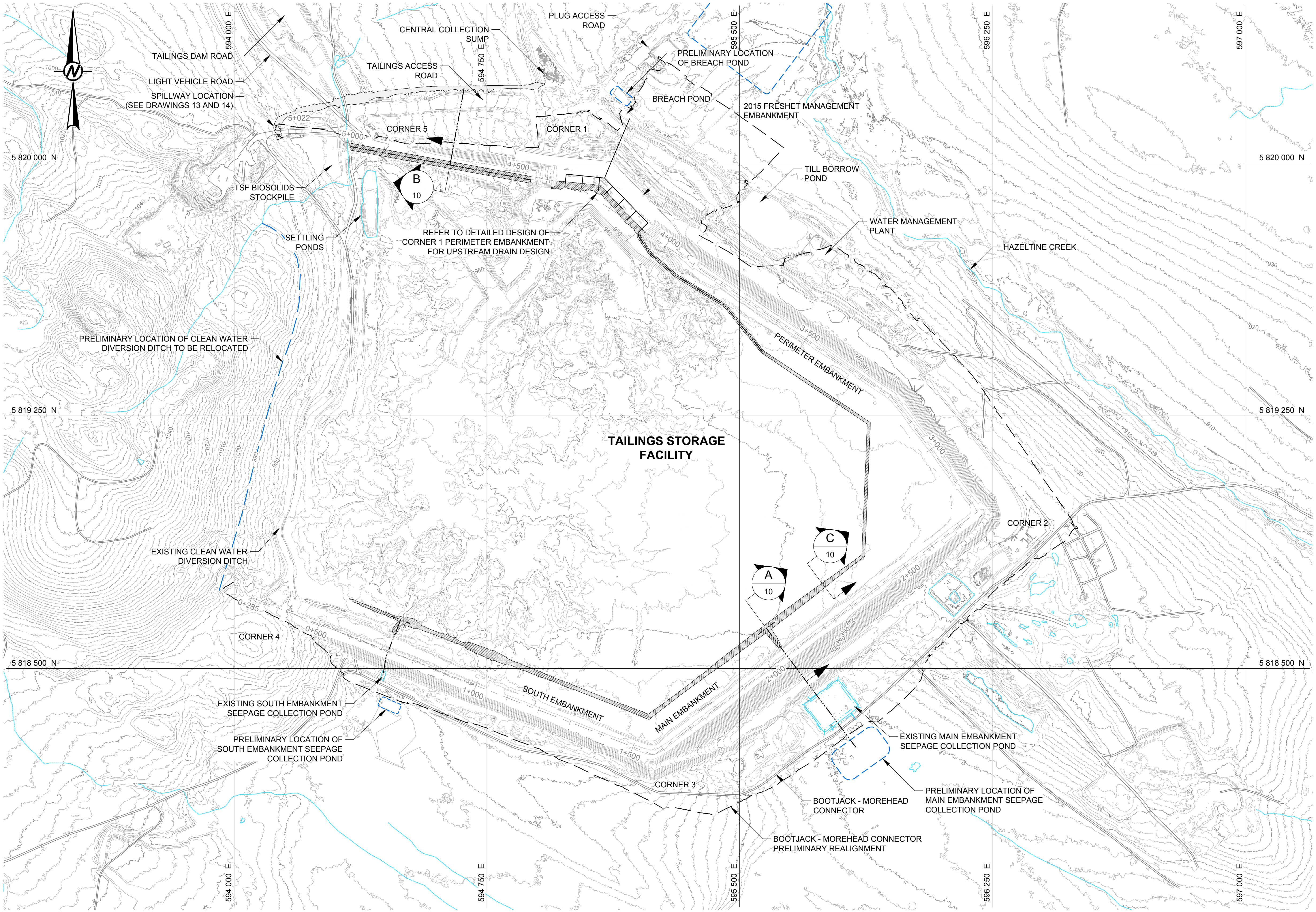

LEGEND

(hatched)	UPSTREAM DRAIN FOOTPRINT
— · — ·	UPSTREAM DRAIN PIPE
— — —	EL. 984 FEASIBILITY DESIGN EMBANKMENT AND BUTTRESS TOE
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.

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: "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.

NOT FOR CONSTRUCTION

0 200 400
1:6,000 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED AS FINAL	TAK	GJ	AJH	TLE
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A	2015-10-08	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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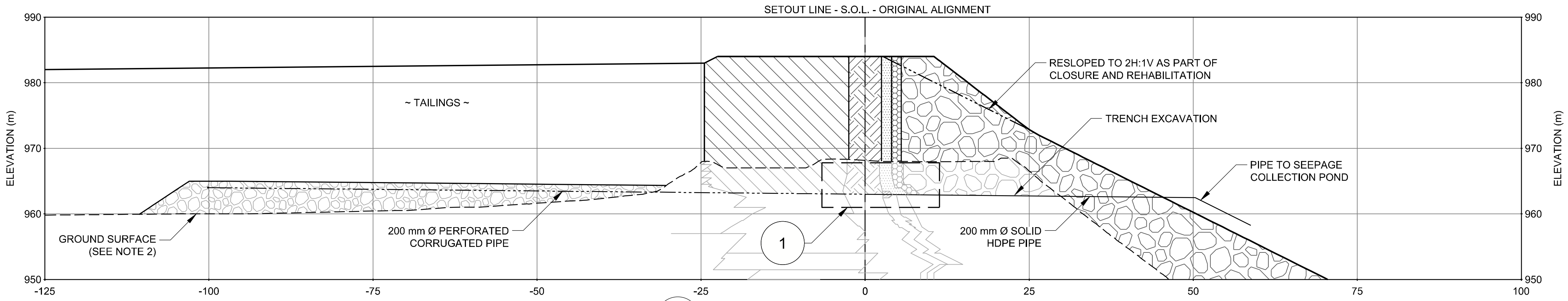
PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TAILINGS STORAGE FACILITY
UPSTREAM DRAIN LAYOUT

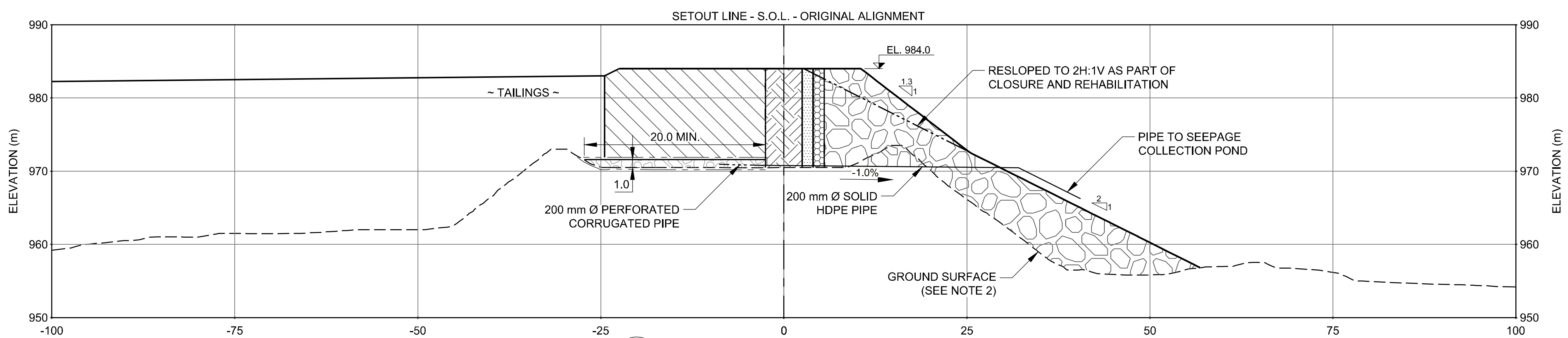
PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	9000/9300	0		9

Path: \\golder.gds\gal\Burnaby\CAD-GIS\Client\1413803\PHASE 19000\Task 9300\Feasibility Report\ | File Name: 1413803-9000-9300 - FEASIBILITY - UPSTREAM_DRAIN.dwg

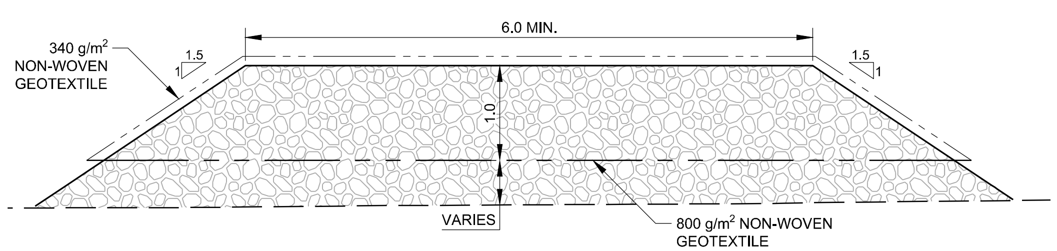
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D
25 mm



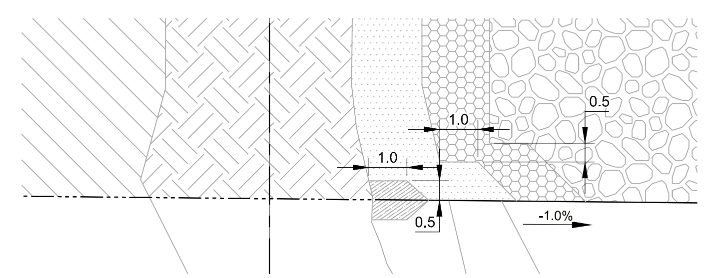
SCALE 1:400 m A 9 MAIN EMBANKMENT - STATION: 2+060



SCALE 1:400 m B 9 PERIMETER EMBANKMENT - STATION: 4+700



SCALE 1:40 m C 9 UPSTREAM DRAIN TYPICAL SECTION



SCALE 1:100 m 1 PIPE THROUGH EMBANKMENT DETAIL

LEGEND

- GROUND SURFACE (SEE NOTE 2)
- FILTER SAND
- FILTER MATERIAL
- TRANSITION MATERIAL
- ROCKFILL
- DRAIN ROCK
- TILL CORE
- UPSTREAM FILL
- 340 g/m^2 NON-WOVEN GEOTEXTILE
- 800 g/m^2 NON-WOVEN GEOTEXTILE

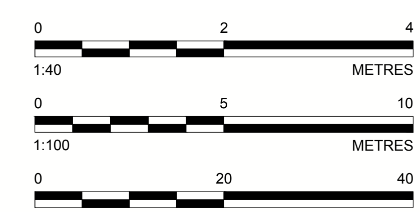
NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
2. GROUND SURFACE INFORMATION OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WAS COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).

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.
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



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B	2015-10-28	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TAILINGS STORAGE FACILITY
UPSTREAM DRAIN SECTIONS

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
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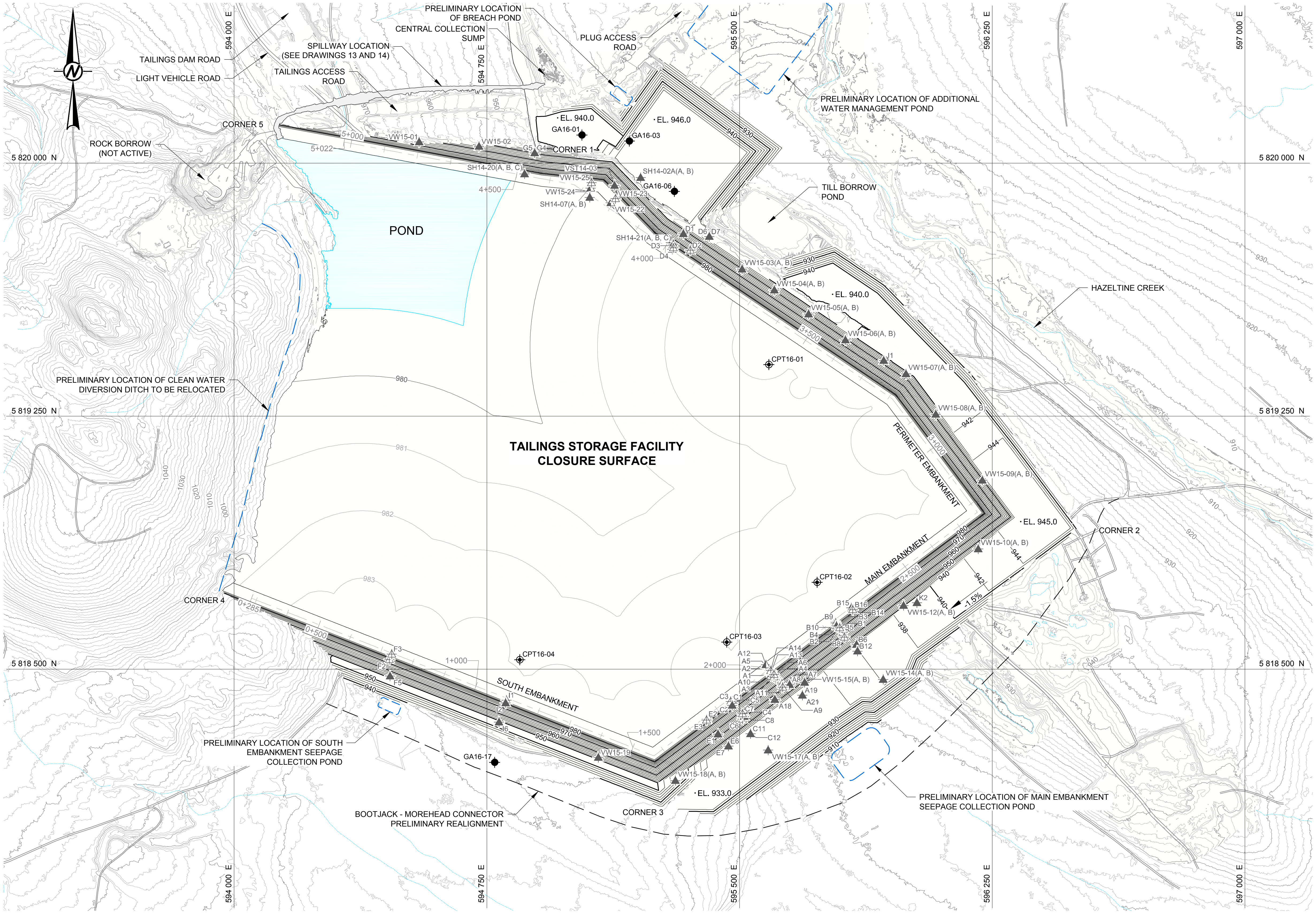

LEGEND

CPT16-04	PROPOSED VIBRATING WIRE PIEZOMETER - TO BE INSTALLED IN TAILINGS
GA16-17	PROPOSED 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
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.

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: "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.

NOT FOR CONSTRUCTION

0 200 400
1:6,000 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED AS FINAL	TAK	GJ	AJH	TLE
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A	2015-10-08	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TAILINGS STORAGE FACILITY
PIEZOMETER INSTRUMENTATION

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	9000/9300	0		11

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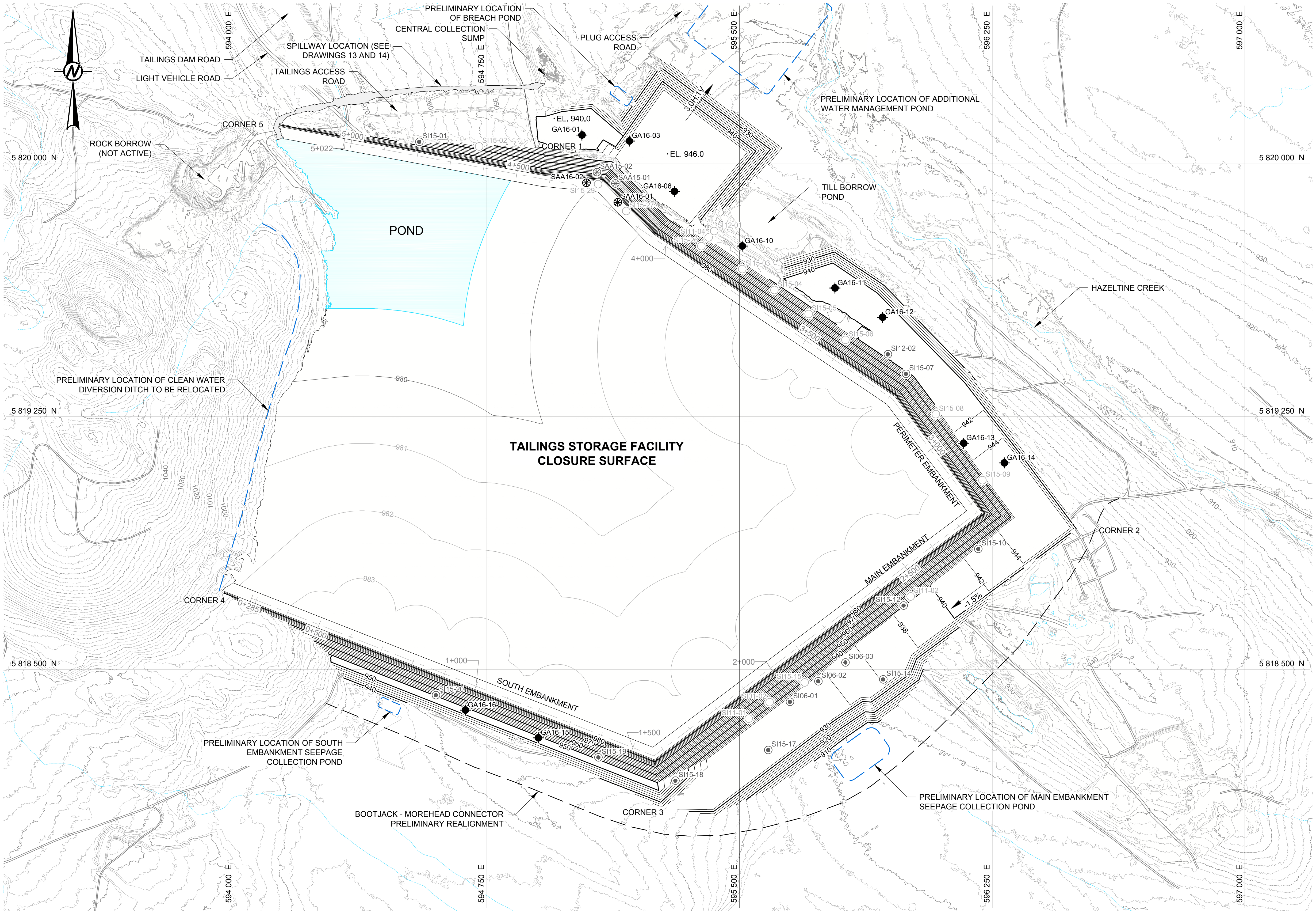

LEGEND

- GA16-16 — PROPOSED SLOPE INCLINOMETER LOCATIONS (INSTALLED AS PART OF 2016 DRILLING PROGRAM)
- SAA16-02 — PROPOSED SHAPE ACCEL ARRAY INSTALLATION (SAA)
- SAA15-02 — EXISTING SHAPE ACCEL ARRAY (SAA)
- EXISTING SLOPE INCLINOMETERS
- EXISTING SLOPE INCLINOMETERS TO BE DESTROYED BY CONSTRUCTION (SEE NOTE 4)
- 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. SHAPE ACCEL ARRAY (SAA) MAY BE INSTALLED WITHIN SELECT INCLINOMETER CASINGS.

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: "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.

NOT FOR CONSTRUCTION

0 200 400
1:6,000 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED AS FINAL	TAK	GJ	AJH	TLE
B	2015-10-28	ISSUED FOR CLIENT REVIEW	TAK	GJ	AJH	TLE
A	2015-10-08	ISSUED FOR INTERNAL REVIEW	TAK	GJ	AJH	TLE

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PROJECT
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LIFE OF MINE FEASIBILITY DESIGN

TITLE
TAILINGS STORAGE FACILITY
SLOPE INCLINOMETER AND SAA INSTRUMENTATION

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	9000/9300	0		12

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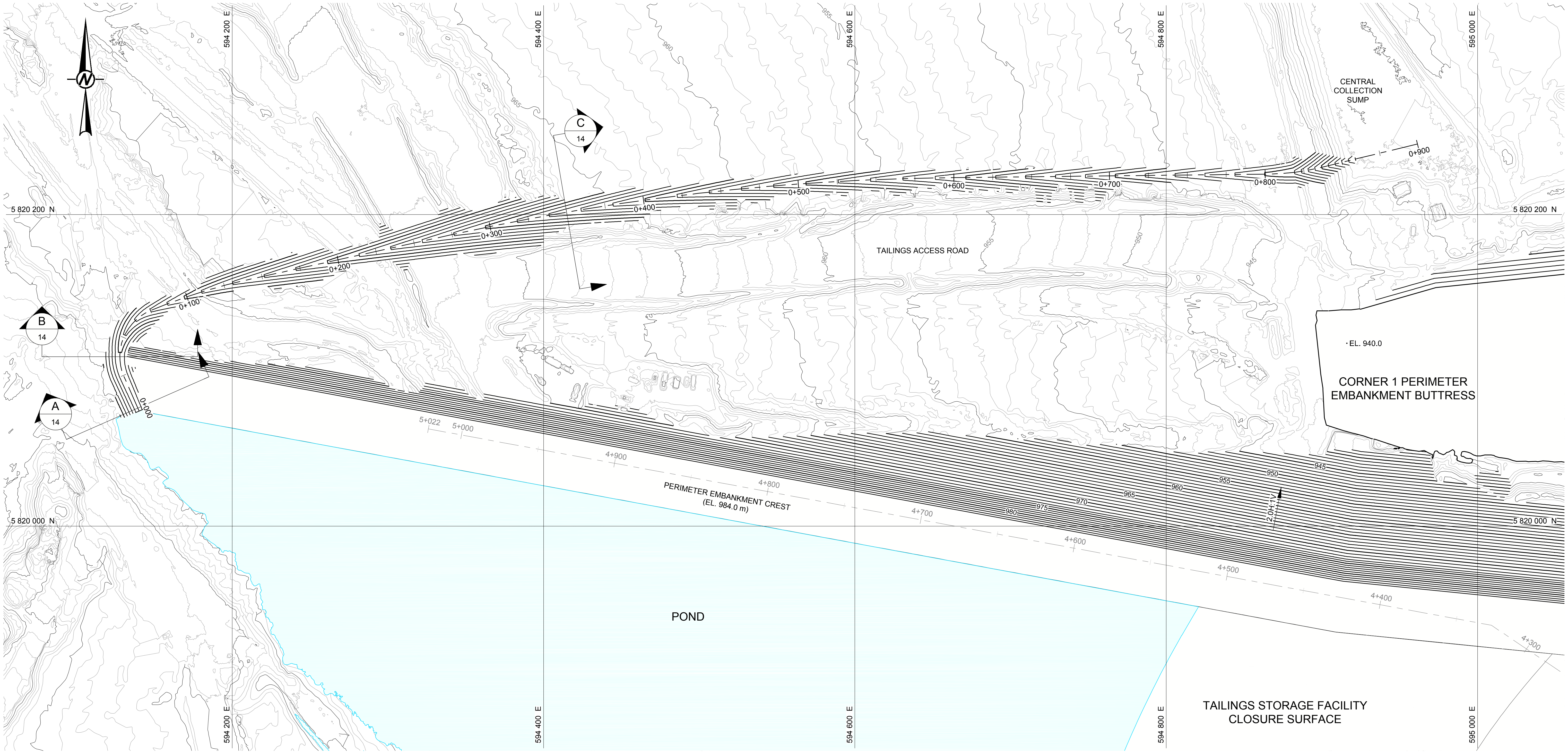

LEGEND

0+900 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).

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.

NOT FOR CONSTRUCTION

0 50 100
1:1,250 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED AS FINAL	TAK	SH	JO	TLE
B	2015-10-28	ISSUED FOR CLIENT REVIEW	BC	SH	JO	TLE
A	2015-10-27	ISSUED FOR INTERNAL REVIEW	BC	SH	JO	TLE

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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
EL. 984 m SPILLWAY DESIGN
PLAN

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	9000/9300	0		13

Path: \\golder.gds\gal\Burnaby\CAD-GIS\Client\1413803\PHASE 1\9000\Task 9300\Feasibility Report | File Name: 1413803-9000-9300 - FEASIBILITY - SPILLWAY_DSGN_PLAN.dwg

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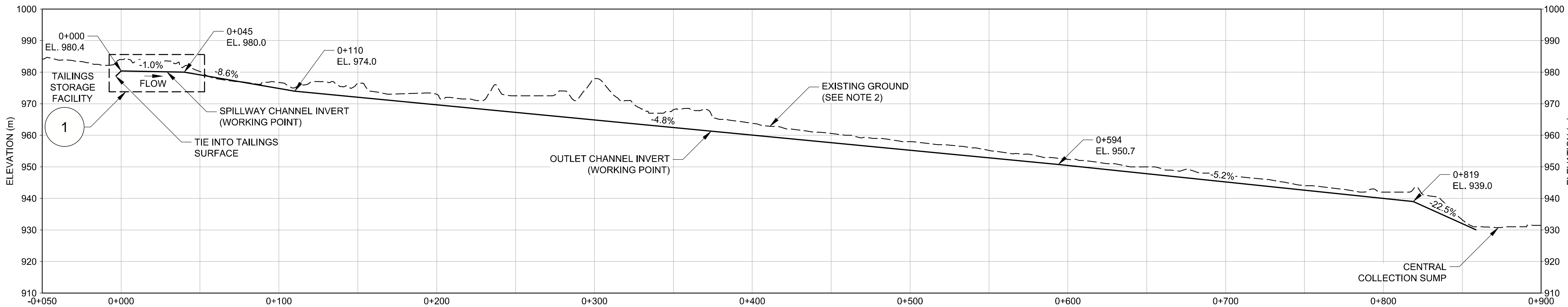
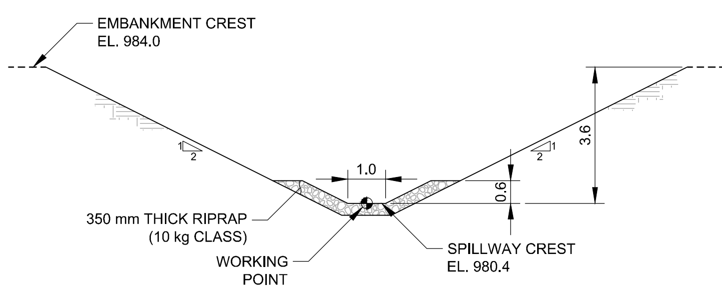
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



SPILLWAY PROFILE
SCALE 1:1,500 m
VERTICALLY EXAGGERATED 2x



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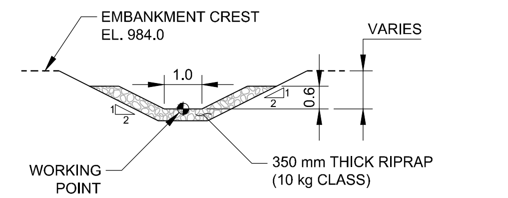
STATION 0+000



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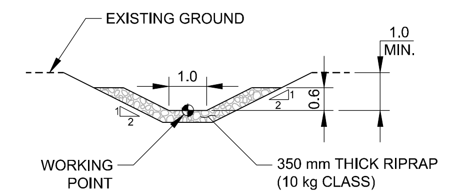
STATION 0+000 TO STATION 0+040



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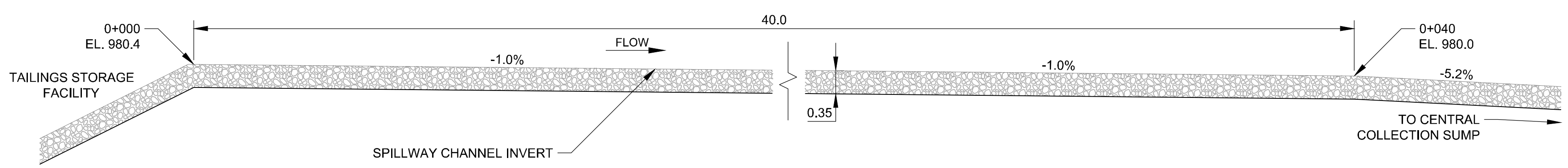
STATION 0+040 TO STATION 0+594



SCALE 1:50 m 1 SPILLWAY DETAIL

NOT FOR CONSTRUCTION

LEGEND

RIPRAP

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.

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.

0 2 4
1:50 METRES

0 5 10
1:100 METRES

0 50 100
1:1,500 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-11-03	ISSUED AS FINAL	TAK	SH	JO	TLE
B	2015-10-28	ISSUED FOR CLIENT REVIEW	BC	SH	JO	TLE
A	2015-10-27	ISSUED FOR INTERNAL REVIEW	BC	SH	JO	TLE

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PROJECT
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY

TITLE
EL. 984 m SPILLWAY DESIGN
SECTION AND DETAILS

PROJECT No.	PHASE/TASK	Rev.	of	DRAWING
1413803	9000/9300	0		14

Path: \\golder.gds\gal\Burnaby\CAD-GIS\Client\1413803\PHASE 19000\Task 9300\Feasibility Report\ | File Name: 1413803-9000-9300 - FEASIBILITY - SPILLWAY_DSGN_SECT+DTLS.dwg

0 25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

APPENDIX B

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.

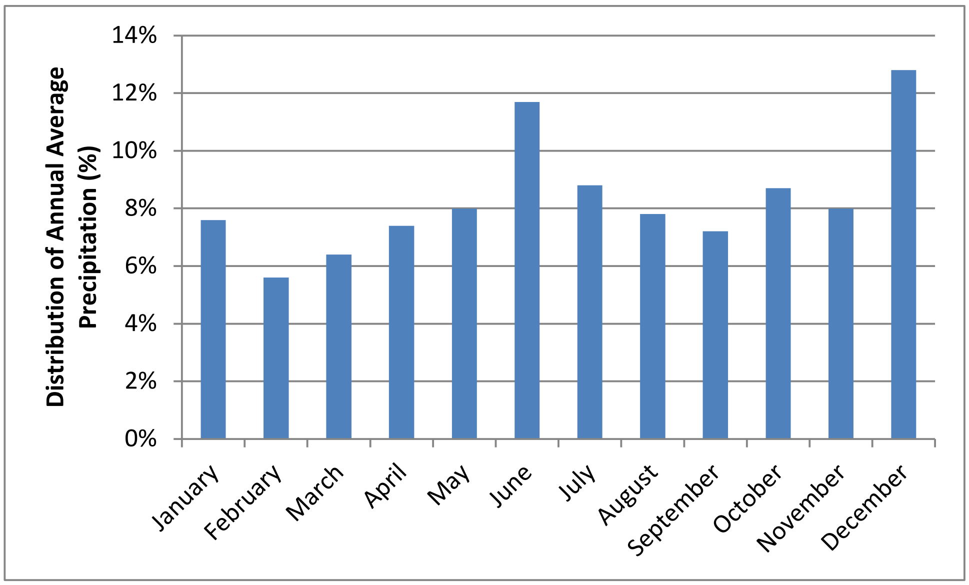

Figure 1: Distribution of Annual Average Precipitation

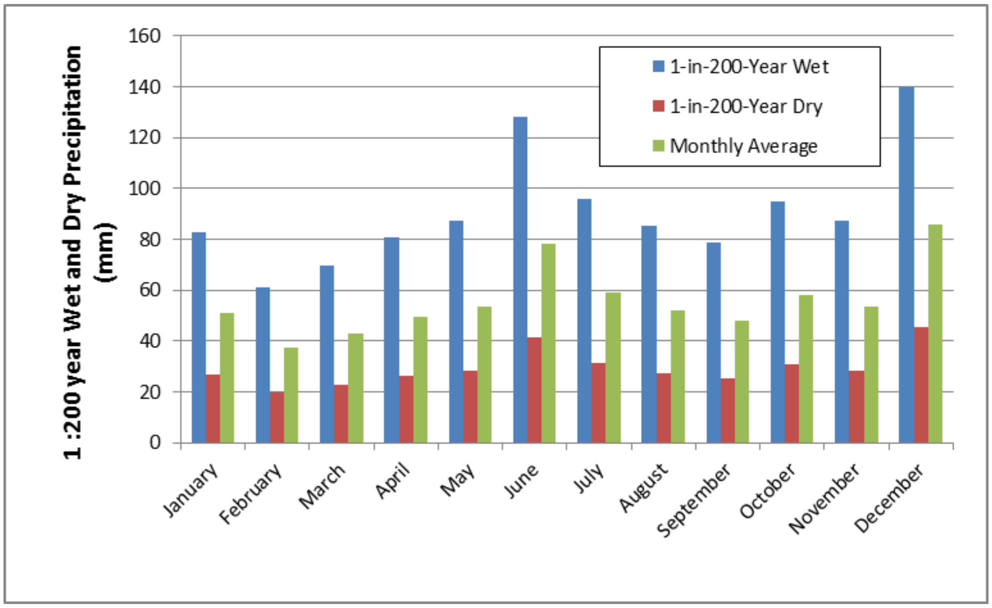

Figure 2: 1:200 Year Wet and Dry Precipitation

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
2019 Quarter 1	1,861,998	-	1,861,998

Period	Tailings discharged from the Mill (tonnes)	Tailings Removed from Springer Pit (Tonnes)	Total placed in the TSF (Tonnes)
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

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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 C

Tailings Storage Facility Siting and Deposition Technology Review

1.0 INTRODUCTION

This appendix presents a discussion on selection of a site for future tailings management at the Mount Polley Mine site and on best applicable technology (BAT) and best applicable practice (BAP) for tailings deposition as it relates to the Mount Polley Mine.

The goal of tailings management is to provide permanent physical stability of the tailings while maintaining chemical stability. Physical stability of the tailings requires that the facility containing the tailings be designed to withstand the forces that will be applied or that the tailings themselves are deposited in such a manner that the tailings are able to withstand the forces applied. Potential failure mechanisms that must be addressed in the design of the tailings storage facility (TSF) are identified in many dam and tailings management facility design guidelines, such as the Canadian Dam Association Dam Safety Guideline (CDA 2013), International Commission on Large Dams (ICOLD) Bulletin 121 Tailings Dams Risk of Dangerous Occurrences – Lessons Learnt from Practical Experiences (ICOLD 2001), and ICOLD Draft Bulletin 139 Improving Tailings Dam Safety: Critical Aspects of Management, Design, Operation and Closure (ICOLD 2006). These guidelines identify failure mechanisms that include foundation failure due to construction related pore pressures, foundation failure related to unrecognized soil and rock conditions, internal erosion of dam fills and of foundation materials, slope instability, landslides into the impoundment, overtopping due to floods, overtopping due to improper ancillary facility maintenance, and earthquakes resulting in dam fill failure or foundation failure. Other failure mechanisms include excessive dust generation from the tailings surface, excess rate of seepage from the facility resulting in degradation of downstream water quality, and excessive rate of seepage from the facility resulting in insufficient water to run the process plant.

The design of any future embankment or dam that will be required for tailings or water management at the Mount Polley Mine Site will use the maximum potential tailings and water levels to calculate the loads on the embankments or dams so that under all conditions the embankments or dams will be stable. The operating principles for the facility will be developed so that under normal operating conditions the loads imposed on the embankments or dams will be less than the design values. These principles will be based on the objectives set out in the Independent Expert Engineering Investigation and Review Panel (IEERP) report of January 2015:

- reduce free water within the impoundment (which reduces loads as well as the consequences of a breach);
- maintain the free water away from the embankments where possible;
- promote unsaturated conditions in the tailings (by the provision of drainage); and
- increase in situ density of the tailings.

2.0 SITE AND TECHNOLOGY SELECTION OBJECTIVES

In selecting potential locations and technologies for the storage of tailings, the following objectives are to be met:

- provide secure and permanent storage for about 36 million tonnes of tailings (approximately 4 years production) with expansion capacity to store up to a total of 70 million tonnes of tailings (approximately 10 years production);
- minimize the time to restarting mining (this includes time to carry out site characterization studies and geotechnical and hydrogeological investigations, to design the facility, to obtain the required permits, and to procure the required equipment and construct the facility);
- minimize additional land disturbance;
- minimize environmental impact (e.g., wildlife, habitat, water quality and discharge, dust generation);
- minimize social impact (e.g., negative public perceptions, disruption of traditional land use); and
- minimize cost (this includes the costs for investigation, design, procurement, construction, operation and closure).

The second objective is fundamental in selection of the tailings disposal options for the Mount Polley Mine. The Mine is currently operating under a restricted operations permit, which allows operation for the lesser of: expiration of the permit to operate on July 9, 2016 or the processing of 4 million tonnes of ore. The tailings produced under this restricted operations permit are being deposited in the Springer Pit, and the combined elevation of water and tailings in the Springer Pit are not permitted to exceed (El) 1,030 m. If an alternative tailings storage site and technology is not available before 4 million tonnes of ore is processed, ore processing will be stopped. Extensive delays in restarting the operation would significantly negatively impact the economics of the operation, and may lead to the mine being placed under care and maintenance and, ultimately, closed.

3.0 POTENTIAL SITES

The potential locations identified for tailings include surface disposal in the existing TSF or in a newly constructed facility, disposal in the underground mine workings, disposal in an open pit, or lake deposition. The following is a list of potential sites which can be considered for tailings deposition:

- **Existing TSF**—Raise the crest of the breach repair at Corner 1 of the Perimeter Embankment to El 970 m and use the existing TSF. Provide additional capacity by extending the buttresses and raising the embankments. The main advantages of using the existing TSF are that minimum additional footprint will be required; the foundation conditions underneath the TSF have been thoroughly investigated and are well understood, which allows designs to be developed; the tailings transportation and water management infrastructure is already in place for this site; and deposition of tailings into the TSF can be used to create the closure land surface within the TSF rather than reshaping the surface using mechanical equipment.

- **New TSF location**—Four potential locations for a new TSF have been identified, as shown in Figure 1. The site to the north of the mine was identified in the original siting studies carried out by Knight Piésold in 1989, as shown in Figure 2. The size and configuration of a new TSF would be dependent on the tailings deposition technology; however, in general, the required area for any technology would be similar. Considering that 36 million tonnes of tailings will require storage, and that the achieved dry density will be in the range from about 1.4 t/m^3 for slurry deposition to 1.7 t/m^3 for filtered tailings, the volume of tailings to be stored would be in the range from 26 to 21 Mm^3. Assuming an average thickness of tailings of 20 m for an embankment height of about 30 m would mean than an area of about 120 to 150 ha would be required. This is about half the size of the existing TSF. To expand a new TSF to accept an additional 35 Mt of tailings (to meet storage requirements for the 10-year mine life) would require raising the dams to a maximum height of about 60 m or doubling the footprint. A detailed site investigation will be needed to characterize the foundation conditions at the new site location, which will likely also be partially underlain by glaciolacustrine soils. Additional land disturbance will be required for the new borrow areas for dam construction materials, for the new access roads, for the new tailings and water conveyance corridors, and for the new seepage collection and water management ponds.

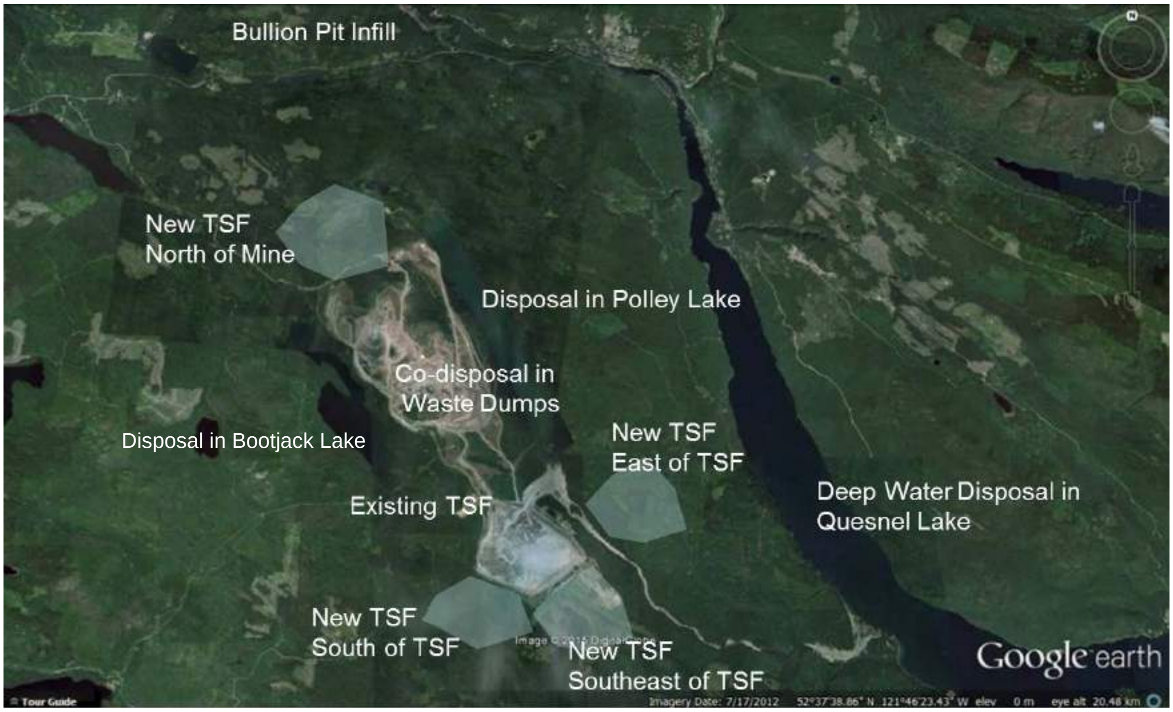


Figure 1: Potential Locations for a Future Tailings Storage Facility

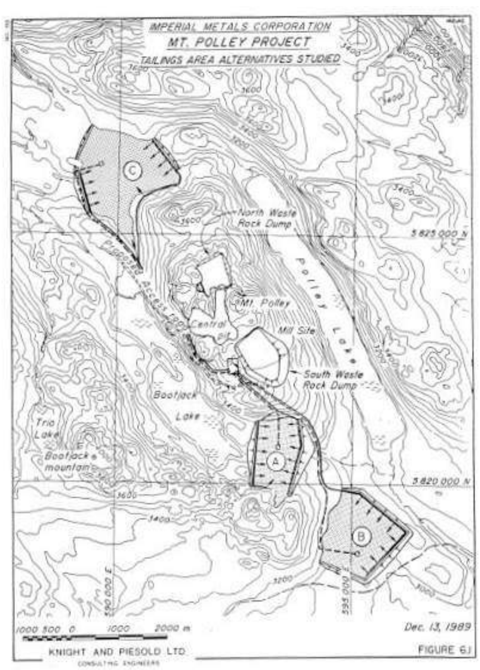


Figure 2: Potential Tailings Storage Facility Sites from 1989 Study (Source: Knight Piésold 1990)

- **Lake deposition**—Deposit tailings into an existing lake, such that the tailings remain below the lake level. Nearby lakes include Polley Lake, Bootjack Lake, and Quesnel Lake. This alternative results in a physically stable facility. Acid generation is prevented, which is not a concern for the Mount Polley tailings; however, metal leaching under neutral conditions may still be a concern.

- **Open pit deposition**—Deposit tailings within a mined-out pit, where there are no active open pit activities or. The tailings are typically placed sub-aqueously (deposited under water). After deposition, the solids settle out and the supernatant water can then be recycled for use within the mill or treated and discharged from the site. This is a favourable alternative providing a physically stable location without increasing the disturbed footprint. An example is shown in Figure 3. Three open pits exist on the Mount Polley Mine site, but all are part of the active mining operation and are not available for tailings disposal. The Bullion Pit is a potential site for the Mount Polley tailings, which would allow this abandoned placer mining pit to be restored to a more natural landform than the present condition. A dam would be required to close the pit opening.

Figure 3: JEB Tailings Management Facility in Northern Saskatchewan

- **Underground disposal**—Tailings can be placed underground in mined out areas only as a means of tailings disposal, or tailings may be incorporated in the mining process as backfill. The required strength of the backfill can vary from negligible (where the only objective is to fill voids), to several megapascals (where the backfill is required to provide structural support to allow ongoing underground mining). In active mining environments, a maximum of about 50% of the tailings can be placed underground as a consequence of the much higher porosity of the tailings relative to rock (porosity of tailings is about 50%, while rock has nearly 0% porosity). At the Mount Polley Mine, the underground mining will advance in parallel with the open pit mining, and therefore only a small portion of underground workings could potentially be available for tailings disposal. Additionally, the underground workings at Wight Pit could only take a small proportion of the tailings generated from the Mount Polley Mine.

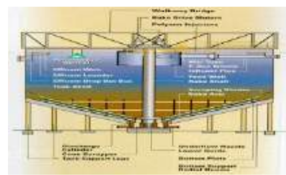
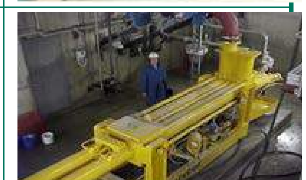
- **Co-disposal with waste rock**—The disposal of tailings and waste rock in one facility or area. There are many different forms of co-disposal, which vary by degree of mixing, physical arrangement, and mixture ratio of tailings to waste rock. Options can include the paste rock blended concept, thickened tailings in cells in the waste rock dump, or tailings sand (cyclone underflow) in the waste rock with fines (cyclone overflow) in a TSF. For efficient operation, the area required would be similar to that of a new TSF, namely about 100 to 150 ha. It is understood that Mount Polley Mining Corporation has a permit amendment allowing trialling the placement of the coarse cyclone underflow fraction of the tailings within existing waste rock facilities. If successful, the placement of the coarse fraction of the tailings (cyclone underflow) within the rockfill for tailings dam buttress construction can also be considered. The fine tailings fraction (cyclone overflow) will still be required to be stored within an alternate location. Co-disposal of the coarse cycloned underflow fraction of the tailings with waste rock and potentially as buttress construction material could account for approximately 10% to 30% of the total tailings, and will be dependent on the tailings gradation and the allowable fines within the underflow.

The potential locations are shown in Figure 1. Of the locations identified, the existing TSF is the only site that has had sufficient site investigation to allow detail engineering design of the containment structures to proceed immediately.

4.0 TAILINGS MANAGEMENT TECHNOLOGIES

The available tailings management technologies are differentiated primarily by the water content of the tailings, which determines the transportation method and the deposition method. Mineral processing commonly results in tailings with solids contents in the range of 30% to 50%. Dewatering of the tailings can be carried out to increase the solids contents of the tailings. This may be done for water management reasons or for tailings management reasons. Examples of the various technologies are shown in Table 1.

Table 1: Tailings Consistency, Dewatering Technology, and Conveyance Technology

Tailings Consistency		Dewatering Technology		Conveyance Technology	
Slurry – 30% to 58% solids		Conventional thickener		Gravity pipeline or launder, low pressure pipeline, with or without centrifugal pumps	
High density slurry – 55% to 65% solids (Thickened Tailings)		High rate thickener		Centrifugal pumps or piston diaphragm pumps	
Low density paste – 60% to 70% solids		Deep bed thickener, deep cone thickener		Piston diaphragm pumps (high pressure)	
High density paste – 65% to 75% solids		Filter		Dual positive displacement pumps with high pressure steel pipelines	
Filter Cake >80% solids		Filter		Truck or conveyor	

A summary of the difference between conventional slurry, thickened tailings, paste tailings and filtered tailings, according to operational criteria is shown in Table 2.

Table 2: Comparison of Tailings Technologies According to Operational Criteria

Criteria	Conventional Slurry	Thickened Tailings	Paste	Filtered Tailings
Pumpability	gravity flow or centrifugal pumps	gravity flow or centrifugal pumps to piston diaphragm pumps	high pressure positive displacement pumps	not possible
In situ density	tailings segregate resulting in areas with fines with low density	non-segregating tailings possible, giving uniform deposit with higher density	non-segregating tailings with higher initial solids content giving uniform deposit with higher density	can be compacted to achieve highest density
Supernatant water	tailings sedimentation, settlement, and consolidation release water to a pond	water recovered from the tailings in the thickener; tailings settlement and consolidation release less water to a pond.	water recovered from the tailings in the thickener; paste tailings release very small quantity of water.	water recovered from the tailings in the filter plant; no water released from the tailings.
ARD management	ARD management depends on the specific design of the facility			
Dewatering and conveyance costs	Lower	medium	high	Highest
Beach slopes	flatter 0.3% to 1.5%	steeper 0.7% to 2%	steeper 1% to 10%	fills placed and compacted at stable angles

Note: Green represents a favourable condition while red represents a less favourable condition. The darker the shade of green or red, the more or less favourable the condition.

ARD = acid rock drainage.

Cycloning is a mechanical separation and dewatering process that results in two streams of tailings, namely the cyclone underflow, which is primarily sand at high solids content, and the cyclone overflow, which is primarily fines at low solids content.

Each technology is explained in more detail in the sections below.

4.1.1 Low Solids Content (Conventional) Slurry Deposition

Transport and deposition of tailings as a slurry (mixture of water and tailings solids) is commonly used in combination with wet ore mineral processing techniques. This method is presently used at Mount Polley for deposition into the Springer Pit and was used for deposition into the TSF prior to the breach.

The tailings are transported from the mill to the TSF in a pipeline or open launder chutes and deposited from a single point discharge or from multiple spigots. The deposition can be subaqueous or subaerial, but typically a subaerial beach is developed during the deposition sequence. The coarser fraction of tailings drop out near the discharge to form a beach and the finer fraction is carried to the supernatant pond. The tailings beach slopes typically range between 0.3% and about 1.5%.

A supernatant pond is typically present within the facility, from which water is decanted by means of a floating barge or decant tower. The pond is maintained on the tailings and is necessary for sedimentation and settling. The size of the pond can be minimized to that needed for operation of the water reclaim system. The process water requirements can be supplemented by an alternative source or by having an independent process water pond.

The consolidation process increases the density of the tailings, releasing water to the pond or to the ground. The typical achieved settled dry density will be in the range of 1.3 to 1.7 t/m^3, depending on the tailings (mineralogy, grind, and clay content).

Containment dams can be constructed of earthfill, rockfill (potentially mine waste rock), or sand separated from the tailings using hydrocyclones, with the design of the dams carried out to suit the characteristics of the site and the mining operation. Existing tailings containment dams at other sites exceed 200 m in height.

4.1.2 Thickened (Non-segregating) Tailings

Thickening of tailings involves placing slurry tailings in a tank, allowing the solids to settle to the bottom and be removed while the water is removed from the top of the tank. Mechanical rakes and/or chemical additives are often required to increase the settling rate of the solids. The additives may be flocculants, coagulants, or a combination of both.

The tailings are typically deposited down a slope from a number of discharge points, with the tailings confined by a retaining dyke at the foot of the slope. Thickened tailings are generally non-segregating as the material is deposited and form a homogenous mass of tailings.

Thickened tailings will bleed some water when deposited, but the majority is retained in the mill. Although a supernatant pond may not be formed, consolidation and bleed water will be derived as seepage from thickened tailings, and the TSF will still require surface water runoff and seepage management systems. A secondary facility for re-circulation of water may still be required.

The advantages of thickened tailings over conventional tailings typically include higher water recovery at the mill and lower losses (relevant to sites with negative water balances, not surplus conditions as present at Mount Polley), increased storage capacity due to slightly higher settled density and steeper slopes toward the embankment. The disadvantages include higher operational costs (processing and pumping). In areas with large earthquakes, structures to contain all the tailings may be required if liquefaction of the tailings can occur.

Examples of thickened tailings discharge include Kidd Creek Mine, Timmons, Ontario; Peak Mine, Australia; Century zinc mine, Australia; Osborne Mine, Australia; Falconbridge Strathcona mine, Sudbury, Ontario, Canada; Musselwhite mine, northwest Ontario, Canada; Essakane, Burkina Faso; and the Porgera Gold Mine, Papua New Guinea (Figures 4 to 6).

Figure 4: Thickened Tailings at the Essakane Gold Mine, Burkina Faso

Figure 5: Discharge of Thickened Tailings (Essakane Gold Mine)

Figure 6: Thickened Tailings Storage Facility at Musselwhite Gold Mine, Canada

4.1.3 Paste

Paste tailings typically have solids contents of between 60% and 70% and are pumpable using high pressure pumps, are non-segregating, and typically do not release water. Paste tailings are achieved by using chemical additives or a combination of mechanical devices (such as deep cone thickeners) with chemical additives including flocculants.

Paste tailings are frequently used for backfilling underground mine workings (often combined with cement and/or flyash), but surface disposal of paste tailings is also possible.

Paste tailings can be transported using pressure pipelines to the storage area. Containment facilities are still required for the management of surface water from precipitation, although due to the increased density (lower moisture content) and increased slope of deposition of the tailings, the size and/or height of the facilities may be reduced compared to slurry type methods of disposal.

Paste tailings are typically only considered for surface disposal in arid climates with high cost of water due to the considerably higher operating costs of the thickeners and pumping systems. Careful control of the thickener is required to obtain consistent rheology that will give consistent deposited slopes. Changes in the mineralogy, grind, and temperature can affect the rheology. Steeper (but variable) deposition slopes can be achieved. These steeper slopes can produce inefficient filling for valley containment systems.

Examples of mines that use the paste technology for tailings deposition include Bulyanhulu, Tanzania (Figure 7); Myra Falls (on Vancouver Island); Esparanza, Chile; and Cobriza mine, Peru.

Figure 7: Paste Disposal at Bulyanhulu Gold Mine in Tanzania

4.1.4 Filtered Tailings

Filtered tailings are produced using mechanical devices (such as high capacity vacuum and pressure belt filters), often in combination with chemical additives. The tailings are usually dewatered in a thickener before filtration. The resulting tailings have about 80% to 85% solids and are too thick to pump. Instead, they are transported by truck or conveyor system and then stacked. Filtered tailings that are stacked are not “dry,” but rather have moisture contents several percentage points below saturation.

Typically, filtered tailings are stacked by placing, spreading, and compacting to form an unsaturated dense and stable mound. No additional containment structures, such as dams, are required to retain the tailings. These facilities may result in a smaller footprint area due to their increased density. Containment structures may be required to manage runoff and sediment from precipitation. If the stack is placed with bottom-up construction, concurrent reclamation of the tailings can be carried out.

The nature of the tailings produced, both the grain size and mineralogy, can play an important role in determining the effectiveness of filter processing. Tailings with a high percentage of clay-sized particles and with clay mineralogy reduce the efficiency of the filtering process and may result very high power consumption.

The power consumption and costs associated with filtration and transportation of filtered tailings are considerably higher than those related to slurry and thickened tailings disposal. Truck transport of the tailings increases the carbon footprint relative to methods using transport in pipelines. This method has, therefore, mostly been utilized in specific conditions where water conservation is critical or only a small footprint is available.

Liners may be installed under the stack if groundwater contaminant could be a problem. Consolidation and downward drainage of the water in the tailings and climate conditions may result in saturated conditions at the base of the stack. Compaction is used to create a non-liquefiable material that will be stable in earthquakes.

Examples of dry stack tailings facilities are Greens Creek mine, Alaska; Raglan, Quebec; Mineral Hill, Montana; La Coipa, Chile; Pogo mine, Alaska; and Cerro Lindo, Peru (Figure 8). The Cerro Lindo dry stack tailings facility has a 30 m high water management dam located downstream of the tailings area.

Figure 8: Placement of Filtered Tailings at Cerro Lindo Mine, Peru

4.1.5 Hydro-cyclone Classified Tailings

Hydrocyclones are used to split the tailings into a fine overflow fraction and coarse (sand) underflow fraction. The coarse fraction can be used for the construction of embankments and buttresses or stacked separately. The fine fraction is typically stored within an impoundment as a slurry.

The hydrocyclones are selected to give a sand product with specified permeability and drainage capacity. Maximum fines content in the sand is typically in the range of 10% to 15% with a maximum of 20%. The sand can be transported in pipelines and deposited from spigots or spreader bars. For dam construction, the sand is compacted to achieve a strong, non-liquefiable material.

Dams constructed from cycloned sand include: the Gibraltar and Highland Valley Copper LL tailings dams in BC; Cerro Verde in Peru; and Mauro, Los Tortolas, and Ovejeria dams in Chile. The Caserones Copper project in Chile places cyclone sand in a separate sand stack area and contains the cyclone overflow fines behind a rockfill tailings dam.

5.0 ASSESSMENT OF TAILINGS MANAGEMENT ALTERNATIVES

The term Best Applicable Technology (BAT) does not represent any one specific technology that can be applied to every situation. Rather, the technology must match the specific site conditions and the mining situation. The purpose of evaluating alternative technologies in this instance is to identify the preferred method of providing reliable containment of the tailings that will be produced from the remaining life of the Mount Polley Mine (approximately 4 to 10 years). Chemical stability of the tailings is less of a concern due to the nature of the Mount Polley tailings. The conservation of water (which is a benefit of thickened and filtered tailings) is not an advantage at Mount Polley due to the net water surplus on the mine site that requires ongoing discharge of water from the site.

The open pits and underground workings at the Mount Polley Mine are still being actively mined and are, therefore, not available for tailings storage.

The potential sites, and the potential technologies that could be applied to each site, are summarized in Table 3.

Table 3: Applicability of Tailings Technology to Potential Locations

Site	Applicable Technologies			
	Conventional Slurry	**Thickened Tailings**	**Paste**	**Filtered Tailings**
Existing TSF	●	●	●	●
New TSF	●	●	●	●
Polley/Bootjack/Quesnel Lake	●	●		
Bullion Pit	●	●	●	●
Co-disposal with waste rock	● (with cycloning)		●	●

TSF = tailings storage facility

The options that could accommodate the required volume of tailings were evaluated against the following criteria:

- time to restart mining (including time to investigate, design, permit, procure, and construct);
- disturbed surface area and environmental impact (wildlife, habitat, water quality and discharge, dust generation);
- understanding of foundation conditions;
- social impact; and
- cost (including construction, operation, and closure).

The five groups of sites have been evaluated based on the required objectives identified, as shown in Table 4.

Physical stability has not been included as a criterion because all potential alternatives can be designed to have similar likelihood of failure. The consequence of failure is related to the water stored with the tailings and the amount of water and eroded tailings that could be released in the event of a failure.

The advantage of paste or filtered tailings is to reduce the consequence of failure by eliminating the supernatant pond that forms when water is released from the tailings, and to increase the placed density of the tailings which reduces the total storage volume required and reduces the mobility of the tailings in the event of a failure.

If conventional tailings are deposited within the existing TSF, the risk and consequence of failure can similarly be reduced. This can be achieved by implementing BAP, and design of the retaining embankments:

- The supernatant pond volume can be maintained with defined limits by having a water management plan (including a permitted discharge of water from site), a secondary water storage facility for excess water if required, and water discharge through a spillway. These measures will reduce the risk of overtopping and limit the consequence if failure occurs.
- A minimum beach width, in addition to the upstream tailings fill, is maintained between the embankment and the pond. This will result in a portion of the tailings being in an unsaturated condition.
- Construct drainage through future embankment raises to allow seepage from the facility and promote consolidation of the tailings. Underdrains are already present within the existing south, main, and perimeter embankments.

Based on the above, it is considered that tailings management with the goal to improve stability can be realized with tailings slurry deposition, as with alternative technologies such as thickened tailings, paste or filtered tailings. The tailings breach on August 4, 2014, was due to inadequate characterization of the foundation conditions. The foundation conditions and material strengths are now well understood. Implementation of the BAP and the ability to discharge water will also prevent a similar volume of water to be contained on the TSF

Table 4: Evaluation of Tailings Disposal and Storage Alternatives

Location	Technology	Approximate Delay to Restarting Full Mine Operation (after Permitting)	Additional Disturbed Footprint and Environmental Aspects	Understanding of Foundation Conditions	Social Impact	Economic Impact
Existing TSF	low density slurry tailings	**2 months** to raise Corner 1 embankment use of existing tailings transport and water reclaim infrastructure	**0 ha** use of existing footprint	**Well understood** considerable geological interpretation, investigation, and laboratory testing has been performed	**Negative perception** using the same facility and technology as prior to the breach	**Lowest additional cost** limited additional infrastructure to be built buttressing of embankments to achieve required factor of safety for stability
	thickened tailings	**~18 months** procurement, construction, and implementation of thickener			**Positive perception** utilizing technology to reduce surface water stored in the TSF	**Increased capital and operational cost** construction and operation of thickener increased pumping cost buttressing of embankments to achieve required factor of safety for stability
	filtered tailings	**~3 years** procurement, construction, and implementation of filter presses	**0 ha** use of existing footprint large new surface water management pond outside TSF required **high potential for dust generation**		**Positive perception** utilizing technology identified in the IEERP report to reduce surface water stored in the TSF	**Highest costs** capital and operating costs of filter plants trucking of tailings; spreading of tailings using bulldozers and graders; buttressing of embankments to achieve required factor of safety for stability
New TSF	low density slurry tailings	**~2 years** construction of a new facility, which includes site investigation, environmental assessment, and design EIA required	**~ 200 to 300 ha** approximate footprint of new TSF, access roads, water management ponds, pipeline corridors, and surface water diversion ditches	**Limited Information** foundation conditions likely to be geologically similar, with detailed investigation required to characterize foundation, in particular location and characteristics of glaciolacustrine soils	**Positive perception** failed embankment not reused for mine operations	**Increased cost** construction of a new facility increased closure cost, with two facilities to rehabilitate
	thickened	**~2 years** in addition to the new facility, procurement, construction, and implementation of thickener EIA required			**Positive perception** new facility and utilizing technology to reduce surface water stored in the TSF	**Increased costs** construction and operation of thickener increased pumping cost construction and closure of new facility
	filtered tailings	**~3 years** in addition to the new facility, procurement, construction, and implementation of thickener EIA required				**Highest costs** capital and operating costs of filter plants; trucking of tailings construction and closure of new facility
Bullion Pit	low density slurry tailings	**~2 years to 3 years** construction of additional infrastructure for the transportation and storage of tailings, including pipelines, embankment, roads, and water management infrastructure EIA required	**Minimal increased footprint** using an existing footprint disturbed by previous mining activities	**Low quantity of existing information** detailed geotechnical investigation required where retaining embankments will be required	**Negative perception** Bullion Pit is considered a heritage site and tourist attraction for Likely **Positive perception** reclamation of mining affected landscape	**Increased cost** construction of new infrastructure, including tailings and water pumps and pipelines, high dam, seepage cutoff, and collection system to prevent water loss to the Quesnel River
Polley, Bootjack or Quesnel Lake	conventional tailings	**Increased time** the environmental assessment and permitting time may make this alternative not feasible	**Increased footprint** **Lost habitat** DFO approval would be required to place tailings in fish-bearing water body	**Low quantity of existing information** detailed geotechnical investigation required where retaining embankments will be required	**Negative perception** loss of fish habitat loss of public recreation area	**Low cost** minimal additional infrastructure required
Waste rock dump	filtered tailings	**~3 years** procurement, construction and implementation of filter presses	**Minimal change in total footprint** increase in waste dump footprint	**Reasonably understood.** foundation under waste rock dumps already characterized; investigation of footprint of extended footprint required	**Positive perception** new facility and utilizing technology to reduce surface water stored	**Highest cost** capital and operating costs of filter plants; trucking of tailings.

Note: Green represents a favourable condition, yellow a less favourable condition, and red the least favourable condition.

TSF = tailings storage facility; IEERP = Independent Expert Engineering Investigation and Review Panel ; EIA = environmental impact assessment; DFO = Fisheries and Oceans Canada

6.0 FINDINGS

The following observations were made regarding the alternatives that have been considered:

- The existing TSF is the only location that can be used to meet the timelines of the mine plan and provide continuity of operations. The foundation conditions have been investigated in sufficient detail to allow the detail engineering to be carried out. The foundation conditions in the area of the 2014 failure at Corner 1 have been extensively studied in two investigations carried out independently of the mine (KCB 2015 and IEERP 2015).
- Conventional tailings can be operated in a manner that reduces both the likelihood (conservative assessment of soil strength and adoption of conservative design criteria resulting in wide buttresses along the perimeter and main embankments) and consequence of failure (wide beaches, relatively dense tailings, and a small pond volume) provided that ongoing discharge of water from the mine site is permitted so that year over year accumulation of water does not occur.
- Thickened tailings offer limited advantages over conventional tailings. The mine site has an overall positive water balance, and freshet water management would be carried out using the TSF, similar to the conventional tailings option. The maximum pond size is controlled by the run-off during the freshet and not by the operating requirements of the process plant. The quantity of water excess to the process requirements would and released during each summer. The inclusion of thickeners would prevent continuation of operations, and would delay the onset of a restart of operations by about 18 months due the procurement and construction time involved.
- The delays required to procure, install, and commission a filter plant are estimated at about 36 months. This duration of shutdown is unlikely to be economic. The high capital cost of a filter plant (estimated to be around $125 million) may also not be economic given the relatively short remaining life of the mine. A separate water management pond with a storage capacity of about 4 Mm^3 to manage the 1-in-200-year freshet volume would also be required. A dam with a height in the range of 20 m would be required.
- A new land-based TSF footprint is unlikely to offer advantages over the existing TSF footprint. The failure that occurred in the existing TSF was caused by a combination of inadequate understanding of the foundation conditions, inappropriate analysis of the range of loading conditions, and the design of overly steep fill slopes. The foundation conditions of the existing TSF can accommodate additional dam construction, providing that the slopes of the dams are matched to the foundation strengths. Each of these issues can therefore be addressed by appropriate design at the existing TSF site. Using a different land-based site would require significant investigation (such that the foundation conditions could be characterized to sufficient level to enable appropriate design), add to the disturbed area of the mine, and require significantly more closure work at the completion of mining.
- The only advantage to using the Bullion Pit is that an area with significant historical mining disturbance could be restored to a landscape similar to the pre-mining condition. The delay to the mine operation related to the investigation and design of the containment structures and the seepage control system to minimize water loss to the Quesnel River, coupled with the increased costs for transporting the tailings to the Bullion Pit and water from the Bullion Pit to the mine and the need for an environmental impact assessment, make this alternative unattractive, and, likely would prevent continuation of operations (i.e., result in a shut-down condition).

- Deposition of tailings in lakes provides numerous advantages in terms of the physical and chemical stability of tailings Deposition of tailings in lakes is an appropriate option for some situations; however, the permitting of such facilities is difficult, particularly when the lakes provide habitat for fish. This is the case for all of the potential lakes that could be considered. Polley Lake is judged to be more likely to be considered for tailings deposition than other lakes in the area, but given the trout population in Polley Lake it is considered to be a less favourable site than an on-land site.
- The deposition of conventional tailings into the existing TSF (with appropriate design and operation) is considered to be the preferred option for Mount Polley.

7.0 RECOMMENDATIONS

It is recommended that the tailings produced in the remaining life of the Mount Polley mine be transported as conventional (slurry) tailings to the existing TSF and be managed using BAPs. These would include the following:

- having a discharge permit that allows routine and sustained discharge of mine water such that the volume of water stored in the TSF is reduced;
- managing the pond in the TSF such that beaches are maintained against the containing embankments throughout the operational life of the TSF; and
- providing drainage to promote the desaturation and densification of the tailings.

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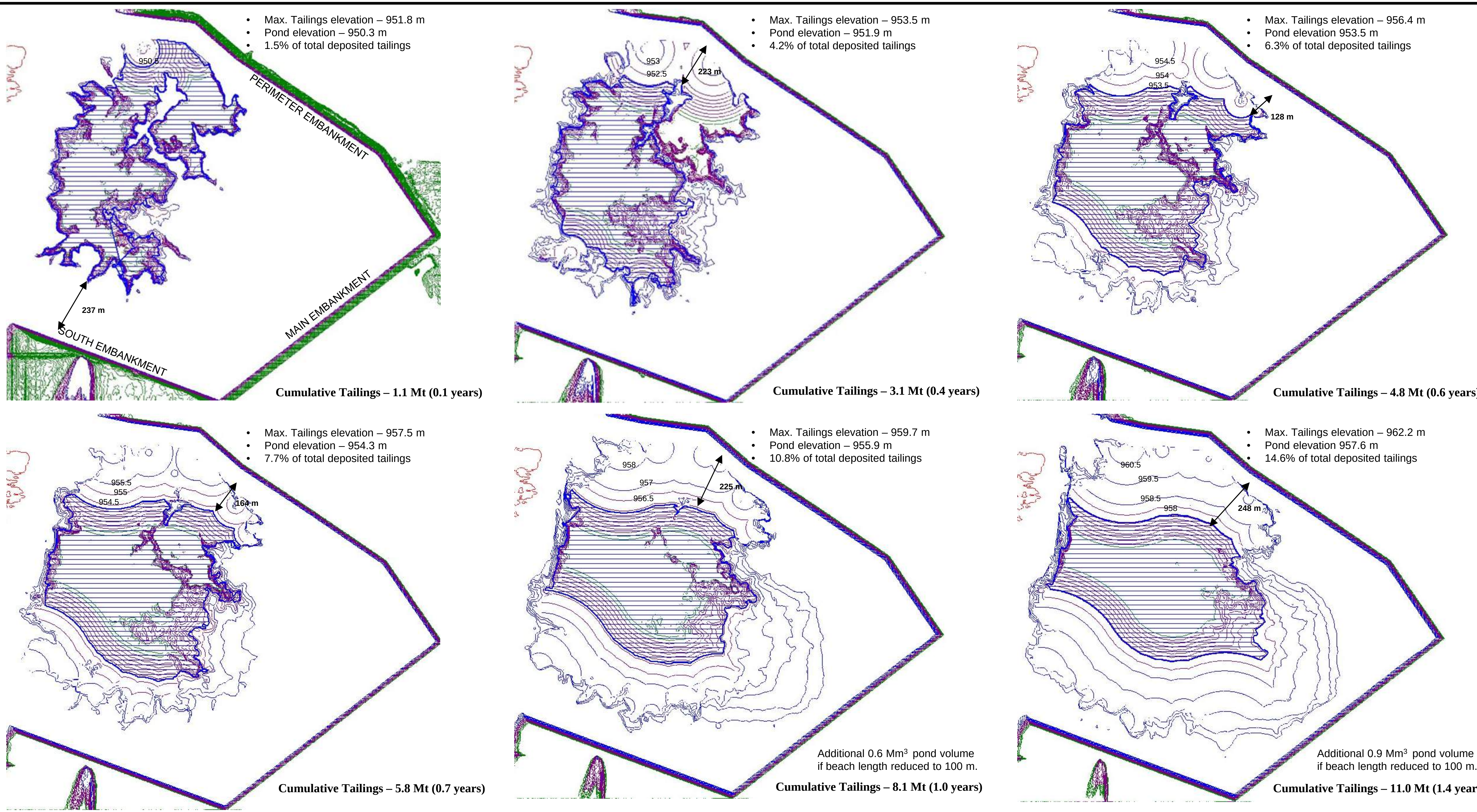
APPENDIX D

Tailings Deposition Models



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LEGEND:

Tailings Pond (1.5 million m^3)

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 LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TAILINGS DEPOSITION MODELLING 1% SUB-AERIAL BEACH SLOPE 3% SUB-AQUEOUS BEACH SLOPE**

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
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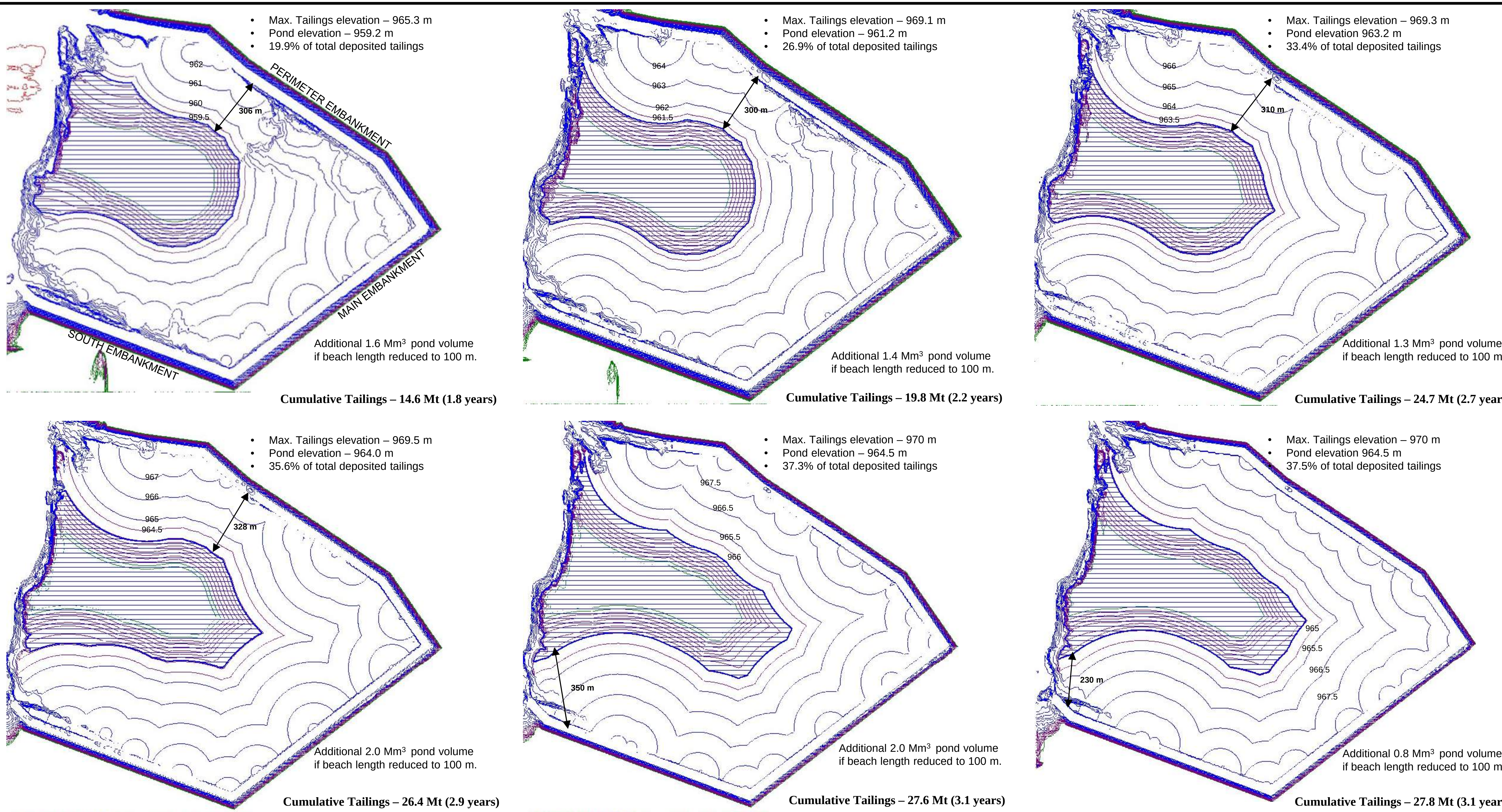
REVIEW	TLE	29OCT15	



LEGEND:

Tailings Pond (1.5 million m³)

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
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TAILINGS DEPOSITION MODELLING**
1% SUB-AERIAL BEACH SLOPE
3% SUB-AQUEOUS BEACH SLOPE

Golder Associates

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REVIEW	TLE	29OCT15	

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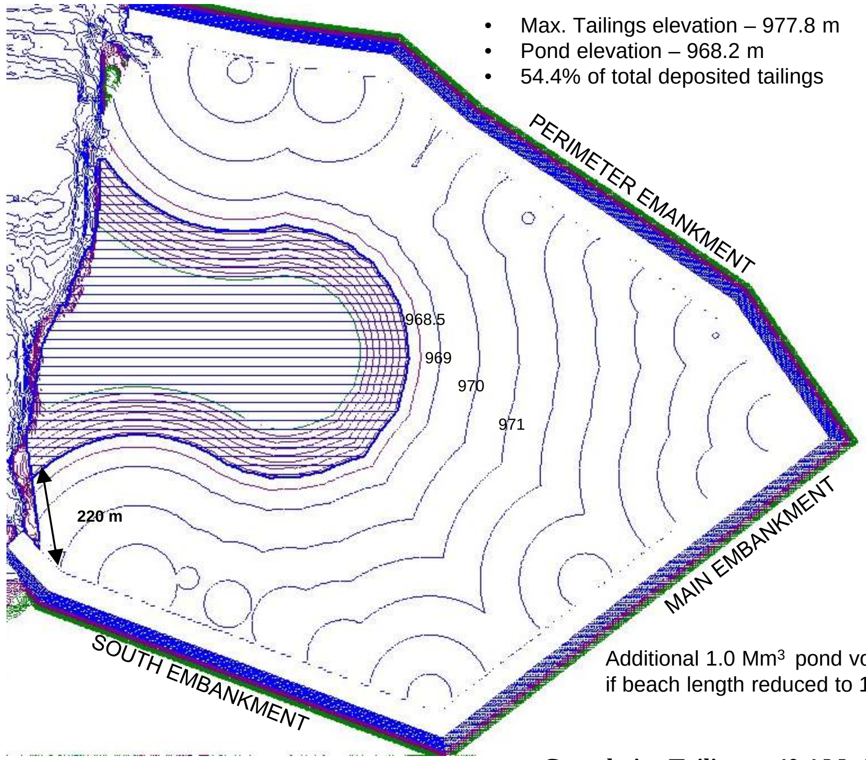
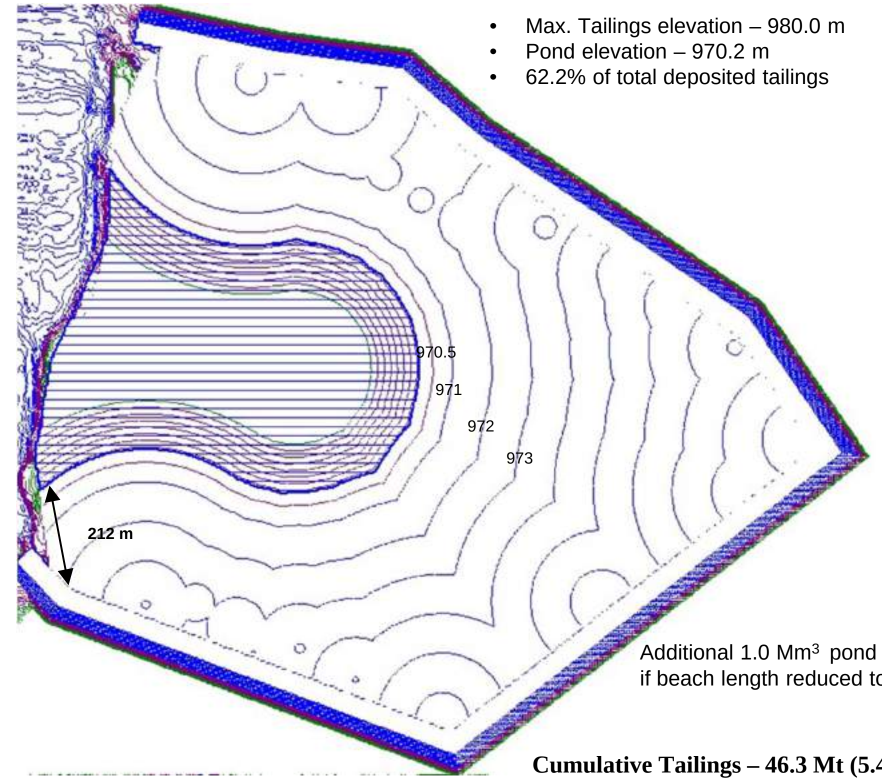
- Max. Tailings elevation – 977.8 m
- Pond elevation – 968.2 m
- 54.4% of total deposited tailings



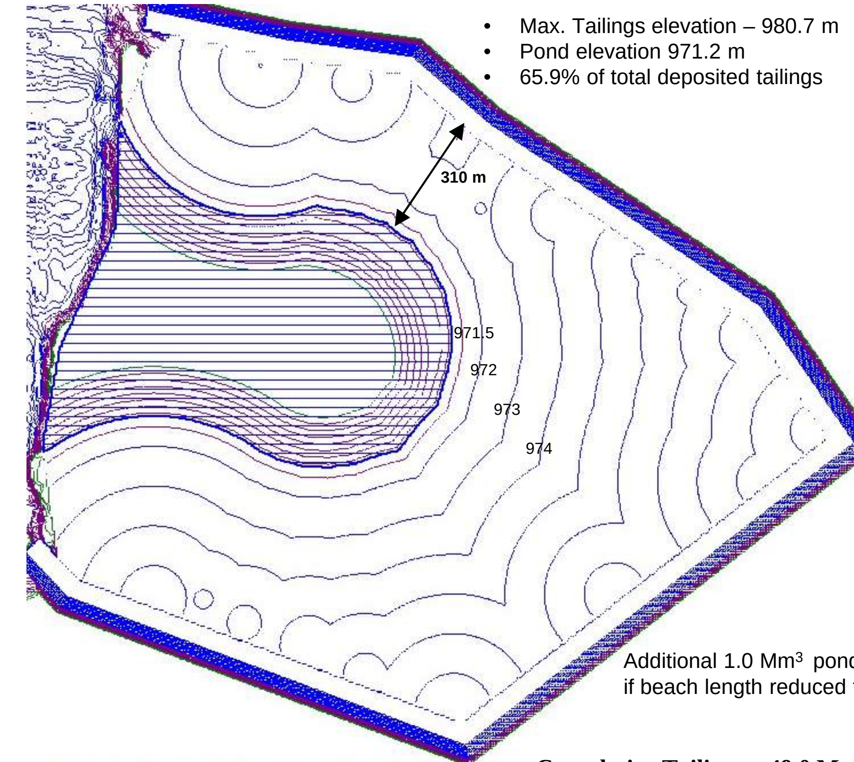
Cumulative Tailings – 40.4 Mt (4.7 years)

- Max. Tailings elevation – 980.0 m
- Pond elevation – 970.2 m
- 62.2% of total deposited tailings



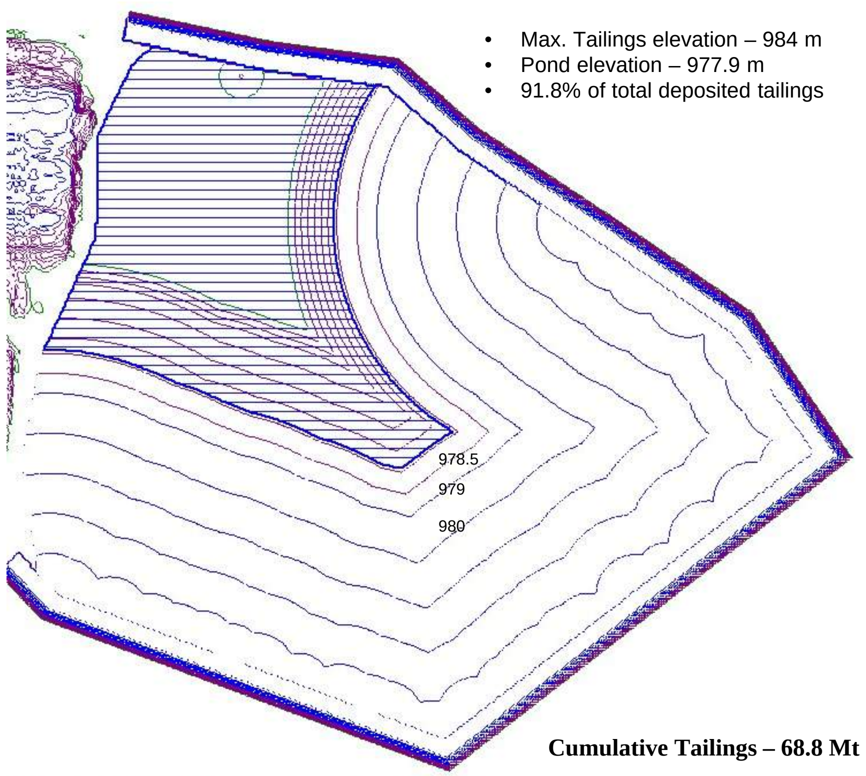
Cumulative Tailings – 46.3 Mt (5.4 years)

- Max. Tailings elevation – 980.7 m
- Pond elevation 971.2 m
- 65.9% of total deposited tailings



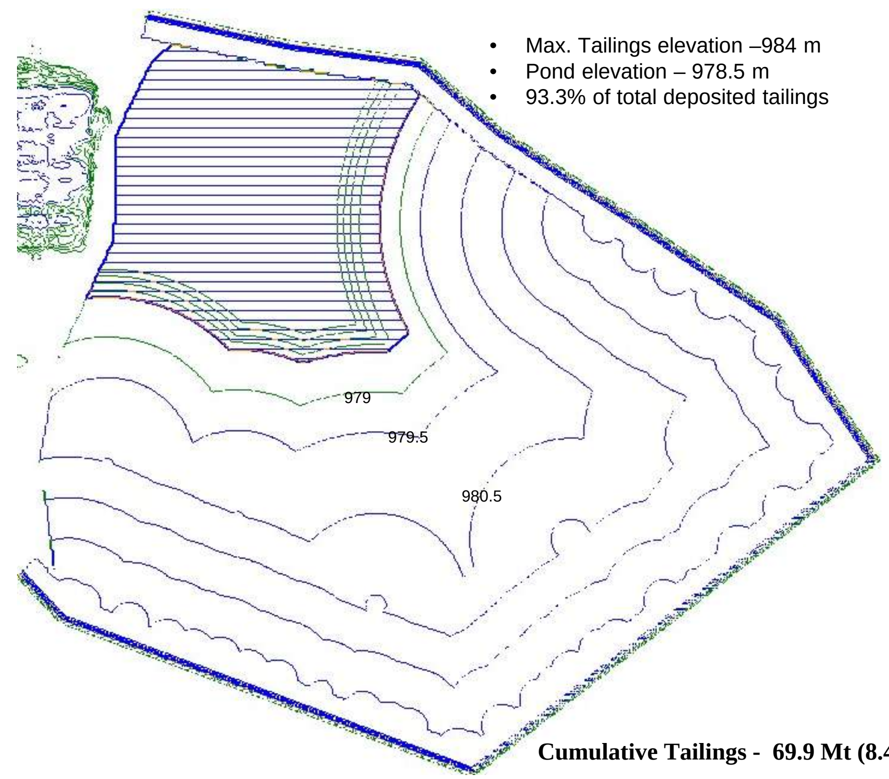
Cumulative Tailings – 49.0 Mt (5.8 years)

- Max. Tailings elevation – 984 m
- Pond elevation – 977.9 m
- 91.8% of total deposited tailings



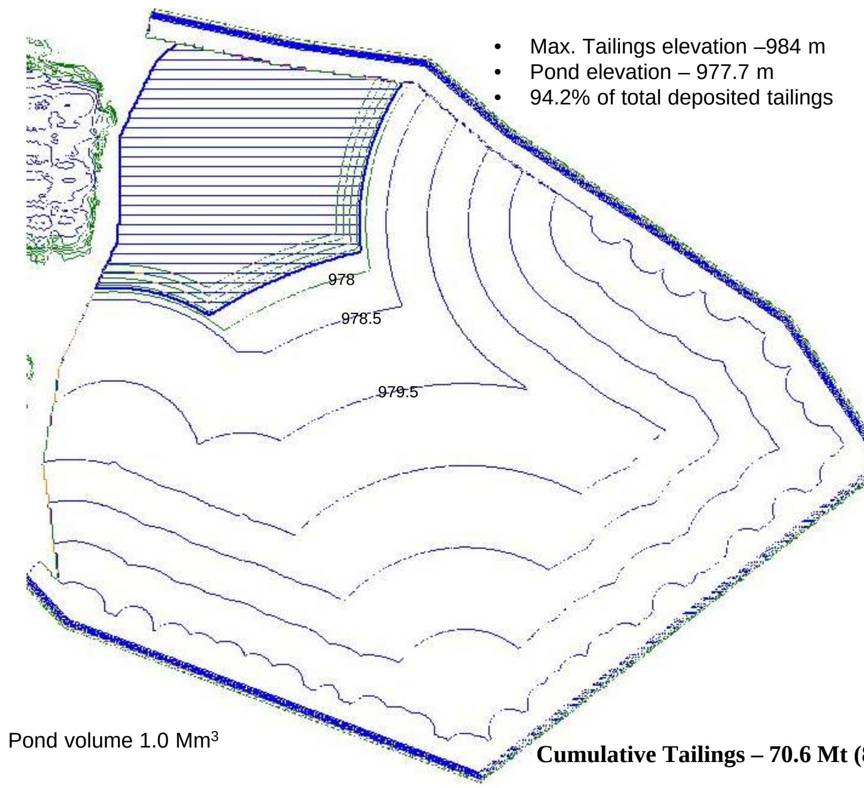
Cumulative Tailings – 68.8 Mt (8.3 years)

- Max. Tailings elevation –984 m
- Pond elevation – 978.5 m
- 93.3% of total deposited tailings



Cumulative Tailings - 69.9 Mt (8.4 years)

- Max. Tailings elevation –984 m
- Pond elevation – 977.7 m
- 94.2% of total deposited tailings



Pond volume 1.0 Mm³

Cumulative Tailings – 70.6 Mt (8.5 years)

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 LIFE OF MINE FEASIBILITY DESIGN			
TITLE	TAILINGS DEPOSITION MODELLING 1% SUB-AERIAL BEACH SLOPE 3% SUB-AQUEOUS BEACH SLOPE			
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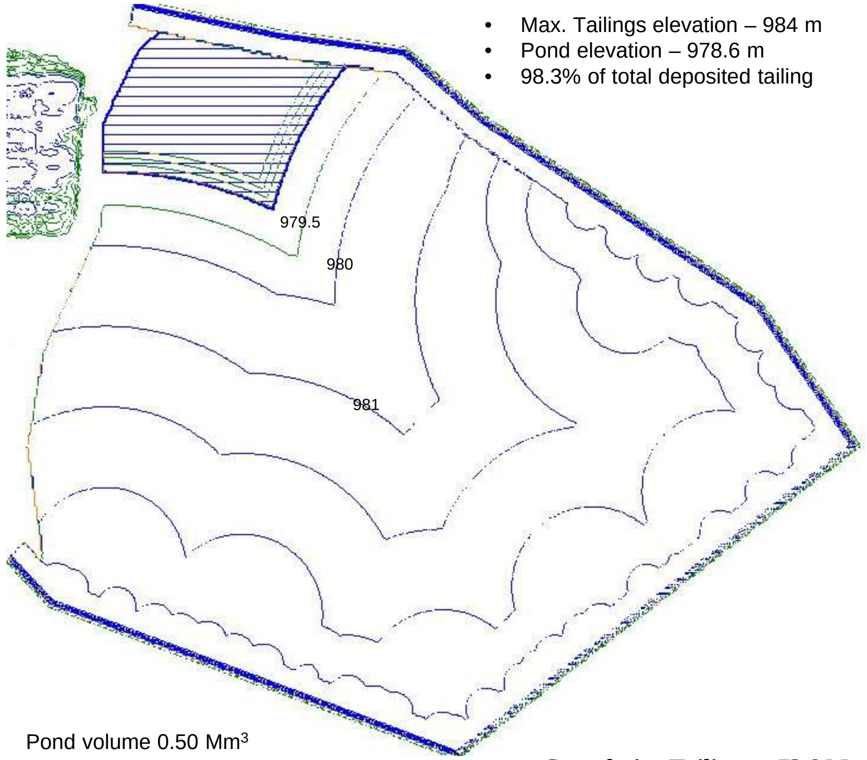
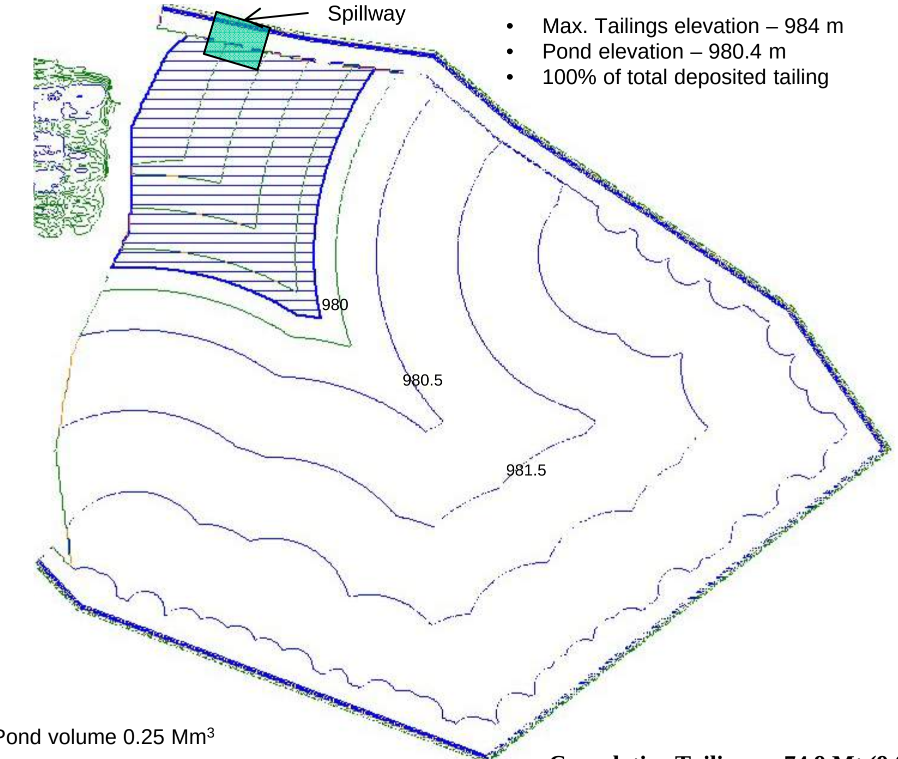


- Max. Tailings elevation – 984 m
- Pond elevation – 978.6 m
- 98.3% of total deposited tailing

Pond volume 0.50 Mm³

Cumulative Tailings - 73.6 Mt (8.9 years)



- Max. Tailings elevation – 984 m
- Pond elevation – 980.4 m
- 100% of total deposited tailing

Pond volume 0.25 Mm³

Cumulative Tailings - 74.9 Mt (9.0 years)

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 0.5 and 0.25 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 LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TAILINGS DEPOSITION MODELLING 1% SUB-AERIAL BEACH SLOPE 3% SUB-AQUEOUS BEACH SLOPE**

Golder Associates

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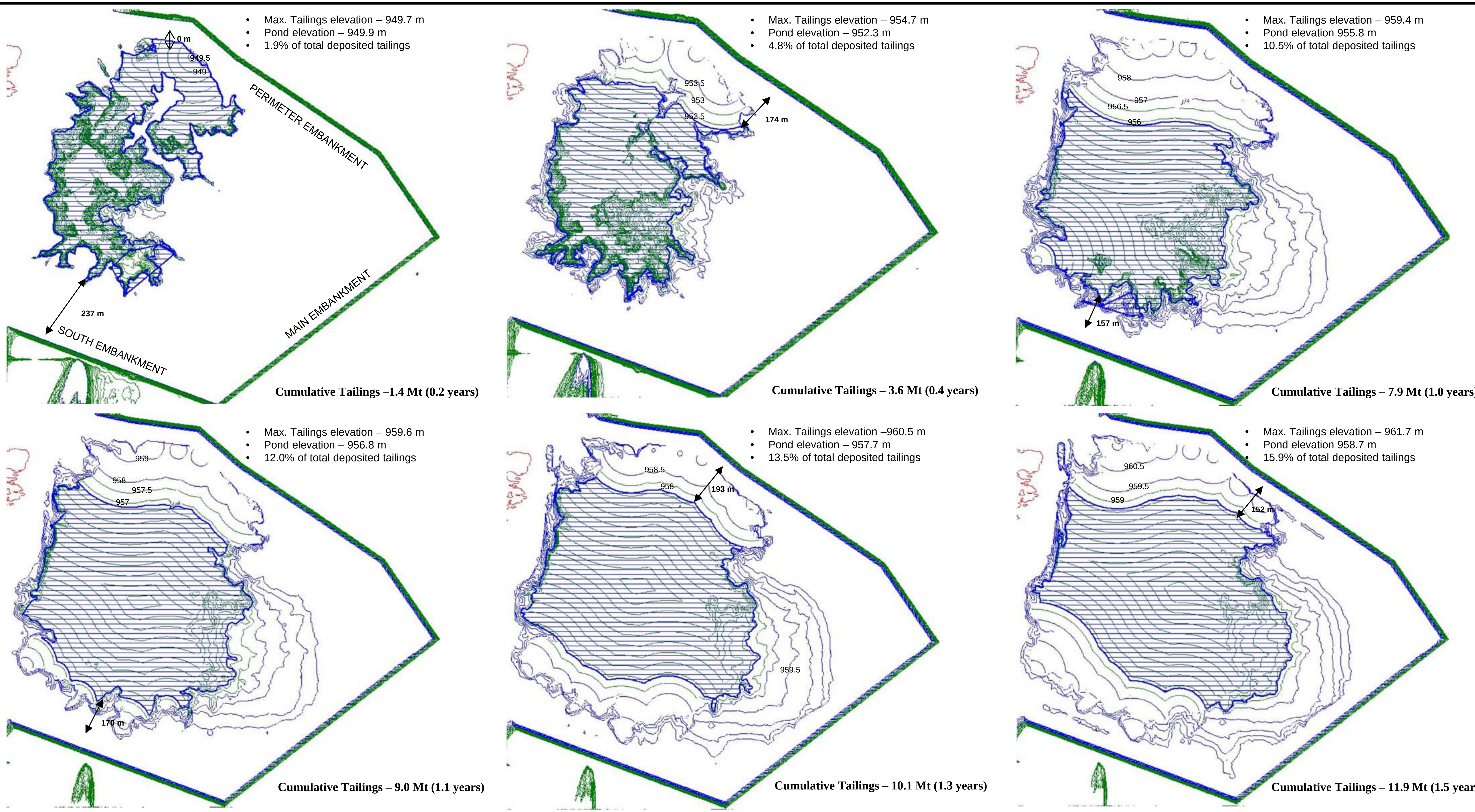

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LEGEND:

Tailings Pond (1.5 million m³)

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.
3. Timeline is based on a deposition rate of 22,000 tonnes per day.
4. In place dry density of 1.35 tonnes /m³ assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TAILINGS DEPOSITION MODELLING
1% BEACH SLOPE

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE REV. 0
CADD	CTM	29OCT15	**FIGURE - D5**
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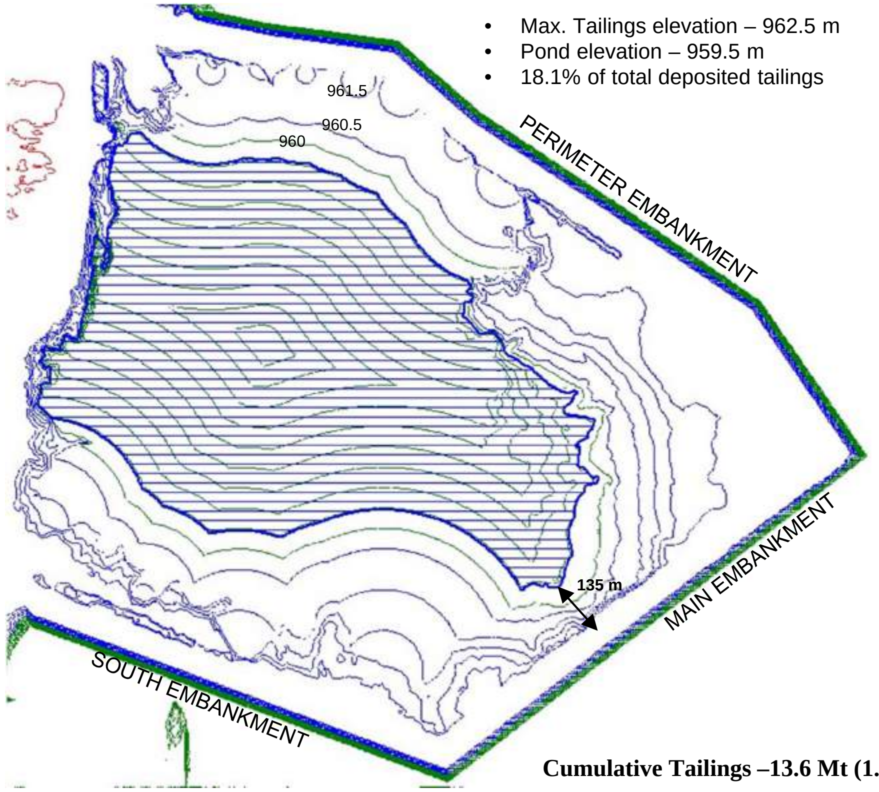
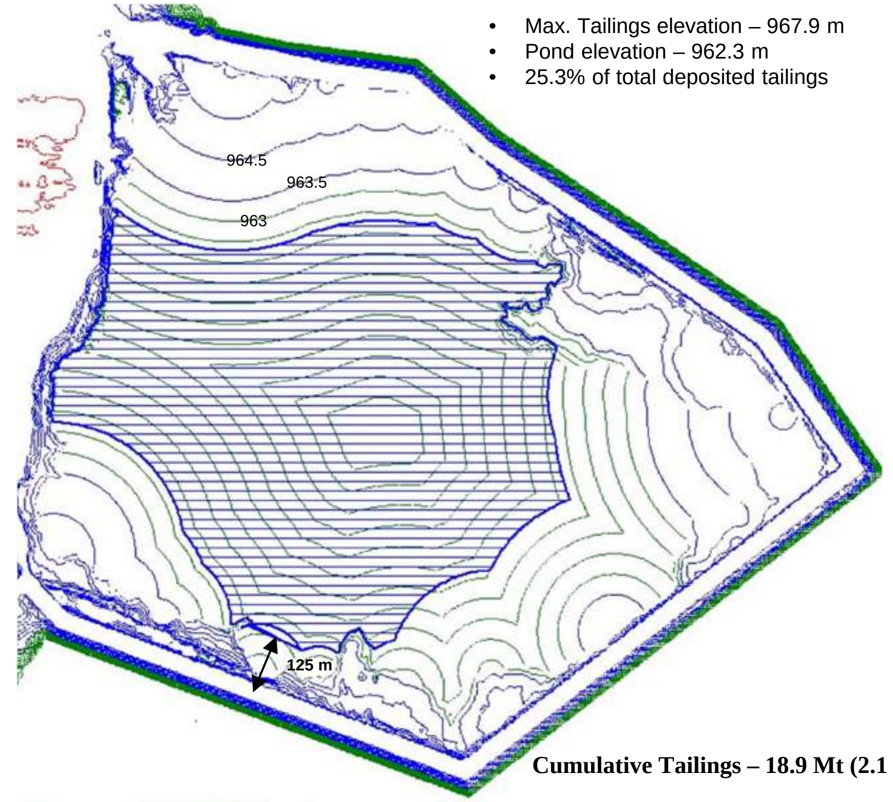
REVIEW	TLE	29OCT15	

- Max. Tailings elevation – 962.5 m
- Pond elevation – 959.5 m
- 18.1% of total deposited tailings



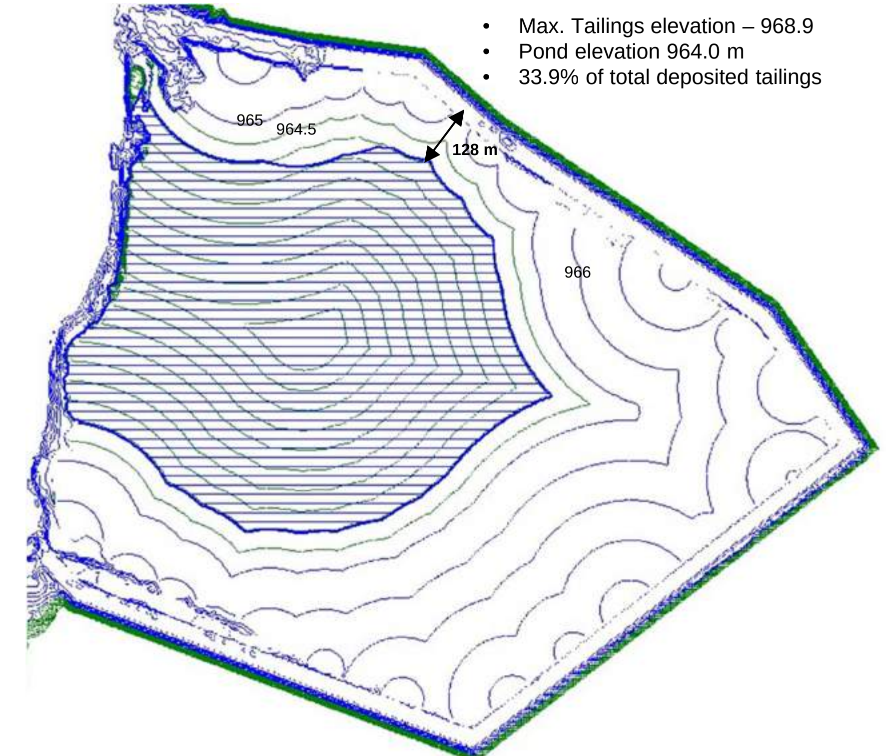
Cumulative Tailings –13.6 Mt (1.7 years)

- Max. Tailings elevation – 967.9 m
- Pond elevation – 962.3 m
- 25.3% of total deposited tailings



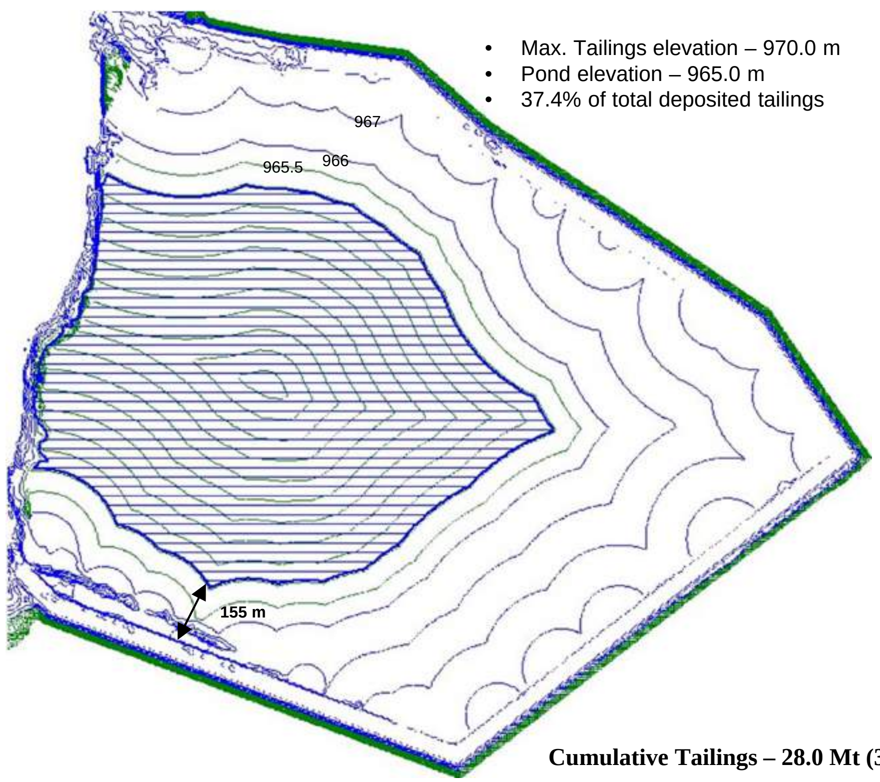
Cumulative Tailings – 18.9 Mt (2.1 years)

- Max. Tailings elevation – 968.9
- Pond elevation 964.0 m
- 33.9% of total deposited tailings



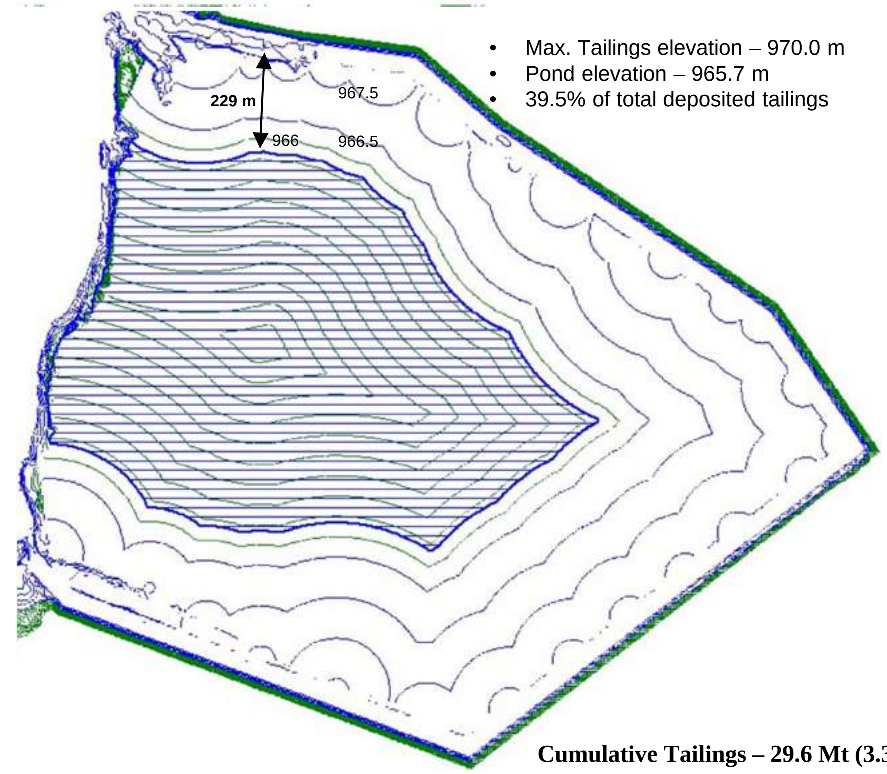
Cumulative Tailings – 25.4 Mt (2.7 years)

- Max. Tailings elevation – 970.0 m
- Pond elevation – 965.0 m
- 37.4% of total deposited tailings



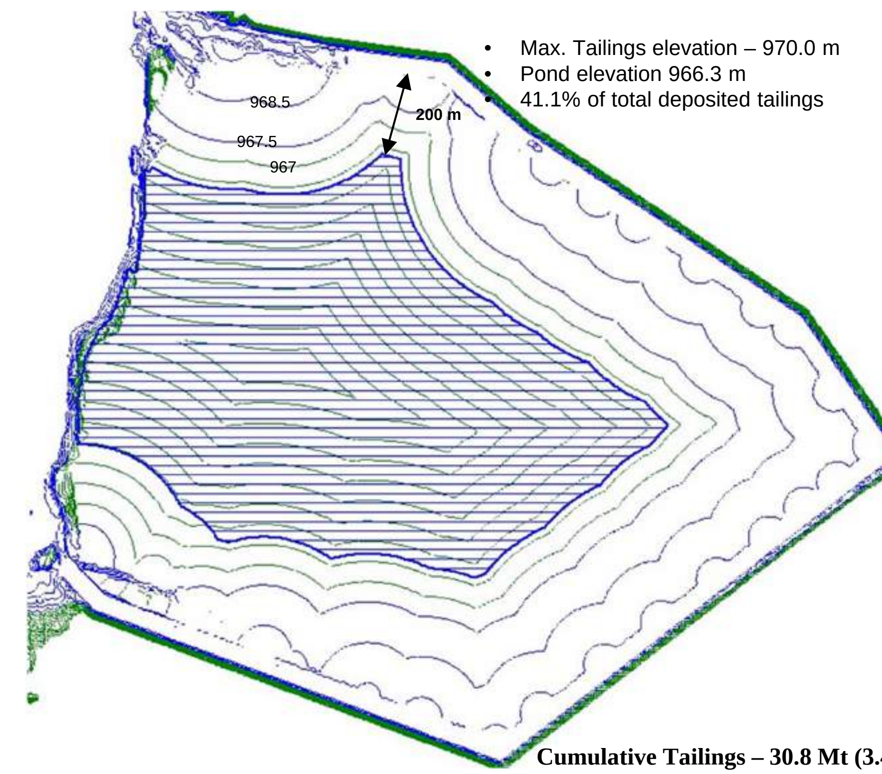
Cumulative Tailings – 28.0 Mt (3.1 years)

- Max. Tailings elevation – 970.0 m
- Pond elevation – 965.7 m
- 39.5% of total deposited tailings



Cumulative Tailings – 29.6 Mt (3.3 years)

- Max. Tailings elevation – 970.0 m
- Pond elevation 966.3 m
- 41.1% of total deposited tailings



Cumulative Tailings – 30.8 Mt (3.4 years)

LEGEND:

Tailings Pond (1.5 million m^3)

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.
3. Timeline is based on a deposition rate of 22,000 tonnes per day.
4. In place dry density of 1.35 tonnes /m^3 assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

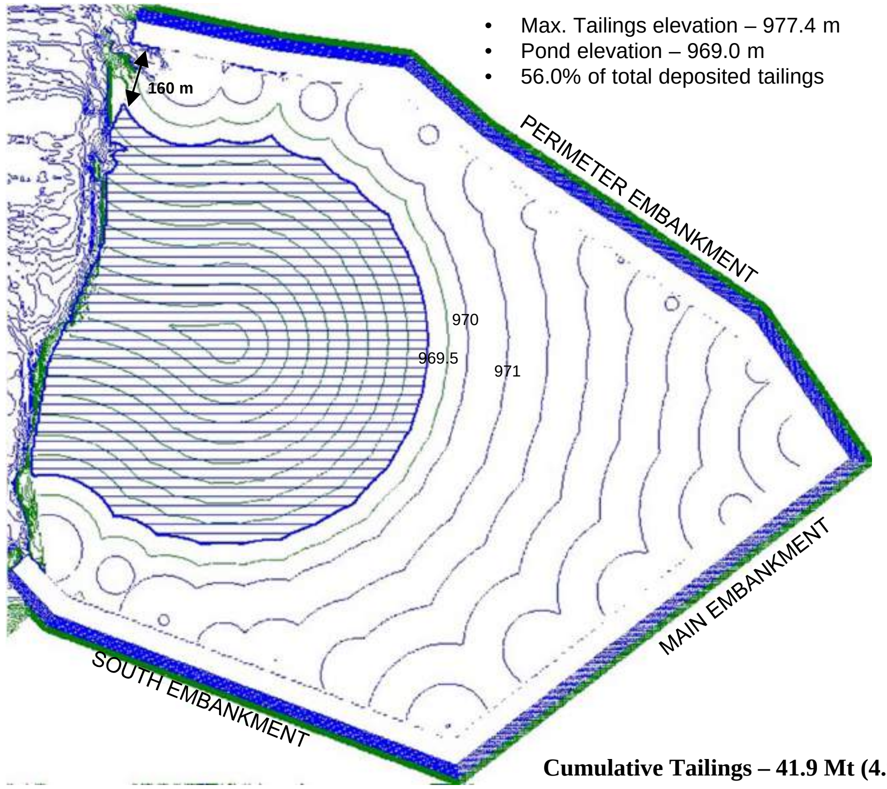
TITLE
TAILINGS DEPOSITION MODELLING
1% BEACH SLOPE

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE REV. 0
CADD	CTM	29OCT15	
CHECK	GJ	29OCT15	**FIGURE - D6**
REVIEW	TLE	29OCT15	

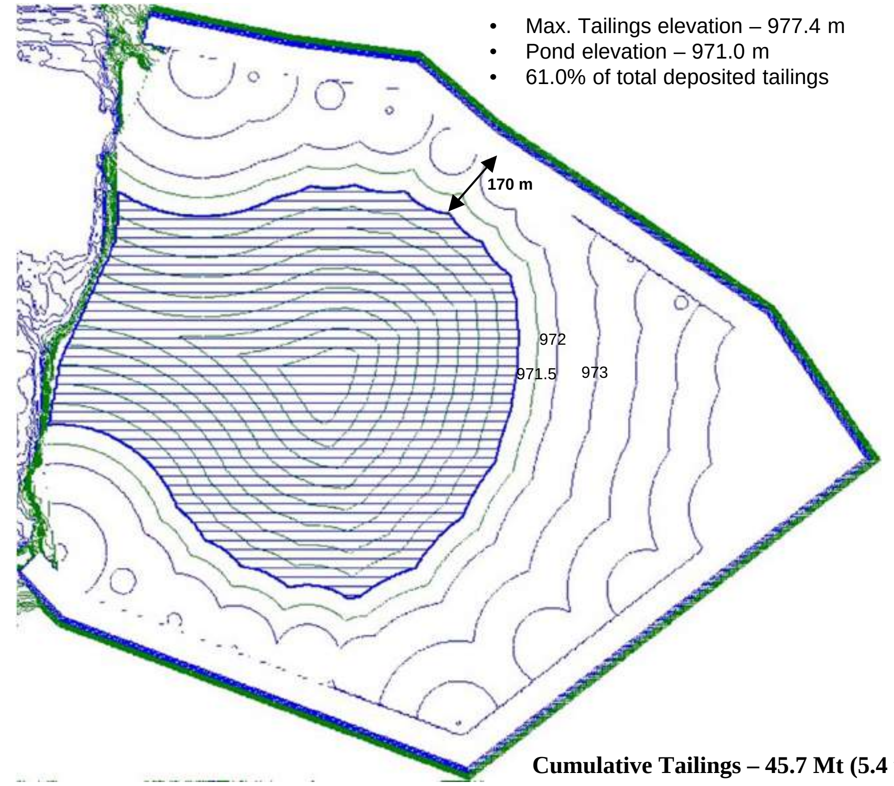
FILE: \\golder.gds\gal\burnaby\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Tailings Deposition Planning\June 2015

- Max. Tailings elevation – 977.4 m
- Pond elevation – 969.0 m
- 56.0% of total deposited tailings



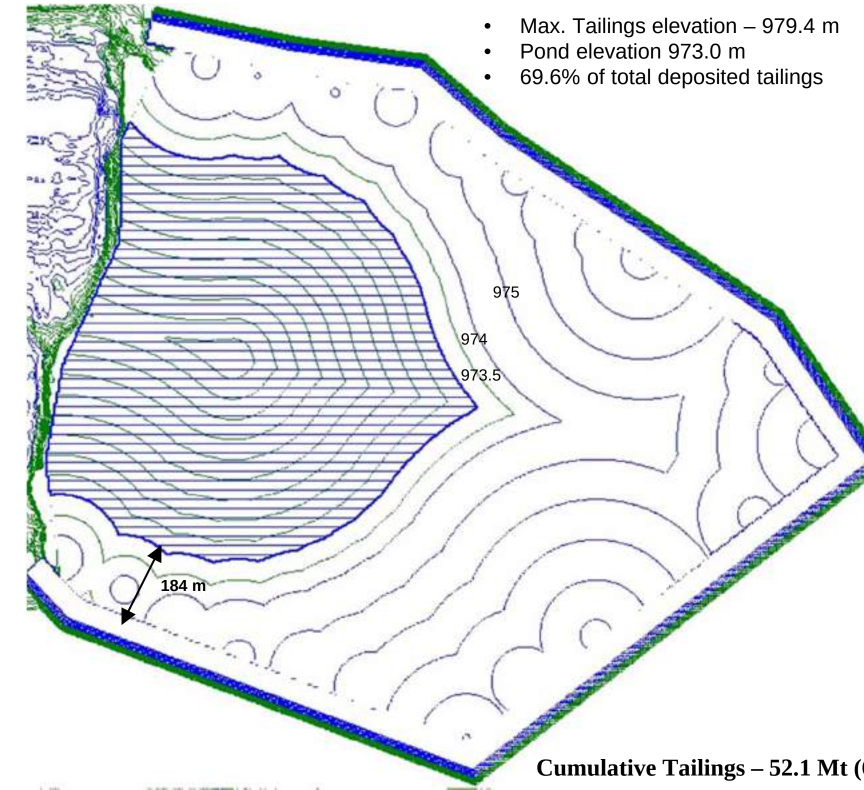
Cumulative Tailings – 41.9 Mt (4.9 years)

- Max. Tailings elevation – 977.4 m
- Pond elevation – 971.0 m
- 61.0% of total deposited tailings



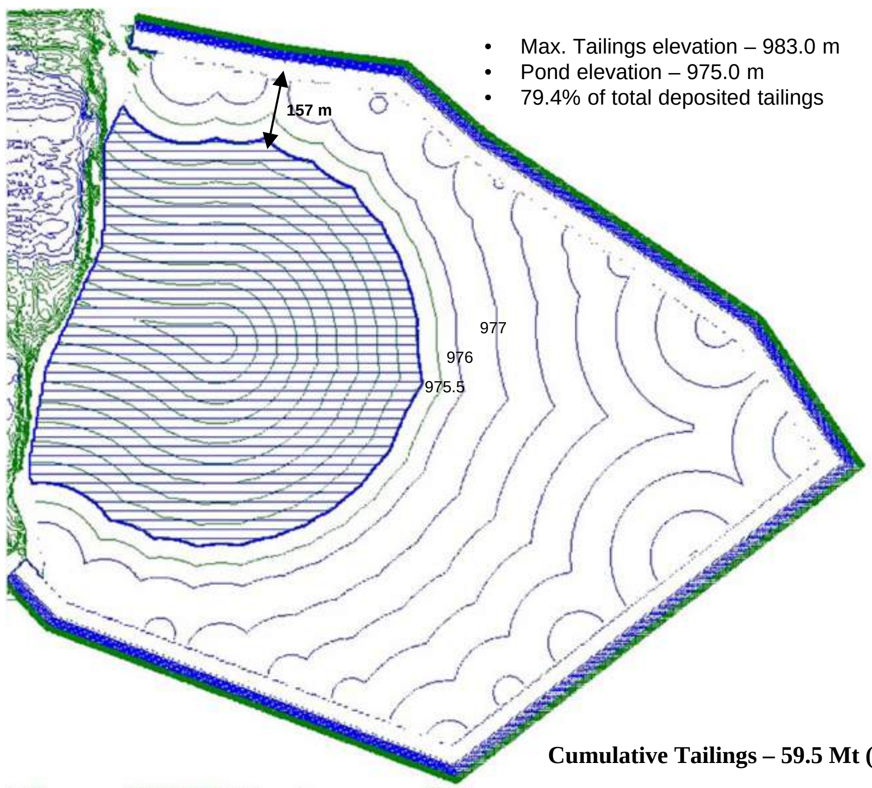
Cumulative Tailings – 45.7 Mt (5.4 years)

- Max. Tailings elevation – 979.4 m
- Pond elevation 973.0 m
- 69.6% of total deposited tailings



Cumulative Tailings – 52.1 Mt (6.2 years)

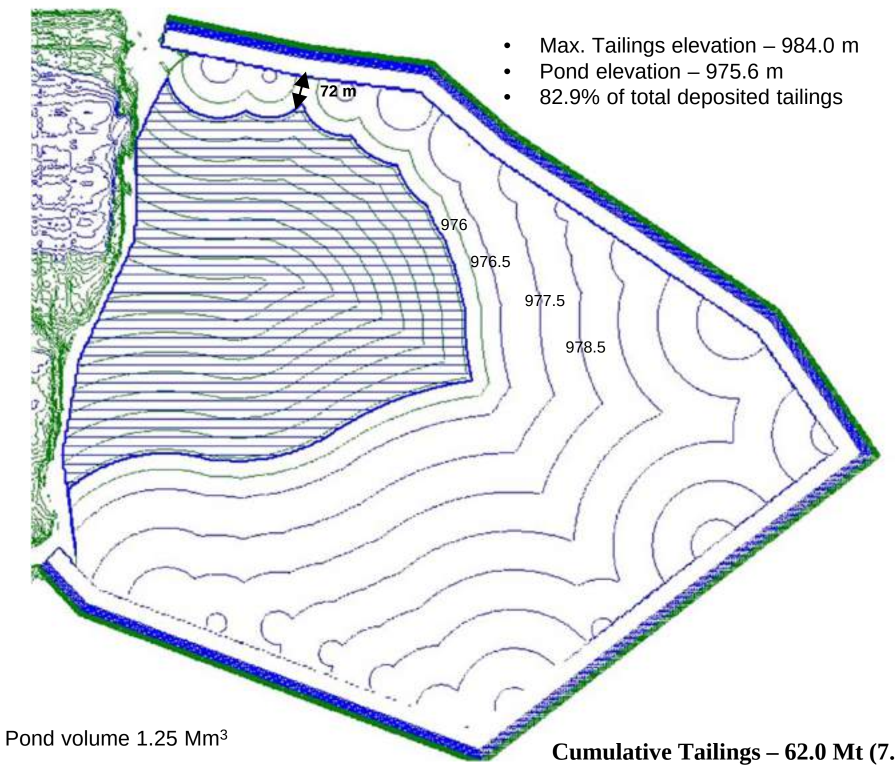
- Max. Tailings elevation – 983.0 m
- Pond elevation – 975.0 m
- 79.4% of total deposited tailings



Cumulative Tailings – 59.5 Mt (7.1 years)

Pond volume 1.25 Mm^3

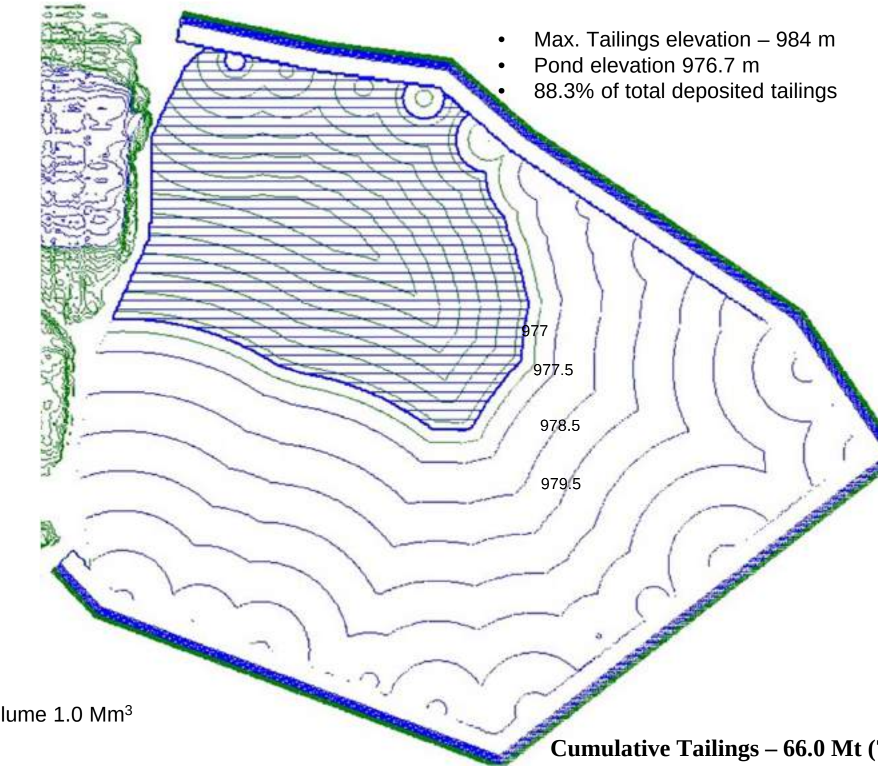
- Max. Tailings elevation – 984.0 m
- Pond elevation – 975.6 m
- 82.9% of total deposited tailings



Cumulative Tailings – 62.0 Mt (7.4 years)

Pond volume 1.0 Mm^3

- Max. Tailings elevation – 984 m
- Pond elevation 976.7 m
- 88.3% of total deposited tailings



Cumulative Tailings – 66.0 Mt (7.9 years)

FILE: \\golder.gds\gal\burnaby\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Tailings Deposition Planning\June 2015

LEGEND:

Tailings Pond

Sub-aerial beach length

NOTES:

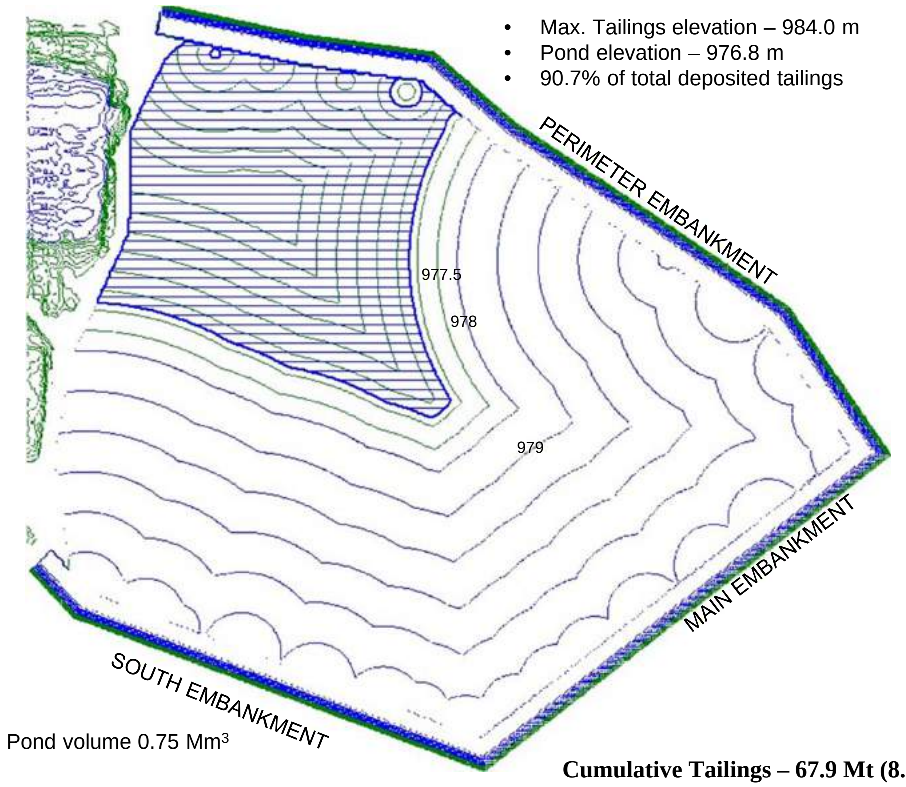
1. The survey taken on May 27, 2015 was used as the base survey.
2. Pond capacity of 1.5 million m^3 is shown, and is reduced nearing closure to shape the tailings basin for the closure configuration.
3. Timeline is based on a deposition rate of 22,000 tonnes per day.
4. In place dry density of 1.35 tonnes /m^3 assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

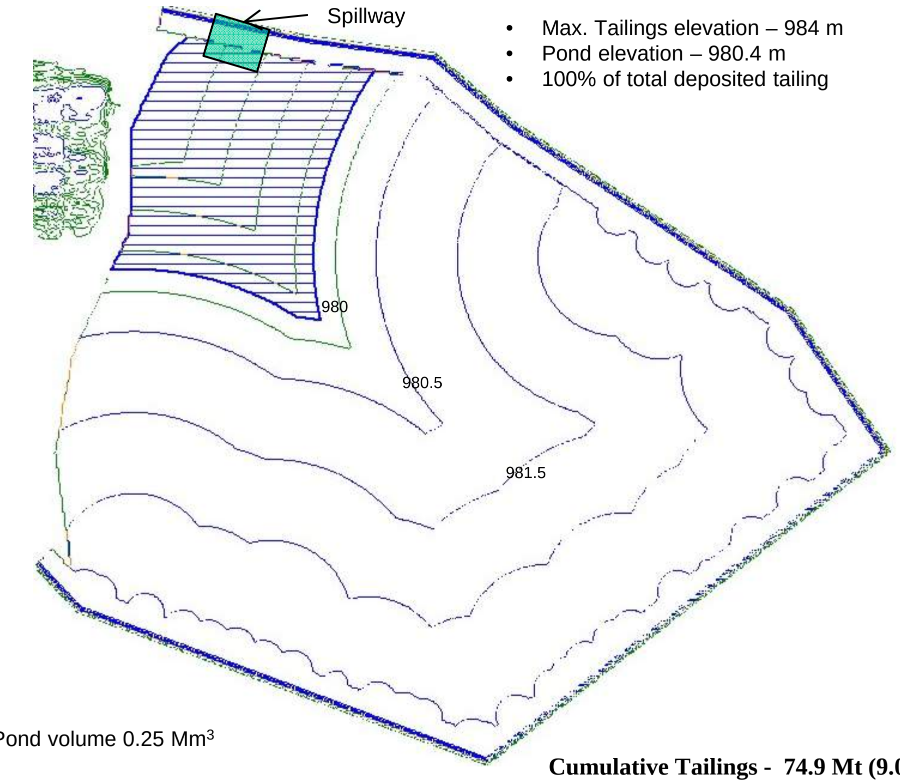
TITLE
TAILINGS DEPOSITION MODELLING
1% BEACH SLOPE

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE REV. 0
CADD	CTM	29OCT15	
CHECK	GJ	29OCT15	**FIGURE - D7**
REVIEW	TLE	29OCT15	



Cumulative Tailings – 67.9 Mt (8.1 years)



Cumulative Tailings - 74.9 Mt (9.0 years)

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 is as shown.
3. Timeline is based on a deposition rate of 22,000 tonnes per day.
4. In place dry density of 1.35 tonnes /m³ assumed.

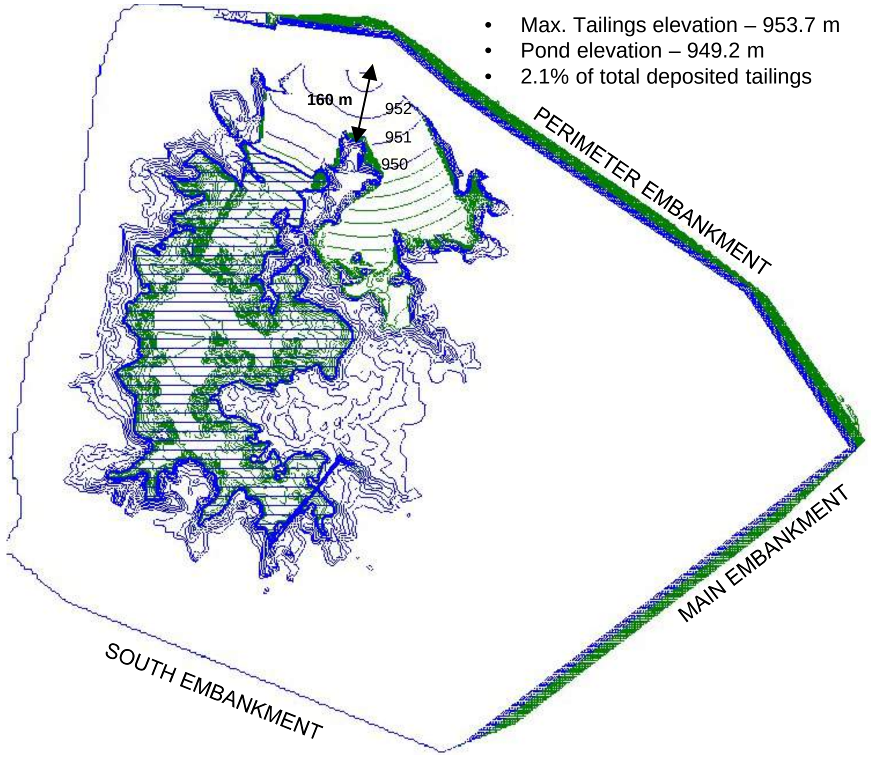
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TAILINGS DEPOSITION MODELLING
1% BEACH SLOPE

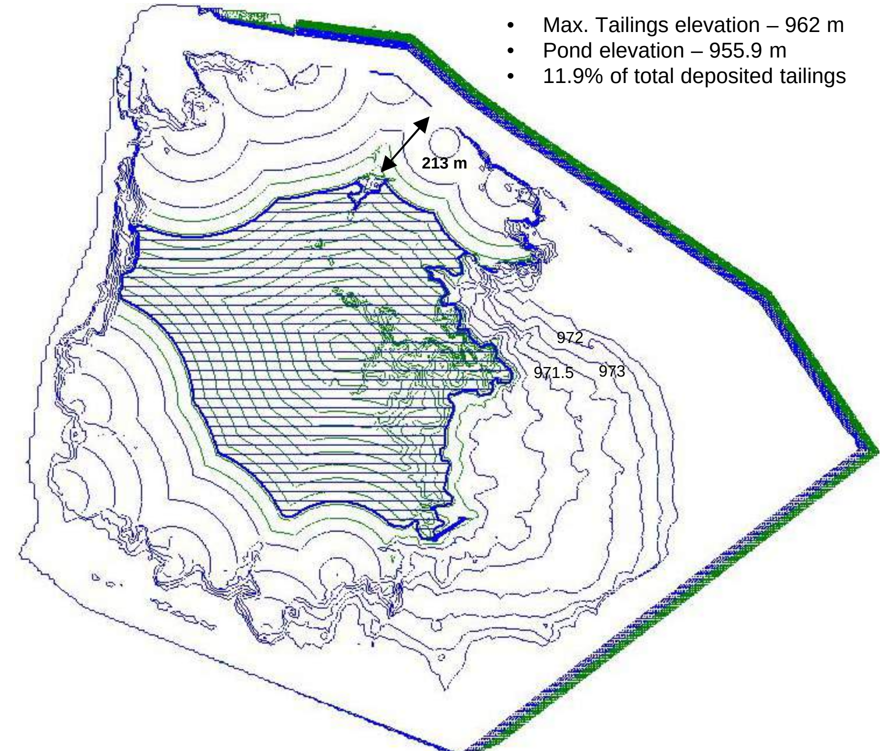
Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE REV. 0
CADD	CTM	29OCT15	**FIGURE - D8**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

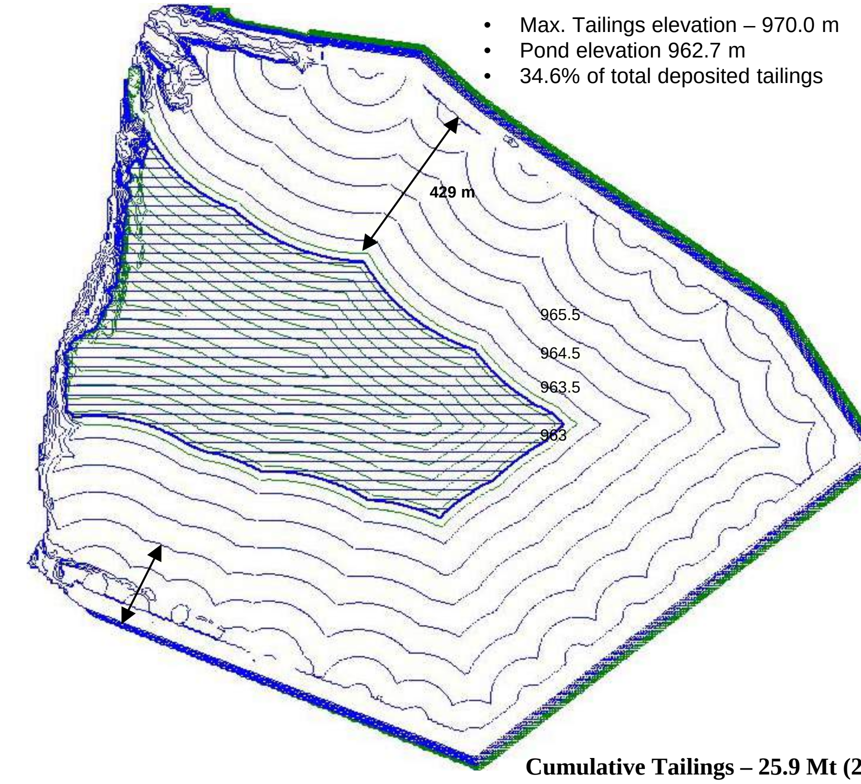
FILE: \\golder.gds\gal\burnaby\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Tailings Deposition Planning\June 2015



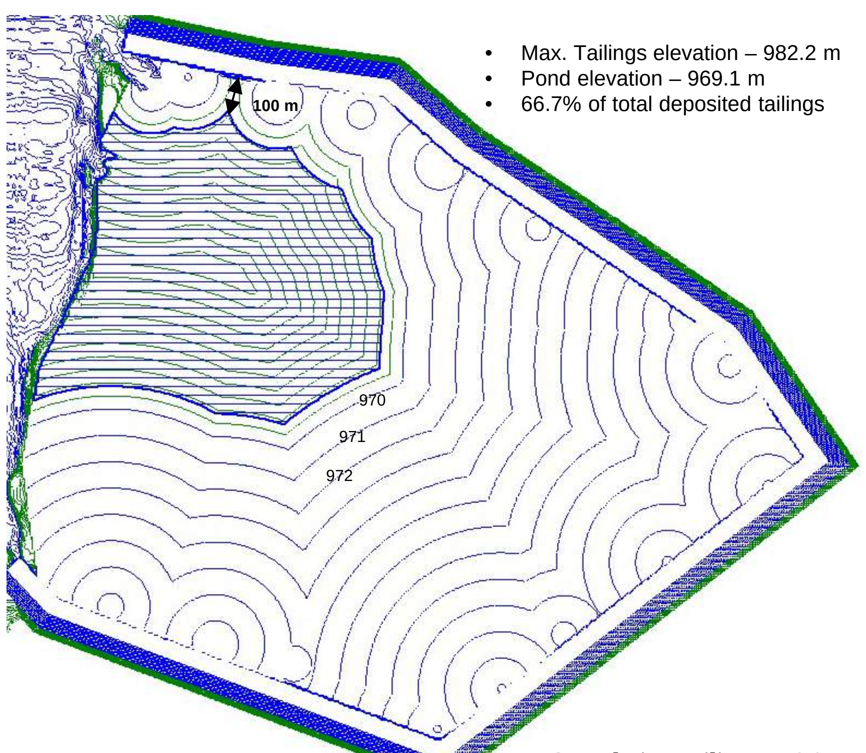
Cumulative Tailings – 1.6 Mt (0.2 years)



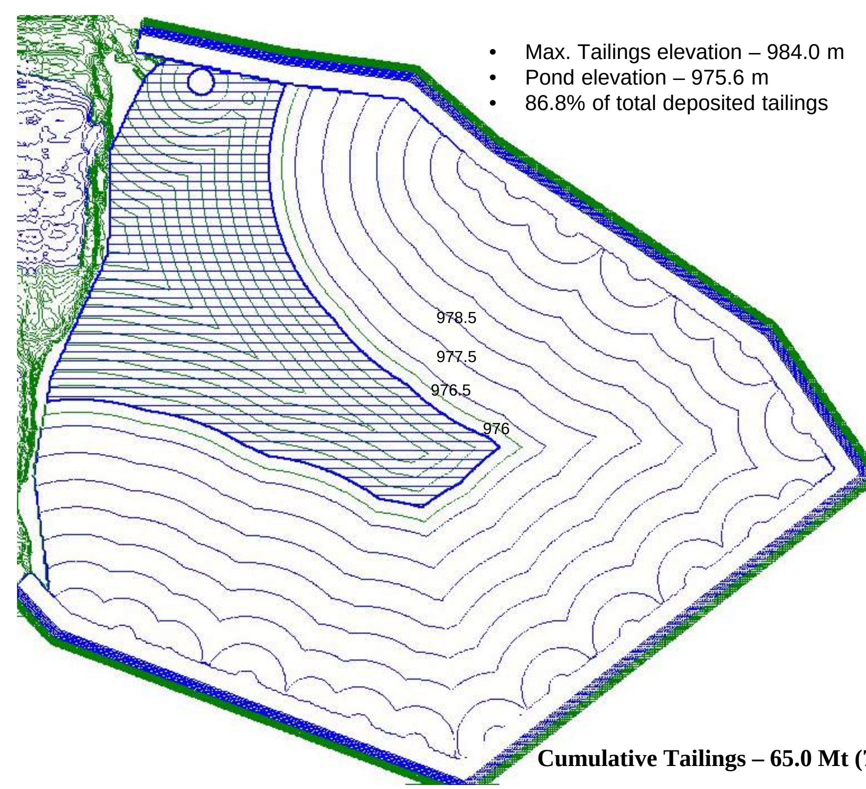
Cumulative Tailings – 8.9 Mt (1.1 years)



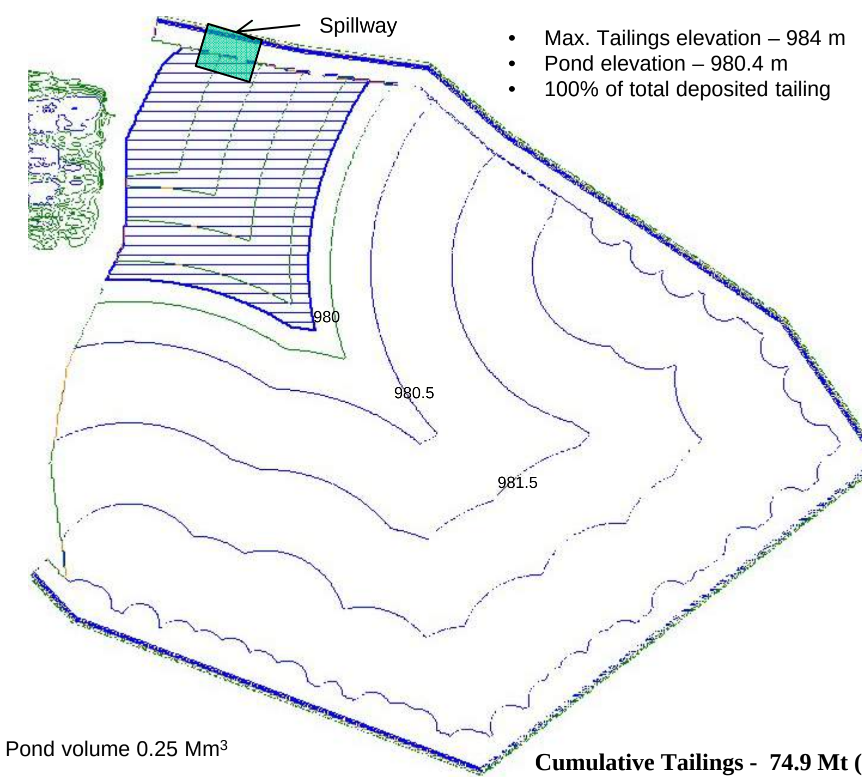
Cumulative Tailings – 25.9 Mt (2.8 years)



Cumulative Tailings – 49.9 Mt (5.9 years)



Cumulative Tailings – 65.0 Mt (7.8 years)



Pond volume 0.25 Mm^3

Cumulative Tailings - 74.9 Mt (9.0 years)

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. Timeline is based on a deposition rate of 22,000 tonnes per day.
4. In place dry density of 1.35 tonnes /m^3 assumed.

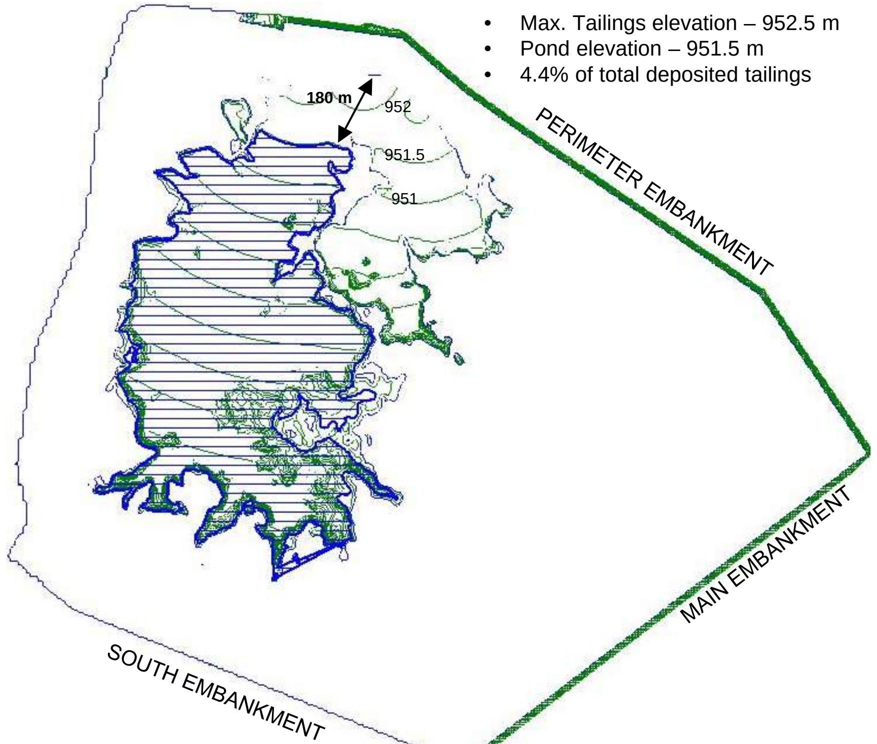
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TAILINGS DEPOSITION MODELLING**
1.5% BEACH SLOPE

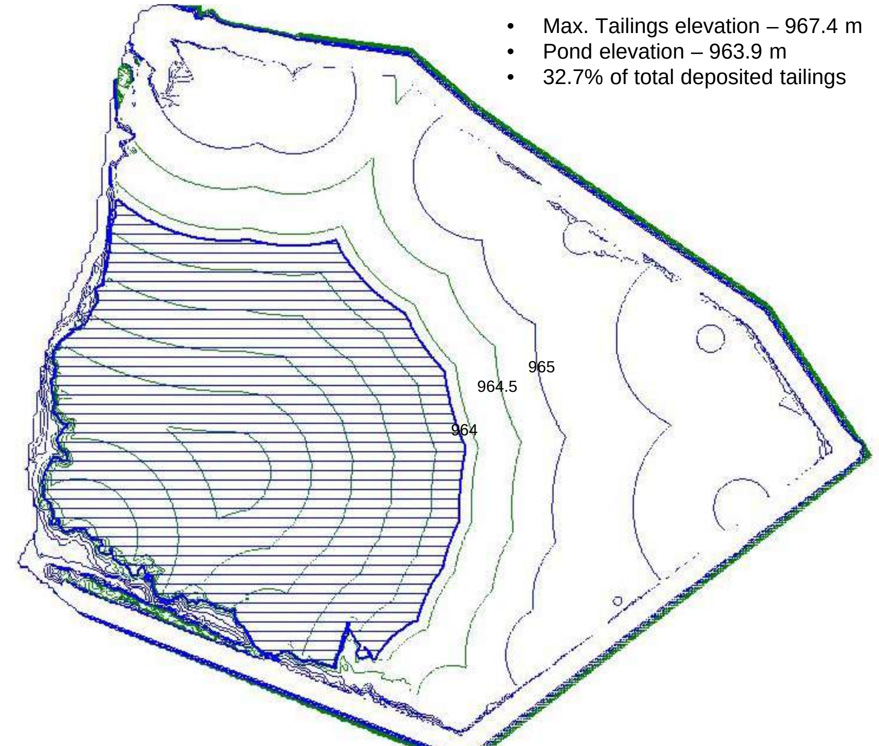
Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE REV. 0
CADD	CTM	29OCT15	
CHECK	GJ	29OCT15	**FIGURE - D9**
REVIEW	TLE	29OCT15	

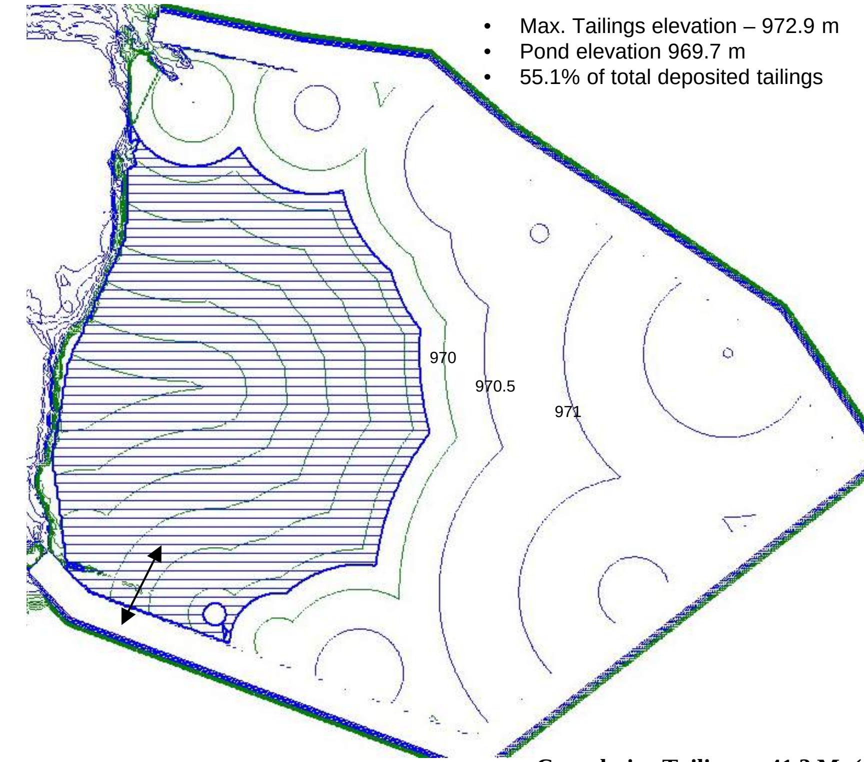
FILE: \\golder.gds\gal\burnaby\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Tailings Deposition Planning\June 2015



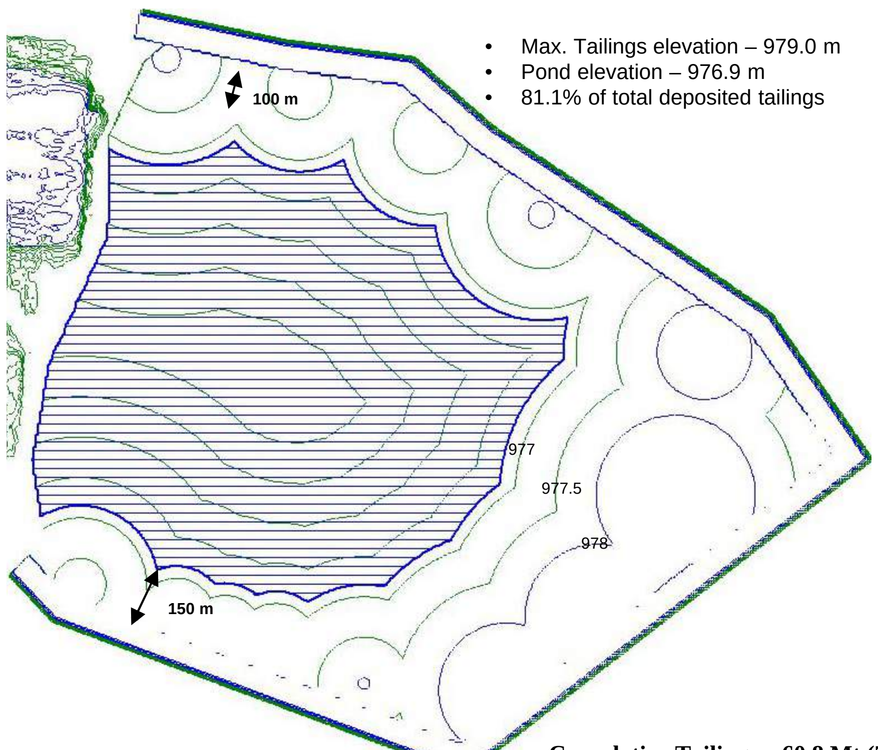
Cumulative Tailings – 3.3 Mt (0.4 years)



Cumulative Tailings – 24.5 Mt (2.6 years)

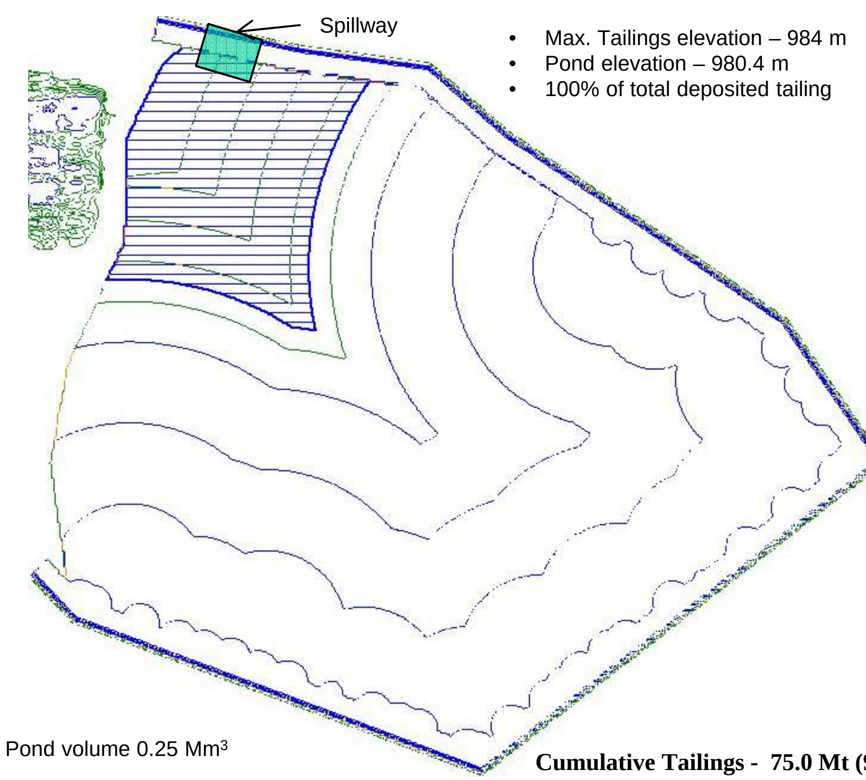


Cumulative Tailings – 41.3 Mt (4.8 years)



Cumulative Tailings – 60.8 Mt (7.3 years)

Cumulative Tailings – 75.0 Mt (9.0 years)



Pond volume 0.25 Mm³

Cumulative Tailings - 75.0 Mt (9.0 years)

FILE: \\golder.gds\gal\burnaby\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Tailings Deposition Planning\June 2015

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. Timeline is based on a deposition rate of 22,000 tonnes per day.
4. In place dry density of 1.35 tonnes /m^3 assumed.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TAILINGS DEPOSITION MODELLING
0.5% BEACH SLOPE

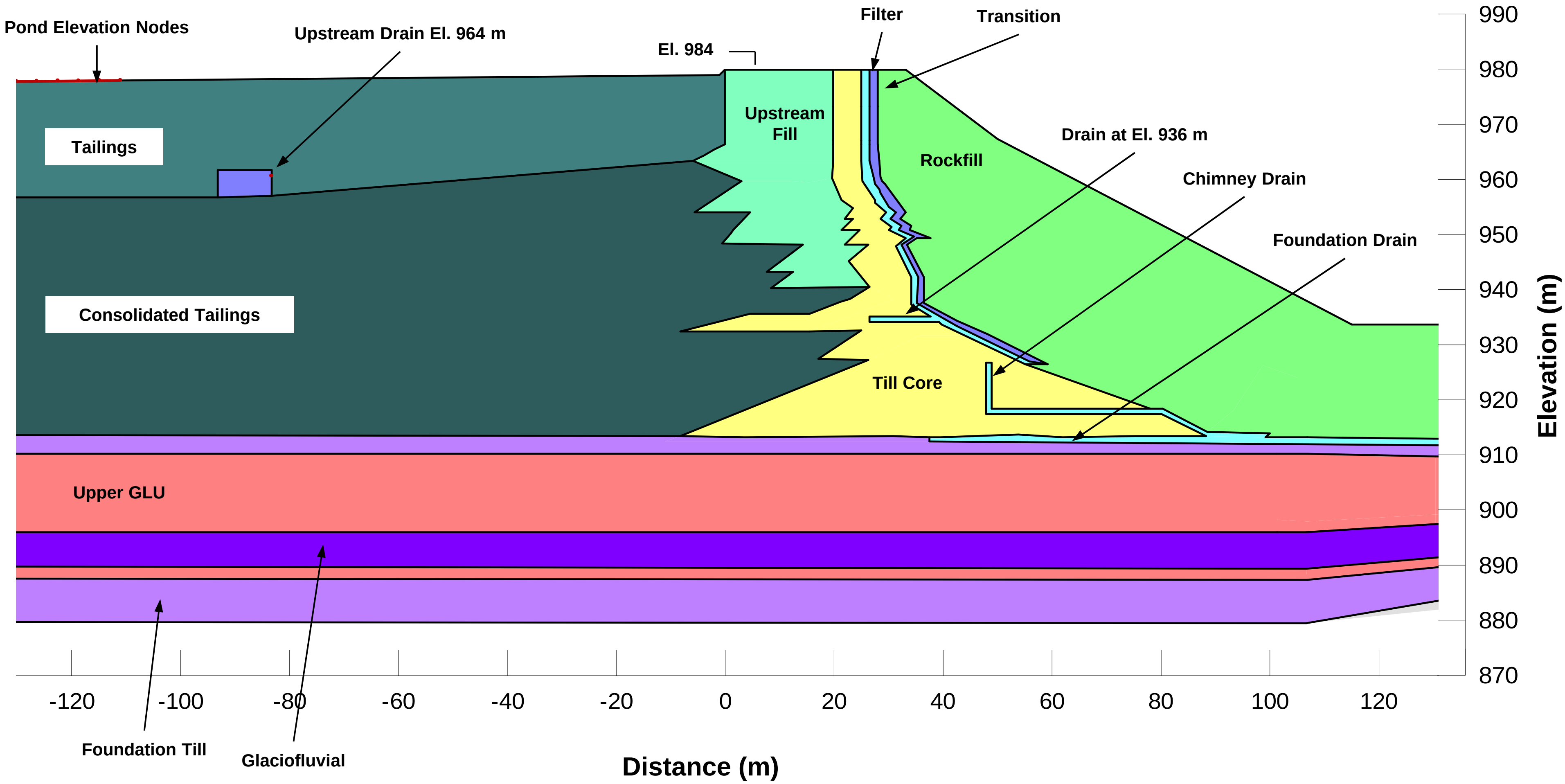
Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE REV. 0
CADD	CTM	29OCT15	**FIGURE - D10**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

APPENDIX E

Seepage Analyses

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



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	$1x10^{-6}$
Consolidated Tailings	$1x10^{-8}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 2+240.

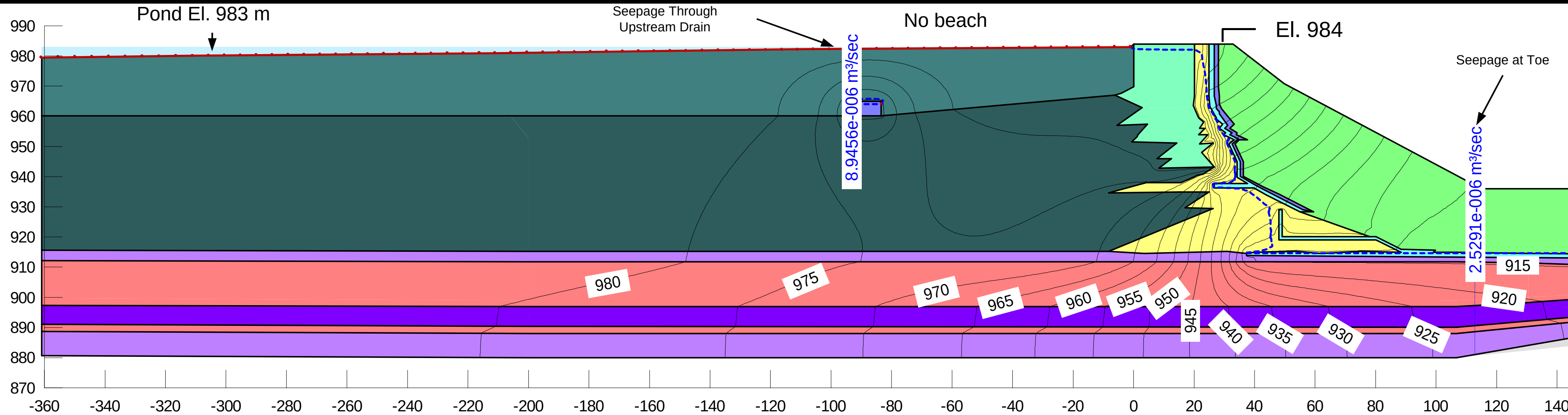
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
TYPICAL SECTION

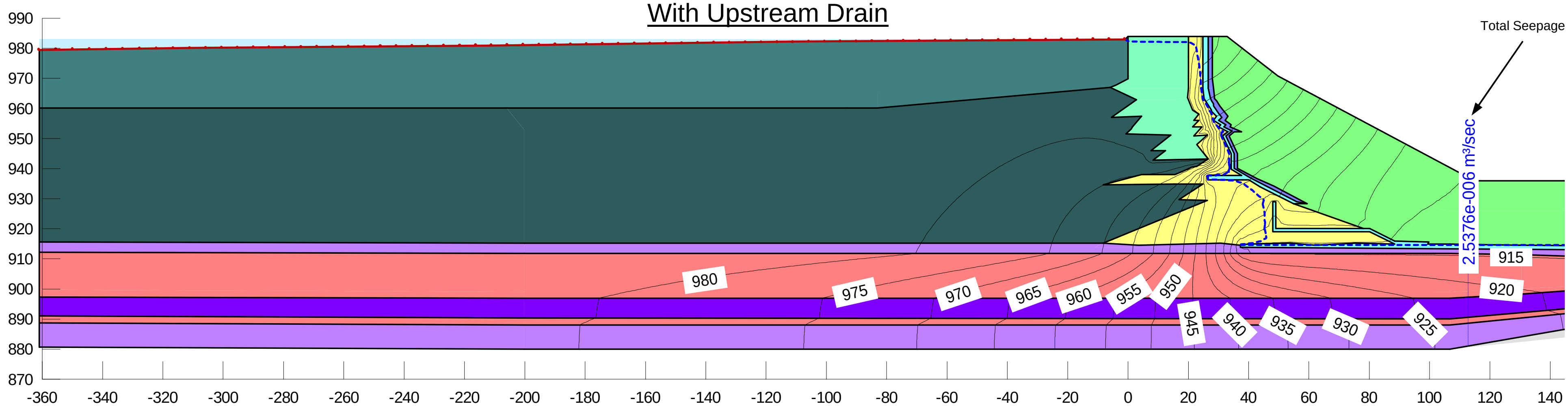
Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE: NTS	REV.0
CADD	CTM	29OCT15	FIGURE - E1	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No Upstream Drain

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}
Consolidated Tailings	1×10^{-8}
Upstream Fill	1×10^{-5}

Notes:
1. Section at Stn. 2+240.
2. Contours show total head, 5 m interval.

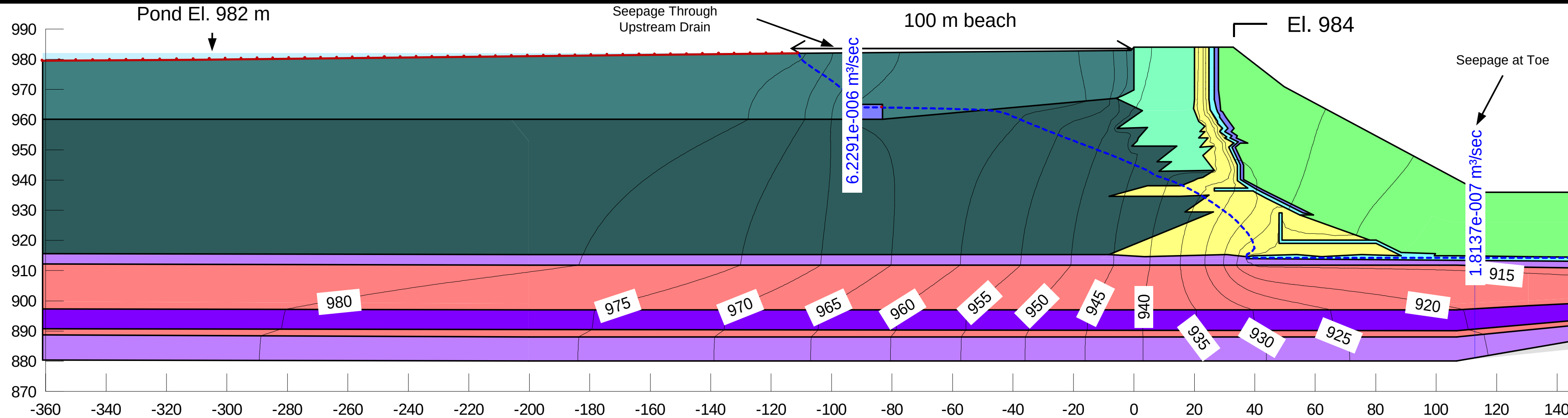
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
NO SUB-AERIAL BEACH

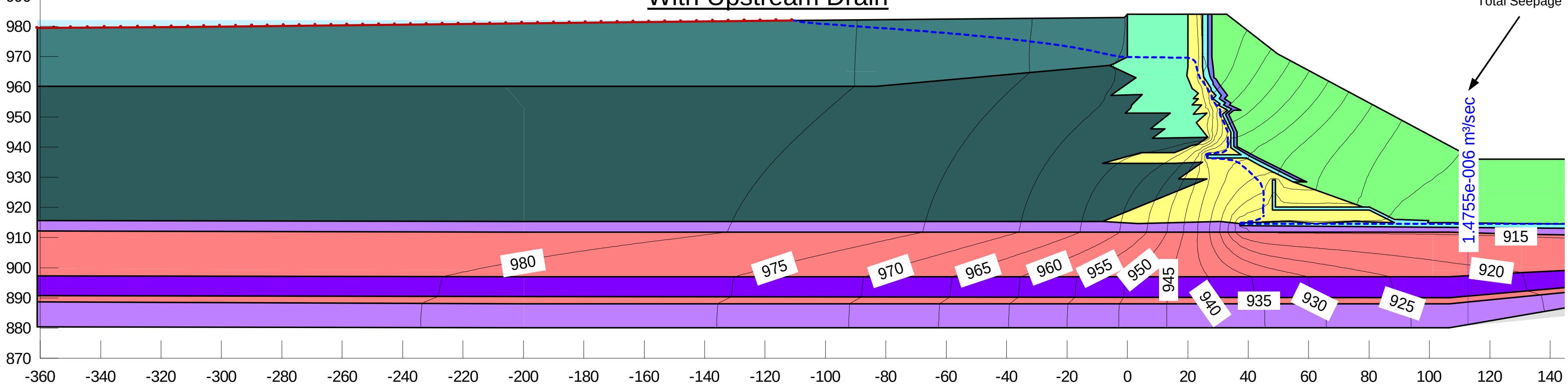
Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE: NTS REV.0
CADD	CTM	29OCT15	**FIGURE - E2**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No 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	$1x10^{-6}$
Consolidated Tailings	$1x10^{-8}$
Upstream Fill	$1x10^{-5}$

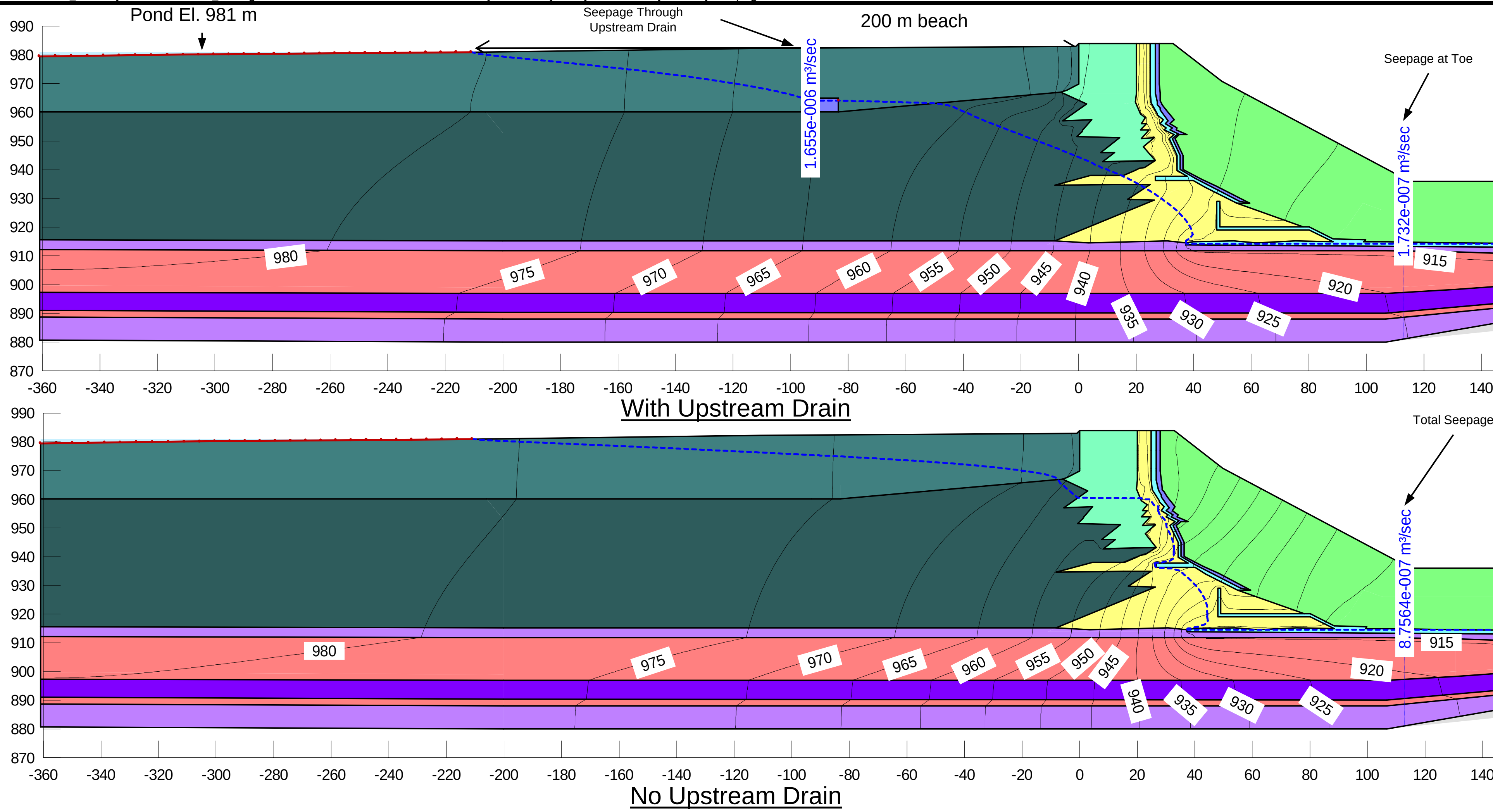
Notes:
1. Section at Stn. 2+240.
2. Contours show total head, 5 m interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
100 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE: NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - E3**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		



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}
Consolidated Tailings	1×10^{-8}
Upstream Fill	1×10^{-5}

Notes:
1. Section at Stn. 2+240.
2. Contours show total head, 5 m interval.

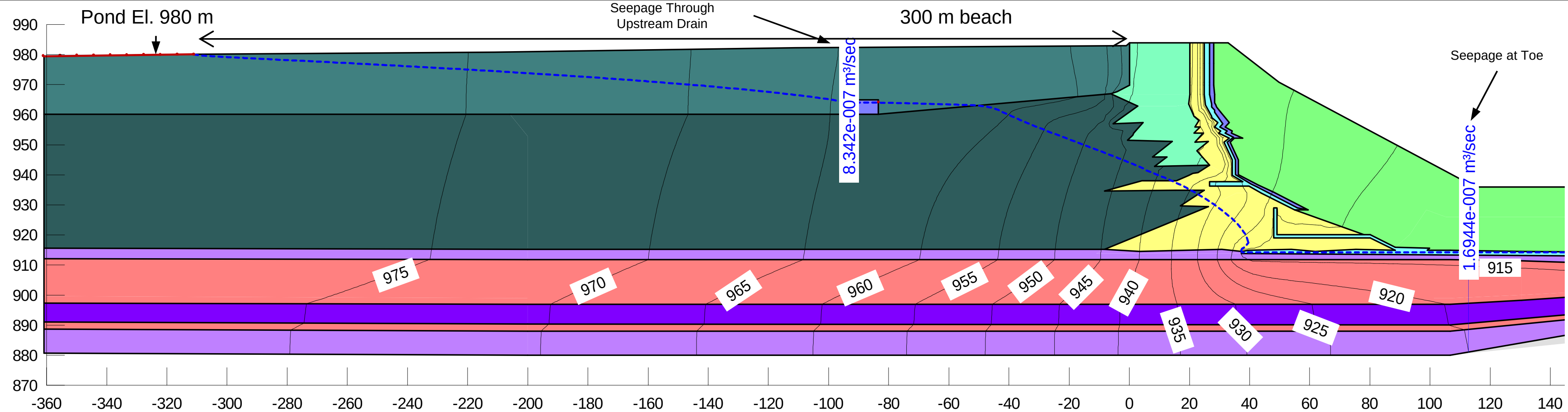
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
200 m SUB-AERIAL BEACH

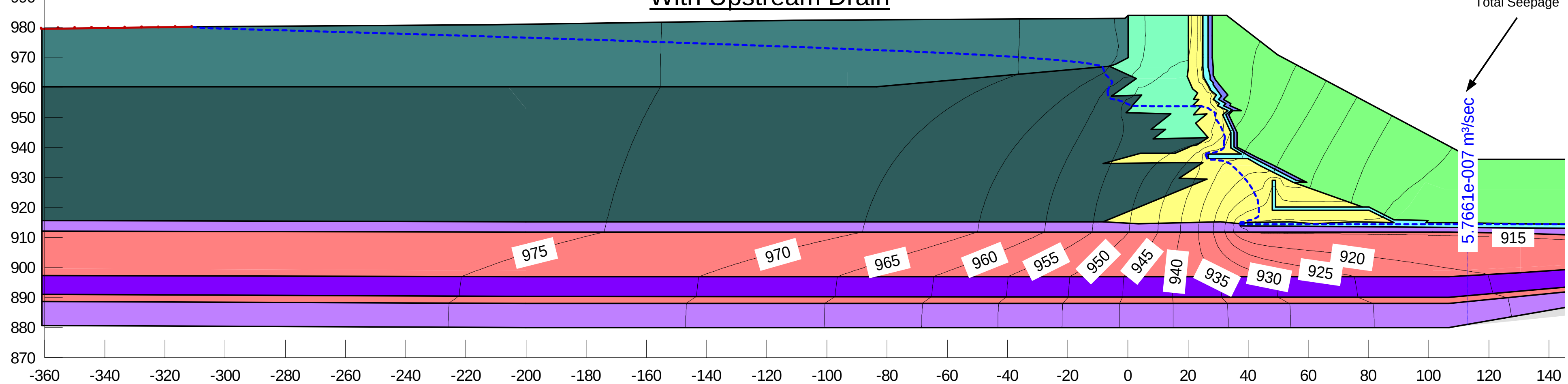
Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE: NTS REV.0
CADD	CTM	29OCT15	**FIGURE - E4**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No Upstream Drain

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}
Consolidated Tailings	1×10^{-8}
Upstream Fill	1×10^{-5}

Notes:
1. Section at Stn. 2+240.
2. Contours show total head, 5 m interval.

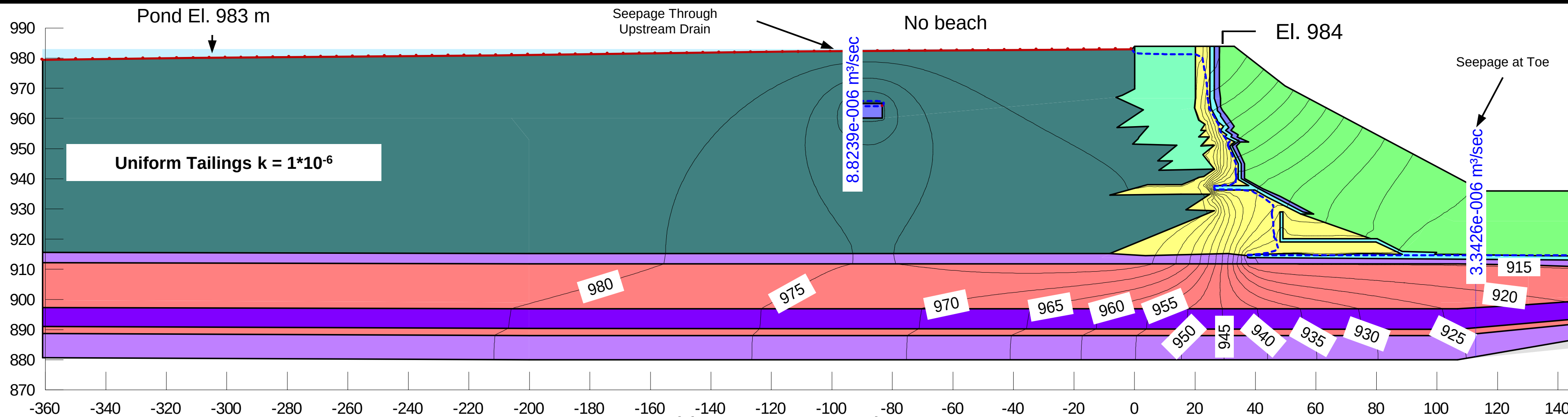
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **SEEPAGE ANALYSIS RESULTS MAIN EMBANKMENT 300 m SUB-AERIAL BEACH**

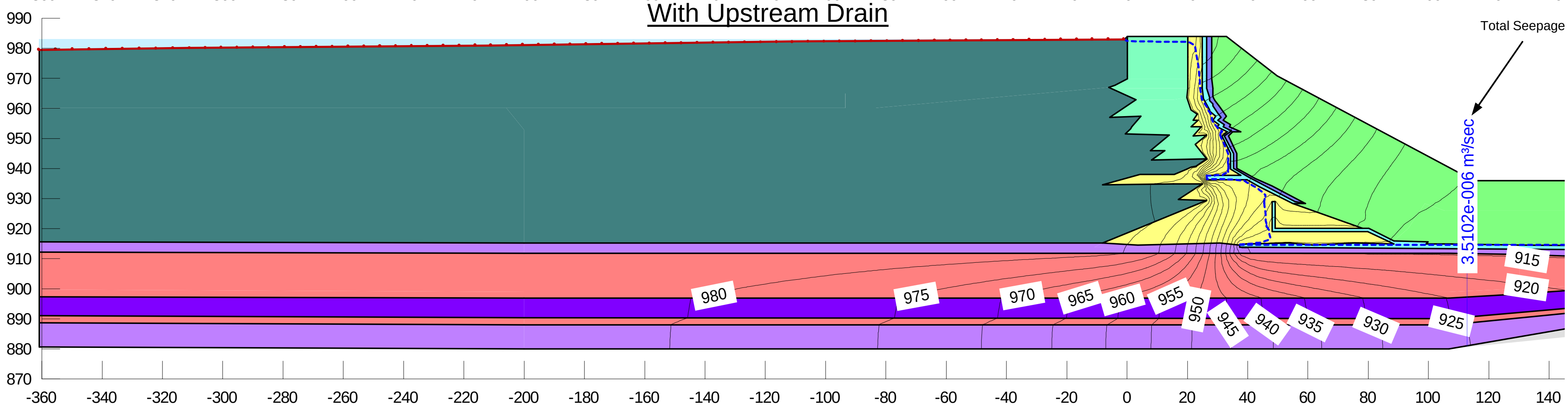
Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE: NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - E5**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No 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	$1x10^{-6}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 2+240.
2. Contours show total head, 5 m interval.

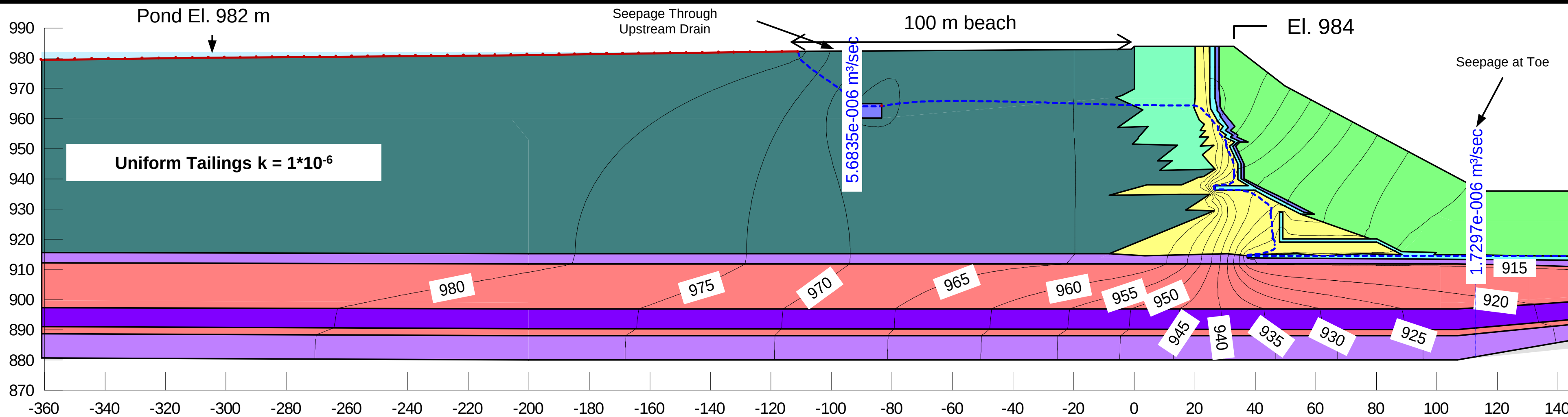
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
NO SUB-AERIAL BEACH

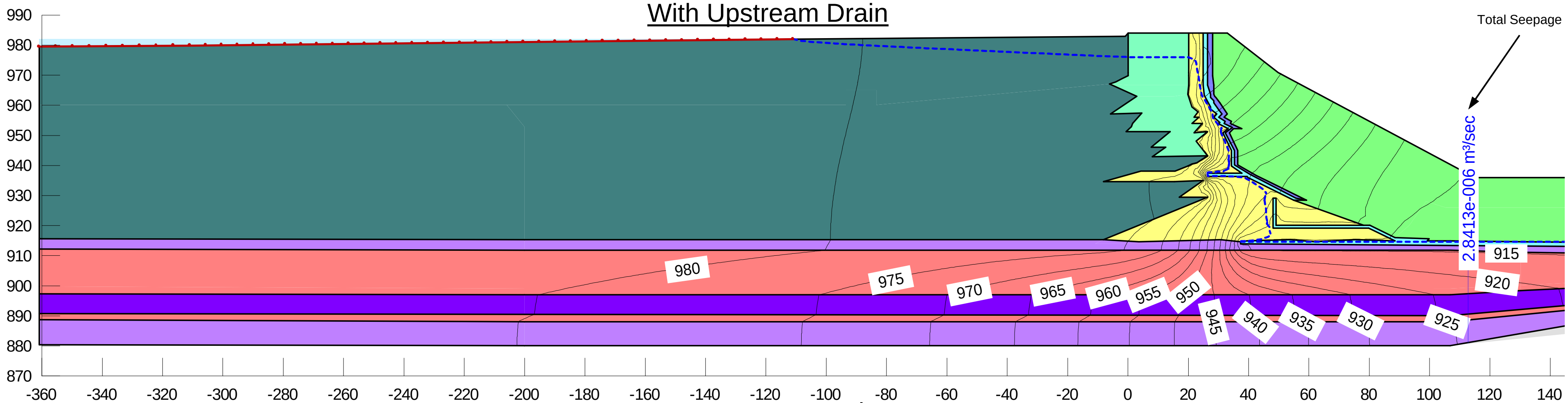
Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE: NTS	REV.0
CADD	CTM	29OCT15	FIGURE - E6	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No 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	$1x10^{-6}$
Upstream Fill	$1x10^{-5}$

Notes:

1. Section at Stn. 2+240.
2. Contours show total head, 5 m interval.

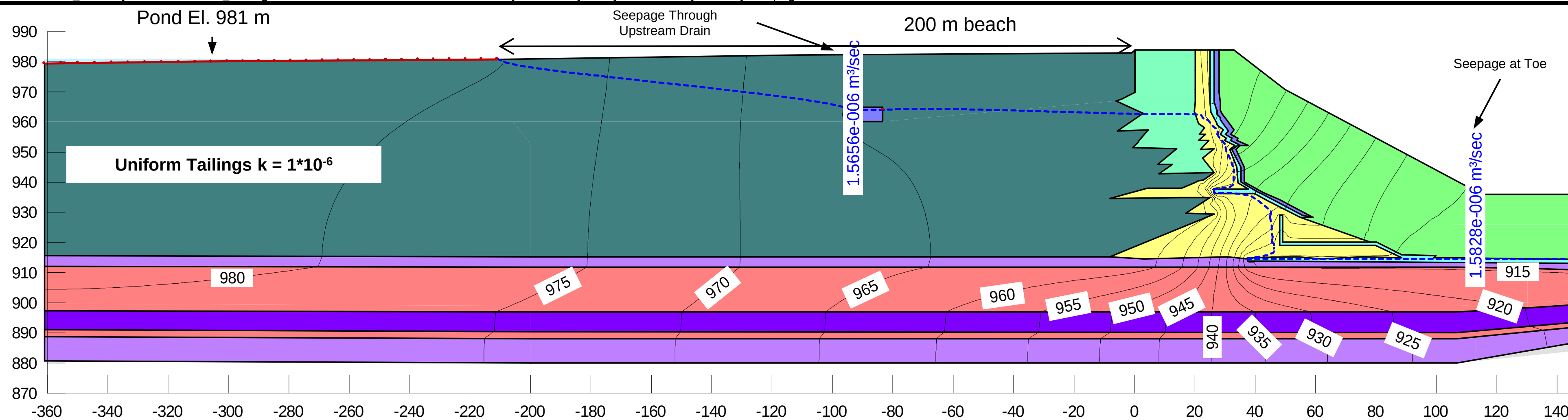
PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
100 m SUB-AERIAL BEACH

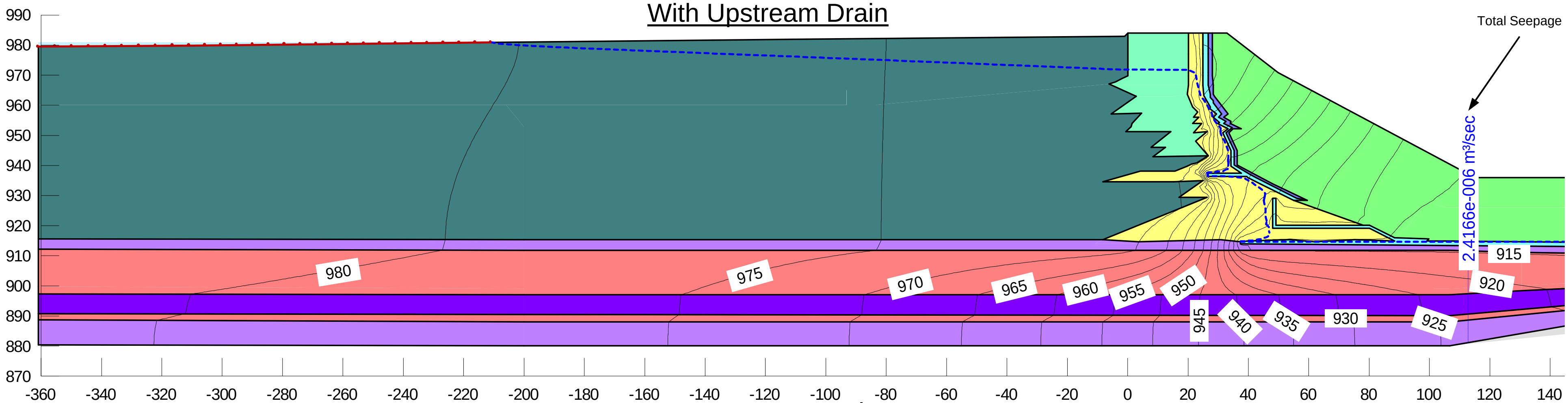
Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE: NTS	REV.0
CADD	CTM	29OCT15	FIGURE - E7	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No 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	$1x10^{-6}$
Upstream Fill	$1x10^{-5}$

Notes:
1. Section at Stn. 2+240.
2. Contours show total head, 5 m interval.

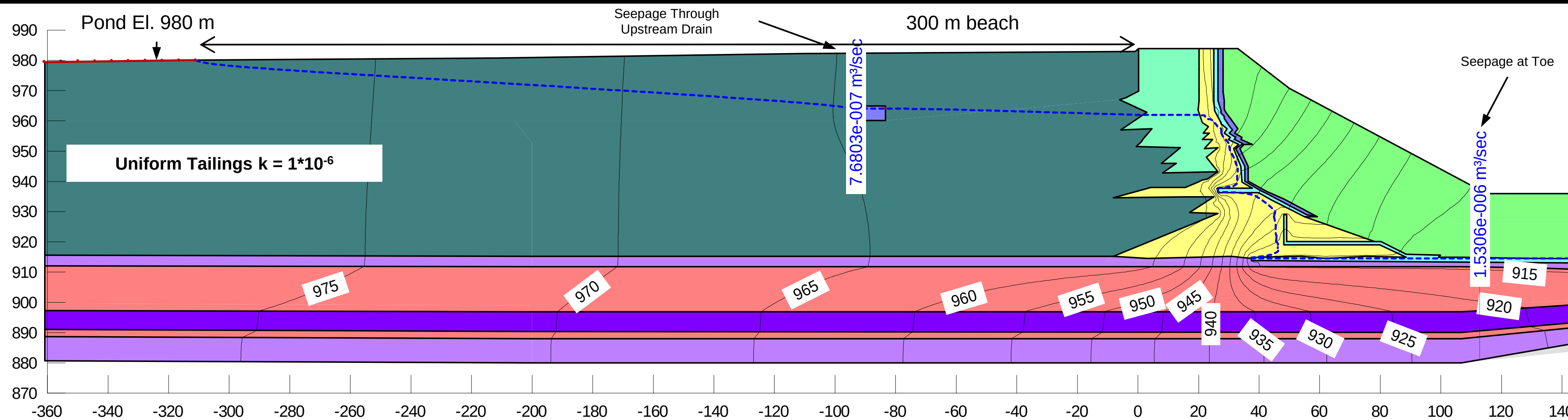
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
MAIN EMBANKMENT
200 m SUB-AERIAL BEACH

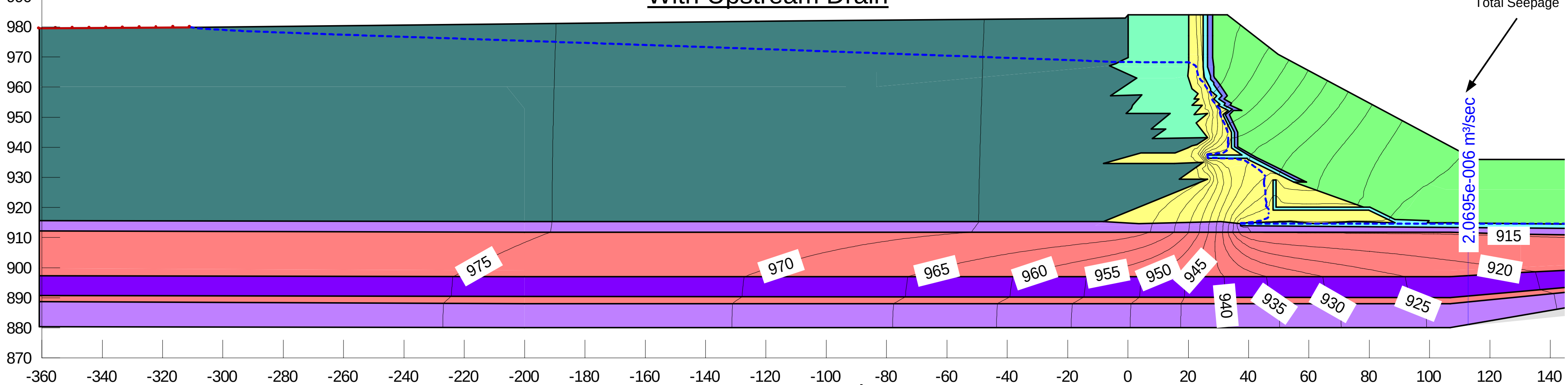
Golder Associates

PROJECT No.	1413803		PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE: NTS REV.0
CADD	CTM	29OCT15	**FIGURE - E8**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No 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	$1x10^{-6}$
Upstream Fill	$1x10^{-5}$

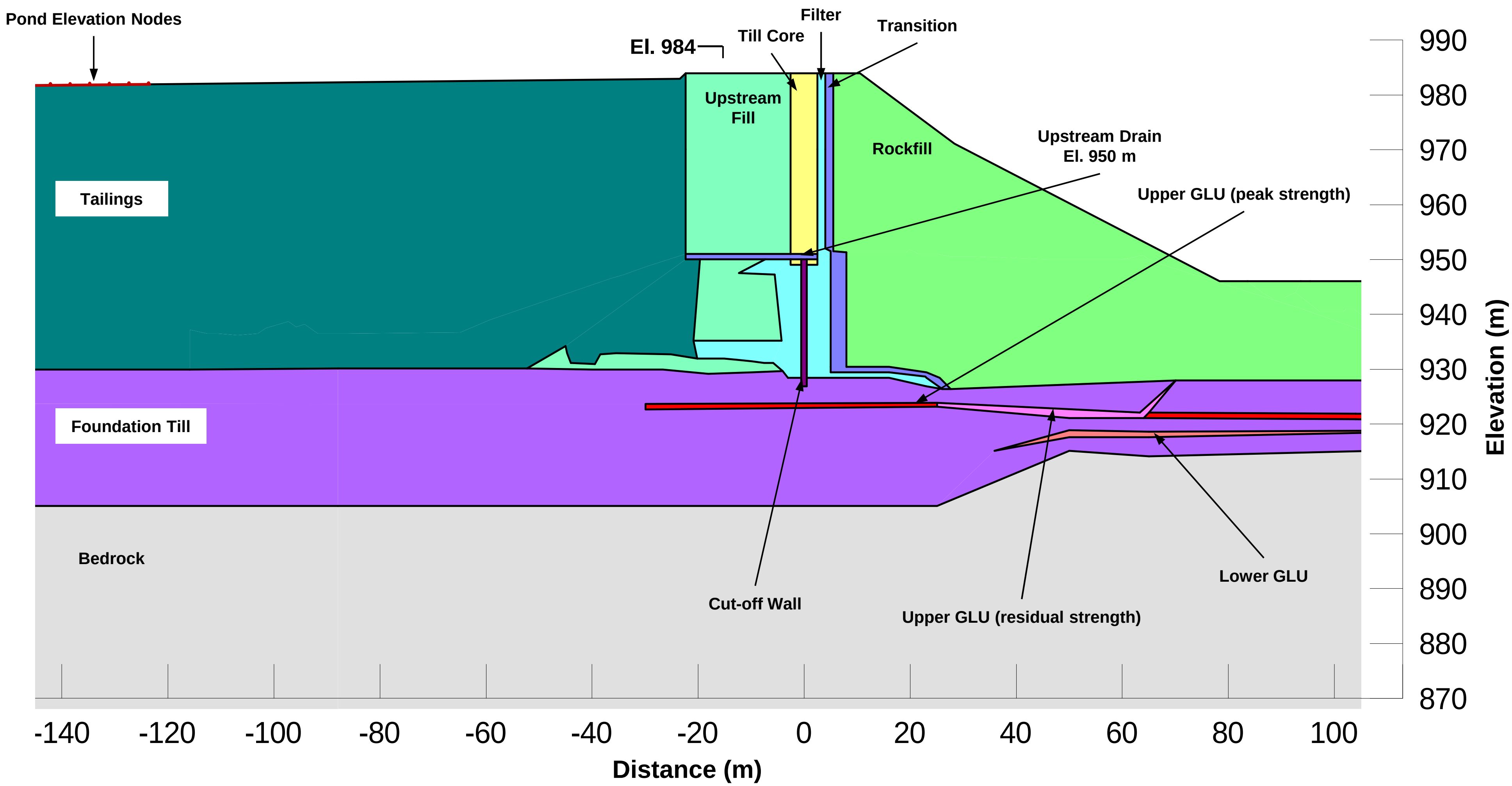
Notes:
1. Section at Stn. 2+240.
2. Contours show total head, 5 m interval.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN
TITLE	SEEPAGE ANALYSIS RESULTS MAIN EMBANKMENT 300 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE: NTS	REV.0
CADD	CTM	29OCT15	FIGURE - E9	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



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	$1x10^{-5}$
Cut-off Wall	$1x10^{-8}$

Notes:
1. Section at Stn. 20+180.

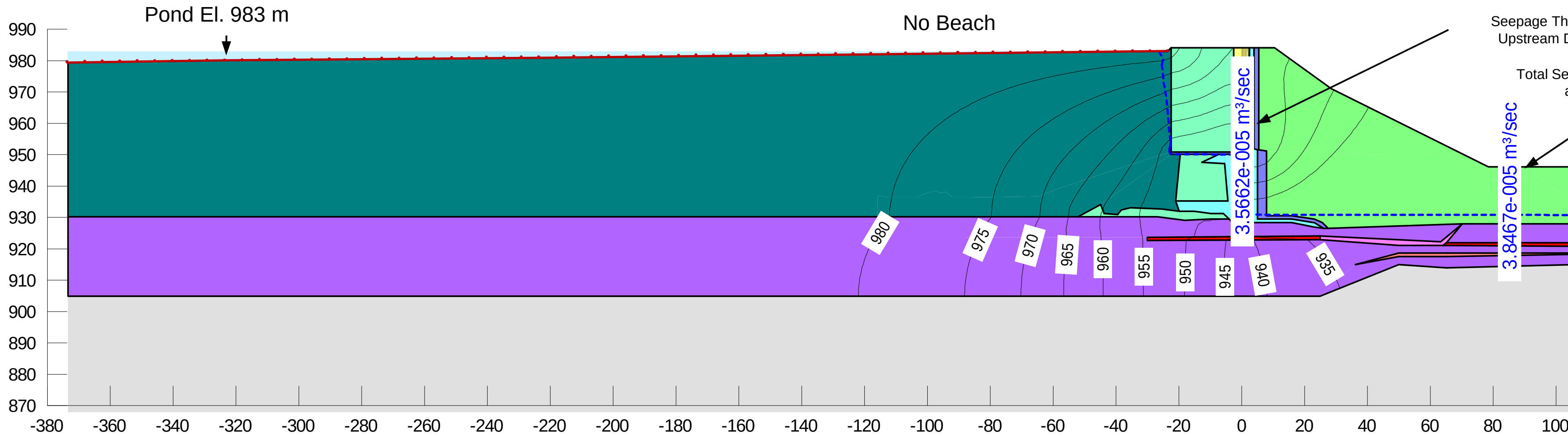
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
CORNER 1 PERIMETER EMBANKMENT
TYPICAL SECTION

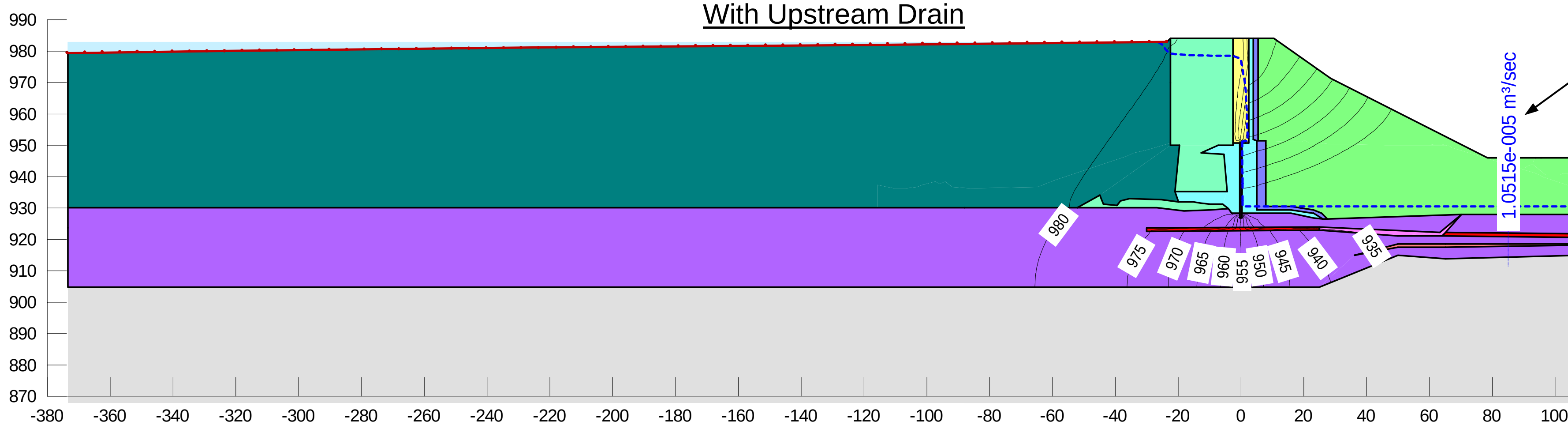
Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE: NTS REV.0
CADD	CTM	29OCT15	**FIGURE - E10**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No Upstream Drain

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}
Cut-off Wall	1×10^{-8}

Notes:
1. Section at Stn. 20+180.
2. Contours show total head, 5 m interval.

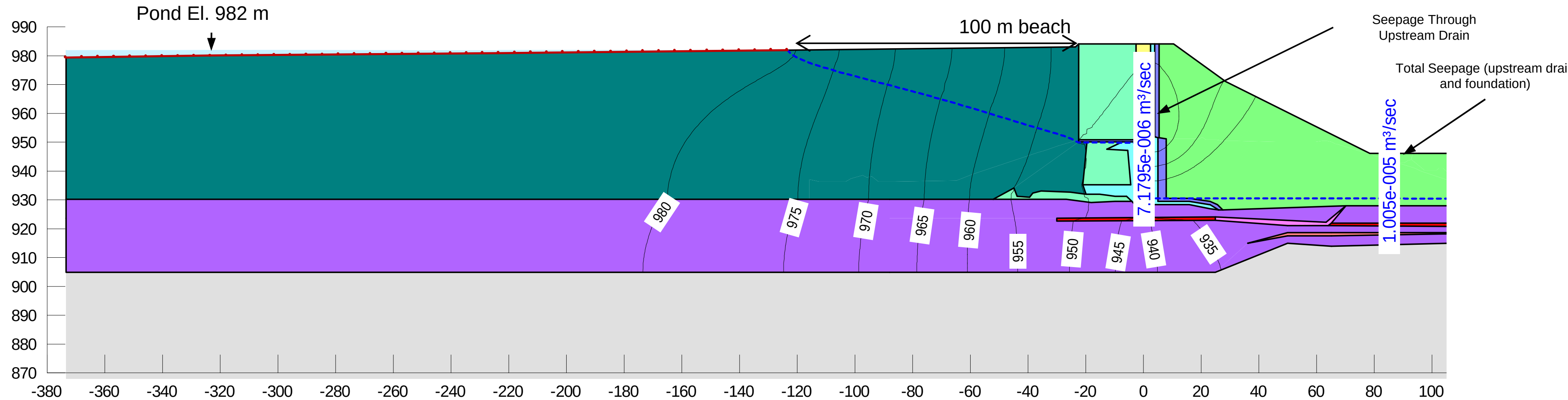
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
CORNER 1 PERIMETER EMBANKMENT
NO SUB-AERIAL BEACH

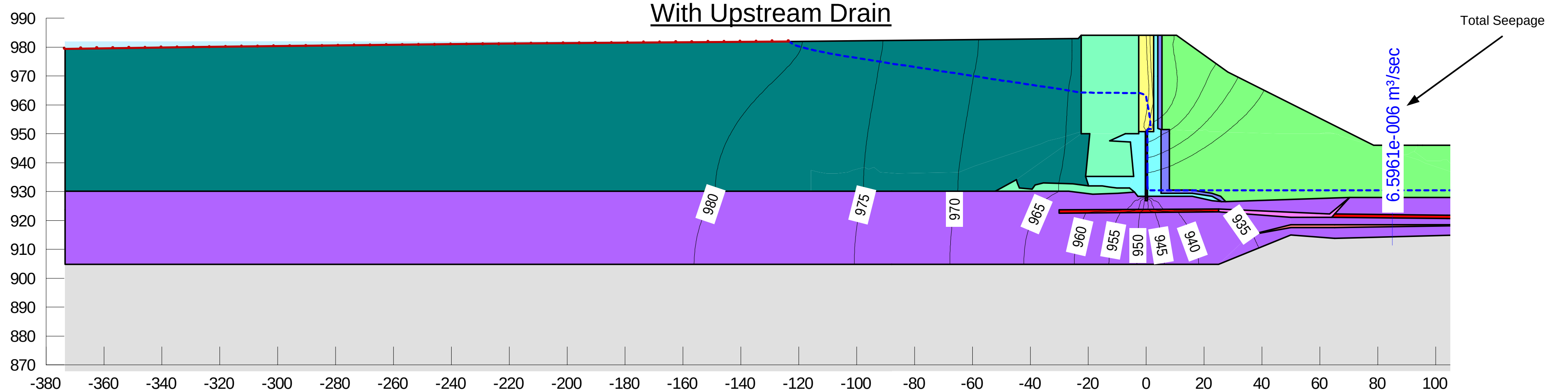
Golder Associates

PROJECT No.	1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE: NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - E11**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No Upstream Drain

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}
Cut-off Wall	1×10^{-8}

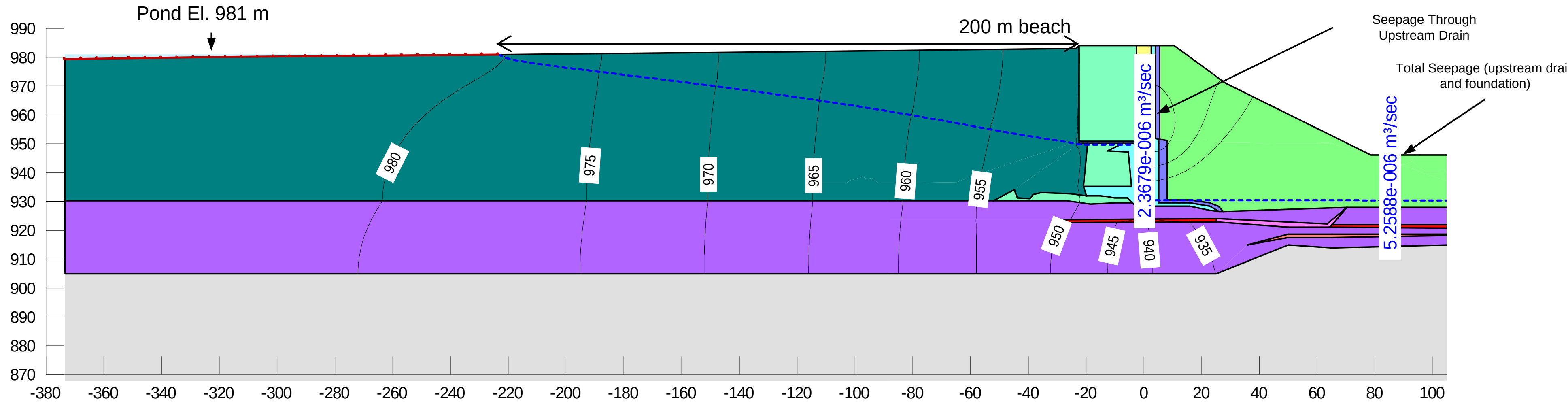
Notes:
1. Section at Stn. 20+180.
2. Contours show total head, 5 m interval.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN
TITLE	SEEPAGE ANALYSIS RESULTS CORNER 1 PERIMETER EMBANKMENT 100 m SUB-AERIAL BEACH

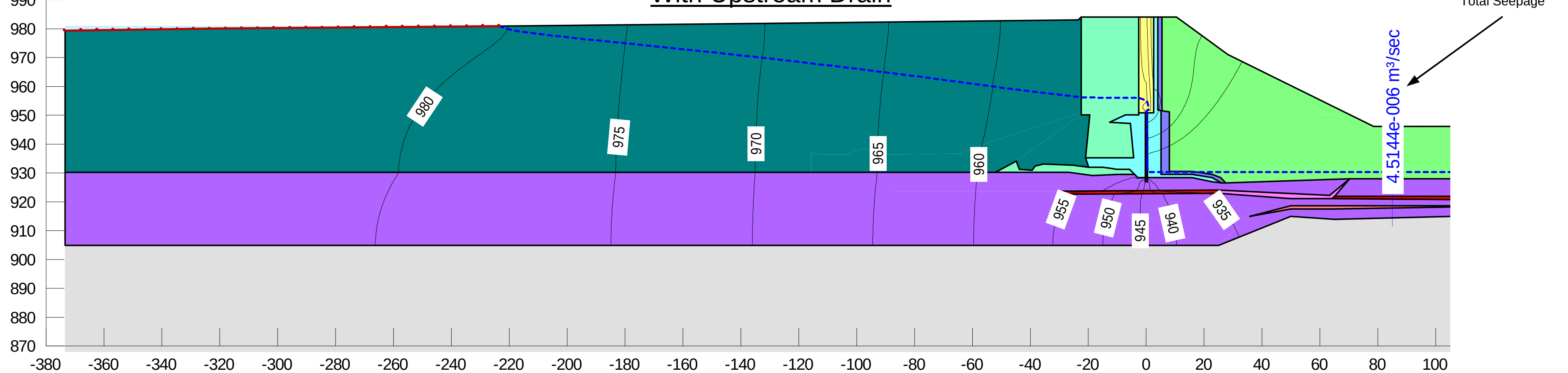
Golder Associates

PROJECT No.	1413803		PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE: NTS REV.0
CADD	CTM	29OCT15	FIGURE - E12
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability\Seepage



With Upstream Drain



No Upstream Drain

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}
Cut-off Wall	1×10^{-8}

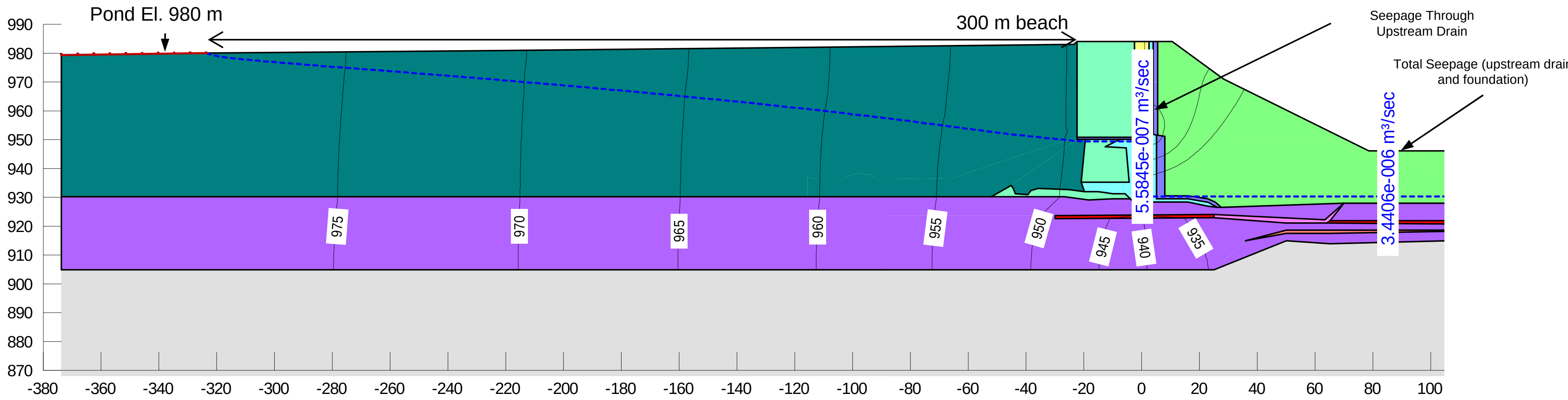
Notes:
1. Section at Stn. 20+180.
2. Contours show total head, 5 m interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

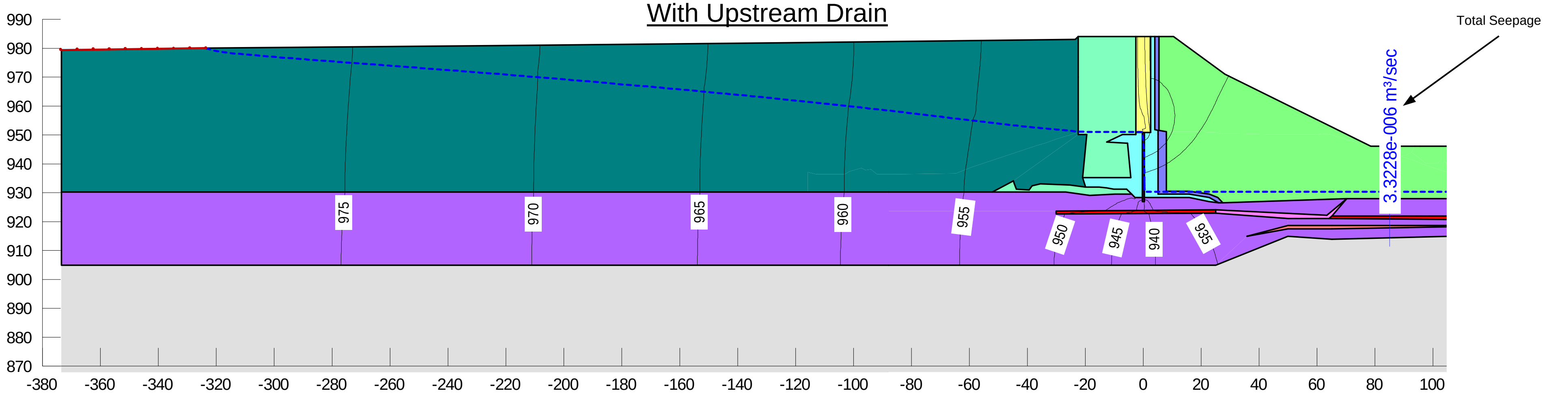
TITLE
SEEPAGE ANALYSIS RESULTS
CORNER 1 PERIMETER EMBANKMENT
200 m SUB-AERIAL BEACH

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE: NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - E13**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		



With Upstream Drain



No 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}
Upstream Fill	1x10^{-5}
Cut-off Wall	1x10^{-8}

Notes:
1. Section at Stn. 20+180.
2. Contours show total head, 5 m interval.

PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
SEEPAGE ANALYSIS RESULTS
CORNER 1 PERIMETER EMBANKMENT
300 m SUB-AERIAL BEACH

Golder Associates

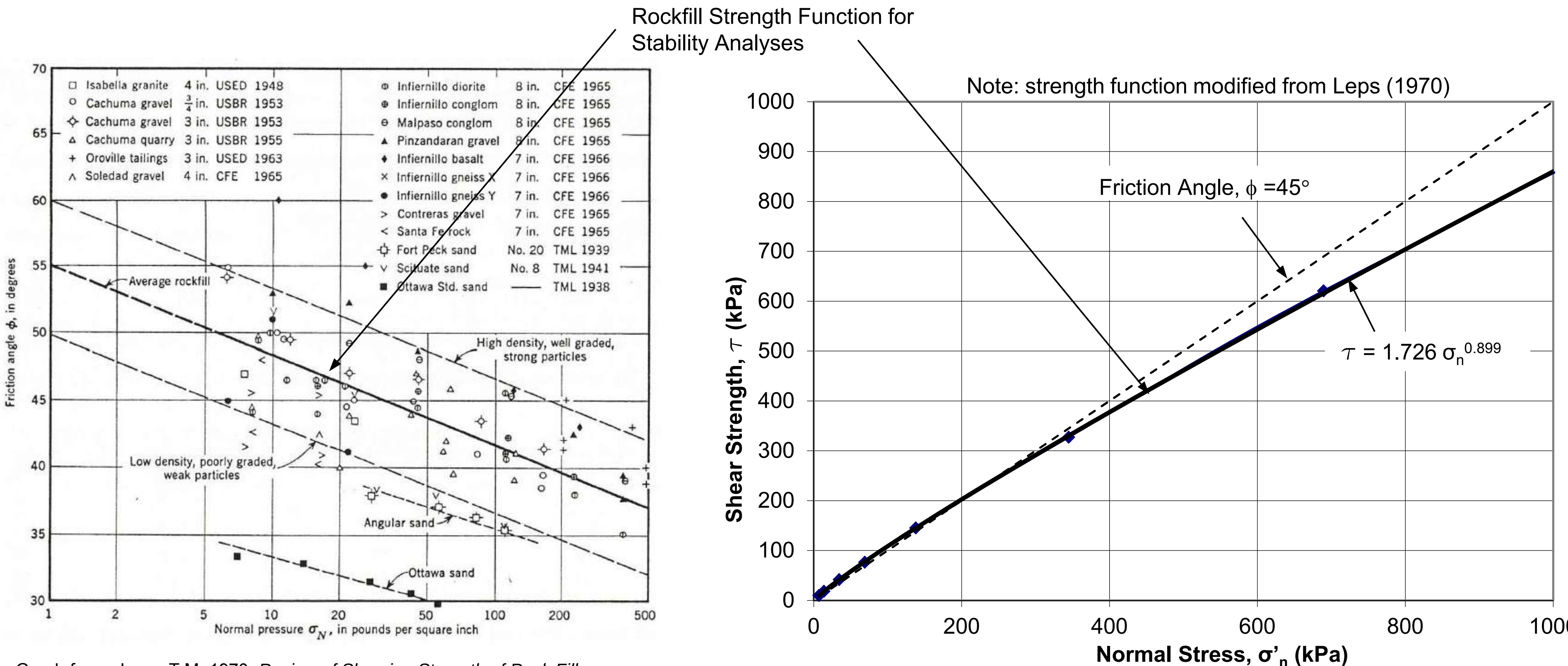
PROJECT No. 1413803		PHASE No. 9000
DESIGN	CTM	29OCT15
CADD	CTM	29OCT15
CHECK	GJ	29OCT15
REVIEW	TLE	29OCT15

SCALE: NTS REV.0

FIGURE - E14

APPENDIX F

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.

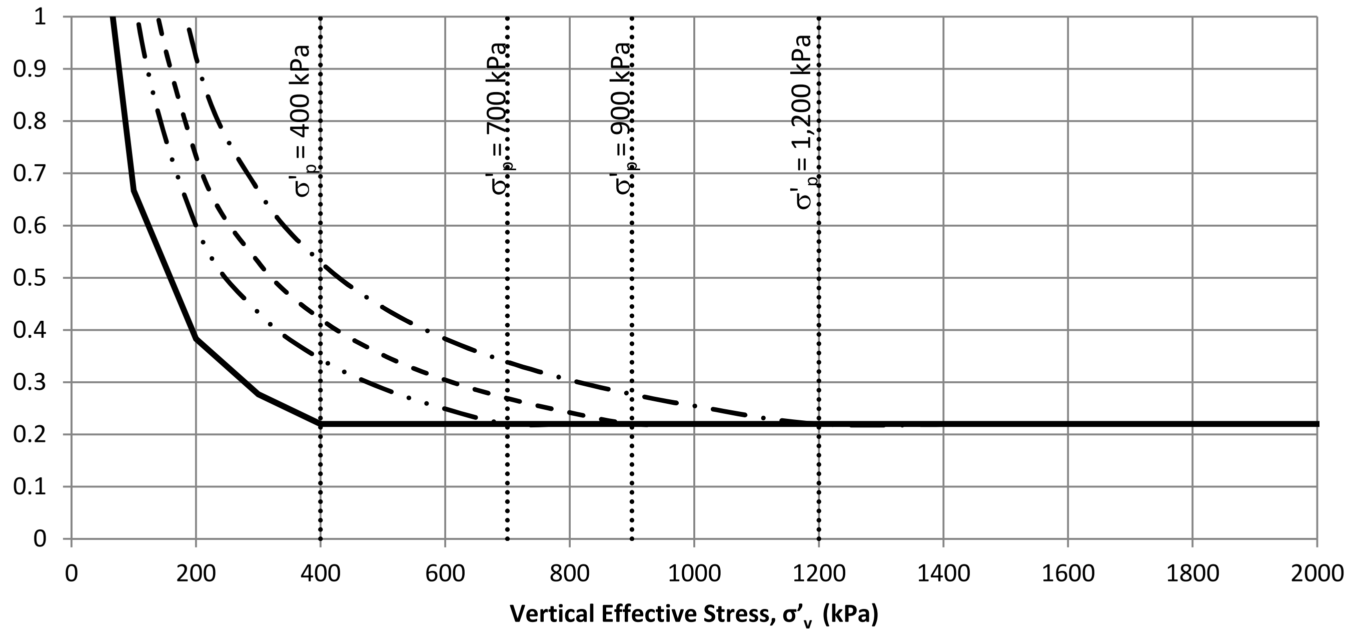
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

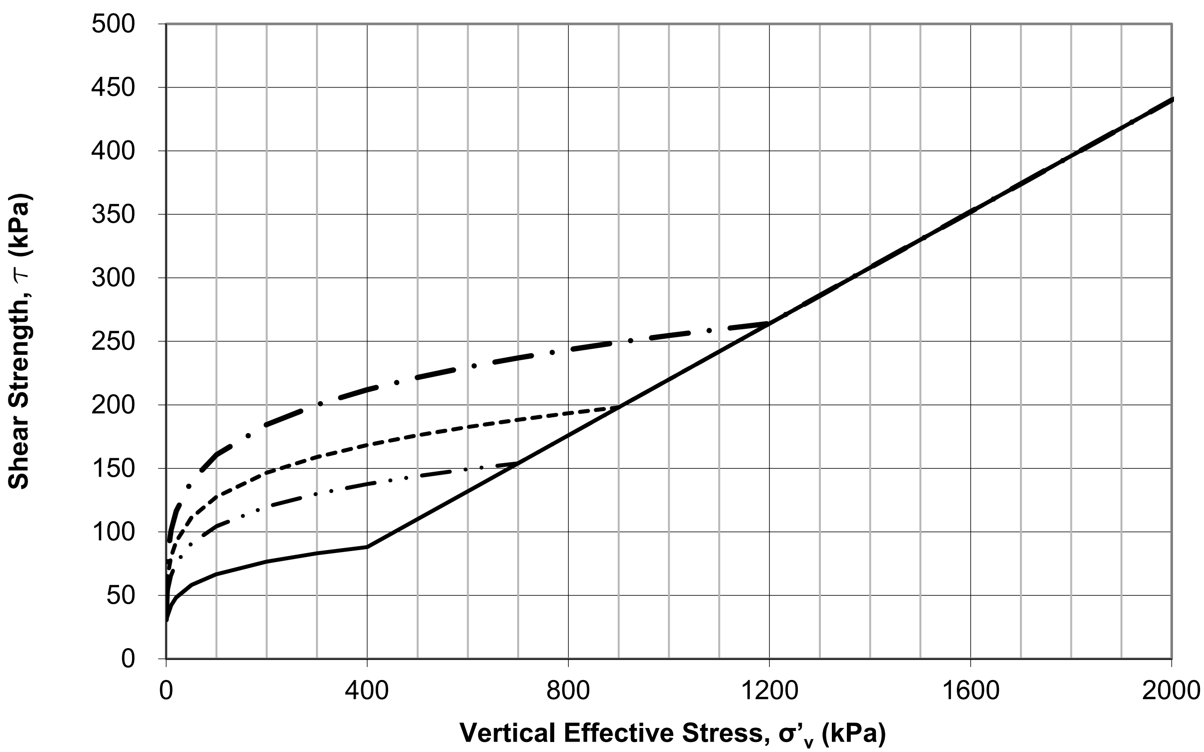
TITLE **STABILITY ANALYSIS**
ROCKFILL STRENGTH FUNCTION

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F1**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability





LEGEND

- $\tau = 0.22\ \sigma_v'\ OCR^{0.8}$, σ'_p = 400 kPa
- $\tau = 0.22\ \sigma_v'\ OCR^{0.8}$, σ'_p = 700 kPa
- $\tau = 0.22\ \sigma_v'\ OCR^{0.8}$, σ'_p = 900 kPa
- $\tau = 0.22\ \sigma_v'\ OCR^{0.8}$, σ'_p = 1,200 kPa

σ'_p = preconsolidation stress

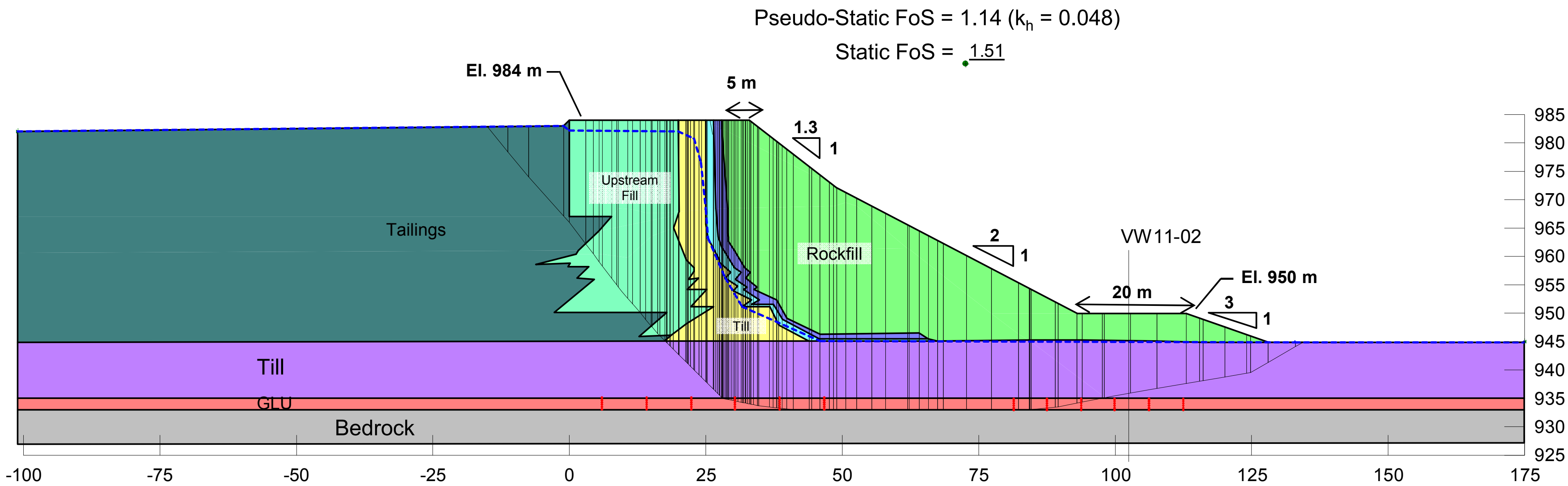
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
STABILITY ANALYSIS
UNDRAINED STRENGTH FUNCTION
GLACIOLACUSTRINE UNITS

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F2**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**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

Piezometric Line

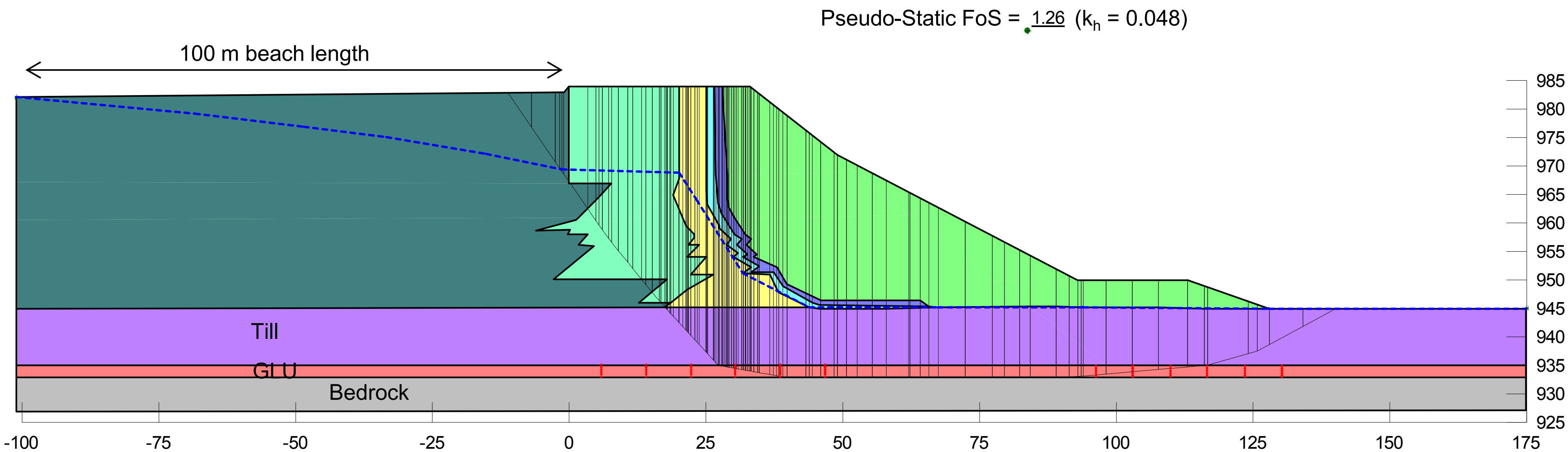
Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT	**MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**
TITLE	**TOTAL STRESS STABILITY ANALYSIS SOUTH EMBANKMENT STN.1+100**

Golder Associates

PROJECT No.	1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F3**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**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

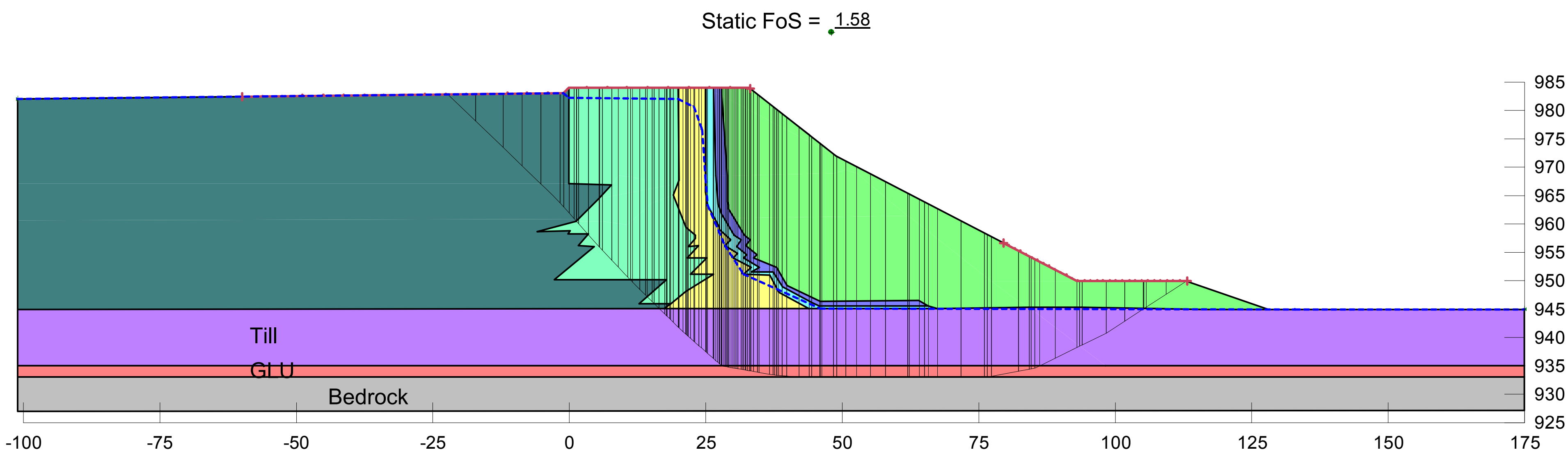
Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN		
TITLE	TOTAL STRESS STABILITY ANALYSIS SOUTH EMBANKMENT STN.1+100		
PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	FIGURE - F4
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

Golder Associates

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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 $\sigma_p' = 1200$

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

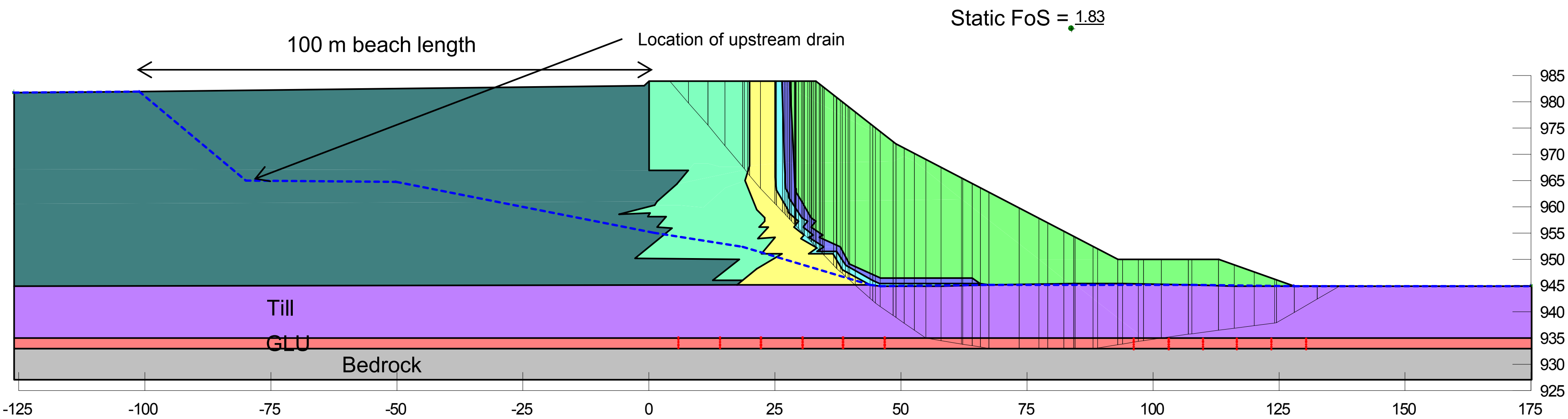
Notes:
1.) No B-Bar applied.

PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE TOTAL STRESS STABILITY ANALYSIS
SOUTH EMBANKMENT STN.1+100

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F5	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain functioning
- 100 m sub-aerial beach
- Pond elevation 982 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 $\sigma_p' = 1200$

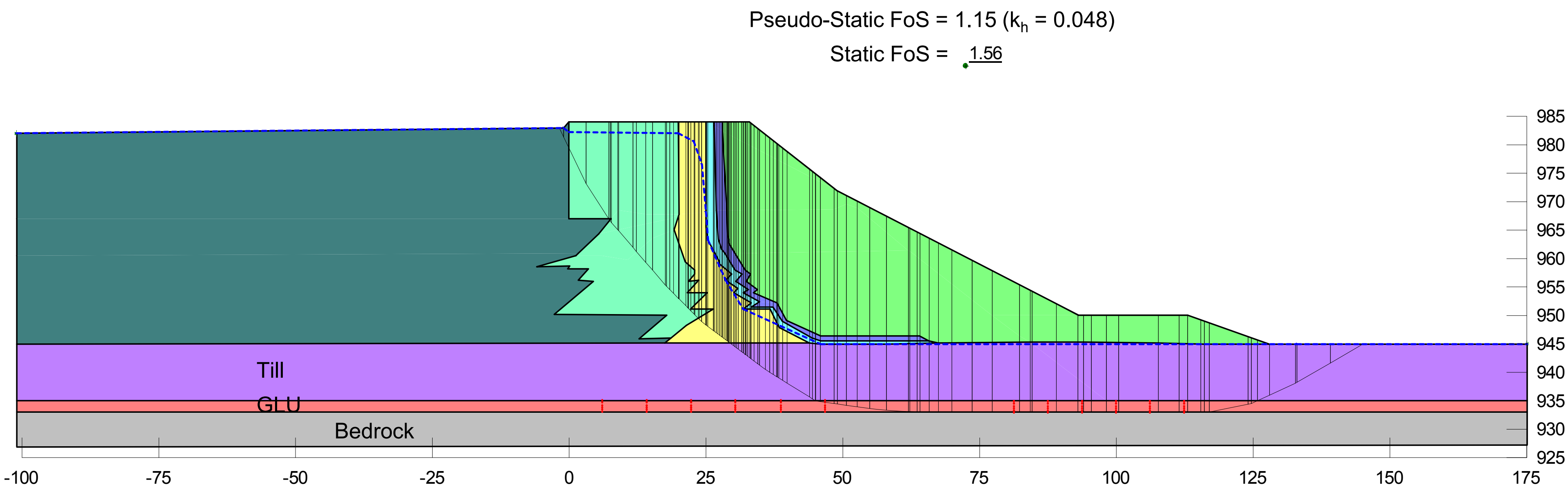
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN				
TITLE	TOTAL STRESS STABILITY ANALYSIS SOUTH EMBANKMENT STN.1+100				
Golder Associates	PROJECT No. 1413803			PHASE No. 9000	
	DESIGN	CTM	29OCT15	SCALE NTS	REV.0
	CADD	CTM	29OCT15	FIGURE - F6	
	CHECK	GJ	29OCT15		
	REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	φ'=25°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

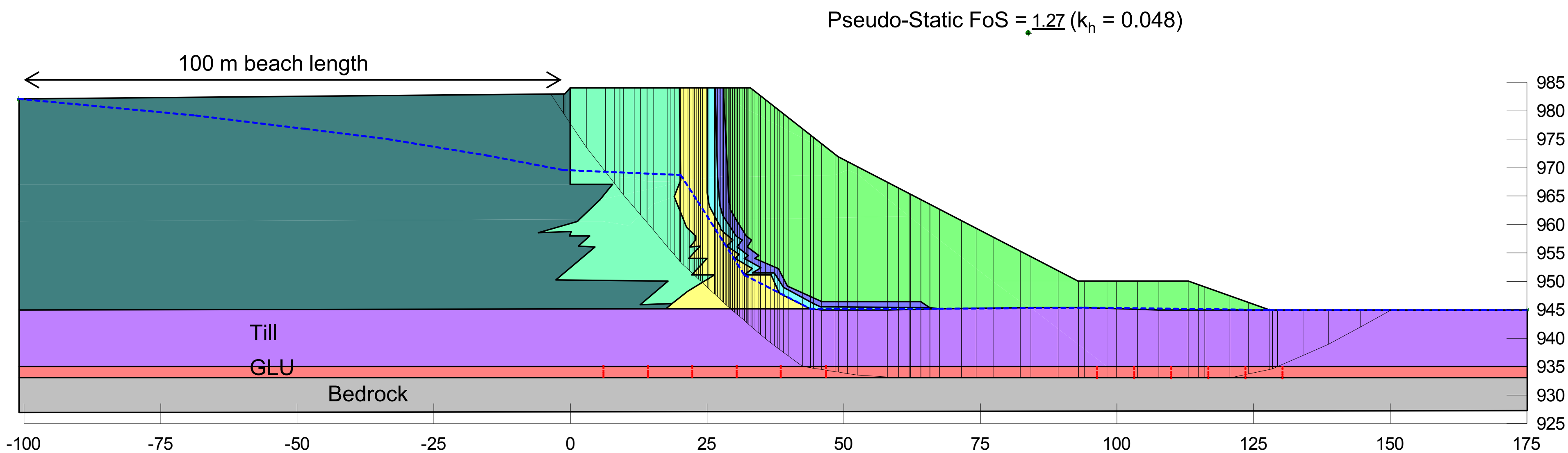
Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
SOUTH EMBANKMENT STN.1+100

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F7**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	φ'=20°, Cohesion = 0 kPa

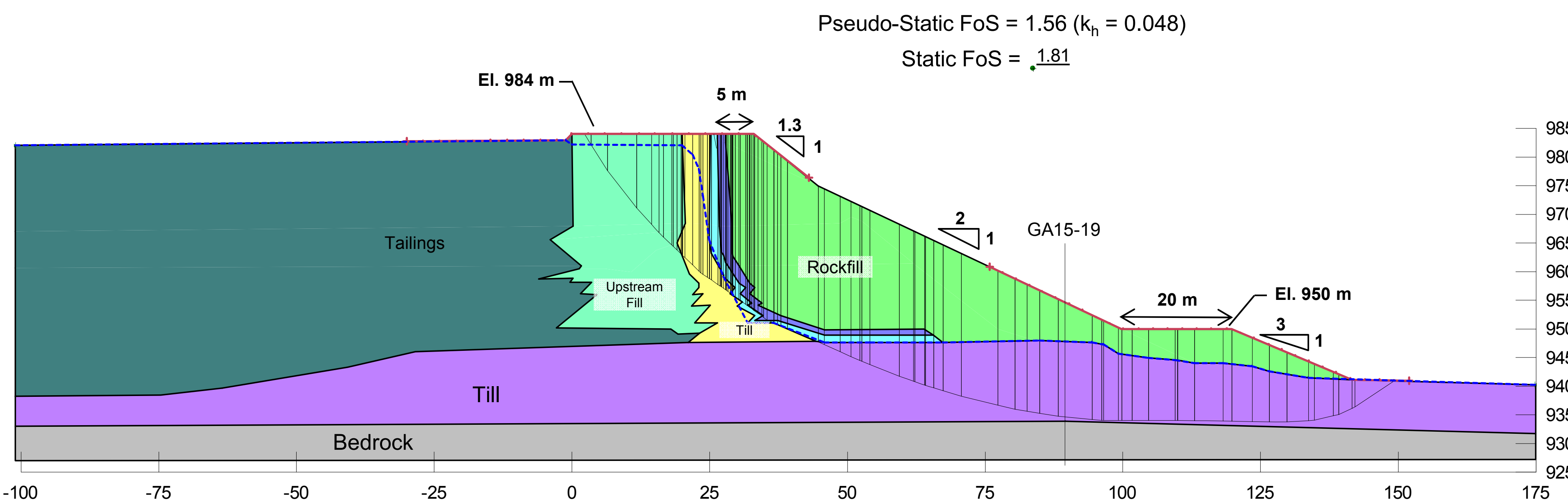
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN		
TITLE	EFFECTIVE STRESS STABILITY ANALYSIS SOUTH EMBANKMENT STN.1+100		
Golder Associates	PROJECT No. 1413803		PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS — REV.0
CADD	CTM	29OCT15	FIGURE - F8
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN
TITLE	TOTAL STRESS STABILITY ANALYSIS SOUTH EMBANKMENT STN.1+415

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F9	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

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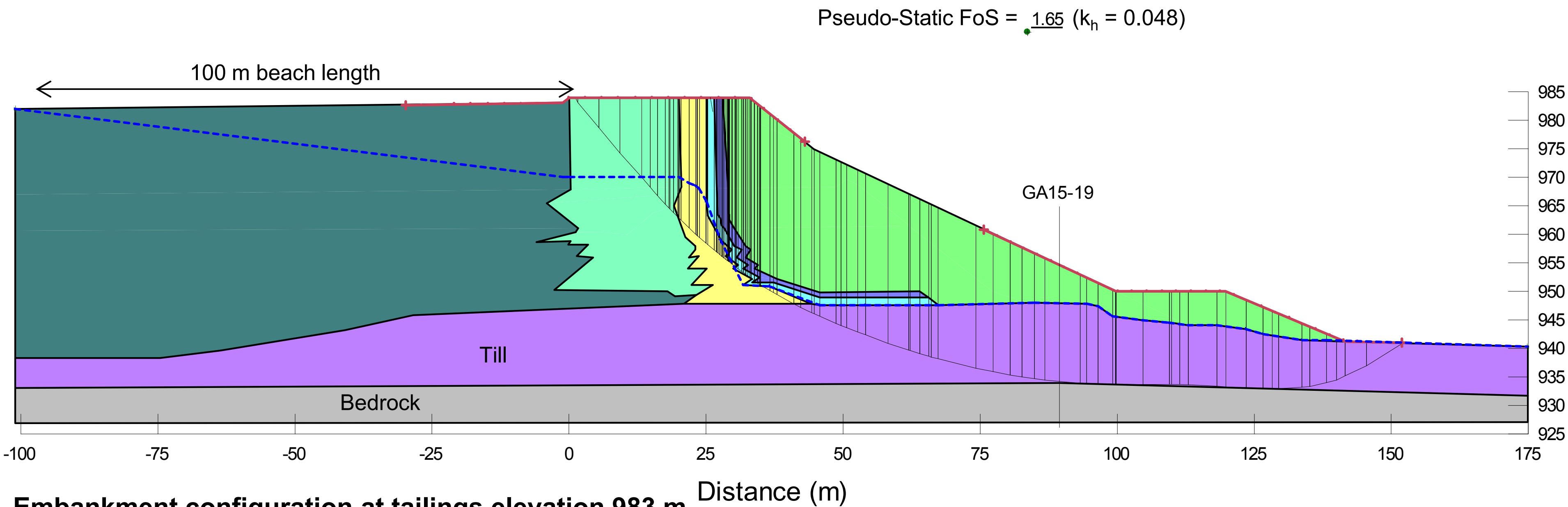


Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

Foundation Material Properties

Material	Unit Weight (kN/m^3)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

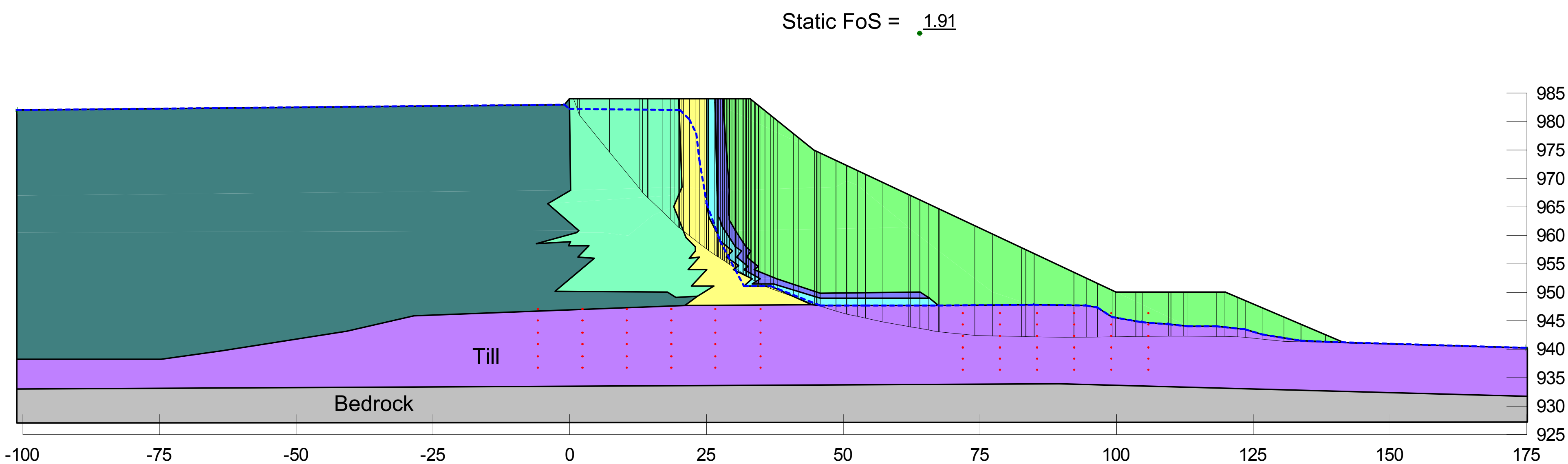
Notes:
1.) No B-Bar applied.
.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
SOUTH EMBANKMENT STN.1+415

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F10**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties

Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

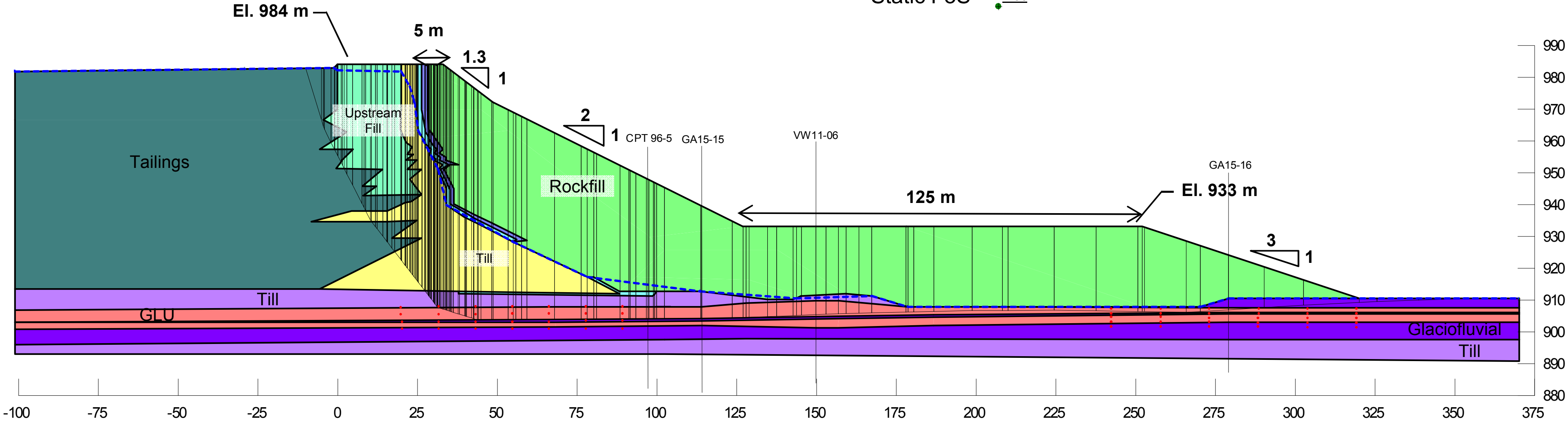
TITLE **TOTAL STRESS STABILITY ANALYSIS**
SOUTH EMBANKMENT STN.1+415

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F11**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

Pseudo-Static FoS = 1.03 (k_h = 0.048)

Static FoS = 1.56



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	Unit Weight (kN/m³)	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

- - Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

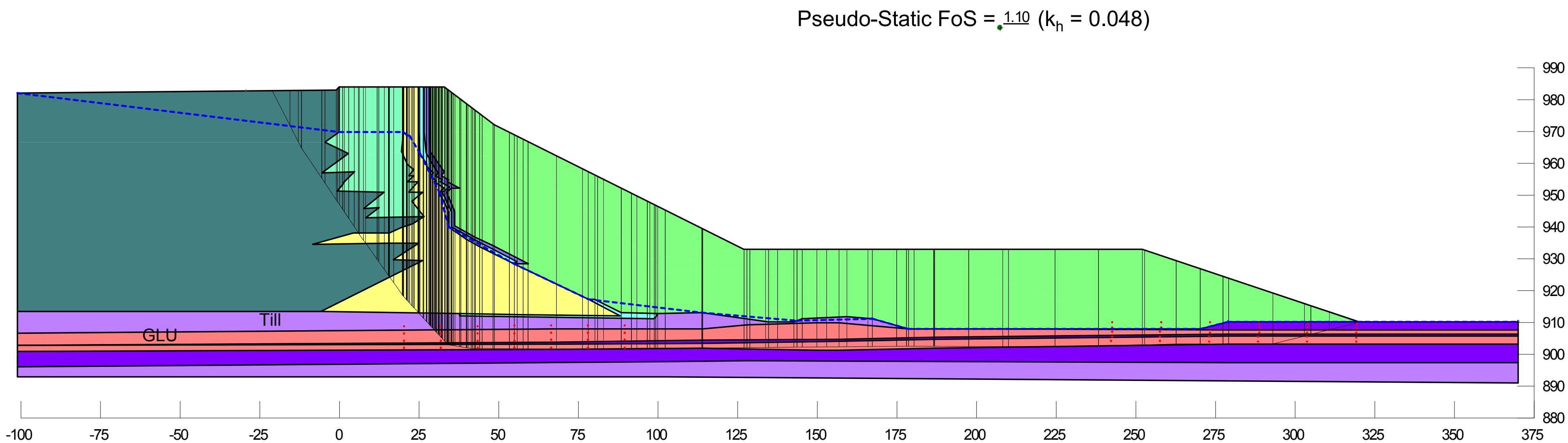
PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE TOTAL STRESS STABILITY ANALYSIS
MAIN EMBANKMENT STN.2+060

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F12	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

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

Piezometric Line

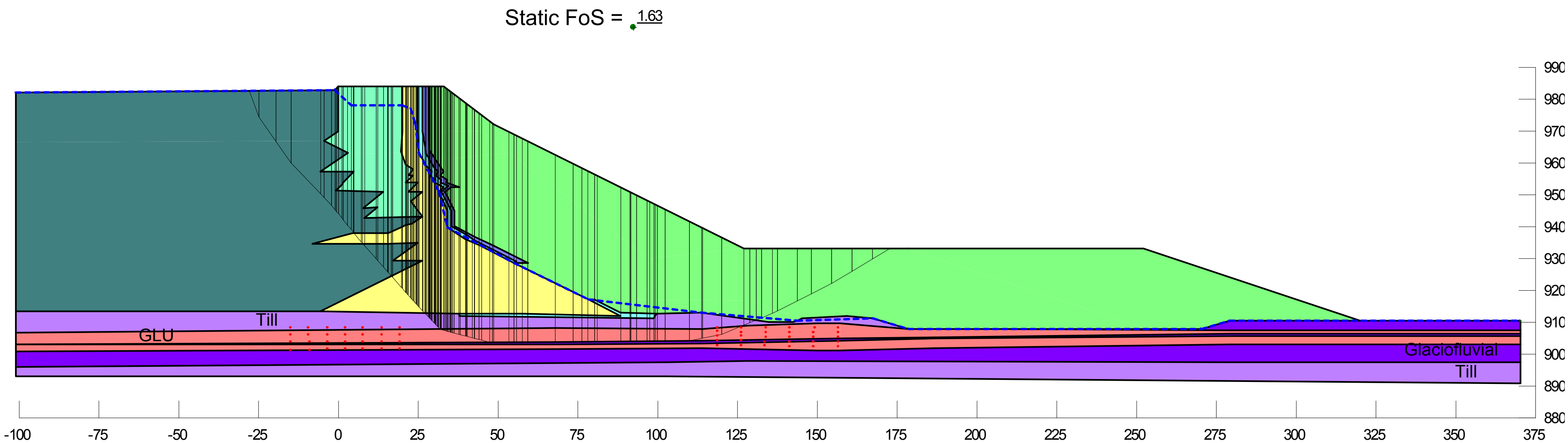
Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT	**MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**
TITLE	**TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+060**

Golder Associates

PROJECT No.	1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F13**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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

Piezometric Line

Notes:
1.) No B-Bar applied.

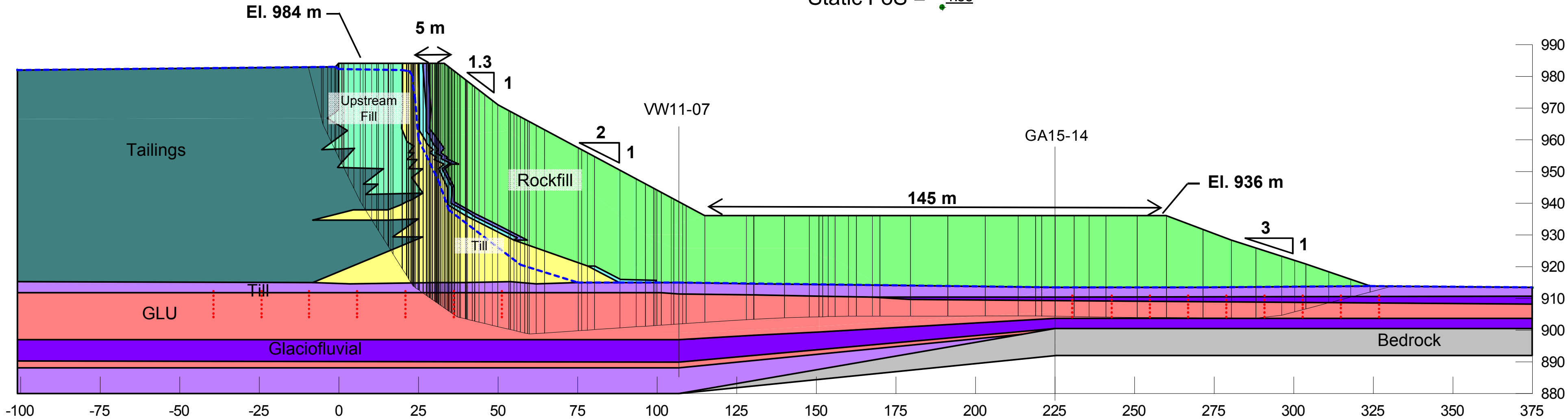
PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN		
TITLE	TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+060		
PROJECT No. 1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F14
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

Golder Associates

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability

Pseudo-Static FoS = 1.04 (k_h = 0.048)

Static FoS = 1.53



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**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

Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

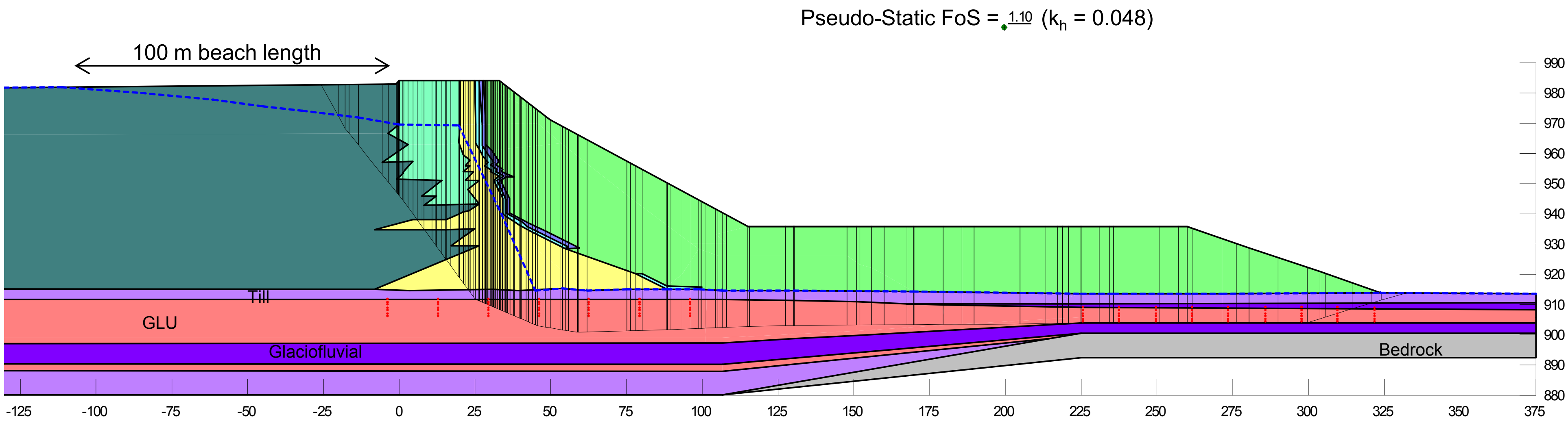
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+240

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F15**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where σ_p' = 1200

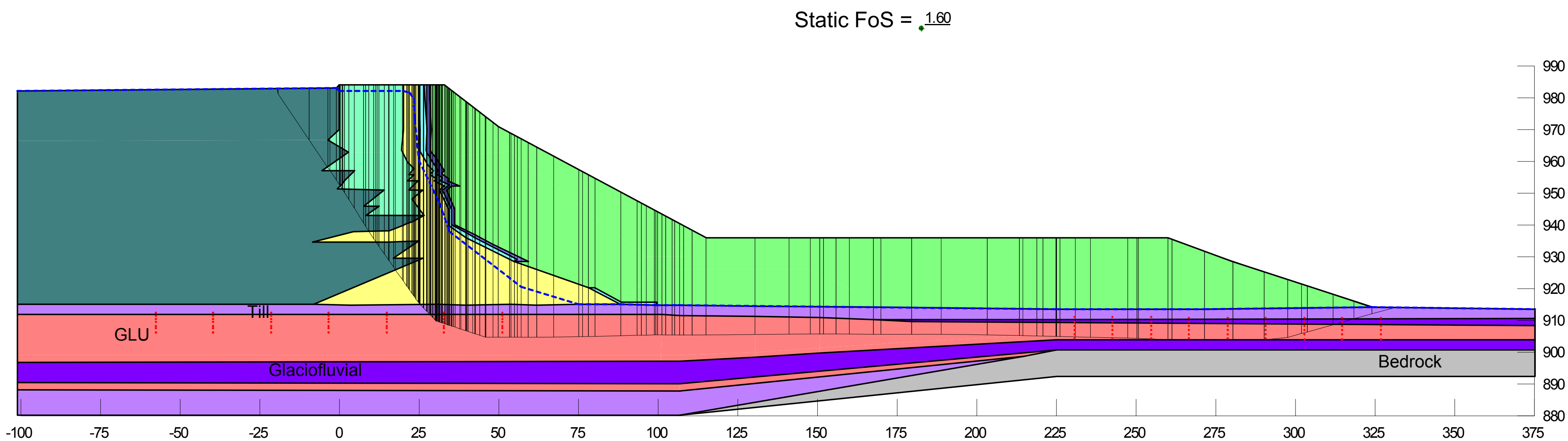
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN			
TITLE	TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+240			
Golder Associates	PROJECT No. 1413803		PHASE No. 9000	
	DESIGN	CTM	29OCT15	SCALE NTS REV.0
	CADD	CTM	29OCT15	FIGURE - F16
	CHECK	GJ	29OCT15	
	REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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 $\sigma_p' = 1200$

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

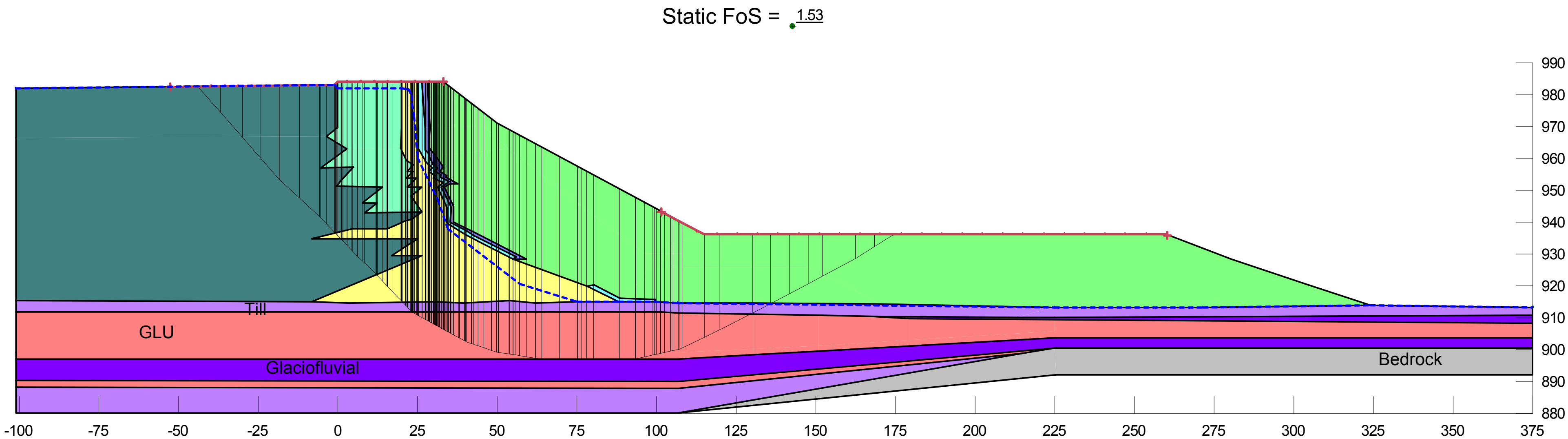
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+240

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F17**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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 $\sigma_p' = 1200$

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

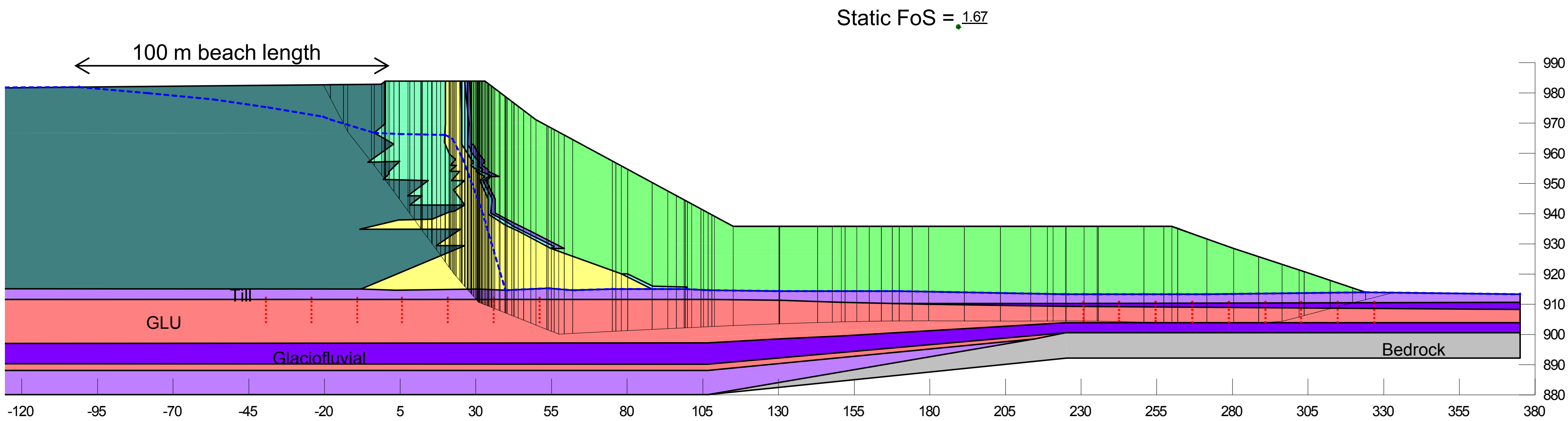
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+240

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F18**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 1200$

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

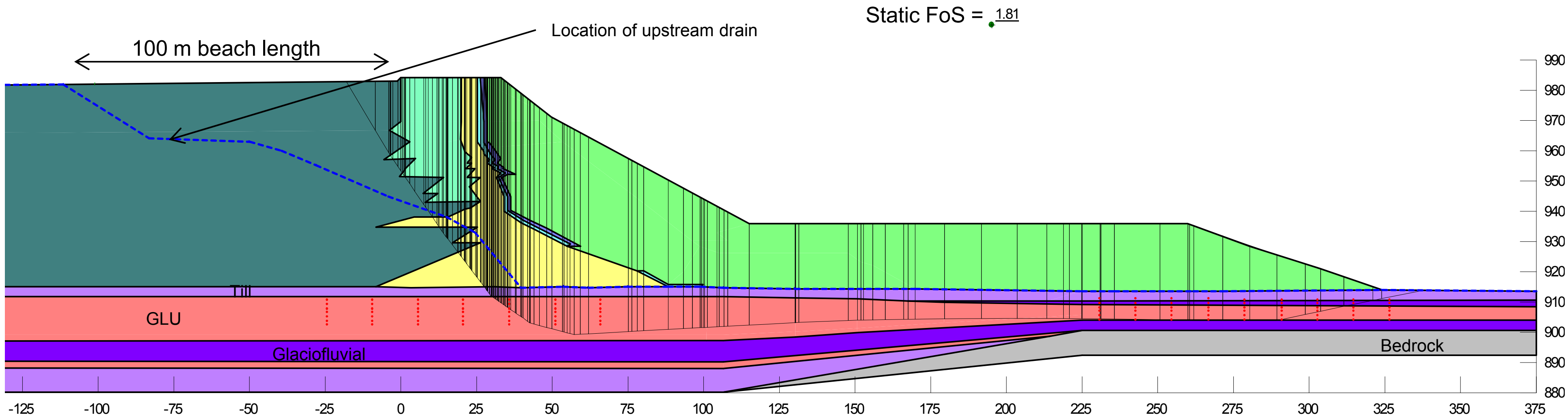
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+240

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F19**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain functioning
- 100 m sub-aerial beach
- Pond elevation 982 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

Piezometric Line

Notes:
1.) No B-Bar applied.

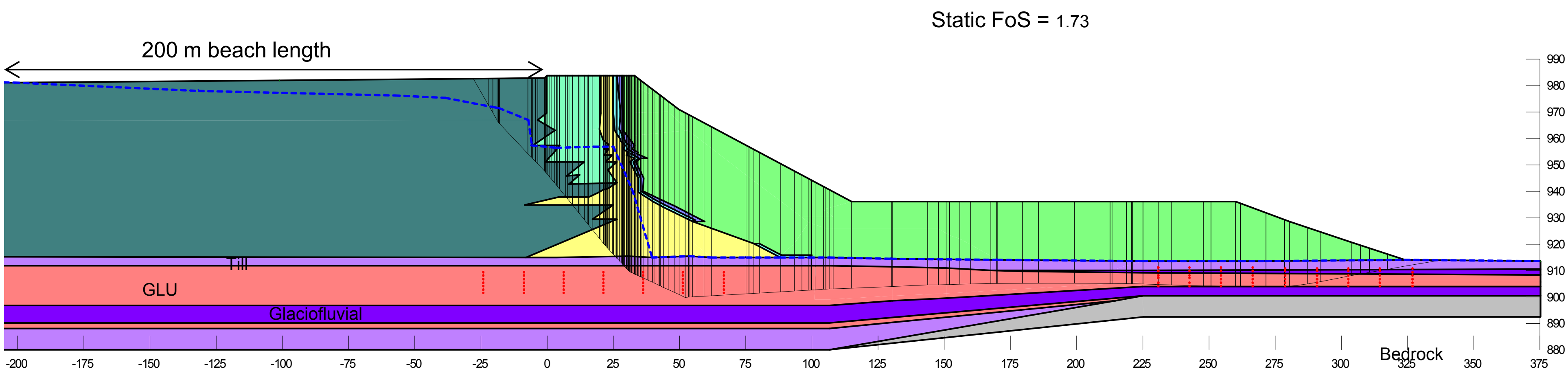
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+240**

Golder Associates

PROJECT No.	1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F20**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 200 m sub-aerial beach
- Pond elevation 981 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

Piezometric Line

Notes:
1.) No B-Bar applied.

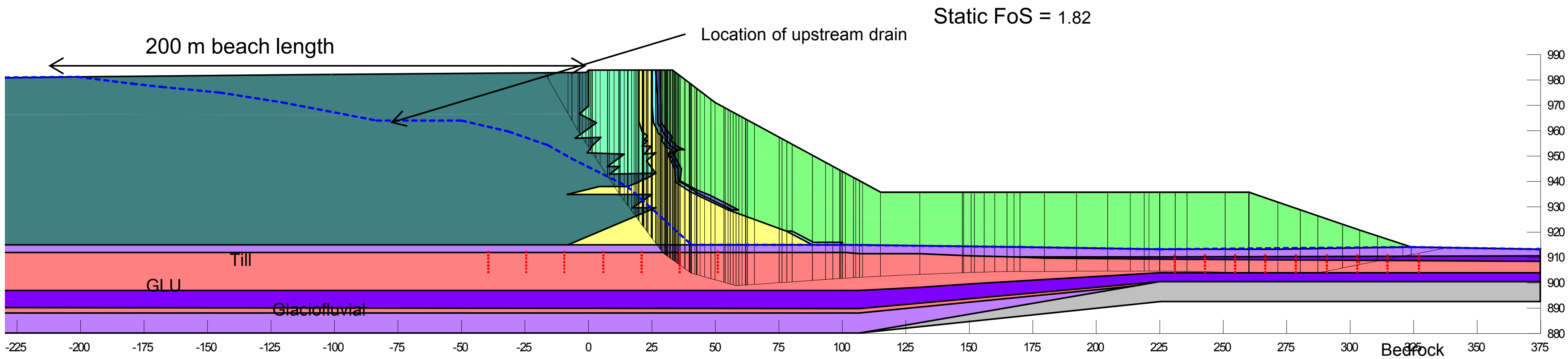
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+240

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F21**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream not functioning
- 200 m sub-aerial beach
- Pond elevation 981 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 $\sigma_p' = 1200$

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

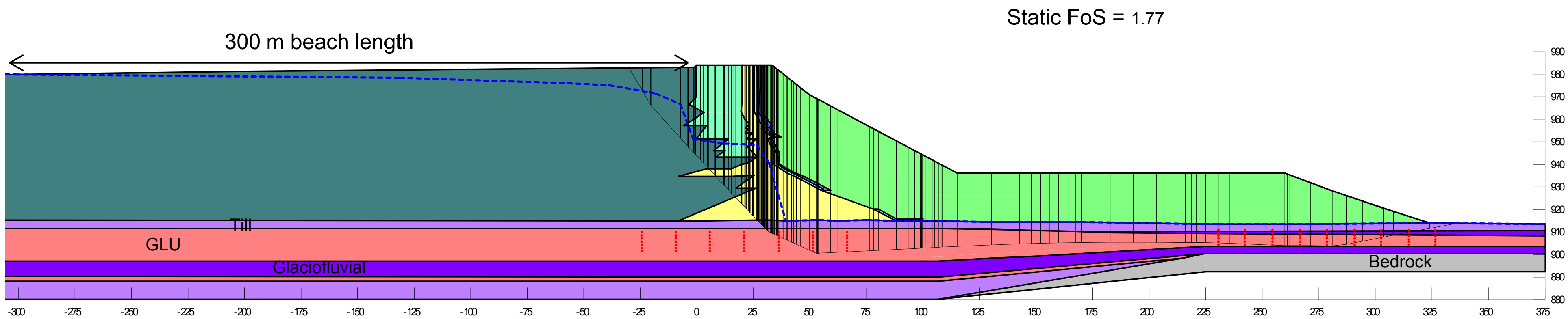
Notes:
1.) No B-Bar applied.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN
TITLE	TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+240

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F22	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 300 m sub-aerial beach
- Pond elevation 980 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 1200$

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

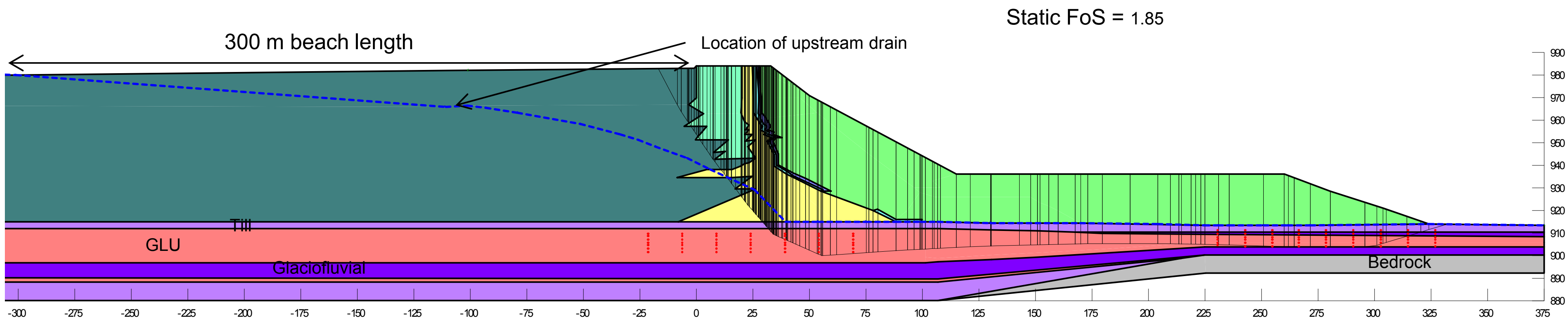
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+240

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	FIGURE - F23
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain functioning
- 300 m sub-aerial beach
- Pond elevation 980 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

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+240

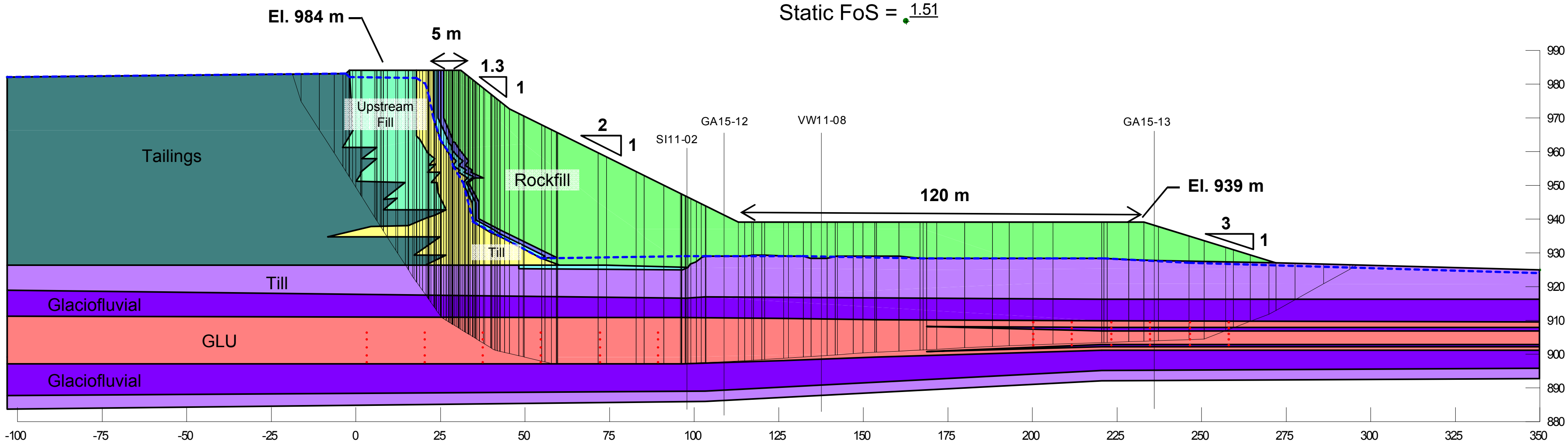
Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F24**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability

Pseudo-Static FoS = 1.03 (k_h = 0.048)

Static FoS = 1.51



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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

Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

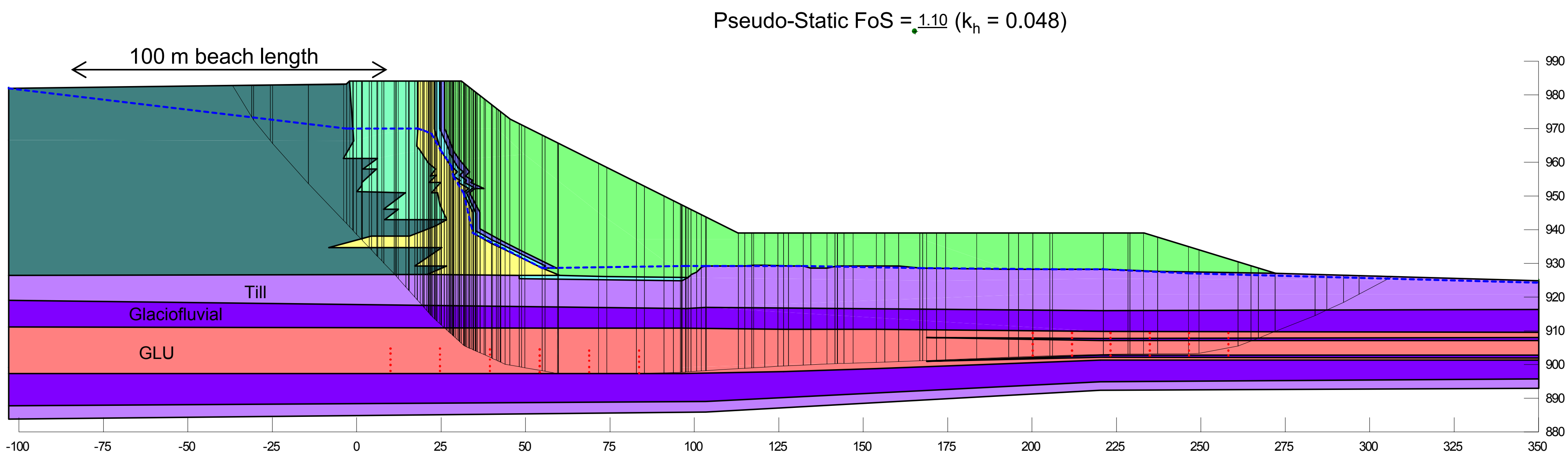
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+460**

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	FIGURE - F25
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

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 $\sigma_p' = 1200$

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

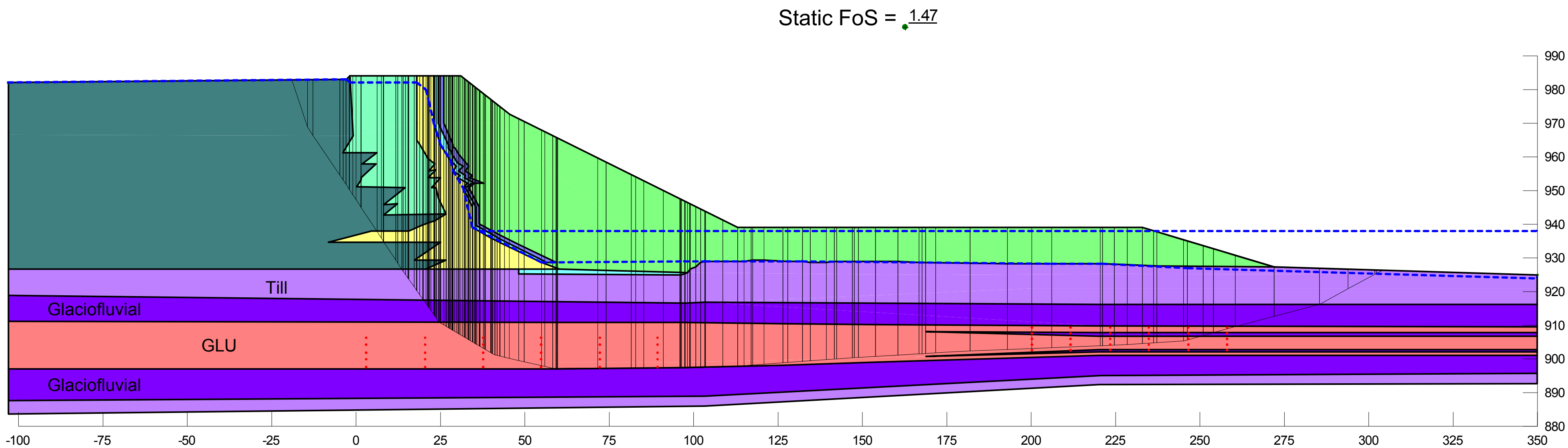
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+460

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F26**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Artesian pressure applied to glaciofluvial
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 1200$

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

- - **Piezometric Line**

Notes:.
1.) No B-Bar applied.

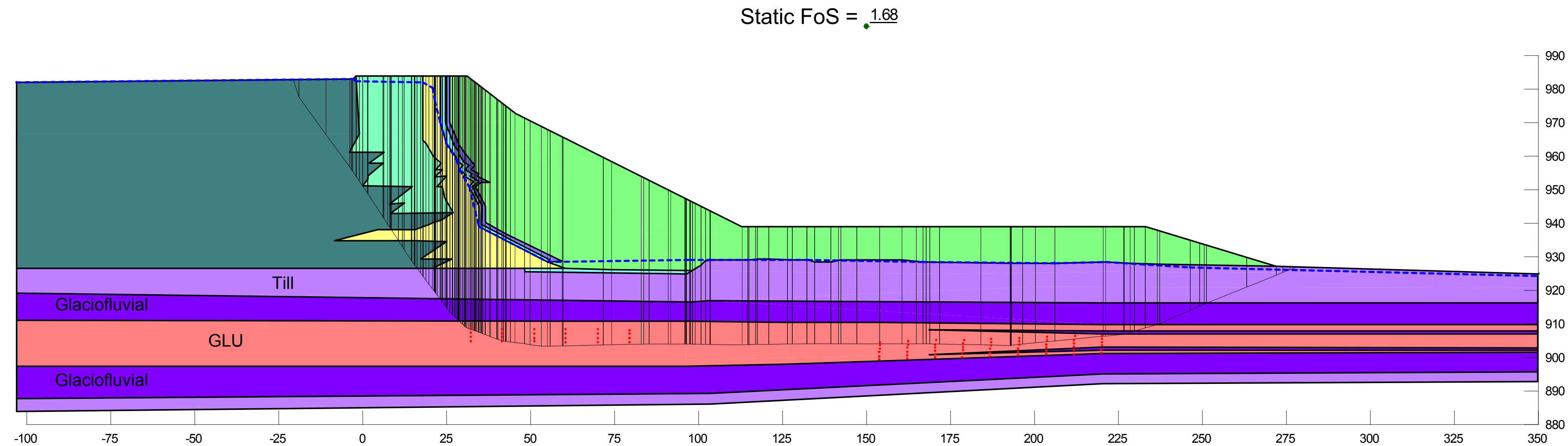
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+460**

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F27	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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 $\sigma_p' = 1200$

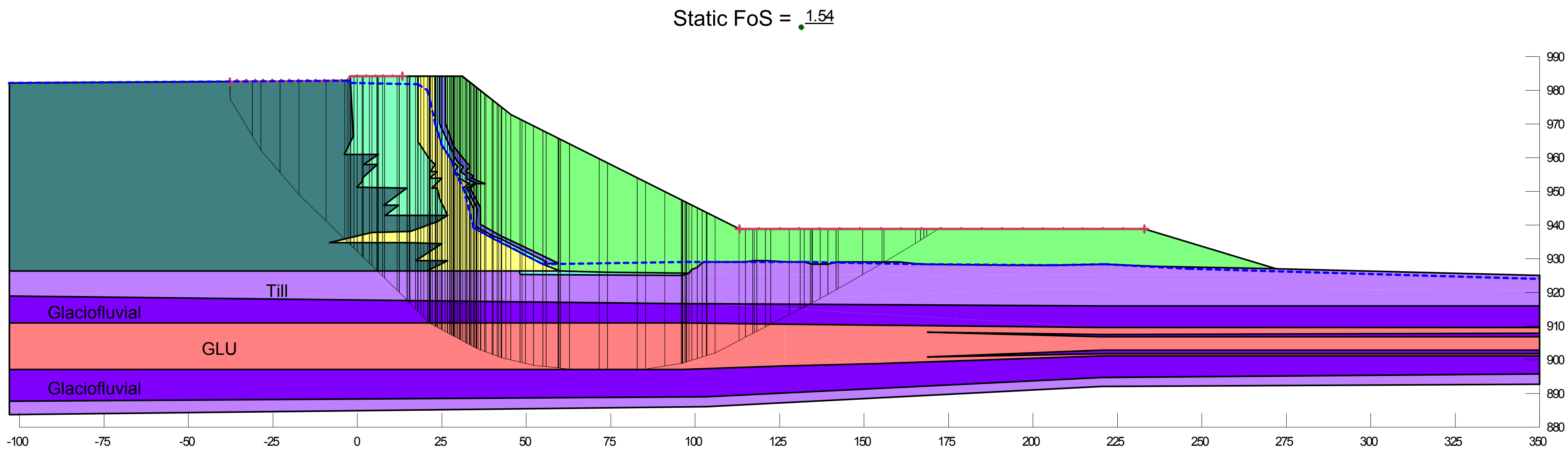
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN			
TITLE	TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+460			
Golder Associates	PROJECT No. 1413803		PHASE No. 9000	
	DESIGN	CTM 29OCT15	SCALE NTS	REV.0
	CADD	CTM 29OCT15	FIGURE - F28	
	CHECK	GJ 29OCT15		
	REVIEW	TLE 29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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

- - Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE TOTAL STRESS STABILITY ANALYSIS
MAIN EMBANKMENT STN.2+460

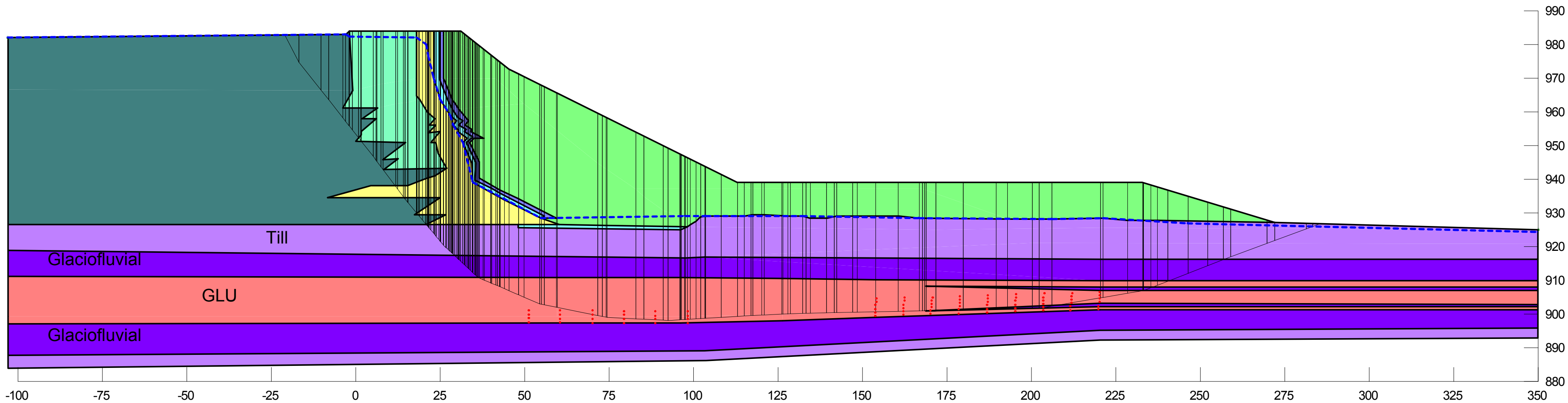
Golder Associates

PROJECT No.	1413803		PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	FIGURE - F29
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability

Pseudo-Static FoS = 1.30 (k_h = 0.048)

Static FoS = 2.04



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	φ'=25°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

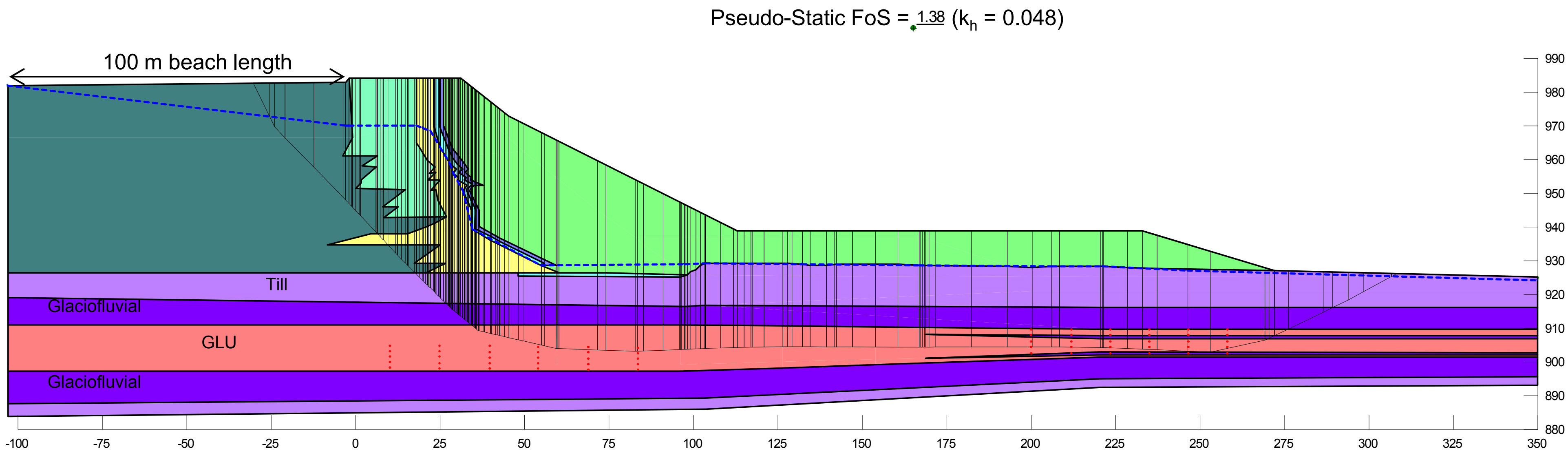
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+460

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F30**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

Foundation Material Properties		
Material	**Unit Weight (kN/m^3)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	φ'=20°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
MAIN EMBANKMENT STN.2+460

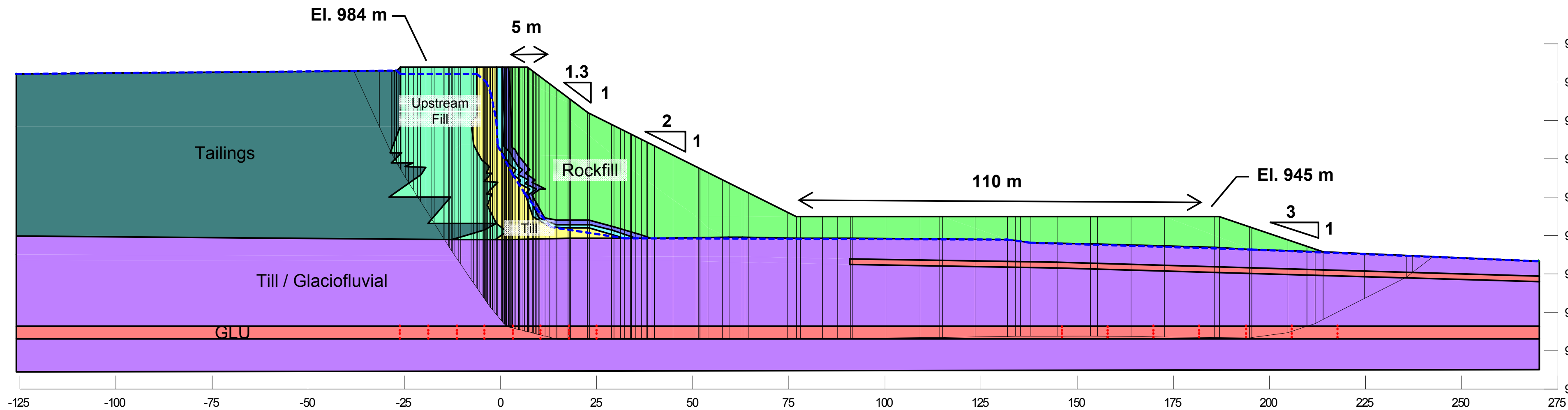
Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F31**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability

Pseudo-Static FoS = 1.04 (k_h = 0.048)

Static FoS = 1.53



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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

Piezometric Line

Notes:.
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

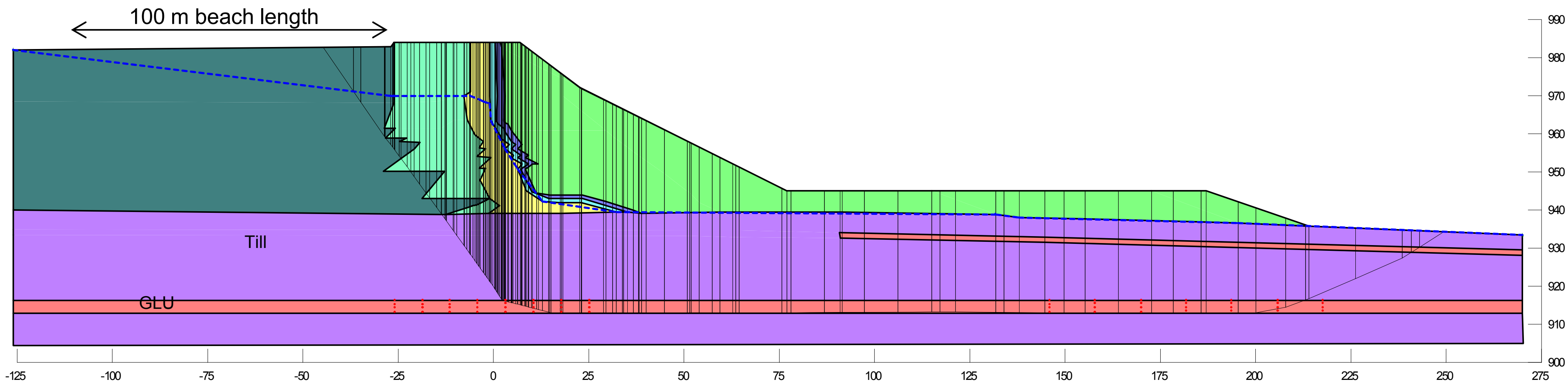
TITLE **TOTAL STRESS STABILITY ANALYSIS**
PERIMETER EMBANKMENT STN.2+850

Golder Associates

PROJECT No.	1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F32**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability

Pseudo-Static FoS = 1.13 (k_h = 0.048)



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	Τ = 0.22 σ_v' OCR$^{0.8}$ where σ_p' = 1200

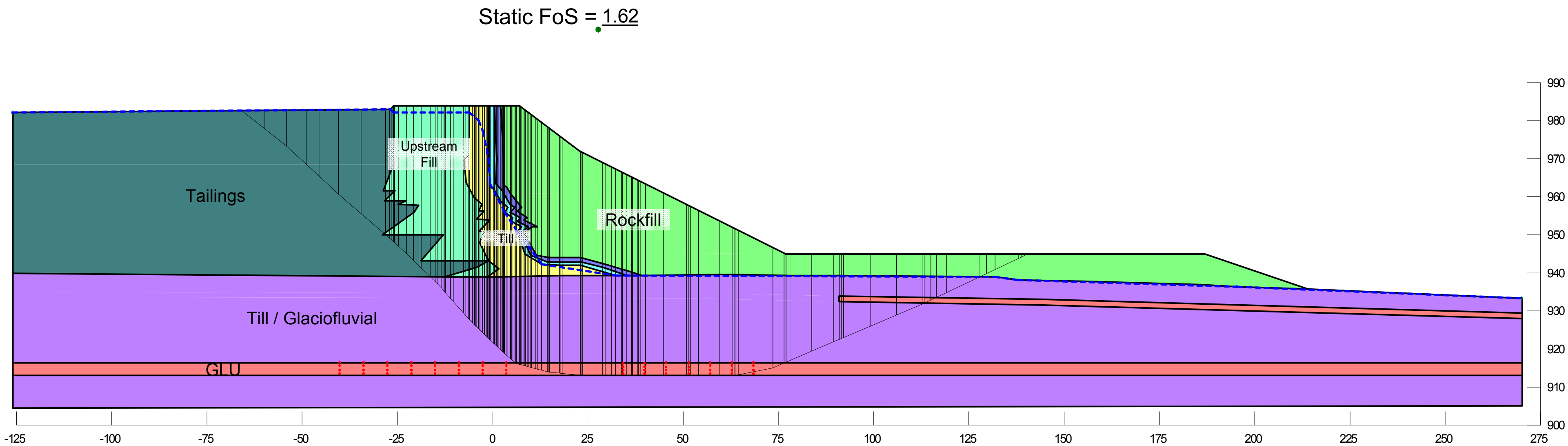
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN				
TITLE	TOTAL STRESS STABILITY ANALYSIS MAIN EMBANKMENT STN.2+460				
Golder Associates	PROJECT No.	1413803		PHASE No. 9000	
	DESIGN	CTM	29OCT15	SCALE NTS	REV.0
	CADD	CTM	29OCT15	FIGURE - F33	
	CHECK	GJ	29OCT15		
	REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
PERIMETER EMBANKMENT STN.2+850

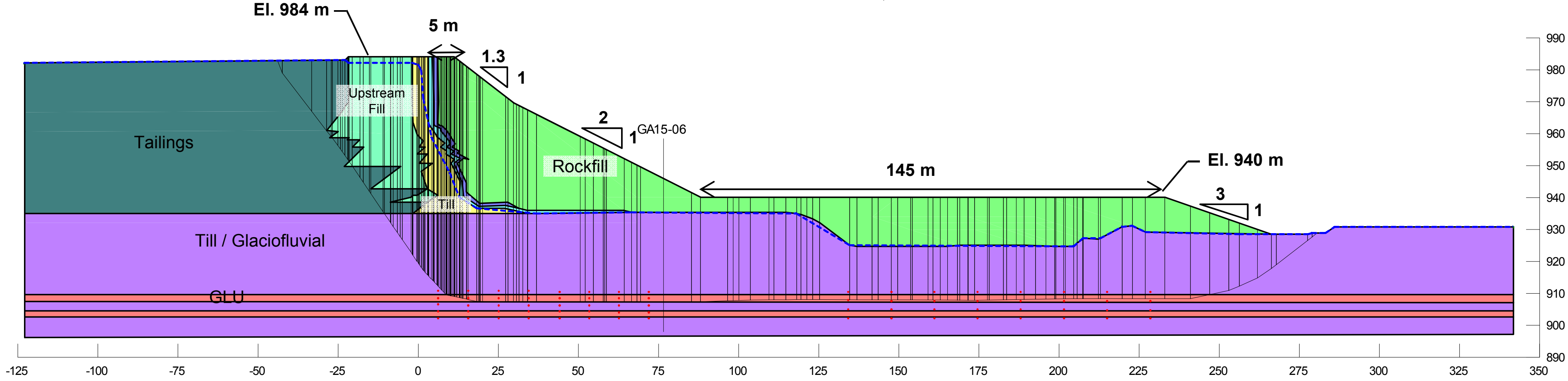
Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F34**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability

Pseudo-Static FoS = 1.06 (k_h = 0.048)

Static FoS = 1.56



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

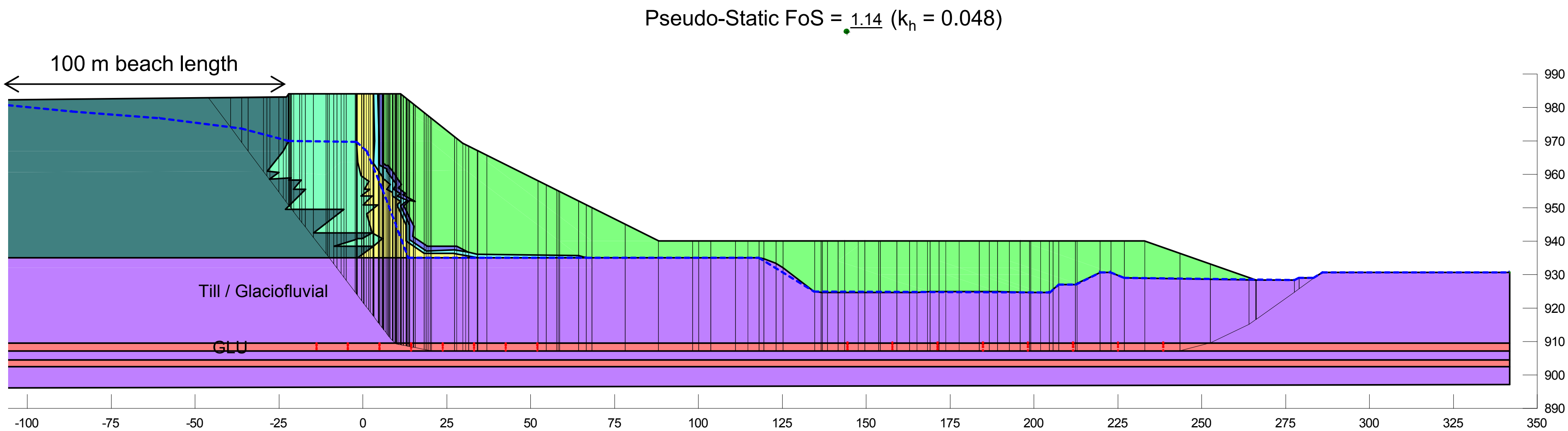
PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE TOTAL STRESS STABILITY ANALYSIS
PERIMETER EMBANKMENT STN.3+400

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F35	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

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' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.
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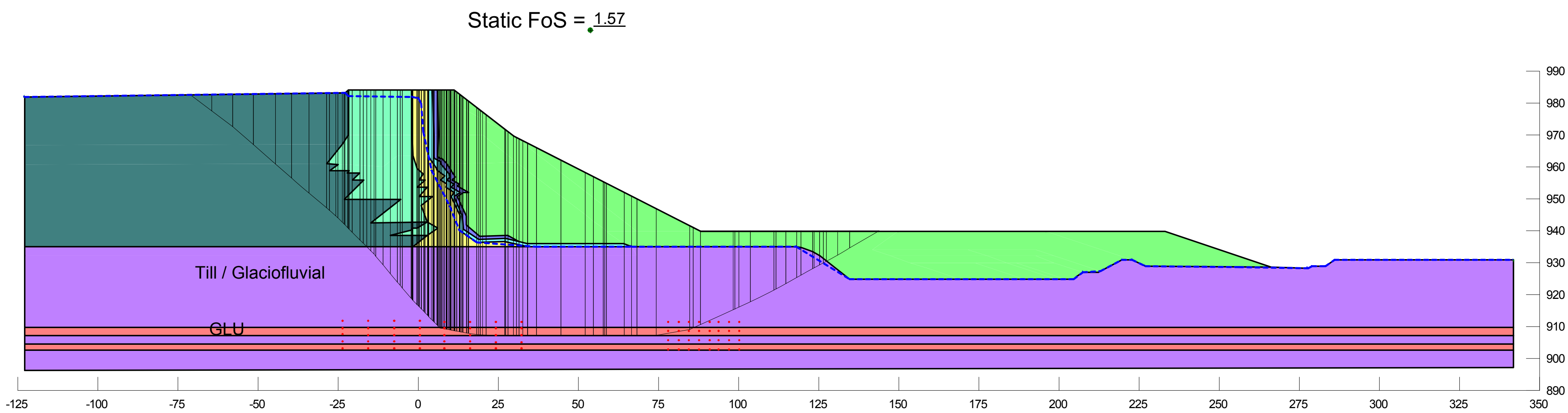
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TOTAL STRESS STABILITY ANALYSIS
PERIMETER EMBANKMENT STN.3+400

Golder Associates

PROJECT No.	1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F36	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
PERIMETER EMBANKMENT STN.3+400

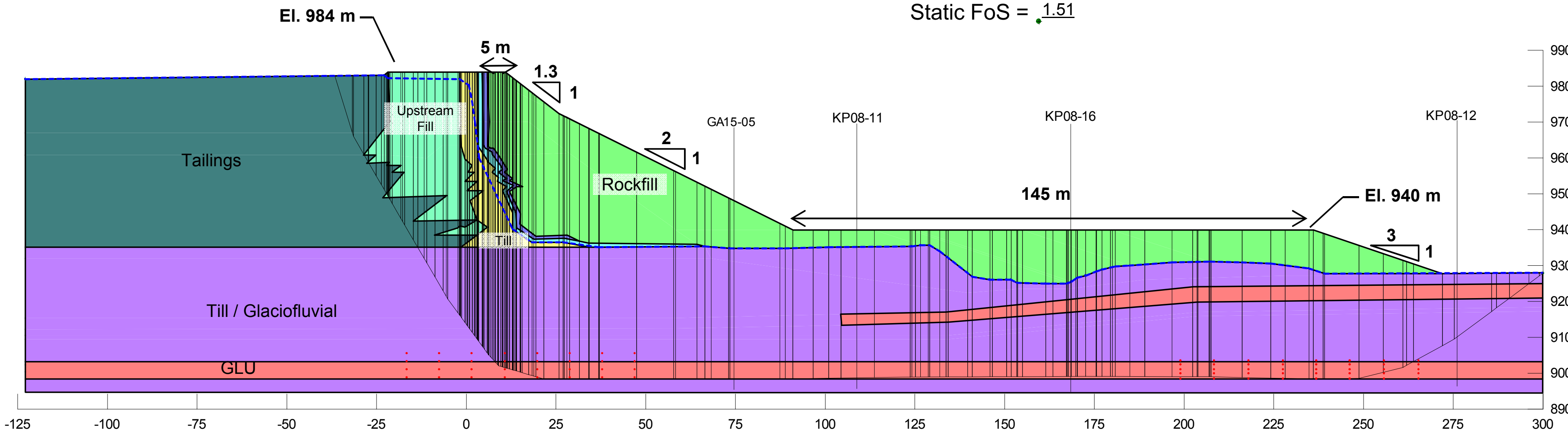
Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F37**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability

Pseudo-Static FoS = 1.04 (k_h = 0.048)

Static FoS = 1.51



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

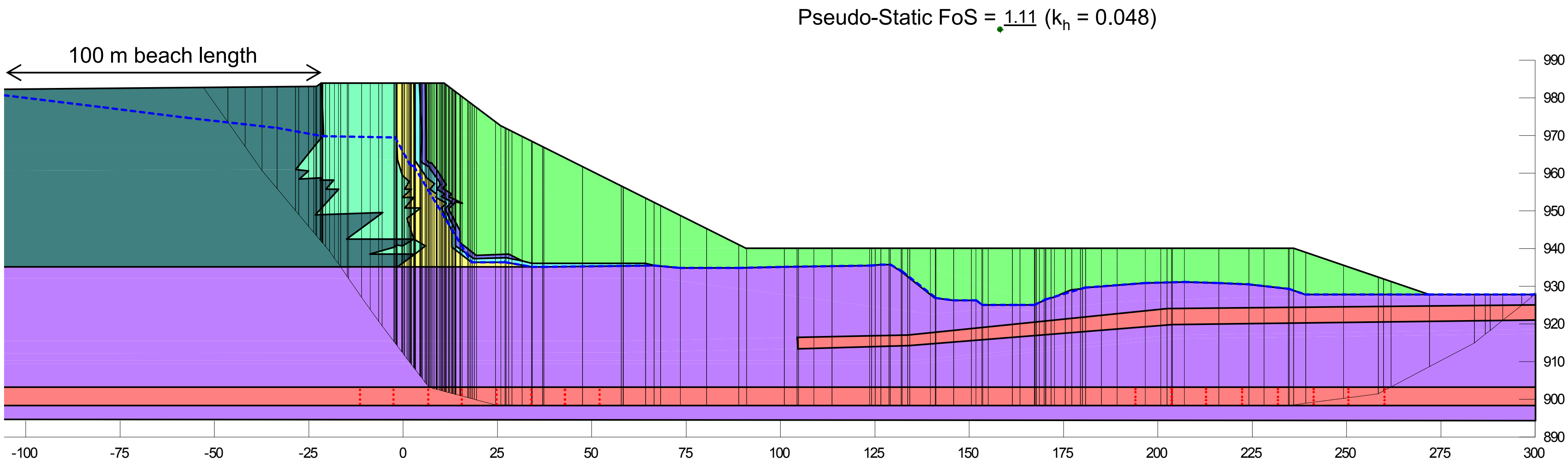
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS PERIMETER EMBANKMENT STN.3+535**

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F38**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

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' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

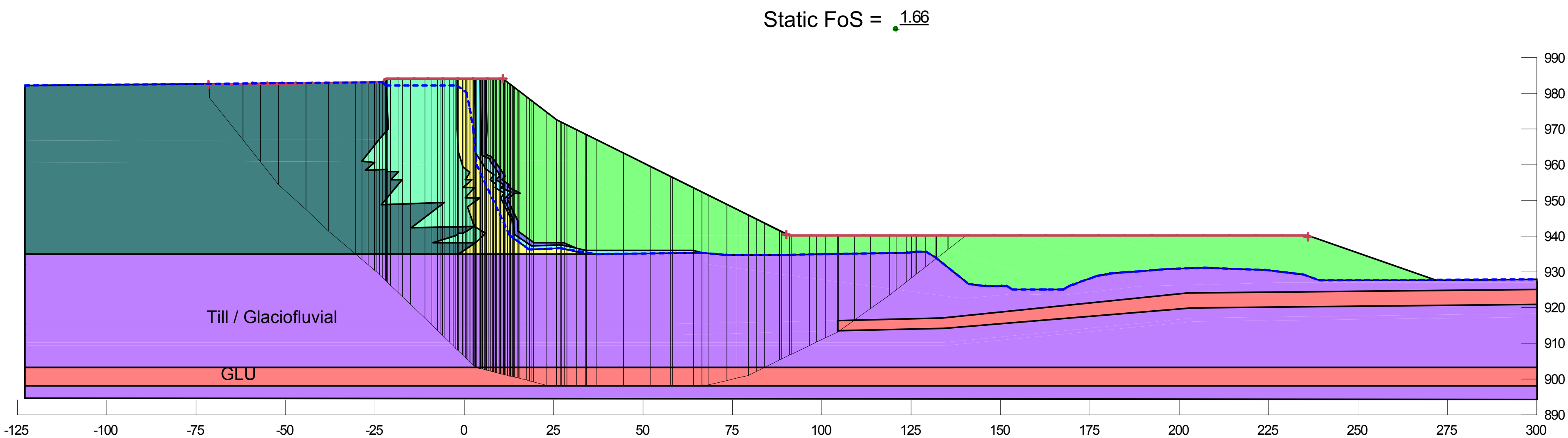
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS PERIMETER EMBANKMENT STN.3+535**

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F39**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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' = 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

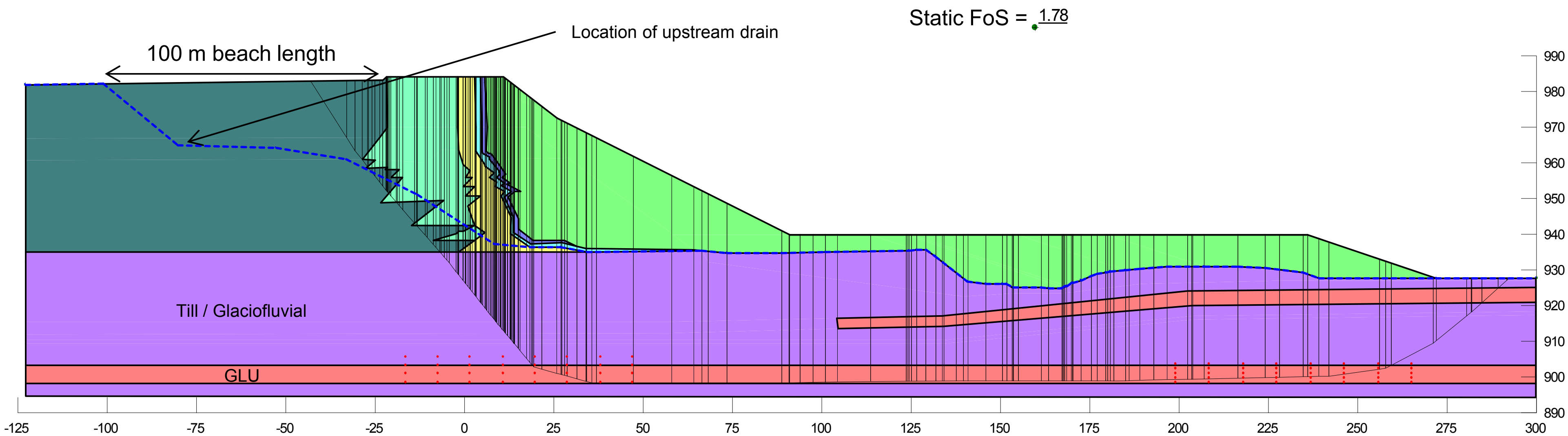
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
PERIMETER EMBANKMENT STN.3+535

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F40**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain functioning
- 100 m sub-aerial beach
- Pond elevation 982 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

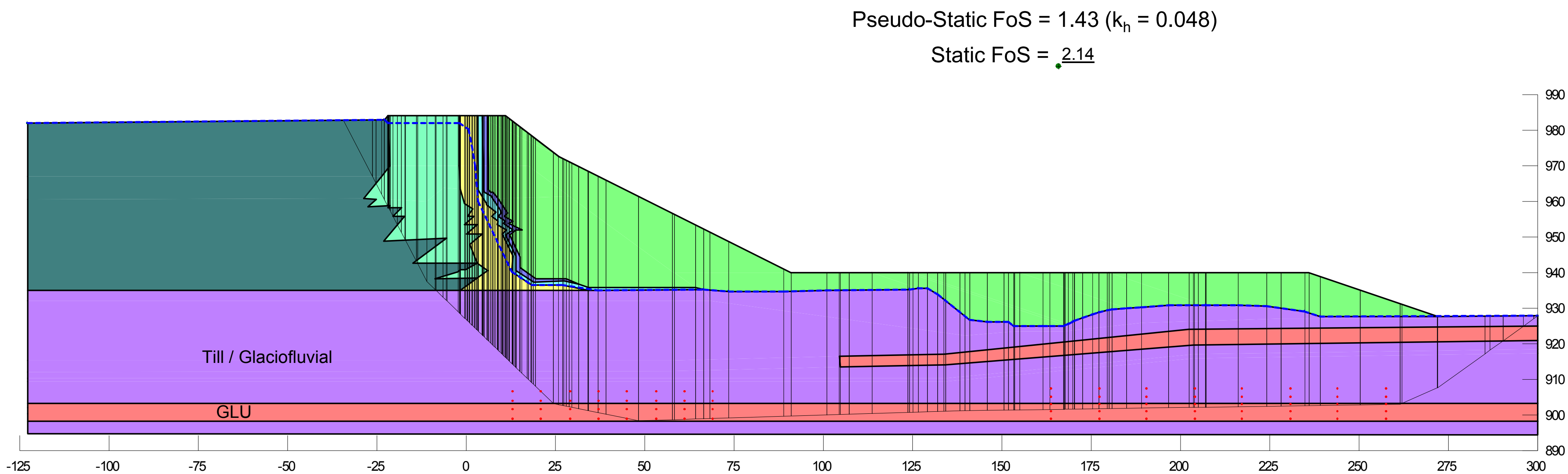
φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN				
TITLE	TOTAL STRESS STABILITY ANALYSIS PERIMETER EMBANKMENT STN.3+535				
Golder Associates	PROJECT No. 1413803			PHASE No. 9000	
	DESIGN	CTM	29OCT15	SCALE NTS	REV.0
	CADD	CTM	29OCT15	FIGURE - F41	
	CHECK	GJ	29OCT15		
	REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	φ'=25°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

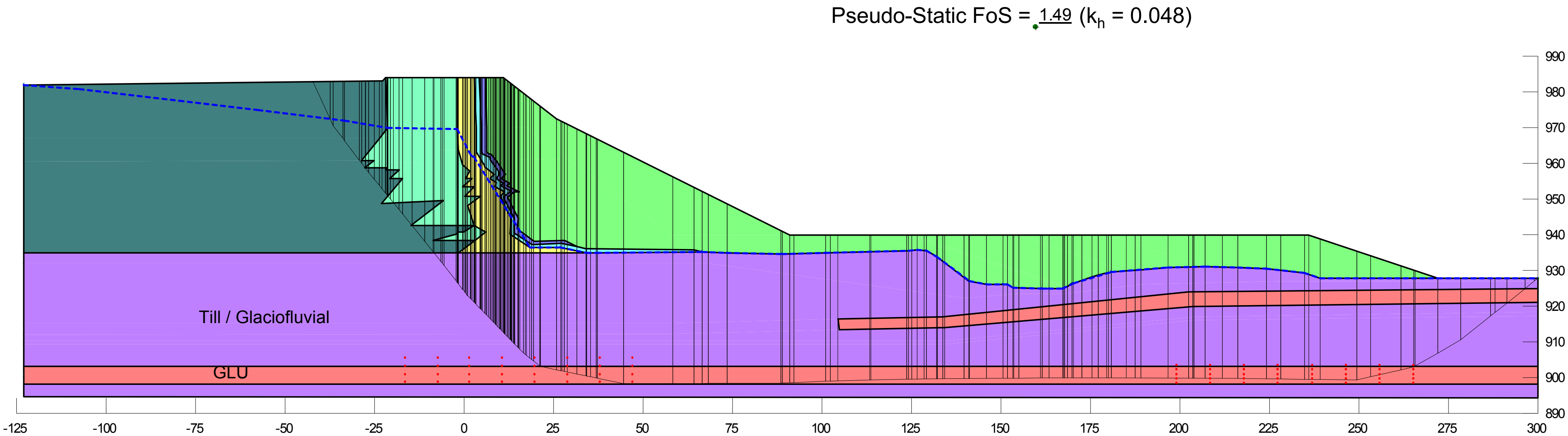
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
PERIMETER EMBANKMENT STN.3+535

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	FIGURE - F42
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
GLU	20	φ'=20°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
PERIMETER EMBANKMENT STN.3+535

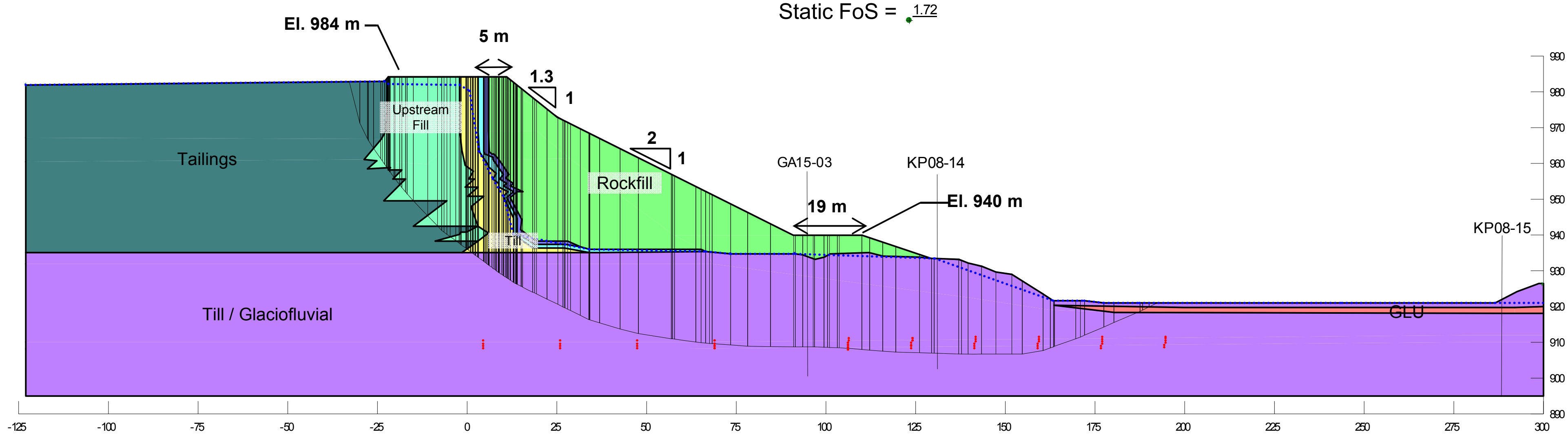
Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F43**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability

Pseudo-Static FoS = 1.49 (k_h = 0.048)

Static FoS = 1.72



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

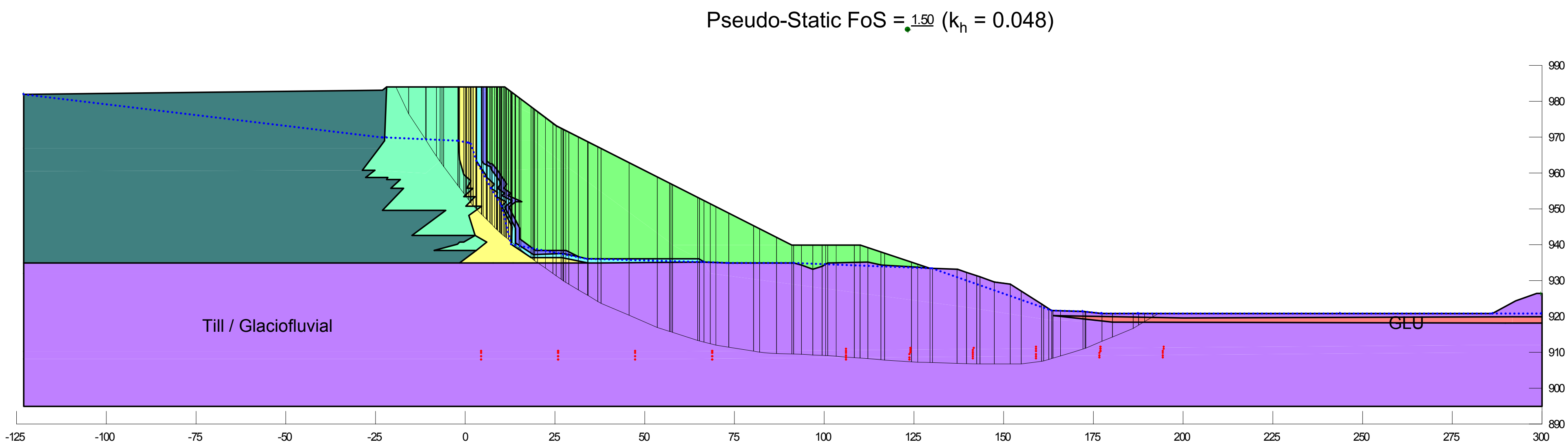
PROJECT: MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE: TOTAL STRESS STABILITY ANALYSIS
PERIMETER EMBANKMENT STN.3+770

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	FIGURE - F44
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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' = 900

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

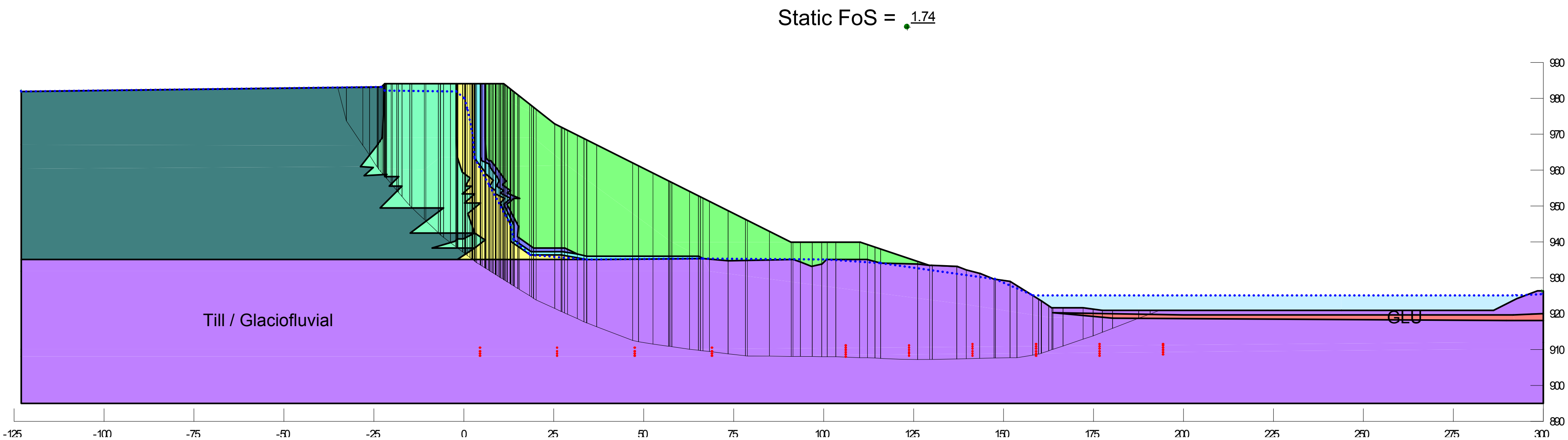
PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS PERIMETER EMBANKMENT STN.3+770**

Golder Associates

PROJECT No.	1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F45**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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' = 900

No B-bar applied; 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

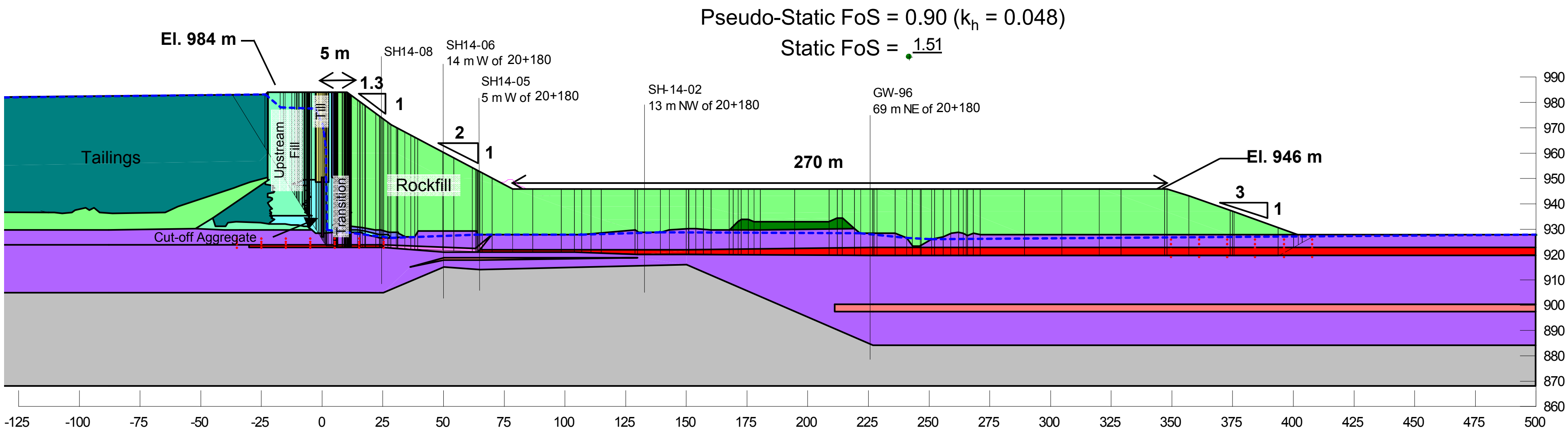
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
PERIMETER EMBANKMENT STN.3+770

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F46**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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	T = 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.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) LGLU and lower till modelled as impenetrable to force failure surface through UGLU.
4.) GLU shear strength reduced to 80% for pseudo-static analysis.

Piezometric Line

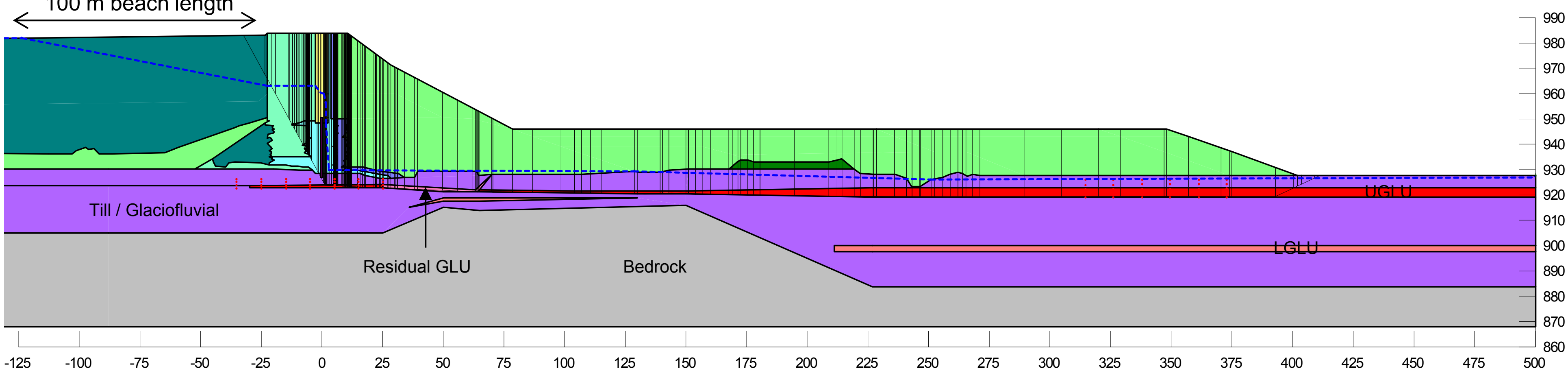
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TOTAL STRESS STABILITY ANALYSIS
CORNER 1 PERIMETER EMBANKMENT
STN.20+180

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F47	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

Pseudo-Static FoS = 1.02 (k_h = 0.048)



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

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	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ 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.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

Piezometric Line

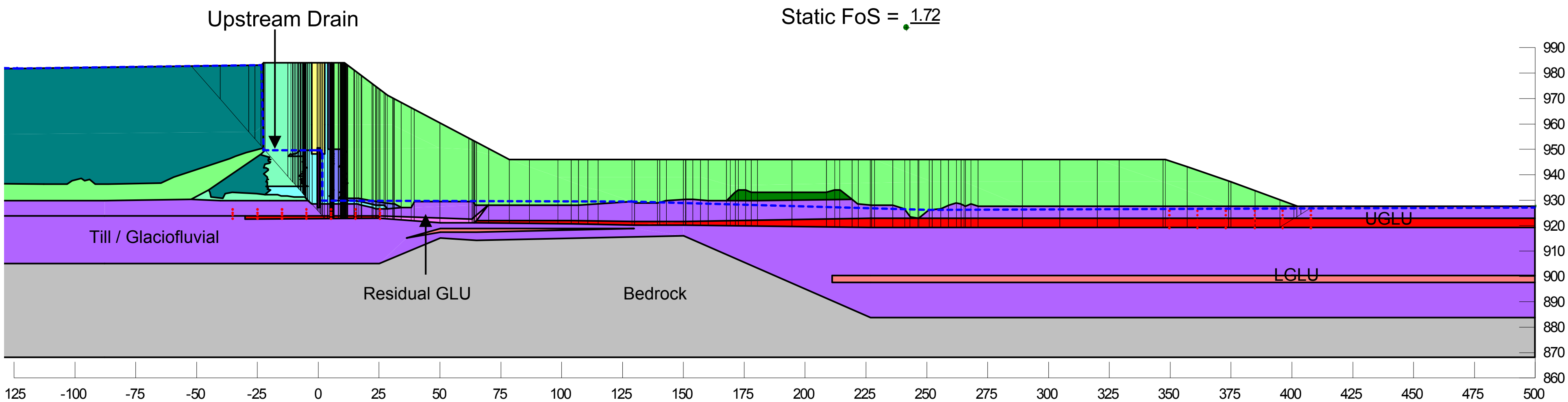
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180**

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F48**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain functioning
- 0 m sub-aerial beach
- Pond elevation 983 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	$T = 0.22\ \sigma_v'\ OCR^{0.8}$ 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.

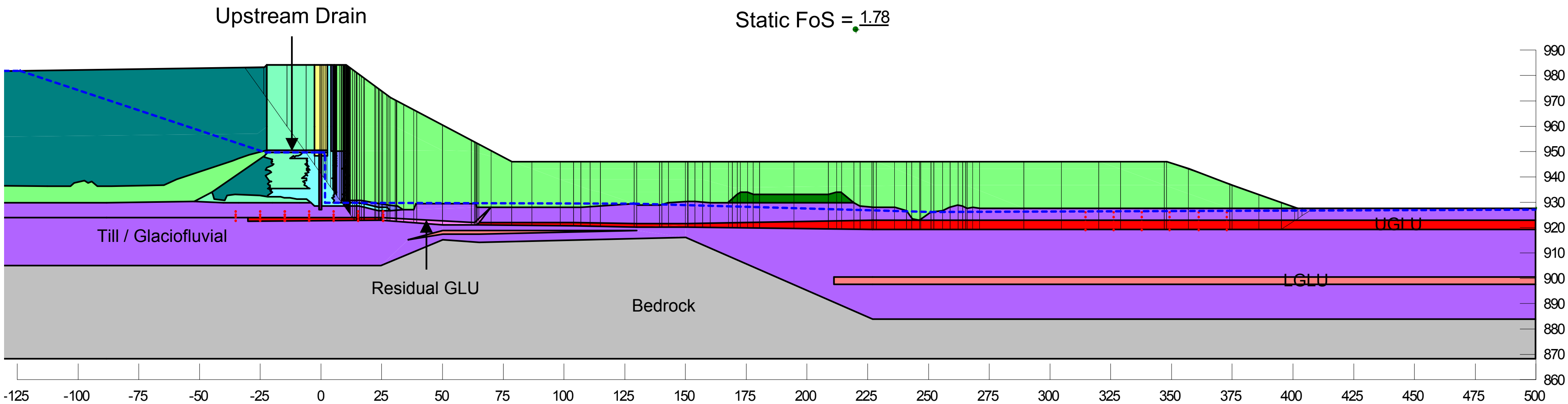
Piezometric Line

PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180**

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F49**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain functioning
- 100 m sub-aerial beach
- Pond elevation 982 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	T = 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

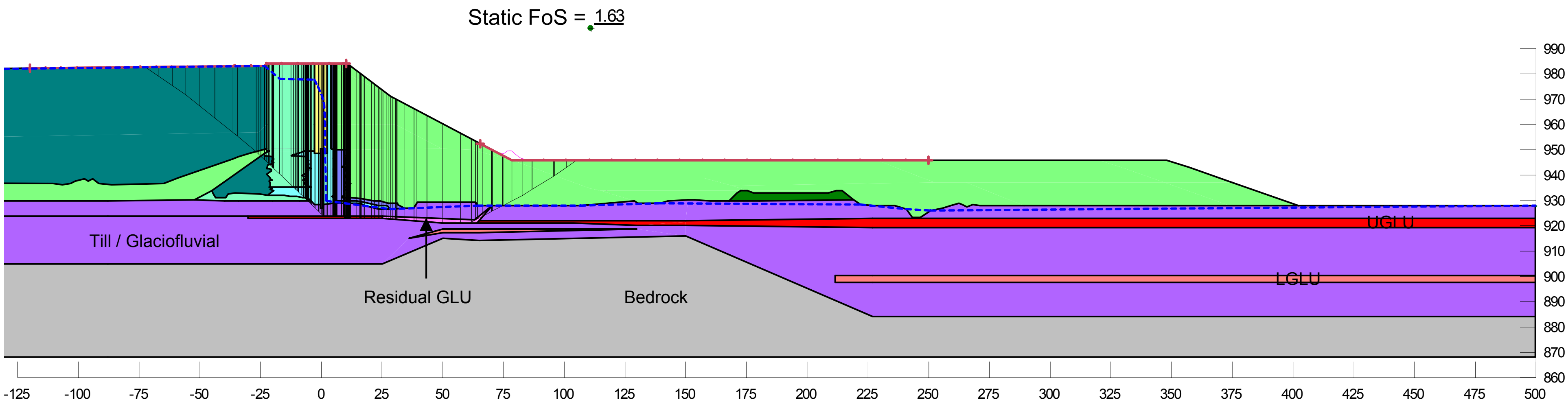
PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE TOTAL STRESS STABILITY ANALYSIS
CORNER 1 PERIMETER EMBANKMENT
STN.20+180

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	FIGURE - F50
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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

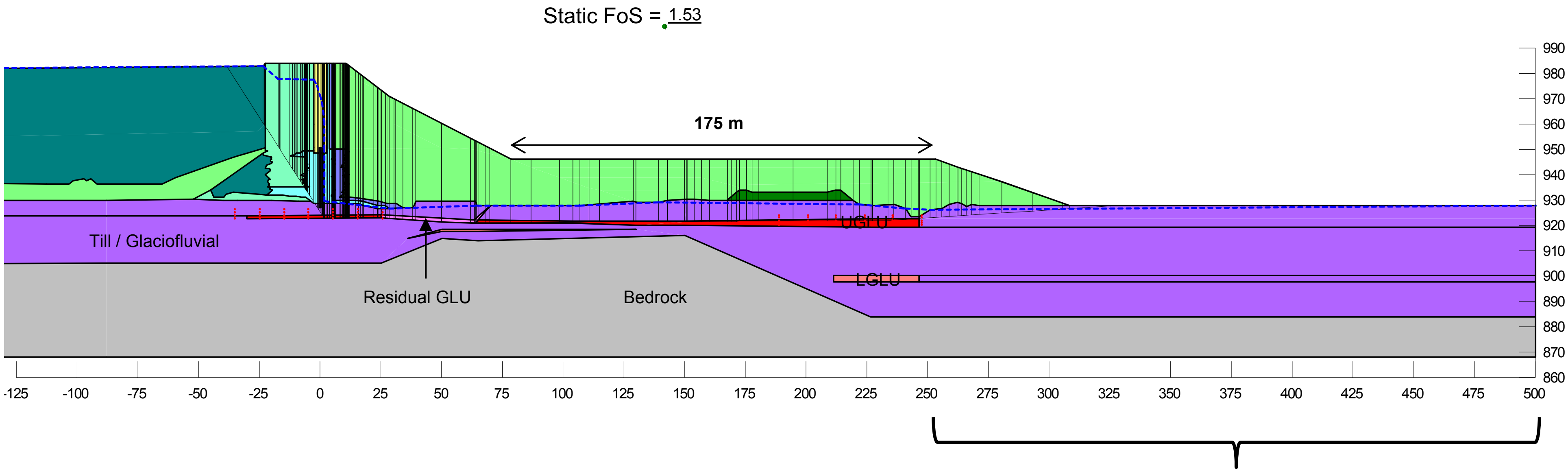
φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

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 LIFE OF MINE FEASIBILITY DESIGN			
TITLE	TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+180			
Golder Associates	PROJECT No.	1413803		PHASE No. 9000
	DESIGN	CTM	29OCT15	SCALE NTS REV.0
	CADD	CTM	29OCT15	FIGURE - F51
	CHECK	GJ	29OCT15	
	REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m
- UGLU extent reduced

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	T = 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

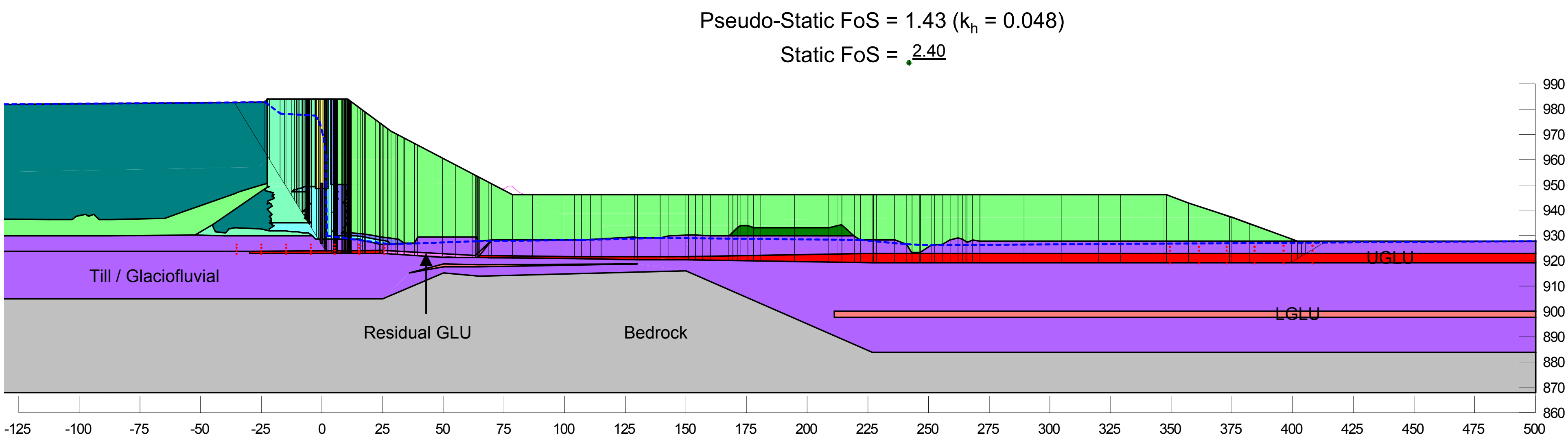
PROJECT
MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE
TOTAL STRESS STABILITY ANALYSIS
CORNER 1 PERIMETER EMBANKMENT
STN.20+180

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F52**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

Piezometric Line

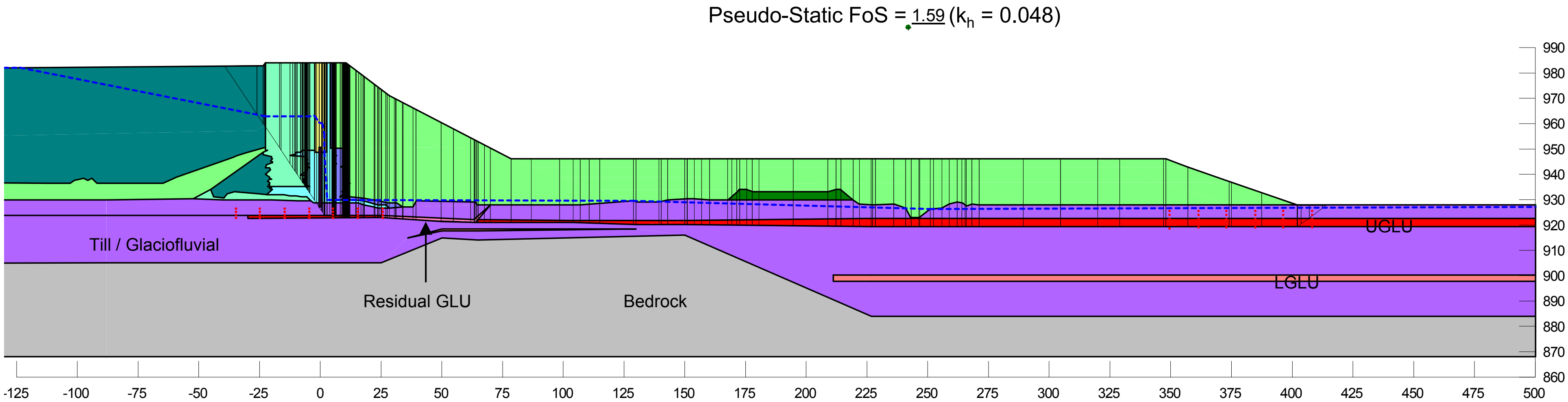
PROJECT MOUNT POLLEY MINING CORPORATION
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE EFFECTIVE STRESS STABILITY ANALYSIS
CORNER 1 PERIMETER EMBANKMENT
STN.20+180

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	FIGURE - F53	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 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.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

Piezometric Line

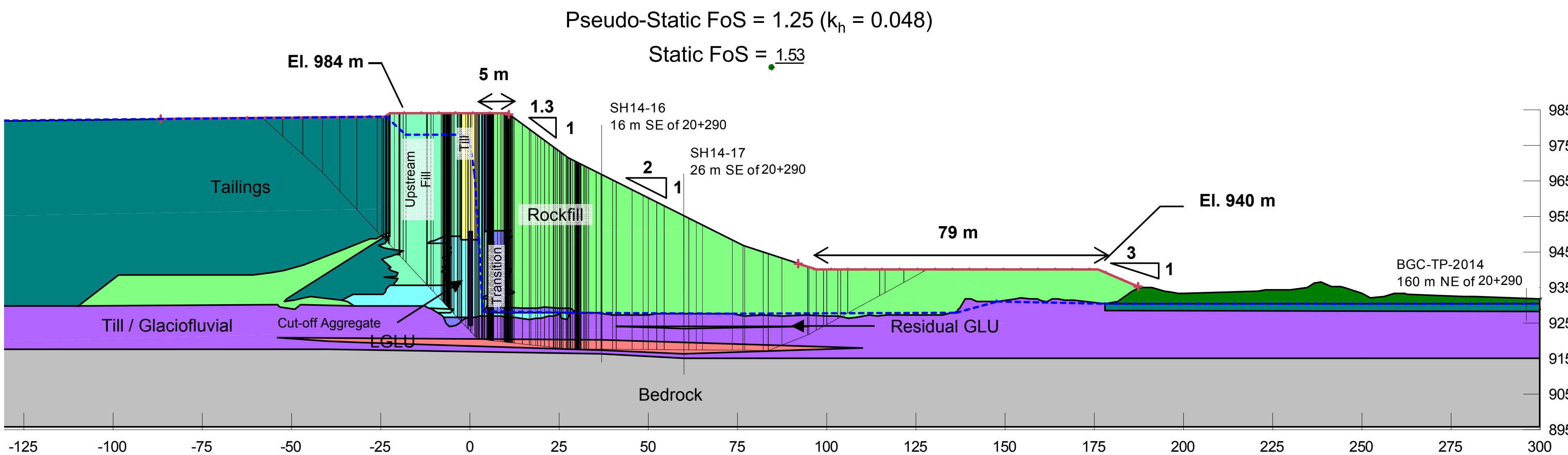
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+180

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F54**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	T = 0.22 σ_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

- - Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

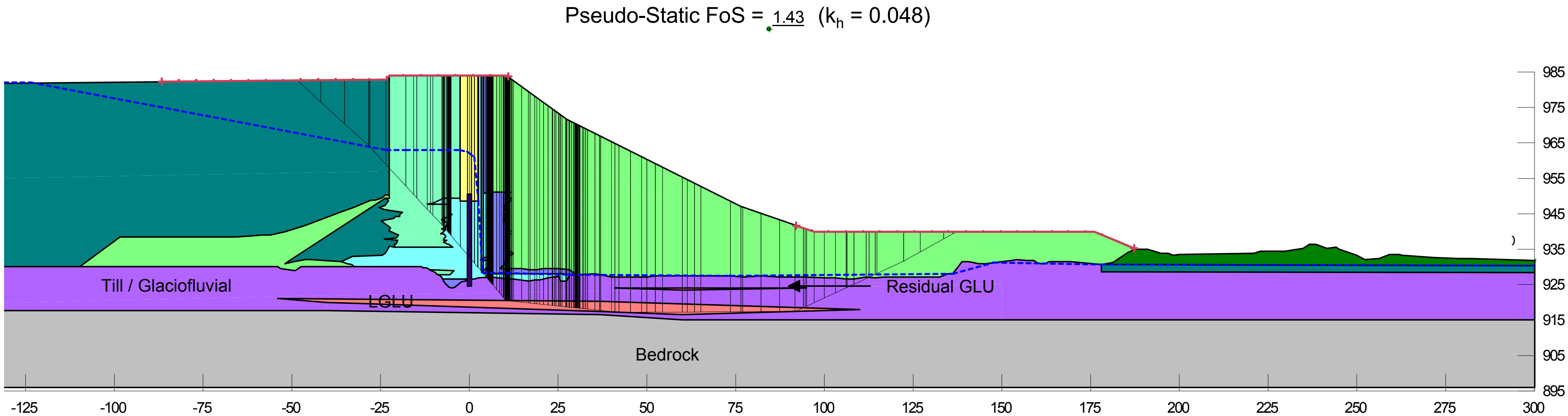
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295**

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F55**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

Foundation Material Properties		
Material	Unit Weight (kN/m³)	Shear Strength
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	$\tau = 0.22\ \sigma_v'\ OCR^{0.8}$ where $\sigma_p' = 700$
Residual GLU	18	Undrained (φ'=0°) , Cohesion = 17.6 kPa

φ'= friction angle; τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

- - Piezometric Line

Notes:
1.) Borehole locations shown are approximate.
2.) No B-Bar applied.
3.) GLU shear strength reduced to 80% for pseudo-static analysis.

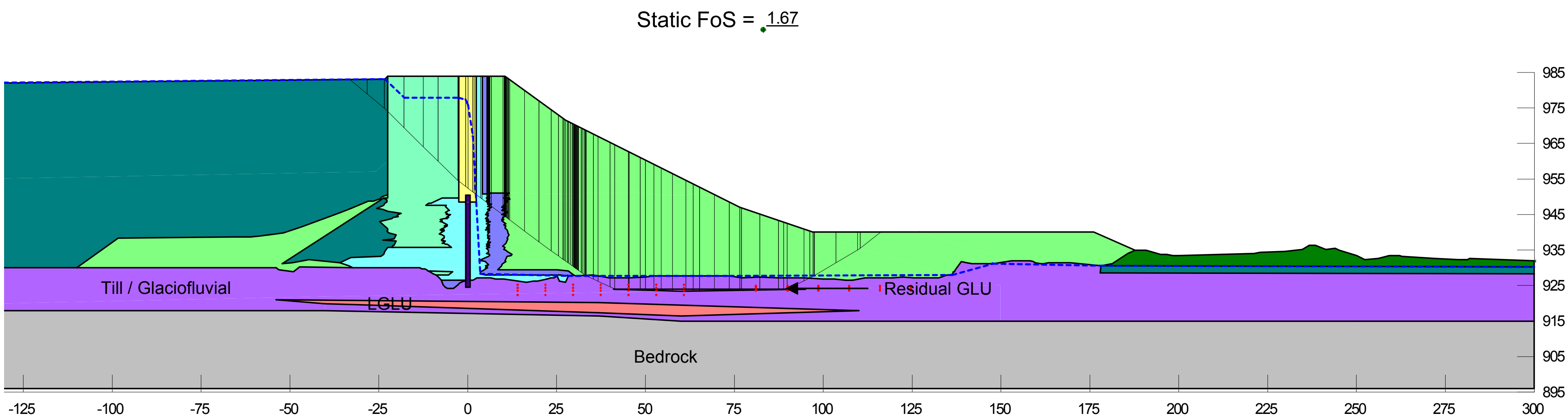
PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+295

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F56**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	T = 0.22 σ_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

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT	**MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**
TITLE	**TOTAL STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295**

Golder Associates

PROJECT No. 1413803			PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F57**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

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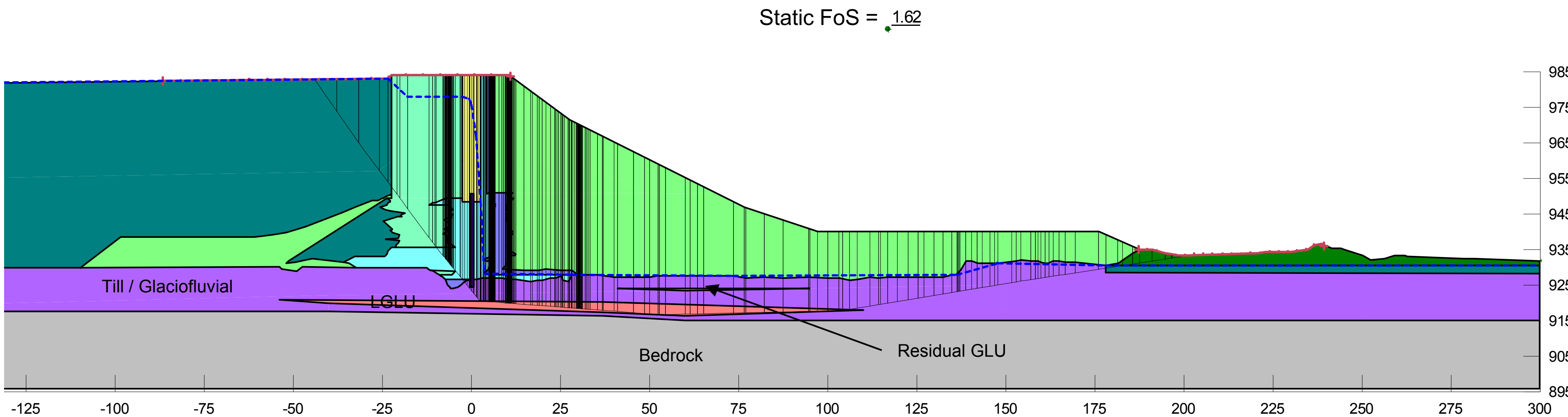

Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	20	T = 0.22 σ_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

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **TOTAL STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+295

Golder Associates

PROJECT No. 1413803			PHASE No. 9000
DESIGN	CTM	29OCT15	SCALE NTS REV.0
CADD	CTM	29OCT15	**FIGURE - F58**
CHECK	GJ	29OCT15	
REVIEW	TLE	29OCT15	

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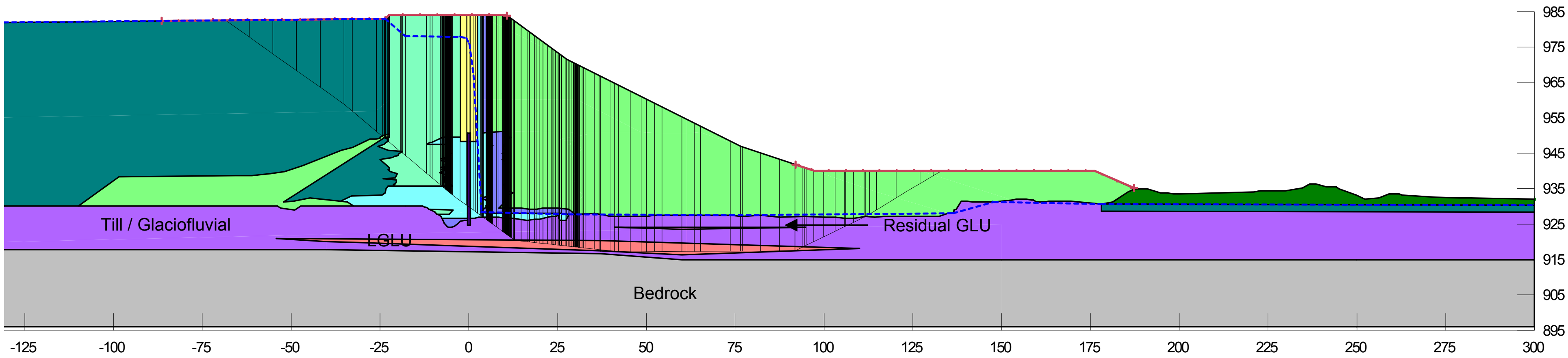
Pseudo-Static FoS = 1.25 (k_h = 0.048)

Static FoS = 1.86



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 m

Foundation Material Properties		
Material	**Unit Weight (kN/m³)**	**Shear Strength**
Till/Glaciofluvial	22	φ'=34°, Cohesion = 0 kPa
LGLU	25	φ'=25°, Cohesion = 0 kPa
Residual GLU	11	φ'=11°, Cohesion = 0 kPa

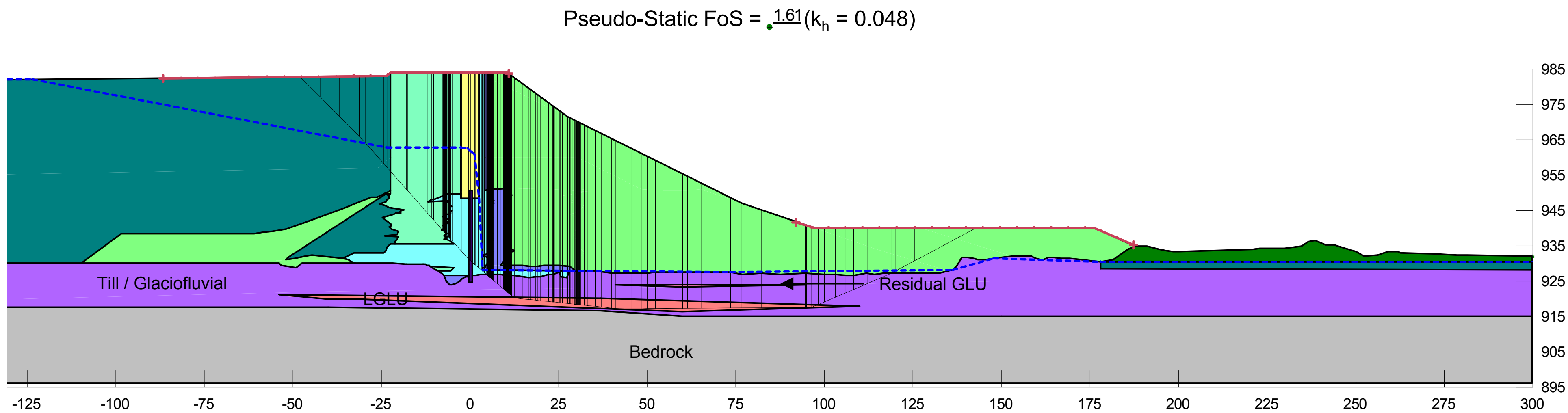
φ'= friction angle; Τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

PROJECT	MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN		
TITLE	EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295		
Golder Associates	PROJECT No. 1413803		PHASE No. 9000
	DESIGN CTM	29OCT15	SCALE NTS REV.0
	CADD CTM	29OCT15	FIGURE - F59
	CHECK GJ	29OCT15	
	REVIEW TLE	29OCT15	

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 100 m sub-aerial beach
- Pond elevation 982 m
- 1 in 1,000 year PGA

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	8.8	φ'=11°, Cohesion = 0 kPa

φ'= friction angle; T=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.
2.) GLU shear strength reduced to 80% for pseudo-static analysis.

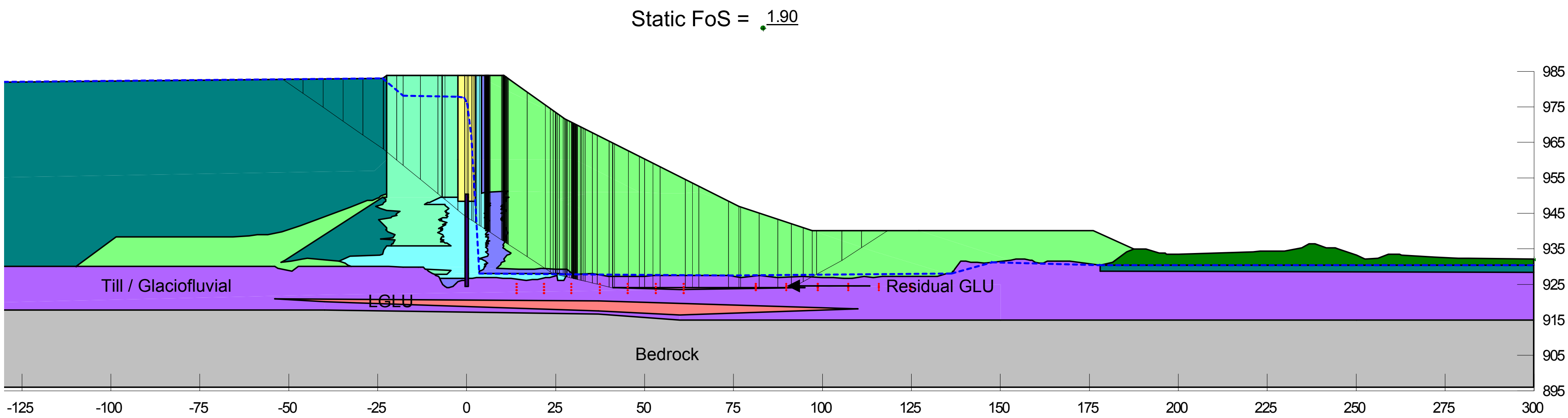
PROJECT **MOUNT POLLEY MINING CORPORATION TAILINGS STORAGE FACILITY LIFE OF MINE FEASIBILITY DESIGN**

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS CORNER 1 PERIMETER EMBANKMENT STN.20+295**

Golder Associates

PROJECT No.	1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F60**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

FILE: O:\Active_2014\DynamicsNumbers_MiningDivision\1413803 CONFIDENTIAL\13 Analysis\Stability Analysis\Feasibility Stability



Embankment configuration at tailings elevation 983 m

- Consolidated foundation soils
- Upstream drain not functioning
- 0 m sub-aerial beach
- Pond elevation 983 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; Τ=Shear strength; σ_v'=vertical effective stress; σ_p'=preconsolidation stress; OCR = Overconsolidation Ratio

Piezometric Line

Notes:
1.) No B-Bar applied.

PROJECT **MOUNT POLLEY MINING CORPORATION**
TAILINGS STORAGE FACILITY
LIFE OF MINE FEASIBILITY DESIGN

TITLE **EFFECTIVE STRESS STABILITY ANALYSIS**
CORNER 1 PERIMETER EMBANKMENT
STN.20+295

Golder Associates

PROJECT No.	1413803		PHASE No. 9000	
DESIGN	CTM	29OCT15	SCALE NTS	REV.0
CADD	CTM	29OCT15	**FIGURE - F61**	
CHECK	GJ	29OCT15		
REVIEW	TLE	29OCT15		

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