19 June 2015

VM00156B.1.200

AuRico Gold Inc.
110 Yonge Street, Suite 1601
Toronto, ON M5C 1T4

VIA EMAIL & COURIER

Attention: Peter MacPhail
Chief Operating Officer

Dear Mr. MacPhail:

Re: Kemess South Tailings Storage Facility
Response to February 3, 2015 Ministerial Orders

INTRODUCTION

On February 3, 2015, the Chief Inspectors office of the BC Ministry of Energy and Mines (MEM) issued orders related to the recent findings of the Expert Panel that was convened to examine the Mount Polley tailings dam breach which occurred on August 4, 2014. The ministerial order required that a letter of assurance be provided from each mine site to determine if the tailings facilities at each may be at risk due to:

1. Undrained shear failure of silt and clay foundations;
2. Water balance adequacy; or
3. Filter adequacy.

For AuRico Gold Inc. (AuRico), the ministerial order applies to the main tailings dam containing the Kemess South Tailings Storage Facility (TSF). Thus AuRico requested that Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler), prepare a letter in response to the ministerial order. This letter is intended to satisfy that request.

The most recent annual Dam Safety Inspection (DSI) was conducted on August 18, 2014. The results of that inspection are described in the report titled “Kemess Mine Tailings Storage Facility – 2014 Dam Safety Inspection”, which was issued to AuRico on October 14, 2014 (AMEC, 2014b). Detailed discussions pertinent to several aspects of this letter are documented in that report and will not be repeated herein. Rather, summary comments will be provided in order to address the ministerial orders with specific references made to the previous studies. The commentary presented in this letter is limited to the existing configuration of the TSF with respect to the

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ministerial orders. For convenience, the selected drawings from the 2014 DSI drawing package for the TSF is appended to this letter.

The scope of this letter includes the following:

- A brief review of the project history and background as it relates to the TSF
- Section 1.0: a discussion on the impact of glaciolacustrine soils
- Section 2.0: a discussion on water balance adequacy
- Section 3.0: a discussion on filter adequacy

For clarity, within Sections 1.0 to 3.0, the individual assessment requirements specified in the ministerial orders under each risk category are listed as subsection headings, and corresponding responses discussed therein.

To summarize this letter, the following statements are made regarding the Kemess South TSF in the context of the ministerial orders of February 3, 2015:

1. The tailings dam is largely founded on pre-sheared glaciolacustrine soils (identified during original dam design investigations in the late 1990's) that have been conservatively treated in design using residual strength parameters. The dam design was adapted to specifically account for these soils in the foundation resulting in the current dam configuration with overall downstream slope angle of 5 horizontal to 1 vertical. The design also included construction of a massive shear key and buttress to control movements where the glaciolacustrine soils were removed over a large portion of the dam toe and replaced with compacted rockfill. The final dam configuration meets the required closure static factor of safety of 1.5 and was developed under the guidance of a distinguished independent geotechnical review panel. No additional investigations or analyses are required.

2. The tailings facility has been designed as a flow through system for closure. The hydraulic performance of the facility is governed by the characteristics of the closure spillway which was designed and constructed to accommodate the flow associated with the probable maximum flood from the entire catchment upstream of the facility.

3. The tailings dam also incorporates specifically designed filter and drainage elements that were meticulously controlled and inspected during construction which, in combination with large above-water beaches, act to mitigate the risk of internal erosion. Nonetheless additional detailed contingency procedures have been developed which are included in the closure OMS Manual.

The tailings dam has been classified with a "very high" consequence rating based on the system outlined in the CDA guidance and has been designed to accommodate the maximum credible earthquake and probable maximum flood for closure in accordance with the 2014 Mining Dams Bulletin.

PROJECT DESCRIPTION AND CURRENT STATUS

The Kemess South TSF is currently under the care and maintenance of AuRico personnel. The storage of tailings solids, produced during mining operations of the Kemess South Mine, within the TSF, commenced in May 1998. Mining and milling operations were subsequently completed on March 9, 2011 after approximately 13 years of operations. Throughout the life of the mine approximately 213.4 million tonnes of tailings were produced with 196.0 million tonnes stored within the TSF (of which 10.6 million tonnes were deposited as downstream cycloned sand fill) and 17.4 million tonnes directed to the mined out portion (west side) of the open pit, beginning in September 2009.

The Kemess tailings dam was completed to its final crest elevation in 2007, with completion of the upstream tailings beach comprising non-acid generating tailings to its final design grade in 2009. The downstream buttresses of the dam were completed in 2010 to their final configuration. Activities since 2010 have focused on implementing the reclamation prescriptions outlined in the Kemess South Mine Reclamation and Closure Plan (RCP, AMEC 2010a, b, c).

With completion of the closure spillway in 2012 the performance of the TSF under inflow design flood (IDF) conditions is now governed by the characteristics of the closure spillway with invert elevation of 1506 m, the attenuation capacity of the reservoir, and the ultimate dam crest elevation of 1510 m and till core elevation of 1509 m. The reservoir has been allowed to recharge naturally following decommissioning of the reclaim barge and piping (barge operation ceased on June 6, 2011) and is currently predicted to reach El. 1506.0 m during 2015 (dependent on the magnitude of the winter snowpack and freshet), upon which time the inlet channel of the spillway will be inundated up to the control structure and the spillway channel will begin to flow. AuRico has indicated that water quality within the impoundment is acceptable for discharge to South Kemess Creek and that a discharge permit has been obtained.

Volume TSF.AB of the Kemess South RCP provides a detailed chronology of the various design iterations, dam construction stages and instrumentation campaigns conducted throughout the life of the facility from 1996 to 2010. Supplemental construction and operational information for the remainder of 2010 and 2011 through 2014 were documented in subsequent annual review reports (AMEC 2011, 2012, 2013d, 2014a, 2014b). The TSF closure spillway was completed in late 2012 to its final configuration, the as-built details of which are documented in AMEC (2013a).

The tailings dam was assigned a “very high” consequence classification during the original dam design under the 1999 Canadian Dam Association (CDA) Guidelines, based on the perceived “extreme” environmental damages associated with a hypothetical dam failure. Under the 2007 CDA guidelines, it was judged that the consequence classification would still be “very high”, on the basis of the consequences associated with environmental and cultural values and was supported by the Dam Breach and Inundation Study performed in 2012 (AMEC 2013b). The classification system remains unchanged in the 2014 CDA Mining Dams Bulletin. The responsibility for assigning and accepting Risk Classification rests with the owner, and has been subsequently concurred with by MEM.

Per the 2014 CDA Mining Dams Bulletin updating the guidelines for mining dams, the minimum limit equilibrium factors of safety (FoS) required for static loading conditions is 1.5. Under post-seismic conditions the required FoS is 1.2. The closed TSF is stewarded to these targets.

Additional discussion in provided in Section 1.0 c) below on FoS predictions made on the basis of the current understanding of the TSF foundation conditions.

1.0 UNDRAINED SHEAR FAILURE OF SILT AND CLAY FOUNDATIONS;

Of note is that the ministerial orders request an assessment with respect to potential undrained shear failure of silt and clay foundations. It is our understanding that the objective of this request is to ascertain if rapid contractant behaviour during shear (i.e. constant volume during shear leading to excess pore pressures and rapid reduction in effective stress or strength conditions) has been adequately considered in the design. Simply put, has the potential presence of weak silt and clay foundation layers been adequately addressed?

a) Including a determination with respect to whether or not similar foundation conditions exist below the dams on your site,

The Kemess South tailings dam is largely founded on a layer of over-consolidated glaciolacustrine clay termed the glaciolacustrine unit or GLU. The GLU is pre-sheared to a residual shear strength condition as evidenced by pervasive slickensiding (Martin et al 2002). The operative shear strength for the GLU has been defined through years of extensive site investigation, sophisticated laboratory testing and numerical back analysis of recorded construction movement rates to be equivalent to a drained residual strength friction angle (Φ'_r) of 10° in the confining stress range of interest. Empirical correlations (Stark and Eid 1994) between residual shear strength, liquid limit and clay fraction parameters yielded similar residual friction angle values.

b) Whether or not sufficient site investigation (drill holes, etc.) has been completed to have confidence in this determination,

As shown on drawing 900.1, there has been significant investigative effort spent delineating the extents and defining the properties of GLU soils beneath the Kemess tailings dam over the operational life of the facility as discussed in Volume TSF.AB (AMEC 2010a). Since inception, a total of 136 piezometers (112 vibrating wire and 24 standpipe), 24 inclinometers and 11 monitoring wells have been installed within the tailings dam footprint throughout the foundation and various embankment fill zones. This constitutes over 150 boreholes being drilled within the footprint of the TSF not including the un-instrumented and borrow source investigations associated with the early stages of the TSF design. Thus the level of investigation performed to date is considered to be commensurate with the understanding of the geologic variability of the site and the standard of practice. Conservative assumptions have been made regarding GLU continuity as discussed below.

c) If present, whether or not the dam design properly accounts for these materials, and

The presence of glaciolacustrine soils was first discovered during the initial site selection and design phase however its pre-sheared nature was not detected until initial core trench excavation for the starter dam. This realization led to a complete redesign of the facility resulting in a downstream slope angle of 5H:1V rather than the previously envisioned slope of 2H:1V to specifically account for the presence of weak GLU soils. The redesign also included the construction of a massive shear key below the main valley buttress where the GLU was removed and replaced with compacted rockfill. The shear key provides increased shear resistance along the base of potential failure masses as well as a stable toe that is not vulnerable to initiation of an upstream-progressing retrogressive failure.

As noted above, the ministerial order focuses on the concept of undrained shear failure which is considered appropriate for normally consolidated clays or clays that once being over-consolidated, may now behave as normally consolidated due to the increased stress conditions associated with construction of large dam fills. As such when performing slope stability calculations it is typical to apply a ratio of undrained shear strength (S_u) to the vertical effective stress (σ_v') or S_u/σ_v' to the clay in question if rapid undrained behaviour is expected. The Kemess GLU is heavily over-consolidated and pre-sheared to a residual strength level which governs its stability behavior and has been characterized using a drained residual strength friction angle (Φ'_r). It should be noted that when utilized in a slope stability analysis model, such as Slope/W for a horizontal sheared soil layer, as can be the case of GLU deposits, there is an analytical equivalence between Φ' and S_u/σ_v'. For example, for a given effective stress or σ'_v using a $S_u/\sigma_v' = 0.18$ or a $\Phi'_r = 10°$ provides the same hypothetical shear strength level within the stability model for calculation of soil shearing resistance and it is important to understand the governing behaviour (i.e. drained or undrained) when selecting appropriate values of Φ' or S_u/σ_v'.

An important design consideration is the continuity of the GLU below the dam. The design of the overall configuration of the main valley buttress was based on two dimensional limit equilibrium analysis for a section at 11,785N (Refer to drawing 2010.1). This section, which just bypasses both the GLU window (a natural localized absence of the GLU in the valley bottom, confirmed by test pits and likely the result of stream erosion[1]) and the shear key (where the GLU is absent naturally or due to excavation and removal in previous stages of dam construction), has in previous analyses been found to govern the stability of the main valley section of the dam (AMEC 2010a).

A similar level of conservatism is applied to the south abutment buttress design section (refer to drawing 2010.1) which yields quite conservative factors of safety due to the fact that the GLU is modelled as a continuous infinite layer below the entire south abutment buttress, which, based on past field investigations, is not the case. The GLU is known to be discontinuous in the south abutment area and completely absent south of 11,440N. Furthermore, based on the irregular buttress geometry as shown in drawing 800.2, approximating the south abutment buttress as an infinite two-dimensional section further increases the conservatism of the results. Even though the stability of the south abutment is considered to be a three-dimensional issue, the two-dimensional approximation results in factors of safety that meet the dam closure requirements. No further analyses are considered necessary.

Under these conditions the closed Kemess South TSF maintains factors of safety against foundation sliding failures in excess of 1.5 for long term drained conditions which meets the target FoS as per CDA guidance (AMEC 2010a). The required post-seismic FoS of 1.2 is achieved under the loading from the Maximum Credible Earthquake (MCE). The MCE is defined as a magnitude 6.0 (M6) seismic event, with an associated peak (horizontal) ground acceleration

[1] Of interest is the fact that the striations on the slickensided surfaces of the GLU were consistently oriented in the cross valley direction, suggesting downcutting and landsliding as their origin as opposed to glacial drag which would have resulted in striations in the down valley direction. This observation reinforces the absence of the GLU in the valley bottom due to downcutting by Kemess South Creek.

(PGA) of 0.19g. Previous 2-D and 3-D numerical analyses predicted the tailings dam would undergo minimal deformation in the event of the design earthquake (AMEC 2010a and 2011).

d) If any gaps have been identified, a plan and schedule for additional sub-surface investigation.

No gaps have been identified with respect to the treatment of GLU soils at the Kemess South TSF. The current design configuration (completed in 2010) of the TSF was developed in direct consultation with an independent geotechnical review panel (GRP)[2] who provided third party oversight and technical guidance regarding the treatment of the GLU soils on an annual basis throughout the entire design and construction of the TSF.

2.0 WATER BALANCE ADEQUACY;

a) Including the total volume of surplus mine site water (if any) stored in the tailings storage facility,

During active mining the TSF was operated as a closed system in that there was no discharge of tailings pond supernatant or collected seepage to the environment. As such, the design and operation of the TSF required constant tracking and prediction of tailings solids and water levels within the impoundment throughout the life of the mine in order to provide adequate storage and freeboard for dam safety. Seepage from the impoundment and runoff that reports to the Seepage Recycle Pond (SRP) was previously returned to the mill process water supply system and now, upon closure, is discharged to South Kemess Creek. A Water Diversion System (WDS, see Drawing 655.1) continues to divert runoff from three catchments around the tailings storage facility, upstream of the dam.

With completion of the closure spillway in 2012 the performance of the TSF under IDF conditions is now governed by the characteristics of the closure spillway and final dam crest configuration. The reservoir has been allowed to recharge naturally following decommissioning of the reclaim system in 2011 and the water level was at roughly El. 1504.6 m by the end of 2014 which corresponds to a free water volume of 32.9 million m^3 based on a closure bathymetric survey performed in July 2011 (AMEC, 2014b).. The spillway is currently predicted to begin flowing during 2015 when the reservoir reaches the design full service level (FSL) of El. 1506.0 m which corresponds to a free water volume of 38.4 million m^3.

[2] The Kemess Geotechnical Review Panel (GRP) was composed of Dr. Peter Byrne, P.Eng; Mr. Chuck Brawner, P.Eng and Mr. Fred Matich, P.Eng. The GRP was first assembled in the late 1990's during Knight Piesold's original formulation of the dam design. The GRP has been an indispensible resource throughout the life of the TSF, providing substantial insight and guidance on various aspects of design, operation and dam safety. The GRP typically convened at least once per year, and typically issued a report to Kemess and MEM subsequent to each such meeting. The last meeting occurred onsite on October 12, 2010 following completion of the final dam configuration.

b) The volume of surplus mine water that has been added to the facility over each of the past five years,

As previously noted tailings discharge was split between the TSF and open pit starting in September 2009 with continued reclaim from the TSF until mid-2011 which resulted in an overall water balance deficit for the TSF during this period. Since then the pond has been allowed to recharge naturally to the FSL for closure as previously discussed which renders this topic moot for purposes of dam safety.

c) Any plans that are in place or that are under development to release surplus mine water to the environment,

As previously noted the TSF has been designed for closure as a flow through system where natural catchment runoff is routed through the free water pond and out through the closure spillway which was designed to accommodate the flow associated with the probable maximum flood (PMF) from the entire catchment upstream of the TSF. AuRico has indicated that water quality within the impoundment is acceptable for discharge to South Kemess Creek and that a discharge permit has been obtained for the closure spillway.

d) Recommended beach width(s), and the ability of the mine to maintain these widths,

As previously noted the above-water beach was completed to its design closure configuration in 2009 as shown on drawing 800.2. The beach design configuration was defined based on northings and eastings such that from the south abutment to N11,550 m, the above-water tailings beach should extend as far east (upstream) as E15,500 m and north of N11,550 m, the beach should extend as far upstream as E15,400 m. This configuration provides beach widths measuring roughly 165 m wide at the southern end of the dam and 50 to 65 m wide at the northern end of the dam as designed. The shoreline of the final beach was armored in 2010 up to 2 m above the FSL with a three layer erosion protection system grading from 0.3 m mean diameter riprap to sand and gravel overlaying the cycloned sand beach (AMEC, 2011).

e) The ability of the TSF embankments to undergo deformation without the release of water (i.e. the adequacy of the recommended beach width),

The final design of the TSF includes a 4.0 m freeboard allowance above the FSL (1.5 m for routing of the IDF through the closure spillway, 1.5 for wave run-up during the IDF and 1.0 m for long-term embankment settlement). Detailed dynamic FLAC analyses of the final dam configuration suggested that the dam is expected to experience tolerable permanent displacements under the design earthquake loading. That is, the dam crest is predicted to settle in the order of 10 cm to 20 cm and deform downstream in the order of 5 cm to 10 cm in the event of a design earthquake (AMEC, 2011). The constructed closure beach width and freeboard are more than sufficient to accommodate this type of movement.

f) Provisions and contingencies that are in place to account for wet years, and

As previously noted the hydraulic performance of the TSF under IDF conditions is now governed by the characteristics of the closure spillway which was designed to accommodate the flow associated with the PMF from the entire catchment upstream of the TSF.

g) If any gaps have been identified, a plan and schedule for addressing these issues.

No gaps have been identified with respect to the water balance of the TSF.

3.0 FILTER ADEQUACY;

a) Including the beach width and filter specifications necessary to prevent potential piping,

The TSF is a zoned earthfill embankment, with central, low permeability till core to limit seepage. The design section includes filter zones downstream of the core, and downstream shell/buttress fills. Chimney filters (Zones F, B and H1) protect against seepage-induced loss of fines from the till core (Zone S), and to provide drainage to any seepage. Prior to 2003 (Stages 1 through 6), a clean gravelly sand was used for the Zone F chimney filter and Zone B drain. In 2003 with the advent of cycloned sand construction (from Stage 7 onwards), compacted cycloned sand, with a maximum allowable fines content of 10% (percent finer than 0.074 mm by mass), formed the chimney filter. Due to the reduced hydraulic conductivity of Zone H1 fill relative to Zone F fill, Zone H1 was roughly 5 times wider than Zone F to maintain hydraulic capacity. Zone G was also introduced in Stage 7 to provide underdrainage for the cycloned sand and filter protection over coarse materials into which cycloned sand, without such filter protection, could potentially migrate with resultant sinkhole development. The specified gradation envelopes for these zones are presented on drawing 670.35 and were designed in accordance with modern filter criteria as outlined in Section 6.3.3 of the CDA (2007) document "*Technical Bulletin: Geotechnical Considerations for Dam Safety*", an appendix to the CDA (2007) dam safety guidelines.

As noted above the beach width guidelines for the TSF have been set to be more than 50 m and 150 m for the North and South abutment areas, respectively in order to provide phreatic surface control through the dam shell and foundation. These large beach widths were established to control hydraulic gradients and have been maintained as a closure feature (AMEC 2010b).

b) Whether or not the filter has been constructed in accordance with the design, and

As outlined in the RCP Volume TSF.AB (AMEC, 2010), rigorous quality control testing was performed on the core and filter zones throughout the construction of the TSF. Plots summarizing the gradation testing data for each stage of construction are included in that report which indicate that construction of the dam satisfied the intent of the design specifications.

c) If any gaps have been identified, a plan and schedule for addressing these issues.

No gaps have been identified with respect to filter adequacy.

CLOSING REMARKS AND LIMITATIONS

This letter was prepared by Andrew Witte, P.Eng. and reviewed by Dr. Ed McRoberts, P.Eng. We trust that this meets your current needs regarding the February 3, 2015 ministerial orders.

The conclusions presented herein are based on a technical evaluation of the findings of the work noted. If conditions other than those reported are noted during subsequent phases of the project, Amec Foster Wheeler should be notified and be given the opportunity to review and revise the current conclusions, if necessary.

This letter has been prepared for the exclusive use of AuRico Gold Inc. for specific application to the area within this letter. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Amec Foster Wheeler accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this letter. It has been prepared in accordance with generally accepted soil and tailings dam engineering practices. No other warranty, expressed or implied, is made.

Please contact the undersigned at (604) 295-3264 should you have any questions or wish to discuss any aspects of this letter.

Respectfully submitted,

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited

Original copies signed and sealed by
Andrew Witte, M.Eng, P.Eng.

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Senior Geotechnical Engineer

Reviewed by:

Original copies signed by
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Ed McRoberts, Ph.D., P.Eng.
Principal Engineer

AW/EM/jvp

Attachments:

- List of References
- 2014 TSF DSI Drawings (655.1, 800.2, 900.1A, 2010.1, & 670.35)

REFERENCES

AMEC Earth & Environmental Limited 2010a. “Kemess South Mine Reclamation and Closure Plan – Tailings Storage Facility Final Design and As-Built Report”, Volume TSF.AB, August 31.

AMEC Earth & Environmental Limited 2010b. “Kemess South Mine Reclamation and Closure Plan – Tailings Storage Facility Reclamation and Closure Plan”, Volume TSF.RCP, September 17.

AMEC Earth & Environmental Limited 2010c. “Kemess South Mine Reclamation and Closure Plan – Tailings Storage Facility Closure Operation, Maintenance & Surveillance (OMS) Manual”, Volume TSF.OMS, September.

AMEC Earth & Environmental Limited 2011. “Kemess Mine Tailings Storage Facility: 2010 Annual Review Report”, April 8.

AMEC Environment and Infrastructure 2012. “Kemess Mine Tailings Storage Facility: 2011 Annual Review Report”, March 23.

AMEC Environment and Infrastructure 2013a. “Kemess Mine Tailings Storage Facility: Closure Spillway As-Built Report”, January.

AMEC Environment and Infrastructure 2013b. “Kemess Mine Tailings Storage Facility: Dam Breach and Inundation Study”, January.

AMEC Environment and Infrastructure 2013c. “Kemess Mine Tailings Storage Facility: Contingency Grouting Program Design Report”, January.

AMEC Environment and Infrastructure 2013d. “Kemess Mine Tailings Storage Facility: 2012 Annual Review Report”, March 15.

AMEC Environment and Infrastructure 2013e. “Kemess South Mine Tailings Storage Facility Operation, Maintenance & Surveillance (OMS) Manual, Rev 5”, March 31.

AMEC Environment and Infrastructure 2014a. “Kemess Mine Tailings Storage Facility: 2013 Annual Review Report”, March 7.

AMEC Environment and Infrastructure 2014b. “Kemess Mine Tailings Storage Facility: 2014 Dam Safety Inspection”, October 14.

British Columbia Water Act (2011). “Dam Safety Regulations” – Reg. 163/2011

Canadian Dam Association (CDA) (1999). “Dam Safety Guidelines”.

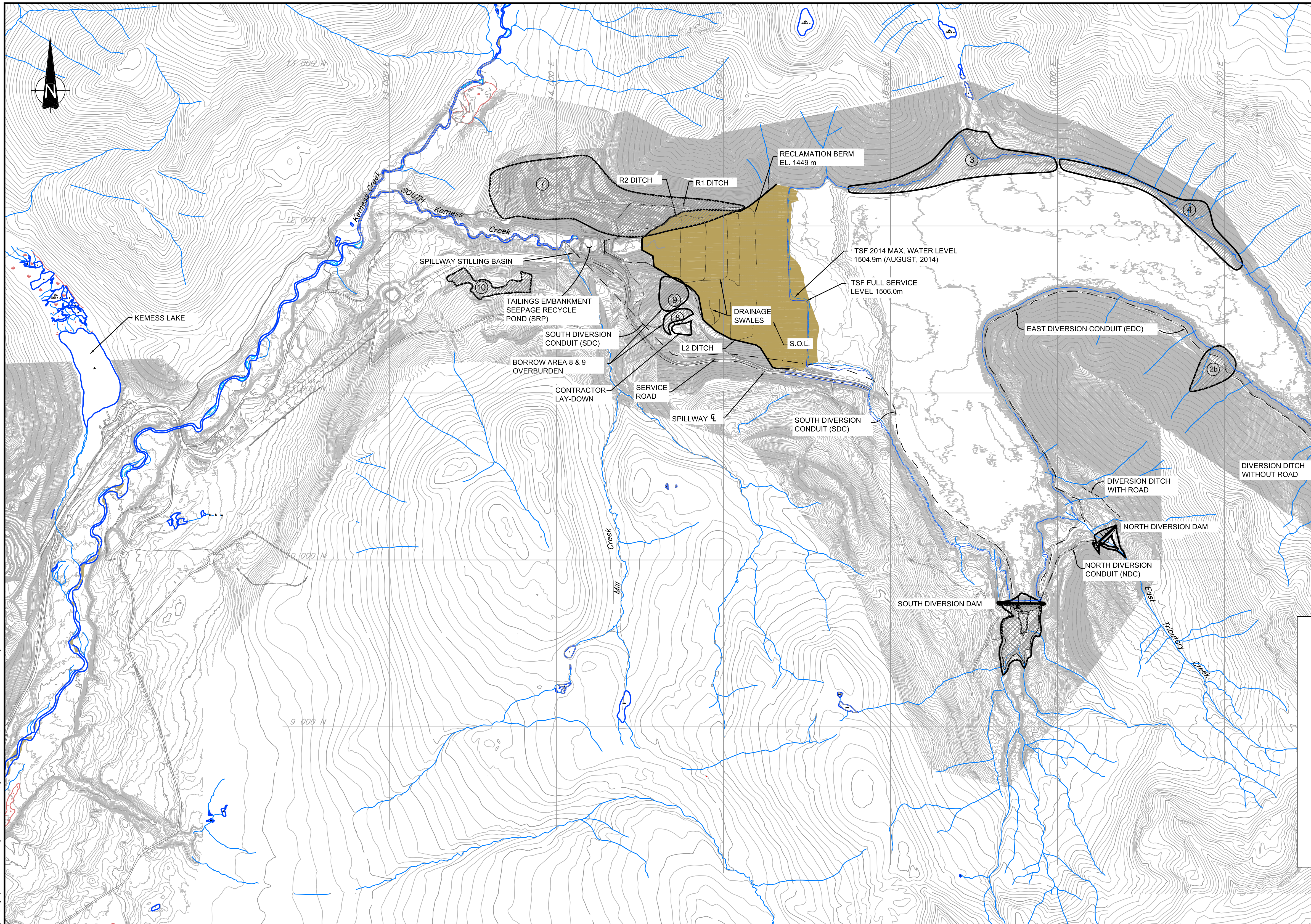
Canadian Dam Association (CDA) (2007). “Dam Safety Guidelines”.

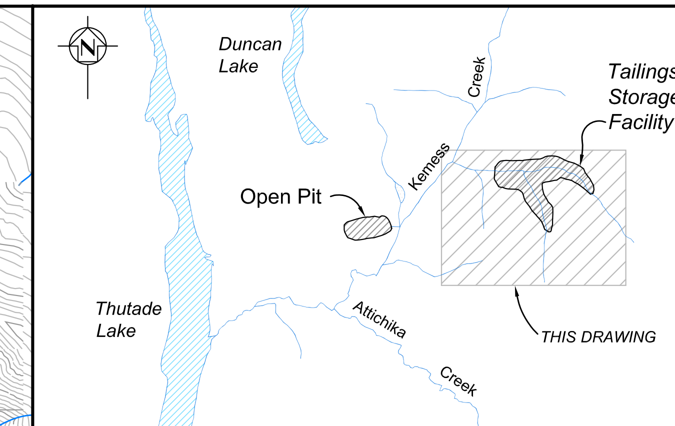
Canadian Dam Association (CDA) (2014). “Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams”. October.

Martin, T., Woodfine, T., & Cunningham, A. (Martin et al 2002). “The Kemess Tailings Dam – A Case History”. *Canadian Dam Association 2002 Annual Conference*. October 6.

Stark, T.D. and Eid, H. T. (1994). “Drained Residual Strength Of Cohesive Soils” *ASCE Journal of Geotechnical Engineering*, Vol. 120, No. 5, May, 1994.

ATTACHMENTS - DRAWINGS





KEY PLAN
NTS

NOTES:

1. GENERAL ARRANGEMENT BASED ON KNIGHT PIESOLD DRAWING NO. 10816-17-110(0), WITH UPDATED DAM AREA SURVEY FROM KEMESS.

2. TOPOGRAPHIC CONTOURS ARE BASED ON A COMPOSITE OF TRIM, AIRBORNE GEOMATICS DATED 1998, LIDAR IMAGERY DATED OCTOBER 2006, AN UPDATED PIT AND MINE SITE SURVEY DATED JUNE 2011, AND SONAR BATHYMETRY DATED JULY 2011.

LEGEND

Approximate outline of Borrow Area

Minimum Water Level
Maximum Water Level
Diversion Ponds

Water Level for Fisheries Requirement (South Diversion Ponds)

0m 200 400 600 800 1000 Metres
Scale

REVISON	DATE	DESCRIPTION	DRW	CHK	APP.
K	10/10/2014	ISSUED FOR 2014 DAM SAFETY INSPECTION REPORT	YC	MH	AW
J	03/05/2014	ISSUED FOR 2013 ANNUAL REVIEW REPORT	MH	MH	AW
I	03/05/2013	ISSUED FOR 2012 ANNUAL REVIEW REPORT	HY	HY	AW
H	08/10/2010	ISSUED FOR FINAL AS-BUILT	TH	AW	TM
G	03/31/2009	ISSUED FOR STAGE 12 AS-BUILT	YC	RM	TM
F	06/06/2007	ISSUED FOR STAGE 12 CONSTRUCTION	YC	AW	TM
E	03/05/2007	ISSUED FOR CONSTRUCTION	YC	RM	TM
D	10/2006	ISSUED FOR STAGE 11 TENDER	YC	AW	TM
C	09/2005	ISSUED FOR STAGE 10 TENDER	YC	TM	TM
B	08/2005	ISSUED FOR REVIEW	YC	TM	TM
A	02/2004	STAGE 7 AS-BUILT	YC	TM	TM

amec

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CLIENT: AuRico Gold Kemess Mines

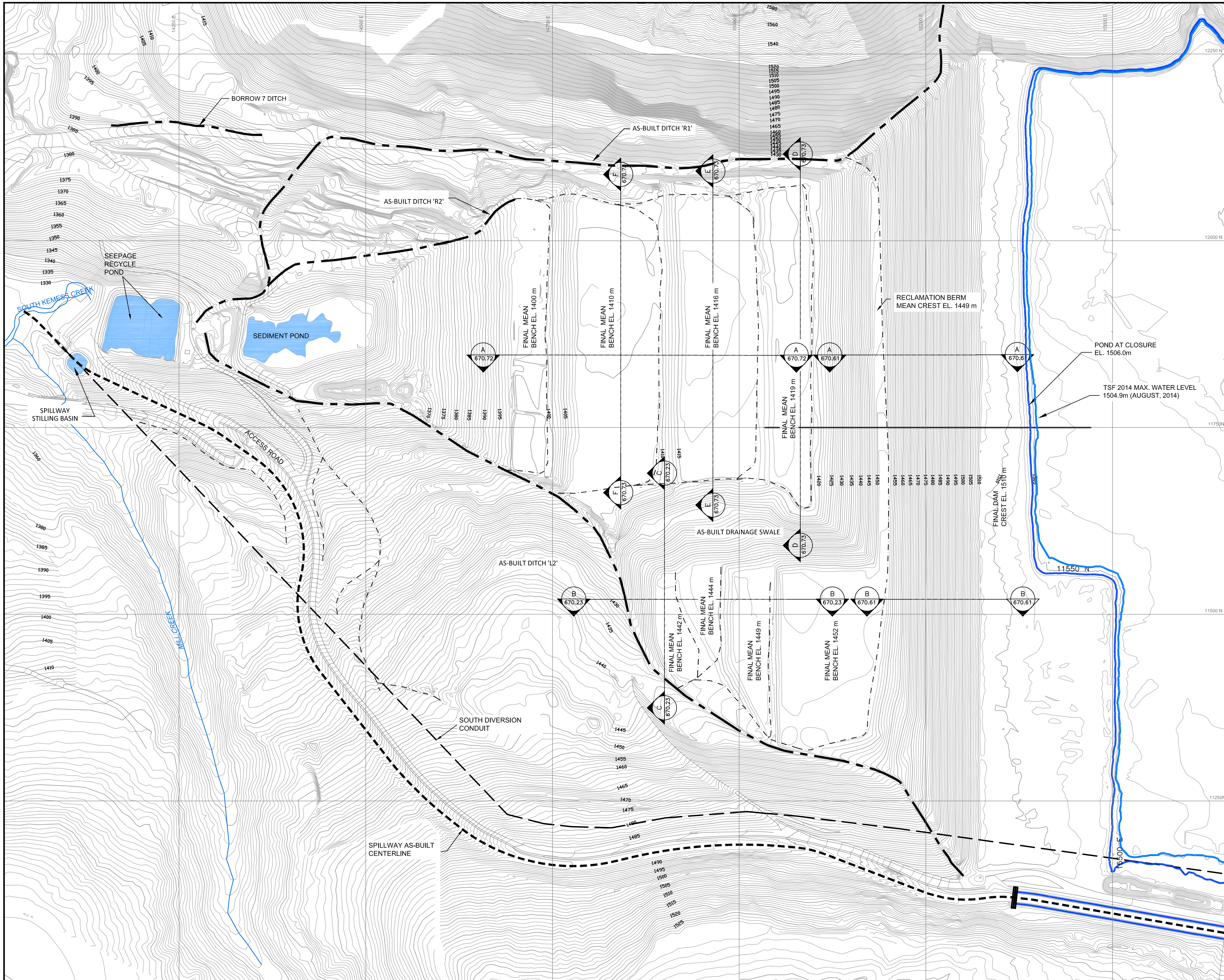
DWN BY: YC
CHK'D BY: AW
APP. TM
SCALE AS SHOWN

KEMESS TAILINGS STORAGE FACILITY
2014 DAM SAFETY INSPECTION

TSF GENERAL ARRANGEMENT

DATE: OCTOBER 2014
PROJECT NO: VM00156A
REV. NO: K
DRAWING NO: 655.1

S:\PROJECTS\VM00156A - Kemess South Closure\Drawings\2014 Dam Safety Review\655.1.dwg - 655.1 - Sep. 24, 2014 11:31am - yuan.chen



LEGEND

- CLOSURE DIVERSIONDITCH CENTERLINE (AS-BUILT)
- CLOSURE DRAINAGE SWALE CENTERLINE (AS-BUILT)
- CLOSURE SPILLWAY CENTERLINE (AS-BUILT)

NOTES:

1. ADDITIONAL DETAILS ON FINAL GRADING ARE PROVIDED ON DRAWINGS 670.23, 670.72 AND 670.73.
2. POND BATHYMETRY BASED ON 11 JULY 2012 SOUNDING PERFORMED BY KEMESS.
3. DETAILED TOPOGRAPHY AT GENERAL AREA BASED ON MAY 2007 LIDAR SURVEY BY TERRA REMOTE.
4. TAILINGS DAM & BEACH TOPOGRAPHY BASED ON 2012 SURVEY BY KEMESS.

0m 20 40 60 80 100
SCALE (m)

REVISON	DATE	DESCRIPTION	DRW	CHK	APP.
14	10/10/14	ISSUED 2014 DAM SAFETY INSPECTION REPORT	YC	MH	AW
13	03/06/14	ISSUED FOR 2013 ANNUAL REVIEW	MH	MH	AW
12	03/06/13	ISSUED FOR 2012 ANNUAL REVIEW	MH	MH	AW
11	11/08/10	ISSUED FOR FINAL AS-BUILT	TH	AW	TM
10	30/03/09	ISSUED FOR STAGE 12 AS-BUILT	YC	RM	TM
9	26/10/07	REVISED SOUTH ABUTMENT BUTTRESS CONFIGURATION	YC	AW	TM
8	06/06/07	ISSUED FOR STAGE 12 CONSTRUCTION	YC	AW	TM
7	05/03/07	ISSUED FOR CONSTRUCTION	YC	RM	TM
6	25/10/06	ISSUED FOR STAGE 11 TENDER	YC	AW	TM
5	27/09/06	SOUTH ABUTMENT BUTRESS REALIGNED	YC	AW	TM
4	11/08/06	ISSUED FOR REVIEW	YC	AW	TM
3	22/09/05	ISSUED FOR STAGE 10 TENDER	YC	TM	TM
2	31/08/05	ISSUED FOR REVIEW	YC	TM	TM

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CLIENT
AuRico Gold Inc - Kemess Mine

PROJECT
KEMESS TAILINGS STORAGE FACILITY
2014 DAM SAFETY INSPECTION

TITLE
FINAL DAM AS-BUILT PLAN

DRAWN BY: YC / TH / MH	SCALE: AS SHOWN	DATE: OCTOBER 2014	REVISION
CHECKED BY: MH	PROJECT No. VM00156A.2.200	DRAWING No. 800.2	14
APPROVED BY: AW			

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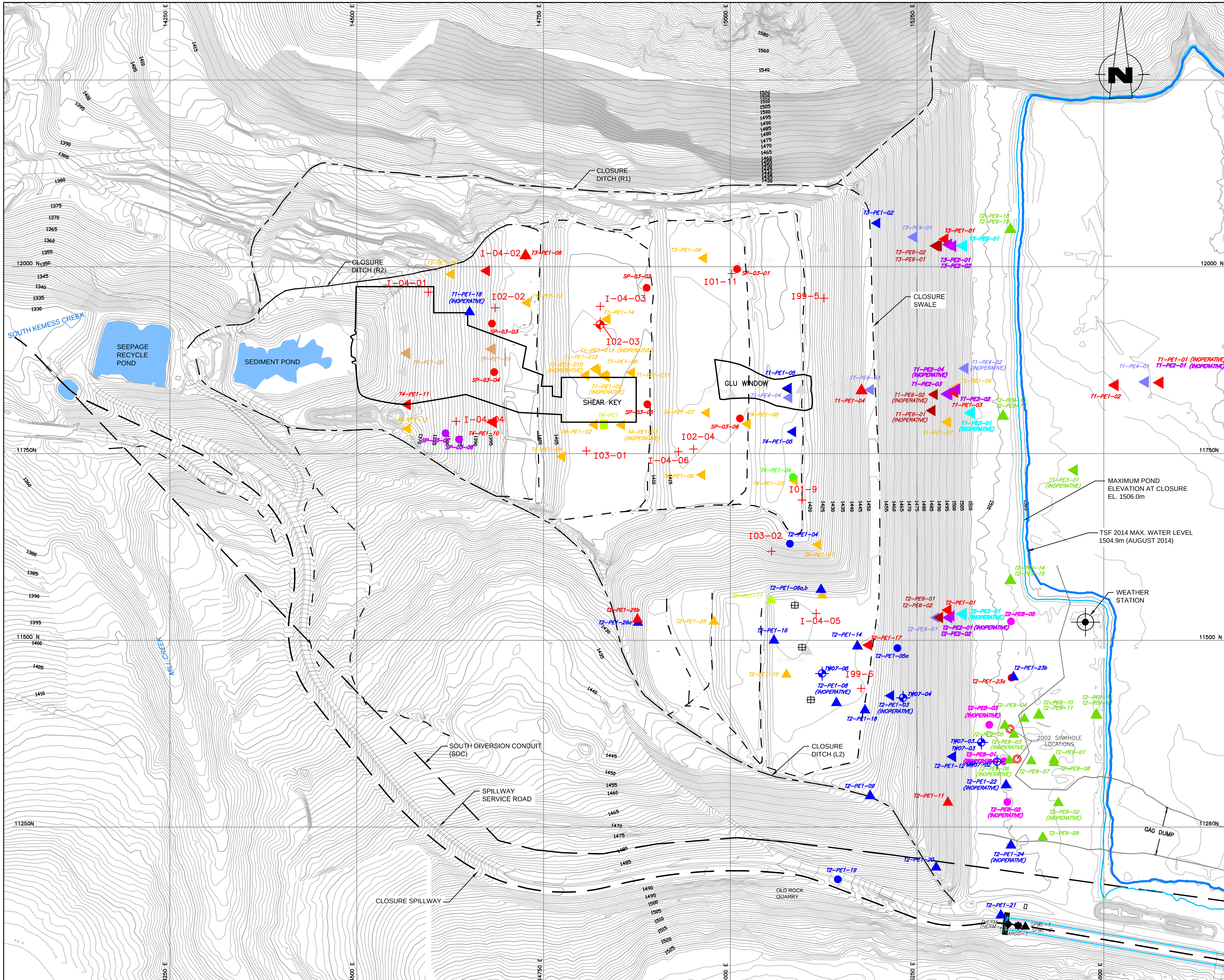

LEGEND:

I99-5	INCLINOMETER
T1-PE1-01	(BASAL TILL)
T1-PE1-06	(GLACIOLACUSTRINE)
T1-PE1-05	(FRACTURED BEDROCK)
T4-PC1	(LOAD CELL)
T1-PE2-01	(ZONE S)
T1-PE3-01	(ZONE A)
T1-PE4-01	(ZONE B1)
T1-PE6-01	(ZONE F)
T1-PE1-19	(TALUS/GLACIOFLUVIAL)
T1-PE7-01	(ZONE G)
T1-PE9-01	(TAILINGS BEACH)
T2-PE1-04	(FRACTURED BEDROCK)
T2-PE8-01	(ROCKFILL)
T4-PE1-04	(GLACIOFLUVIAL)
SP-03-01	(ZONE E)
SP-03-07	(CYCLONED SAND ZONE H)
	VIBRATING WIRE PIEZOMETER
	OPEN STANDPIPE PIEZOMETER
	RELIEF WELL
	TEMPERATURE SENSOR
	SONDEX ARGONAUT VELOCITY PROBE
	WEATHER STATION
	CLOSURE DIVERSIONDITCH CENTERLINE (AS-BUILT)
	CLOSURE DRAINAGE SWALE CENTERLINE (AS-BUILT)

0m 20 40 60 80 100
SCALE (m)

NOTES:

1. POND BATHYMETRY BASED ON 1 JULY 2011 SOUNDING PERFORMED BY AQUASPHERE SURVEYORS.
2. DETAILED TOPOGRAPHY AT GENERAL AREA BASED ON MAY 2007 LIDAR SURVEY BY TERRA REMOTE.
3. TAILINGS DAM & BEACH TOPOGRAPHY BASED ON AUGUST 2011 SURVEY BY KEMESS.

REVISON	DATE	DESCRIPTION	DRW	CHK	APP.
8	10/10/14	ISSUED FOR 2014 DAM SAFETY INSPECTION REPORT	YC	MH	AW
7	03/06/14	ISSUED FOR 2013 ANNUAL REVIEW REPORT	MH	MH	AW
6	03/06/13	ISSUED FOR 2012 ANNUAL REVIEW REPORT	HY	HY	AW
5	11/08/10	ISSUED FOR FINAL AS-BUILT	YC	AW	TM
4	03/31/09	ISSUED FOR STAGE 12 AS-BUILT	YC	RM	TM
3	06/06/07	ISSUED FOR STAGE 12 CONSTRUCTION	YC	AW	TM
2	05/03/06	ISSUED FOR STAGE 11 TENDER	YC	RM	TM
1	10/25/06	ISSUED FOR STAGE 11 TENDER	YC	AW	TM
0	08/22/05	ISSUED FOR STAGE 10 TENDER	YC	AW	TM

amec

AMEC Environment & Infrastructure
4445 Lougheed Highway, Suite 600
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Tel. 604-294-3811 Fax 604-294-4664

CLIENT
AuRico Gold Kemess Mines
AuRico Gold Inc. - Kemess Mines

PROJECT
KEMESS TAILINGS STORAGE FACILITY
2014 DAM SAFETY INSPECTION

TITLE
INSTRUMENTATION PLAN
ALL HISTORICAL INSTALLATIONS

DRAWN BY: YC	SCALE: AS SHOWN	DATE: OCTOBER 2014	REVISION
CHECKED BY: AW	PROJECT No. VM00156A	DRAWING No. 900.1A	8
APPROVED BY: TM			

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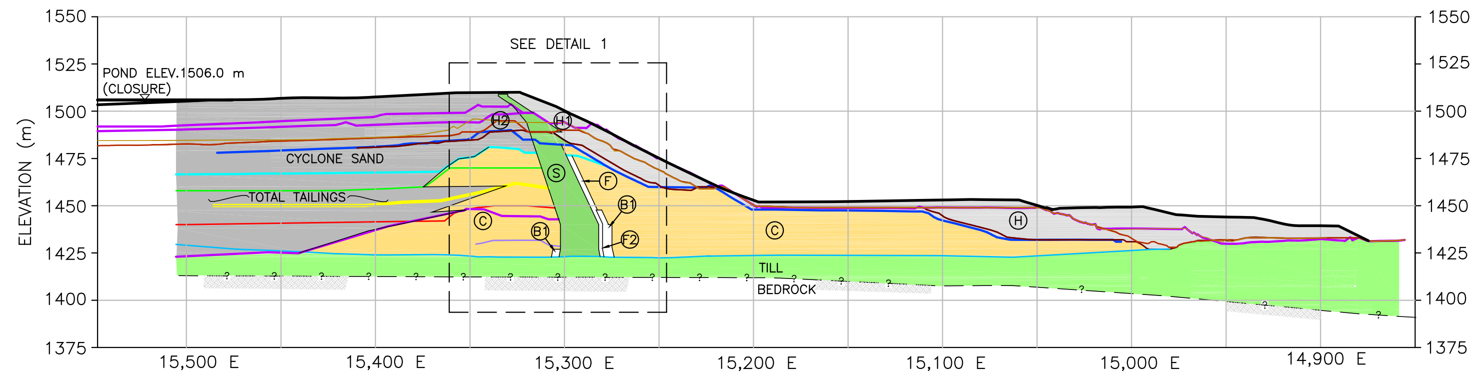
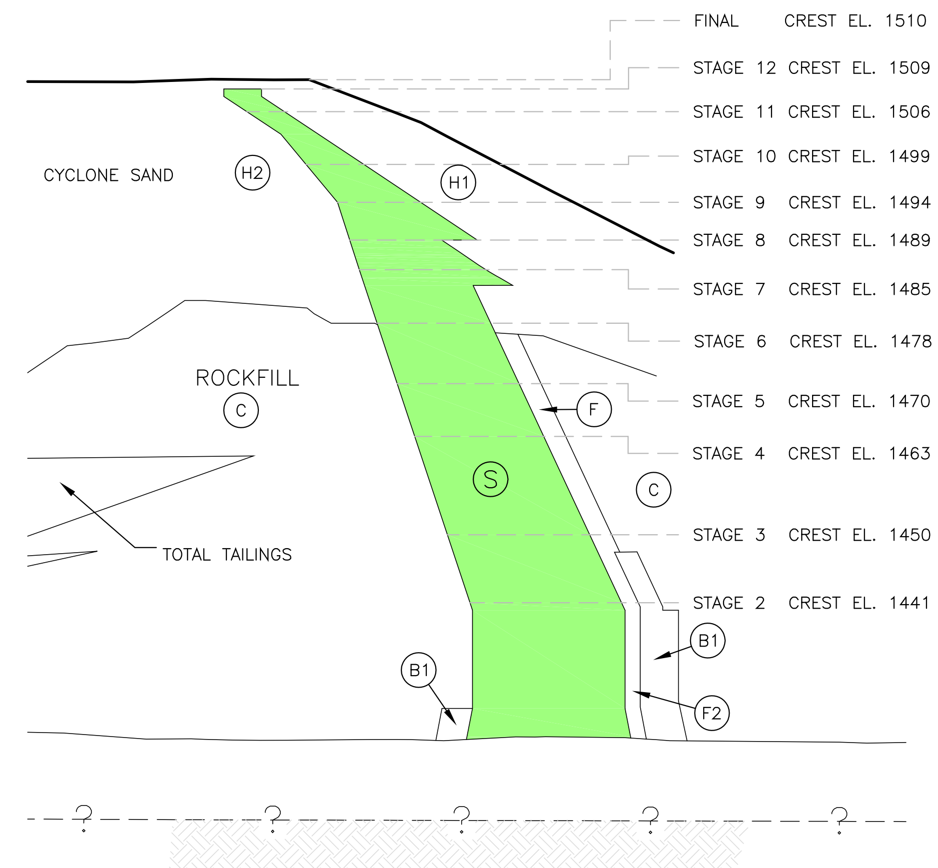
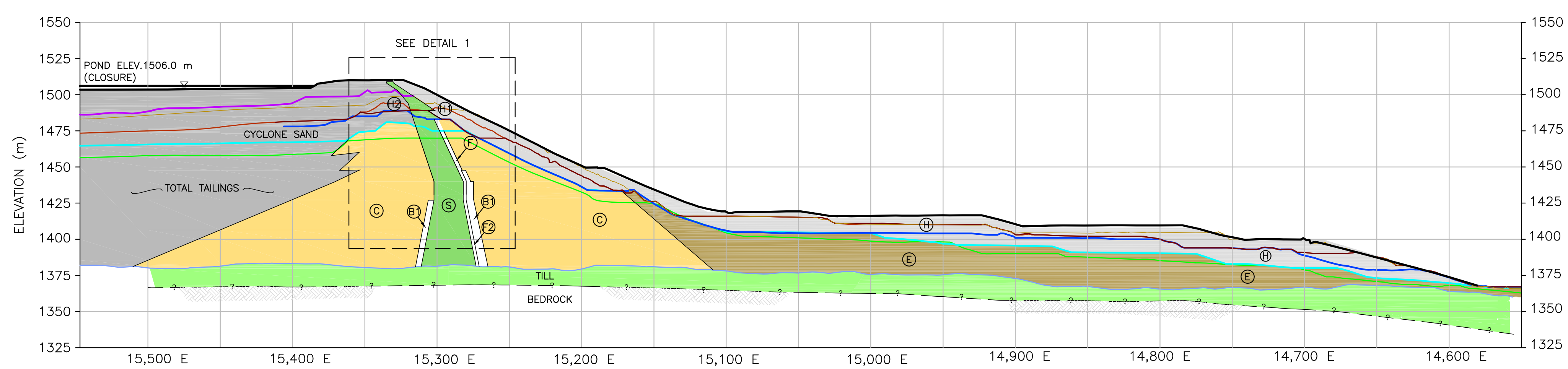


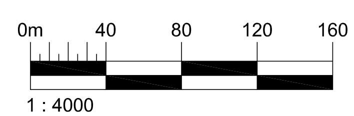
SOUTH ABUTMENT BUTTRESS SECTION (11520 N)



DETAIL 1 – TYPICAL DAM CORE SECTION



MAIN VALLEY BUTTRESS SECTION (11785 N)



LEGEND:

- FINAL CREST AS–BUILT – JULY 2010
- JUNE 2007 SOUNDING
- OCT 2006 SURVEY
- OCT 2006 ASBUILT
- APRIL 2006 ASBUILT
- AUGUST 2005 ASBUILT
- APRIL 2004 ASBUILT
- STAGE 7
- STAGE 6
- STAGE 5
- STAGE 4
- STAGE 3
- STAGE 2
- STAGE 1
- ORIGINAL GROUND
- TAILINGS & UPSTREAM CYCLONE SAND (ZONE H2)
- DOWNSTREAM CYCLONED SAND (ZONES H & H1)
- ROCKFILL (ZONE C)
- TILL CORE (ZONE S)
- RANDOM FILL (ZONE E)
- OVERBURDEN
- BEDROCK

NOTES:

1. FINAL (STAGE 12 DESIGN) CREST ELEVATION 1510.0 m (TILL CORE CONSTRUCTED TO EL. 1509.0 m).
2. SUBSURFACE STRATIGRAPHIC BOUNDARIES (BELOW ORIGINAL GROUND SURFACE) ARE INFERRED FROM NON-CONTINUOUS SAMPLING AND THEREFORE, REPRESENT TRANSITIONS BETWEEN SOIL TYPES RATHER THAN EXACT PLANES OF GEOLOGIC CHANGE.
3. STRATIGRAPHY OF STAGED DAM CONSTRUCTION IS BASED ON ANNUAL AS-BUILT SURVEYS PERFORMED BY KEMESS MINE PERSONNEL.
4. MOST RECENT AS-BUILT SURVEY WAS COMPLETED ON 5 JULY 2010.
5. THE FINAL TAILINGS POND LEVEL WILL BE CONTROLED BY THE INVERT OF THE CLOSURE SPILLWAY (I.E. EL. 1506.0 m).
6. UPSTREAM TAILINGS BEACH AND POND BATHYMETRY IS BASED ON THE JUNE 2010 BEACH SURVEY AND JULY 2010 POND SOUNDING.

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
	10	08	10	ISSUED FOR FINAL AS-BUILT	AW	TM

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Client: AuRico Gold Kemess Mines — AuRico Gold Inc - Kemess Mine

Designed By:	TM
Drawn By:	AW / TH
Checked By:	AW
Reviewed by:	TM
Scale:	AS SHOWN

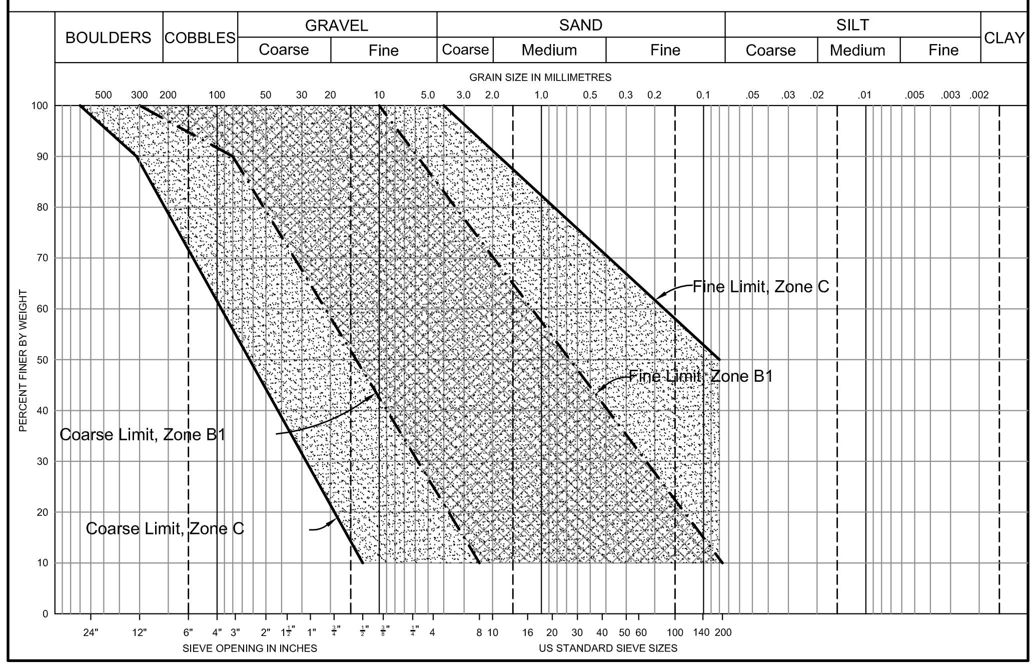
Project: KEMESS TAILINGS STORAGE FACILITY 2014 DAM SAFETY INSPECTION

Title: SOUTH ABUTMENT AND MAIN VALLEY BUTTRESS CUMULATIVE AS-BUILT SECTIONS

Project No.:	VM00156.A
CADD File:	2010.1.dwg
Date:	OCTOBER 2014
Drawing No:	2010.1
Revision No:	0

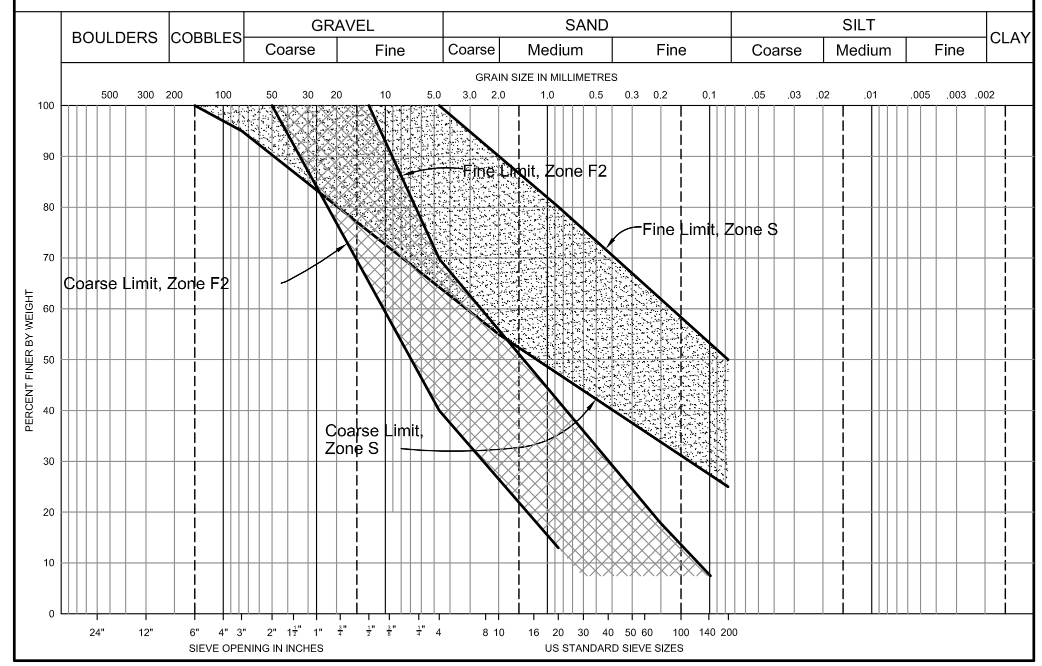
UNIFIED SOIL CLASSIFICATION SYSTEM

AREA: ZONES B1 AND C



UNIFIED SOIL CLASSIFICATION SYSTEM

AREA: LOW PERMEABILITY CORE AND CHIMNEY FILTER - ZONE S AND F2

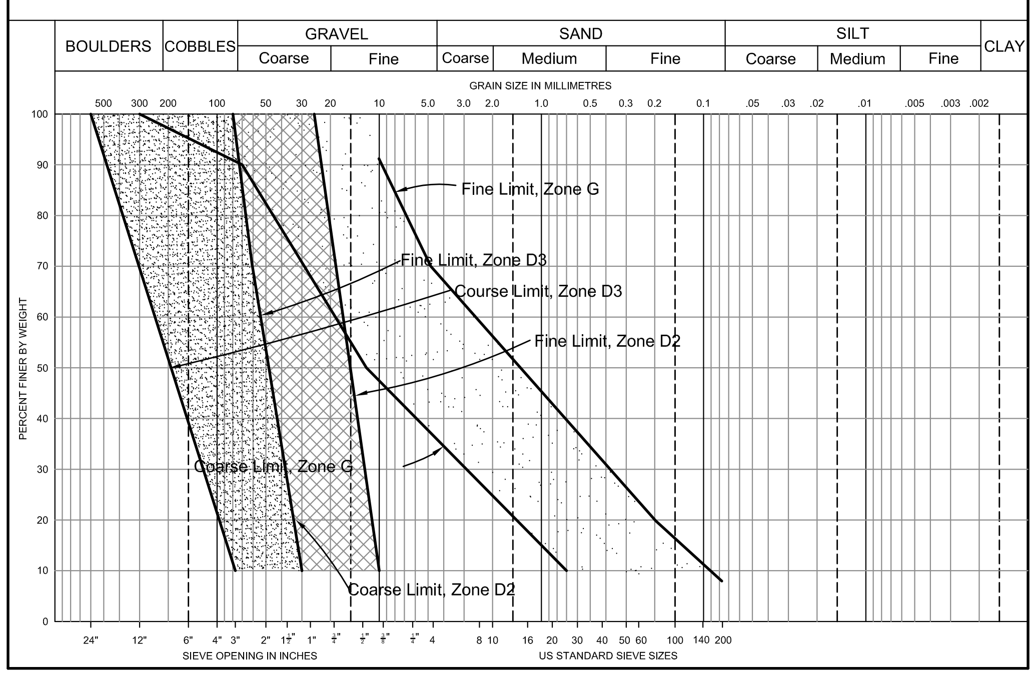


NOTES:

1. ALL DRAWINGS TO BE READ IN CONJUNCTION WITH THE TECHNICAL SPECIFICATIONS.
2. GRADATION SPECIFICATIONS FOR ZONES H AND H1 ARE A FINES CONTENT (PERCENT BY DRY WEIGHT FINER THAN 0.074 mm) SPECIFICATION ONLY. REFER TO FINAL AS-BUILTREPORT TEXT FOR MORE DETAILS.
3. GRADATION SPECIFICATIONS FOR SPILLWAY CONSTRUCTION MATERIALS ARE LISTED ON DRAWING 2009.1.002
4. FOR MATERIAL PLACEMENT SPECIFICATIONS REFER TO FINAL AS-BUILT REPORT TEXT.

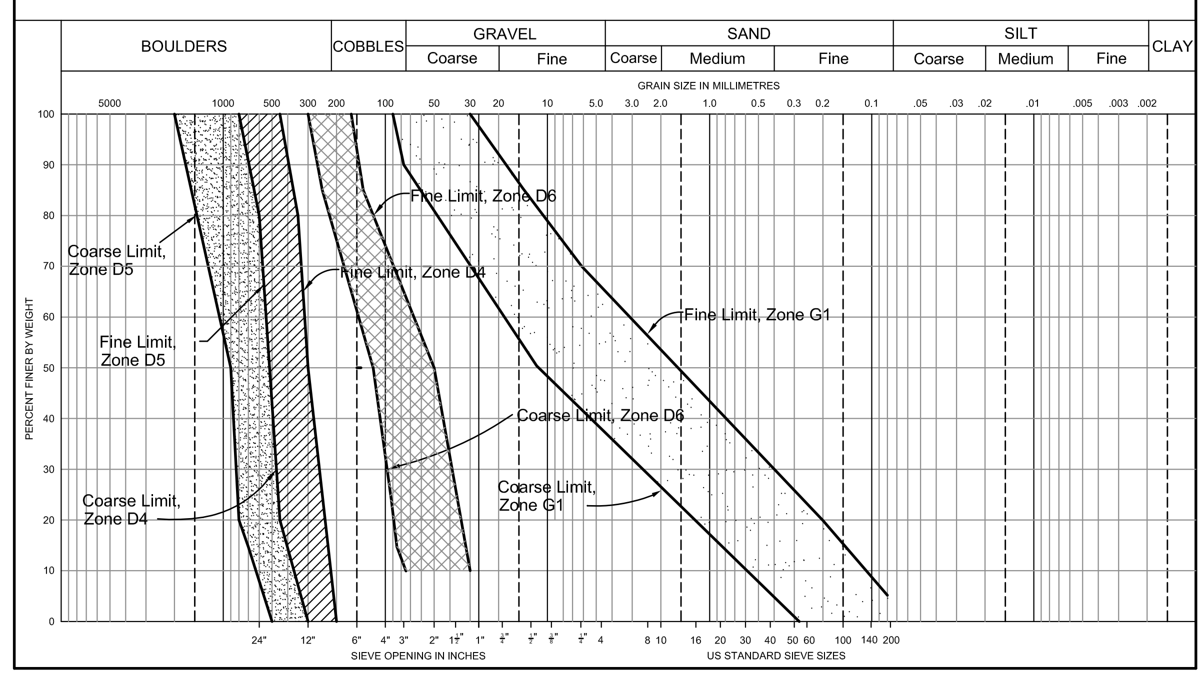
UNIFIED SOIL CLASSIFICATION SYSTEM

AREA: UNDERDRAINAGE SYSTEM - ZONES G, D2 AND D3



UNIFIED SOIL CLASSIFICATION SYSTEM

AREA: DIVERSION DITCH RIPRAP AND FILTER MATERIALS - ZONES G1, D4, D5, AND D6



REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
10	13	08	10	ISSUED FOR FINAL AS-BUILT	AW	TM
9	31	03	09	ISSUED FOR STAGE 12 AS-BUILT	RM	TM
8	06	06	07	ISSUED FOR STAGE 12 CONSTRUCTION	AW	TM
7	05	03	07	ISSUED FOR CONSTRUCTION	RM	TM
6	25	10	06	ISSUED FOR STAGE 11 TENDER	AW	TM
5	22	09	05	ISSUED FOR STAGE 10 TENDER	TM	TM
4	31	08	05	ISSUED FOR REVIEW	TM	TM
3	06	06	05	STAGE 8 AS - BUILT	TM	TM
2	??	02	04	STAGE 7 AS - BUILT	TM	TM
1	04	03	03	ISSUED FOR CONSTRUCTION	RNK	TM

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Client: AuRico Gold Inc. - Kemess Mines

Designed By:	RNK
Drawn By:	YC
Checked By:	AW
Reviewed by:	TM
Scale:	NTS
Project:	KEMESS TAILINGS STORAGE FACILITY 2014 DAM SAFETY INSPECTION
Title:	FINAL AS-BUILT MATERIAL GRADATION SPECIFICATIONS
Project No.:	VM00156.A
CADD File:	670.35.dwg
Date:	OCTOBER 2014
Drawing No.:	670.35
Revision No:	10