APPENDIX 4-H
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

SEABRIDGE GOLD INC.

KSM PROJECT

PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FINAL

PROJECT NO.:	0638014-30	DISTRIBUTION:	
DATE:	July 5, 2013	SEABRIDGE:	4 copies
DOCUMENT NO.:		BGC:	2 copies
		RESCAN:	1 copy

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July 5, 2013
Project No: 0638014-30

Mr. Brent Murphy, VP Environmental Affairs
Seabridge Gold Inc.
108 Front Street East,
Toronto, Ontario, M5A 1E1

Dear Mr. Murphy,

Re: Preliminary Snowfield Landslide Management Plan

Please find attached a copy of the above referenced report. If you have any questions or comments, please contact us as your convenience. We appreciate the continued opportunity to support the development of the KSM Project.

Yours sincerely,

BGC ENGINEERING INC.
per:

Derek Kinakin, M.Sc., P.Geo.
Senior Engineering Geologist

EXECUTIVE SUMMARY

The Snowfield Landslide is a 57 Mm^3 slope instability within the KSM Project area and east-adjacent to the proposed Mitchell Pit. A landslide management plan has been developed to help safeguard mine personnel from a rapid deformation and possible run-out of this landslide. In addition to the main landslide, the management plan also addresses the section of the Mitchell Pit wall that intersects, but does not undercut, the western edge of the Snowfield Landslide.

The staged management plan relies on:

- Active controls to reduce the likelihood of rapid deformation of the landslide.
- A multi-component monitoring program to provide data for the prediction of the onset of rapid landslide deformation.
- Mine planning and standard operating procedures in-pit to reduce the exposure of workers to slope instabilities related to the landslide.

Active controls focus on the reduction of pore water pressures in the landslide via the management of surface water infiltration, vertical pumping wells, and a dewatering adit with a drainage gallery. The multi-component monitoring program is designed to provide landslide displacement and pore-water pressure data. Monitoring instruments include prisms, borehole inclinometers, vibrating wire piezometers, and slope stability radar. Data from the monitoring system will be used to predict future landslide behavior and anticipate the onset of rapid deformation. Alternate egress from the pit will be built into all short term mine plans and be maintained in case of rapid movement of the landslide. Standard operating procedures in-pit will limit access to benches below the landslide material and establish response plans for personnel and equipment based on landslide displacement thresholds.

Although the proposed active controls are intended to slow or arrest the landslide displacements, rapid deformation of the Snowfield Landslide may still occur. Run-out of debris into the Mitchell Valley and the bottom of the Mitchell Pit is predicted based on an empirical assessment and case history reviews. The multi-layered monitoring system will provide adequate warning of the impending collapse to evacuate personnel and equipment from the run-out zone. The management plan developed in the current work will be updated as the KSM Project proceeds through permitting, construction, and mine operations.

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LIMITATIONS

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1.0 INTRODUCTION

1.1. Overview

The Snowfield Landslide is a well-documented (Margolis, 1993; BGC, 2010; 2011; 2012a; 2012b; 2012c) large bedrock slope instability located immediately east of the property boundary of Seabridge Gold Inc.'s (Seabridge) KSM Project; the western limit of the landslide will be intersected by the proposed Mitchell Open Pit. Seabridge has requested BGC Engineering Inc. (BGC) develop a management plan to help safeguard mine personnel from a rapid deformation of the Snowfield Landslide. A run-out analysis was also requested to assist in the delineation of affected areas by debris from the landslide.

1.2. Scope of Work

BGC, with input and review by Mr. Peter Stacey and Moose Mountain Technical Services (MMTS), has developed a staged plan to manage the hazard of rapid deformation of the Snowfield Landslide. The staged management plan has been developed by reviewing yearly mine plans from construction through the end of mining in the Mitchell Pit and the current understanding of the landslide geometry and behaviour (Section 2.0). The landslide management plan (Section 3.0) describes:

- Active controls to reduce the likelihood of rapid deformation of the landslide.
- A multi-component monitoring program to provide data to predict the onset of rapid landslide deformation.
- Mine planning and standard operating procedures in-pit to reduce the exposure of workers to slope instabilities related to the landslide.

Debris may be generated from the run-out of a rapid deformation of the Snowfield Landslide or the portion of the Mitchell Pit slope that intersects the western edge of the landslide. Estimates of run-out distances and paths for this landslide debris have been made for yearly stages of pit development. The estimates of run-out provide information for ongoing mine plan optimization and the development of short term mine plans during pit operations.

1.3. Previous and Other Work

BGC has been investigating the Snowfield Landslide since 2009. Field reviews and preliminary interpretations of the landslide were undertaken during the design of the Mitchell Pit slopes (BGC, 2010a) and geohazard assessments of the Mitchell Valley (BGC, 2010b). The initial geotechnical drilling in the landslide was undertaken by BGC for Silver Standard Resources Inc. during the summer of 2010 (BGC, 2011a). The history of the Snowfield Landslide from aerial photography and preliminary estimates of deformation rates were summarized in July 2012 (BGC, 2012a); this work included a run-out analysis of the landslide prior to the start of mining. Additional geotechnical drilling was completed in August 2012 (BGC, 2012b); this work included the installation of surface and subsurface monitoring equipment. The interpretation of the landslide basal surface was completed in October 2012 (BGC, 2012c).

Additional work is ongoing. A graduate research study is underway at Simon Fraser University under the supervision of Dr. D. Stead to improve the understanding of the landslide configuration and engineering geology. Three-dimensional numerical modeling of the landslide is planned to further evaluate the effects of the proposed mitigation options.

2.0 LANDSLIDE DESCRIPTION

2.1. Landslide Morphology and Volume

The Snowfield Landslide is an actively displacing, retrogressive, and complex bedrock slope instability (Drawing 1). It is located on the south slope of the Mitchell Valley, directly above the current terminus of the Mitchell Glacier. The toe of the landslide is coincident with the valley floor at approximately 960 m above sea level (ASL). The current back scarp, as identified from aerial photographs taken in 2010, is at approximately 1,420 mASL. The current height of the unstable mass of the landslide is approximately 500 m. The maximum width of the presently identified unstable zone is approximately 920 m. The slope angle in the area of the landslide toe is approximately 35°; between the valley floor to 1,140 mASL. The slope angle in the area of the landslide above 1,140 mASL to the current back scarp is approximately 25°.

The landslide has an estimated volume of 57×10^6 m^3 based on the interpretation of the base of the landslide. The three-dimensional interpretation of the basal surface was developed from 15 drill hole intercepts (Drawing 2), geotechnical core logging, televiewer surveys, and aerial photographic interpretations. The depth of the landslide has been interpreted based on changes in rock mass quality observed in the available drill holes (Drawing 3). The south, west, and east flanks of the surface are concave creating a bowl-shape surface that directs movement to the northwest.

2.2. Instability Mode

The mode of instability of the Snowfield Landslide has been previously reported (BGC, 2012a) and is summarized below:

1. The lower slope appears to be mainly toppling; columns or slabs of rock defined by persistent geological structures are tilting and rotating toward the valley.
2. The upper slope, behind the toppling zone, appears to be sliding and down-dropping into the space made available due to the toppling of the lower slope.

The landslide appears to be retrogressive: failure has initiated as toppling in the lower slope and deformation has progressed up-slope as sliding. Rapid slope deformation is not commonly associated with large toppling instabilities; sliding instabilities are considered to be more likely to result in rapid slope deformation.

2.3. Displacement Rates

Historical aerial photography shows that the Snowfield Landslide has been deforming for approximately 50 years, likely in response to the retreat of the Mitchell Glacier. Displacement rates of between 100 and 500 mm per year, or 0.3 mm/day to 1.4 mm/day, have been estimated for the Snowfield Landslide from 2008 to 2012 (BGC, 2012b). The displacement of the landslide is classified as “very slow” to “slow” moving (Cruden and Varnes, 1996).

2.4. Natural Controls on Landslide Displacement

Glacial debuttressing from the retreat of the Mitchell Glacier may have contributed to the observed slope displacement. In 1956, the elevation of the Mitchell Glacier surface was approximately 1,080 mASL, approximately 120 m above the present toe of the landslide. By 2010, the glacier surface had been reduced through ice loss to 960 mASL elevation at the toe of the Snowfield Landslide. The Mitchell Glacier has continued to retreat up valley and no longer provides any support to the slope within the present slide limits.

The rate of landslide movement is inferred to be sensitive to pore water pressures. Two streams of water from snow melt and rain drain into the head scarp of the landslide. Open cracks within the landslide mass allow additional surface water to infiltrate. Seeps are observed near the toe of the slope in the toppling zone. At least three seepage points can be seen in the 2010 aerial photography (BGC, 2012a). Measurements from the MZ-095 vibrating wire piezometer indicate a piezometric head rise from 1073 mASL in May, to 1141 mASL during the middle of the freshet in June (BGC, 2012b). The instrument failed during the 2012 freshet possibly due to shearing at the slip surface. The loss of the piezometer is similar to previously reported anecdotal information (BGC, 2012a): Silver Standard Resources Inc. experienced the loss of drill rods due to the apparent mobilization of part of the landslide. The section of landslide was inferred to be mobilized by high volumes of drilling fluids from four rigs working in close proximity during a summer exploration program.

2.5. Modifications to the Landslide Morphology

The Snowfield Landslide is in an unstable configuration due to natural conditions in the Mitchell Valley. The development of the KSM Project will result in the following modifications to the landslide:

1. A fill road (Drawing 4) will be constructed over the toe and up to the head scarp on the western half of the slide.
2. The Mitchell Pit will intersect the western edge of the landslide between Year 4 and Year 10. Based on the shape of the basal surface of the landslide and the orientation of the proposed pit wall, the landslide is not “undercut” by the slope, i.e., the development of the pit slope does not daylight a potential sliding surface that would result in the landslide moving into the pit. Approximately 5% of the total landslide volume is mined off from the western edge.

The staged management plan (Section 3.0) outlines further changes to the landslide to promote stability of the slope.

3.0 STAGED LANDSLIDE MANAGEMENT PLAN

3.1. Overview

A plan has been developed to allow work below the Snowfield Landslide and mining of the Mitchell Pit to proceed under managed conditions. The management plan relies on:

1. Active controls to reduce the likelihood of rapid deformation of the Snowfield Landslide.
2. A multi-component monitoring program to provide data for the prediction of the onset of landslide acceleration and rapid movement.
3. Mine planning and standard operating procedures in-pit to reduce the exposure of workers to slope instabilities.

The components of the plan are staged (Table 1) with consideration of other construction and mining activities around the landslide. Drawing 4 provides an overview of the management plan infrastructure at Year 23; additional years are provided in Appendix A. In general, the management plan proposed is similar to plans used for other large landslides successfully managed in British Columbia and other parts of the world (Table 2). Technology proposed for the management plan is readily available and commonly used in large open pit mines. Each component of the Snowfield Landslide management plan is discussed below.

3.2. Active Controls

3.2.1. Surface Water Diversion

Reducing the infiltration of surface water will reduce pore water pressures in the landslide mass. The pore water pressure control will prevent increases in landslide displacements. Fresh surface water from ice fields and snowmelt on Sulphurets ridge will be diverted away from the head scarp of the landslide by a diversion ditch. The ditch (Drawing 4) will be built immediately up slope of the current head scarp of the landslide. Water from this ditch will be directed east and then down to the valley floor to be handled by other parts of the fresh-water management system. A similar ditch was planned for construction during Year 27 of mine development; this ditch will now be in-place prior to pre-stripping of the Mitchell Pit. Maintenance of the ditch will be required each spring to clear snow and ice. Additional minor ditches can be constructed if and when needed.

3.2.2. Pumping Wells

Further reduction of the pore water pressures in the landslide will be accomplished with vertical pumping wells. Eight to ten 200 m long, 8" diameter steel-cased vertical wells (Drawing B-01) will be installed at the start of Mitchell Pit mining (Drawing A-02), during the start of the pit dewatering program. Based on the results of the three-dimensional pit dewatering numerical model, these wells may produce a total flow from 2,000 m^3/day to 4,000 m^3/day. Water from the wells is considered contact water and will be piped into the contact water management system.

If landslide deformations continue once the wells are installed, additional wells may be required to increase the extraction of groundwater or replace damaged wells. The wells in the moving landslide are estimated to have a lifespan of 2 to 3 years, based on displacement rates observed to date. If displacements of the landslide are reduced through the reduction of the pore water pressures, the life span of the wells will be longer.

3.2.3. Dewatering Adit

The Snowfield Dewatering Adit (Drawing B-02) will be constructed as an extension of the eastern end of the North Pit Wall Dewatering Adit, approximately in Year 5 and during the initial mining of the western edge of the Snowfield Landslide. The Snowfield Dewatering Adit will provide a gravity drain via a gallery of inclined drainholes drilled up from below the landslide base. The total length of the planned adit is 997 m. The total length of drainholes is estimated to be 15,000 m; individual drainholes may be 50 m to 250 m long, spaced on 25 m to 50 m centres along the adit. Flows to the adit were estimated with consideration of the groundwater stored in the landslide, recharge from precipitation and snowmelt to the landslide footprint, and analytical seepage estimates. The flows captured by the adit are estimated to peak soon after the adit is completed at 4,200 m^3/day; reducing with time to 2,600 m^3/day. Water from the adit will flow into the contact water management system via North Pit Wall Dewatering Adit to the water treatment pond (Drawing 5). Additional drain holes may be installed over the life of the adit. It is likely that vertical dewatering wells will not be required after the Snowfield Dewatering Adit is in place.

3.2.4. Slope Angle Reduction

The development of the Mitchell Pit does not undercut the Snowfield Landslide; however a section of the pit wall is developed in the disturbed and displaced rock mass of the landslide. Slope angles for the section of the Mitchell Pit that intersects the western edge of the landslide have been reduced to improve stability of the pit wall. Bench face angles are reduced to 60° from 70° in the area of the landslide. Catch bench widths are 16 m, resulting in inter-ramp angles of 42°. The maximum height of the pit slope developed in the landslide is 180 m. These reduced slope angles are used during the mining of final pit slope in the Snowfield Landslide from Year 8 to Year 10.

3.2.5. Blast Design

A blast monitoring program will be established during the initial stripping in the Mitchell Pit with seismographs on the Snowfield Landslide. Data from the monitoring program will be used to develop site characteristic curves relating blast hole energy and peak particle velocity in the landslide mass. The estimated peak particle velocities will be compared to slope displacement and pore water pressure monitoring data. These relationships will be used to design production blasts in the Mitchell Pit that limit the likelihood of: generating new fractures in the slide material, mobilizing sections of the slide, and/or resulting in elevated pore water pressures at the base of the landslide.

3.2.6. Geotechnical Berm

No additional mining of the landslide is planned after approximately Year 10. A 50 m wide geotechnical berm will be left at the lowest elevation of the intersection of the pit slope with the landslide (Drawing 4) after the final wall is established. The geotechnical berm provides catchment for fragmental rock fall and access to clean raveling rock or manage seepage from the landslide.

3.3. Monitoring Program

3.3.1. Bench Mark Surveys

Annual surveys of drill hole collars have been relied on to date to estimate landslide deformations from 2008 to 2012. During the 2012 field season, BGC installed six additional permanent survey markers in the Snowfield Landslide (BGC, 2012b). Manual measurements of the drill hole collars and survey markers will be carried out with high precision global positioning system (GPS) tools in 2013 and going forward. Bi-annual surveys (spring and fall) will be undertaken as the KSM Project proceeds through permitting. These data will be used to support ongoing interpretations of the Snowfield Landslide behavior and mode of instability.

3.3.2. Prism Monitoring via Theodolite

Ten to fifteen survey prisms will be installed in the area of the Snowfield Landslide prior to the construction of the fill road and diversion ditch. The prisms will provide information on the displacements of the landslide at surface. The prisms will be monitored from the north wall of the Mitchell Valley on a weekly or monthly basis; depending on the rates of change observed between surveys, the measurement frequency may be increased or decreased. It is expected that this monitoring method will be used when the prisms are not covered by snow.

3.3.3. In-place Inclinometers

Four to six borehole inclinometer casings will be initially installed through the Snowfield Landslide prior to the construction of the fill road and diversion ditch. In-place inclinometers will be installed and connected to data loggers at ground surface. The inclinometer cases are expected to eventually shear-off. The in-place inclinometer measuring tools will be recovered prior to shearing-off of the casing; manual measurements can continue until the casings are lost. Additional casings will be installed to maintain the monitoring network.

The inclinometers provide information on sub-surface deformations of the landslide and further confirm the base of the landslide. Weekly readings of the inclinometers will be conducted; daily reading may be undertaken through May, June, and July during the period of greatest snowmelt and possibly greatest landslide movement.

3.3.4. Vibrating Wire Piezometers

Six to ten fully grouted vibrating wire piezometers (VWPs) will be initially installed during the installation of the vertical dewatering wells and/or the inclinometer casings. The VWPs provide estimates of pore water pressures in the landslide and will be used to evaluate the effectiveness of the landslide dewatering. Each VWP will be connected to a data logger; measurements will be taken twice-daily. Additional VWPs may be required over time as instruments are lost due to landslide displacements.

3.3.5. Automated Data Acquisition System

An automated data acquisition system (ADAS) will be developed for the monitoring instruments used in the Snowfield Landslide. The system will be established during construction and added to as additional monitoring systems are put into place. The in-place inclinometers will be the first instruments captured in the ADAS; VWPs will be added once they are installed. Prism monitoring may be added to the ADAS if automated measurements of the prisms are eventually undertaken.

The ADAS will use radio communication to allow remote downloading of the data loggers from each instrument. The data will be collected in a central database in the main mine operations office for analysis by on staff geotechnical engineers. The remote retrieval of data will be particularly useful during winter months when individual monitoring instruments may be difficult to visit due to snow cover.

3.3.6. Adit Discharge Monitoring

Flow meters will be used in the Snowfield Dewatering Adit to measure the volume of groundwater removed from the landslide. Data from the flow meters will be compared to weather data and VWP measurements to assess effects of the dewatering adit. Water quality will also be measured.

3.3.7. Slope Stability Radar

Slope stability radar (SSR) will be used when there is active mining of and near the Snowfield Landslide (approximately Year 8 through Year 10) to monitor the displacement of pit slopes. After the final wall is developed in the landslide (approximately Year 10), a fixed SSR installation on the west wall of the Mitchell Pit will be used to monitor the final pit slope at the western edge of the Snowfield Landslide while mining continues below.

3.3.8. Displacement Analysis and Prediction

Data from the monitoring of landslide displacements and pore water pressures will be used to:

- Compare displacements to set thresholds established in a trigger-action-response-plan (TARP).
- Further develop and calibrate a three-dimensional numerical model of the landslide for use in predicting future behavior of the landslide.

- Predict the onset of rapid slope deformation using industry standard techniques such as the inverse-velocity method (Rose and Hungr, 2007) or changes in landslide acceleration rates.

The regular analysis of monitoring data will provide months or weeks of warning for a significant acceleration of the Snowfield Landslide or the pit slope that intersects the western edge of the landslide. Based on experience with monitoring and predicting the acceleration of landslide deformation in operating open pits, adequate time to evacuate personnel and equipment will be available.

3.4. Mine Planning and Standard Operating Procedures

3.4.1. Pit Access and Egress

Short term mine plans developed for daily/weekly/monthly activities will be prepared by the mine engineers and modified as required to provide access into the Mitchell Pit that does not pass below the landslide. Where ramps are developed below the landslide, alternate egress will be established.

3.4.2. Visual Inspections

Visual inspections for new cracks in the landslide or at the pit crest in the area of the landslide will be undertaken weekly. The inspection area will be accessed via the fill road along the western half of the landslide. Visual inspections are not practical through the winter due to snow cover. The inspections should begin in May, during the usual start of snow melt, to coincide with the period where surface water infiltration may be greatest and affect slope stability. The visual inspections will continue through the first snows in October or November.

3.4.3. Bench Access Restrictions

Access to mine benches developed in the western edge of the Snowfield Landslide will prevented after blasting, digging, and scaling has been completed. Mapping or slope documentation of these benches may be undertaken with remote methods, such as photogrammetry or LiDAR. Monitoring of these slopes will be undertaken with SSR. Access to the 50 m wide geotechnical berm will be permitted with a safe ingress protocol in-place.

3.4.4. Geotechnical Berm Maintenance

The 50 m wide geotechnical berm will be cleaned regularly to maintain rock fall catchment below the mine benches developed in the western edge of the Snowfield Landslide. Snow will be removed from this bench to provide access throughout the year. Access to the geotechnical berm will be subject to the availability of real time monitoring of the slopes above by the SSR and a safe ingress protocol in-place.

3.4.5. Trigger-Action-Response- Plan

A detailed trigger-action-response- plan (TARP) will be developed by mine engineering staff outlining:

1. Deformation or pore pressure threshold or triggers requiring action by mine staff. Separate thresholds for various levels of displacement may be established with activities in pit modified according to the threshold reached. A displacement threshold requiring evacuation of personnel and equipment from the pit and area below the landslide will be established.
2. Primary contacts and staff responsibilities in case of slope displacements meeting the set thresholds.
3. Evacuation routes from the working areas in the pit and below the landslide and muster areas outside estimated run-out limits of the landslide for personnel and equipment.
4. Procedures for evaluating when access into the pit can be re-established.

Thresholds for slope deformation will be developed and modified as mine engineering staff gain experience with the behavior of the slope. The plan will be developed with input from mine management and safety personnel. The execution of the plan will be dependent on many staff including superintendents, pit supervisors, mine engineers, and geotechnical engineers with accountability to senior mine management.

4.0 RUN-OUT ESTIMATES

4.1. Overview

In the event of a rapid deformation of the Snowfield Landslide or the pit slope intersecting the western edge of the landslide, landslide debris may run-out into the Mitchell Valley or open pit. The possible extents of the debris run-out from these two scenarios have been estimated. The run-out paths of the debris have been evaluated for yearly stages of the Mitchell Pit development; areas of the pit that may be covered by debris have been estimated.

4.2. Landslide Scenarios

4.2.1. Scenario A – Snowfield Landslide

The Snowfield Landslide is currently deforming slowly. Based on changes to the landslide due to the development of the KSM Project, the landslide may:

1. Stop deforming or deform at a reduced rate compared to current estimates.
2. Continue deforming slowly at the current rate.
3. Deform at an accelerated rate resulting in a slump with limited run-out.
4. Deform rapidly, resulting the run-out of landslide debris.

Each of these possible outcomes is considered equally likely at this stage of study and can be managed by the plan proposed in Section 3.0. The run-out analyses provide estimates of the possible extent of the Snowfield Landslide debris in the Mitchell Valley or Pit. Volumes used in the landslide debris run-out analyses have been estimated using the interpreted basal surface of the landslide. The run-out paths have been estimated for yearly pit stages from Year 1 through Year 23 (Appendix C).

4.2.2. Scenario B – Mine Bench Instability

A 180 m high portion of the Mitchell Pit slope will be developed in the western margin of the Snowfield Landslide. Starting in mining Year 4, benching will begin in landslide material increasing to a maximum of six benches high by Year 10. The slope may:

1. Deform, but the slope will function as designed.
2. Deform and ravel, producing fragmental rock fall from the poor quality landslide material exposed in the benches.
3. Deform and accelerate rapidly, resulting in the run-out of landslide debris.

The slopes developed in the landslide have been designed to a factor of safety consistent with the other walls of the Mitchell Pit. It is expected that the 50 m wide geotechnical berm below the landslide will provide sufficient catchment to maintain raveling benches. The rapid failure of this slope and the run-out of landslide debris into the pit is considered to be the least likely outcome of mining this slope. Nevertheless, a prediction of the possible run-out extent of this debris has been provided. Volumes used in the run-out analyses have been estimated for multiple years, depending on the amount of slope developed in the landslide. The run-out paths have been estimated for yearly pit stages from Year 4 through Year 23 (Appendix D).

4.3. Run-out Assessment Methodology

4.3.1. Empirical Estimates of Run-Out Distance

An empirical method is used to relate the landslide volume to the travel distance by the "angle of reach" or "fahrboshung" concept (Heim, 1932). The angle of reach is defined by a line that connects the back scarp of the landslide with the distal edge of the deposit on a cross section along the travel path of the debris. This empirical method has been used for the estimation of the run-out of at least two landslides in an operating open pit mine (Rose, 2011).

The design graph (Figure 1) was developed by McDougall et al. (2012) using a dataset natural landslide case histories collected by Li (1983). Approximately 80 landslides were included in the dataset, including several obstructed by opposing valley walls or deflected by topography. Based on the "best fit" line through the data and considering the underlying scatter, "probability of exceedance" isolines are shown on the design graph. The best fit line defines the 50% exceedance probability, where half of the case studies traveled less than predicted by the best fit line while the other half travelled further than predicted by the best fit line.

BGC has compared nine landslides from operating open pit mines to the design graph to select the exceedance probability used for current work (Figure 1). The landslides in open pits cluster around the 50% exceedance probability line. The "embayment" landslide, a historical landslide located in the western part of the Mitchell Valley (BGC, 2011b), has also been compared to the design graph. This natural landslide plots between the 25% and 50% exceedance probability lines. Based on the additional landslide cases reviewed, the 50% exceedance probability line is considered appropriate for preliminary estimates of the likely run-out distance of landslide debris into open pits.

4.3.2. Volume Estimates

The empirical design graph requires an estimate of landside volume for each scenario considered. Landslide volumes for Scenario A were estimated to be approximately half of the total landslide volume; assuming mainly the sliding part of the landslide would result in debris run-out. Landslide volumes for Scenario B were estimated from the cross sectional area defined by the critical slip surface from two-dimensional slope stability analyses and the total width of the slope intersecting the landslide. The volumes considered in Scenario B change from Year 4 to Year 10, as the pit intersects the western edge of the landslide. To assess the sensitivity of the run-out distance to landslide volume, the estimates of run-out have also been completed for Scenarios A and B using the twice the base case landslide volumes. This sensitivity analysis accounts for uncertainty in the base case volume estimates and bulking of the landslide material during run-out.

4.3.3. Run-out Paths and Extents

Run-out paths for each scenario and each year of mining have been estimated manually. In all cases the run-out is assumed to follow the “fall-line” or line of steepest slope from the initiation zone though the area of deposition. Landslide paths for Scenario A follow the average dip direction of the interpreted basal surface of the landslide before running into the pit and toward the pit bottom. Landslide paths estimated for Scenario B are oriented perpendicular to bench crests into the bottom of the open pit.

At this stage of analysis, the width of the run-out zones is assumed to be similar to the width of the initial failure mass; unless constrained by topography. The length of the run-out zone is estimated from the design graph. The borders of the run-out zones are approximate with confidence limits similar to the estimate of run-out length. There is a 50% likelihood that landslide debris could be located beyond the estimated run-out zones. Additional setbacks from these limits or additional limits based on lower probability of exceedance criteria may be required when developing short term mine plans for the storage of equipment and mobile infrastructure or establishing evacuation limits.

4.4. Scenario A Results

A consistent landslide volume and angle of reach is considered in Scenario A for all years of pit development (Table 3). The assumed run-out path changes as the Mitchell Pit develops toward the east and increases in depth. From Year 1 to Year 7, the likely run-out of the landslide is predicted to extend into the Mitchell Valley and contact the north slope (Drawing C-7). Landslide debris would be located east of the pit crest; debris may spill into the pit if the run-out is greater than predicted. Run-out in years 8 to 10 would result in spill-over of debris onto the upper benches of the east wall of the Mitchell Pit; debris could travel to the working area. By Year 11, the eastern limit of the Mitchell Pit intersects the assumed run-out path of the landslide debris. Landslide debris is predicted to run-out to the bottom of the open pit from Years 11 to 23 (Drawings C-11 to C-23). The east wall, lower sections of the north wall, and the lower sections of the west wall may be covered by landslide debris in the event of run-out from the Snowfield Landslide in Year 23.

4.5. Scenario B Results

Landslide volumes considered in Scenario B vary from < 500,000 m^3 to approximately 2 Mm^3; the volume is predicted to increase from Year 4 to a maximum in Year 10 (Table 3). The assumed run-out path does not change significantly, as the Mitchell Pit developed. In all analyses completed (Appendix D), landslide debris is predicted to reach the working bench or bottom of the open pit. These results may be conservative considering the volumes of rock considered and the material that should be retained on mine benches. However, a comparison of storage volume available on benches and the landslide volumes considered in the current work suggest that not all of the debris can be retained by the benches available at each stage of pit development; debris is available to travel to the working level.

5.0 SUMMARY

The Snowfield Landslide is a documented geological hazard within the KSM Project area and east-adjacent to the proposed Mitchell Pit. A landslide management plan has been developed to help safeguard mine personnel from a rapid acceleration and possible run-out of this landslide. The staged management plan relies on:

- Active controls to reduce the likelihood of rapid acceleration of the landslide.
- A multi-component monitoring program to provide data for the prediction of the onset of rapid deformation of the landslide.
- Mine planning and standard operating procedures in-pit to reduce the exposure of workers to slope instabilities related to the landslide.

If the proposed active controls do not slow or arrest the landslide displacements as expected, a rapid deformation of the Snowfield Landslide may occur resulting in the run-out of landslide debris. The debris could run-out into the Mitchell Valley and travel to the bottom of the Mitchell Pit. The multi-layered monitoring system will provide adequate warning of the rapid deformation, allowing time to evacuate personnel and equipment beyond the run-out zone. Alternate egress from the pit will be built into all short term mine plans and be maintained in case of a collapse of the landslide. Procedures to evaluate when access to the pit could be re-established will be in-place. The management plan developed in the current work will be updated as the KSM Project proceeds through permitting, construction, and mine operations.

6.0 CLOSURE

We trust the above satisfies your requirements for the KSM Project at this time. Thank you for the continued opportunity to support this world class mining project. Should you have any questions or comments, please do not hesitate to contact us.

Yours sincerely,

BGC ENGINEERING INC.
per:

Derek Kinakin, M.Sc., P.Geo
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REFERENCES

BGC Engineering Inc. 2010a. KSM Project: Mitchell Zone - Open Pit Slope Design – Final. Submitted to Seabridge Gold Inc., April 16, 2010.

BGC Engineering Inc. 2010b. Geohazards Overview: KSM Project. Submitted to Seabridge Gold Inc., May 12, 2010.

BGC Engineering Inc. 2011a. Snowfield-Brucejack 2010 Mine Area Site Investigation Summary. Submitted to Silver Standard Resources Inc., February 14, 2011.

BGC Engineering Inc. 2011b. KSM Project – Preliminary Geohazard Risk Reduction Concepts: Geohazard Mitigation for Facilities other than the OPC – Final. Submitted to Seabridge Gold Inc., January 7, 2011

BGC Engineering Inc. 2012a. KSM Project – Preliminary Assessment of the Snowfield Landslide – Final. Submitted to Seabridge Gold Inc., July 13, 2012

BGC Engineering Inc. 2012b. KSM Project – Snowfield Landslide Site Investigation – Draft. Submitted to Seabridge Gold Inc., September 21, 2012

BGC Engineering Inc. 2012c. KSM Project – Preliminary Interpretation of the Basal Surface of the Snowfield Landslide – Final. Submitted to Seabridge Gold Inc., October 19, 2012

Cruden, D. M., Varnes, D. J. 1996. Landslide types and processes. In: Landlsides, Investigation and Mitigation. Special Report 247, Transportation Research Board, Washington pp. 36-75.

Heim, A. 1932. Lanslides and Human Lives. BiTech Publishers Ltd.

Li, T. 1983. A mathematical model for predicting the extent of a major rockfall. Zeitschrift fur Geomorphologie, 27(4): 473-482.

Margolis, J. 1993. Geology and intrusion-related copper-gold mineralization, Sulphurets British Columbia. Ph.D. dissertation, University of Oregon, Eugene

McDougall, S., McKinnon, M., Hungr, O. 2012. Developments in landslide runout prediction. In: Landslides: Types, Mechanisms, and Modelling (eds Clague, J.J. and Stead, D.) Cambridge University Press. Pgs. 187 – 195

Rose, N.D., Hungr, O. 2007. Forecasting potential slope failure in open pit mines using the inverse-velocity method. Int. Journal of Rock Mechanics and Mining Sciences 44: 308-320.

Rose, N.D. 2011. Investigating the Effects of Mining-Induced Strain in Open Pit Slopes. Slope Stability 2011: International Symposium on Rock Slope Stability in Open Pit Mining and Civil Engineering.

TABLES

TABLE 1. Staged Management Plan for the Snowfield Landslide

Stage	Approx. Years	Mitchell Pit Development	Reference Drawings	Active Controls	Monitoring System[1]	Mine Planning and Standard Operating Procedures[2]
1	< 1	• Fill road built on landslide • Water management infrastructure construction in Mitchell Valley	-	• Surface water diversion	• Bench mark surveys • Prism monitoring	• Initial TARP development • Visual inspections
2	1 to 3	• Initial mining of south wall of the Mitchell Pit • No mining in or below the Snowfield Landslide	A-01 to A-03	• Surface water diversion • Vertical wells	• Vibrating wire piezometers • In-place inclinometers • Prism monitoring • ADAS	• TARP • Visual inspections
3	4 to 5	• Initial mining of western edge of the landslide	A-04 and A-05	• Surface water diversion • Vertical wells • Blast design	• Vibrating wire piezometers • In-place inclinometers • Prism monitoring • ADAS	• TARP • Visual inspections • Restricted bench access
4	6 to 8	• Mining in south wall of Mitchell Pit • Mining above and outside of the Snowfield Landslide	A-06 to A-08	• Surface water diversion • Vertical wells • Snowfield Dewatering Adit	• Vibrating wire piezometers • In-place inclinometers • Prism monitoring • ADAS • Adit discharge monitoring	• TARP • Visual inspections • Restricted bench access
5	9 to 10	• Mine final wall in landslide	A-09 and A-10	• Surface water diversion • Snowfield Dewatering Adit • 50 m wide geotechnical berm • Blast design	• Vibrating wire piezometers • In-place inclinometers • Prism monitoring • ADAS • Adit discharge monitoring • Slope stability radar	• TARP • Visual inspections • Restricted bench access • Short term plans with alternate egress • Geotechnical berm maintenance
6	11 to 12	• No additional mining in the Snowfield Landslide • Mine below the elevation of the valley floor and below the basal surface elevation of the Snowfield Landslide	A-11 and A-12	• Surface water diversion • Snowfield Dewatering Adit • 50 m wide geotechnical berm	• Vibrating wire piezometers • In-place inclinometers • Prism monitoring • ADAS • Adit discharge monitoring • Slope stability radar	• TARP • Visual inspections • Restricted bench access • Short term plans with alternate egress • Geotechnical berm maintenance
7	13 to 18	• Mining north wall of Mitchell Pit • Mining above and outside of the Snowfield Landslide	A-13 to A-18	• Surface water diversion • Snowfield Dewatering Adit • 50 m wide geotechnical berm	• Vibrating wire piezometers • In-place inclinometers • Prism monitoring • ADAS • Adit discharge monitoring	• TARP • Visual inspections • Restricted bench access • Short term plans with alternate egress • Geotechnical berm maintenance
8	19 to 23	• Mine below the elevation of the valley floor and below the basal surface elevation of the Snowfield Landslide	A-19 to A-23	• Surface water diversion • Snowfield Dewatering Adit • 50 m wide geotechnical berm	• Vibrating wire piezometers • In-place inclinometers • Prism monitoring • ADAS • Adit discharge monitoring • Slope stability radar	• TARP • Visual inspections • Restricted bench access • Short term plans with alternate egress • Geotechnical berm maintenance

Notes:
1. An automated data acquisition system (ADAS) will be developed to monitor instruments remotely.
2. A detailed trigger-action-response-plan (TARP) will be developed by mine engineering staff to define displacement thresholds and staff responsibilities.

TABLE 2. Landslide Management Case Studies

Landslide	Slide Volume (Mm^3)	Slide Material	Dewatering Description	Flow Rate (m^3/day)	Monitoring Method[1]	Monitoring Frequency[2]	Unmitigated Displacement Rate (mm/year)	Mitigated Displacement Rate (mm/year)	Reference
Downie Slide	1500	Fractured and faulted mica schists and gneisses	2,430 m of tunnel with 13,600 m of drainholes	Adit 1: 2,600 - 4,300 Adit 2: 430 - 1100	Piezometers (117) Inclinometers (17) Extensometers (2) Survey monuments (20) EDM monuments (5) ADAS gauged piezometers (4) ADAS in-place inclinometers (3) ADAS four-point extensometers (2) ADAS flumes (2) ADAS seismic trigger (1)	Piezometers: Twice weekly (Apr - Sept) Inclinometers: Twice yearly Extensometers: Monthly (Apr - Oct) Survey monuments: Yearly EDM monuments: Twice weekly (May - Sept); Twice monthly (Oct - Apr) ADAS read every 10 minutes, one recording per day Seismic trigger: Alarm if 2% g ground motion is exceeded	10	1.7	Imrie et al (1992) Enegren and Imrie (1996)
Nine Mile Creek (Upstream)	>1000	Sheared schist and blocky schist	4,850 m of tunnel with 20,000 m of drainholes	No data available	Geodetic surveys Inclinometers Piezometers (single, nested, and Westbay multi-port) Extensometers Flow measurement weirs at adit portal	Twice weekly	No data available	No data available	Jennings et al (1992) Macfarlane and Gillon (1996)
Nine Mile Creek (Downstream)	300	Sheared schist and blocky schist	3,300 m of tunnel with 15,000 m of drainholes	No data available	No data available	No data available	No data available	No data available	Newton and Smith (1992) Jennings et al. (1992)
Campo Vallemaggia	800	Folded and faulted metamorphics	1,800 m of tunnel with 35 drainholes (25 - 70 m long)	2,600	Geodetic surveys	No data available	300	"stable"	Ederhardt et al. (2007)
Brewery Creek Slide	150	Sheared mica and blocky schist debris	1,900 m of tunnel with 12,000 m of drainholes	No data available	Piezometers Inclinometers Extensometers Survey marks	No data available	No data available	No data available	Gillon et al. (1992b)
Dutchman's Ridge	115	Fractured and faulted gniessic and schistose rock	872 m of tunnel with 17,000 m of drainholes	2,200 - 4,300	Multi-port piezometers (13) Standpipe piezometer (21) Inclinometers (10) Extensometers (1) Surface monuments Flume measuring flows from the adit	Mulit-port: Once a week for first 3 years, then reduced to bi-weekly during freshet and monthly during winter Standpipes: 14 read weekly, 7 read monthly during drainage construction Inclinometers: Six readings per year for first 3 years, reduced to twice yearly Extensometer: ADAS read every 10 minutes, one recording per day Flume: Two sensors read at 10 minute intervals	10	0.8	Moore and Imrie (1992) Meidal and Moore (1996)
No. 5 Creek Slide	60	Sheared mica schist and blocky schist debris	760 m of tunnel with 6,350 m of drainholes	432	No data available	No data available	No data available	No data available	Macfarlane and Jenks (1996)
Cairnmuir Landslide	8.3	Schist debris and fractured schistose rock	600 m of tunnel with 6,000 m of drainholes	No data available	No data available	No data available	No data available	No data available	Gillon and Saul (1996)
Jackson Landslide	5	Schist debris and fractured schistose rock	500 m of tunnel with 7,600 m of drainholes	No data available	No data available	No data available	No data available	No data available	Gillon et al. (1992a)

Notes:
1. The total number of instruments installed to the date of reference publication is shown in parentheses.
2. Monitoring frequency is as reported at the date of reference publication. Current monitoring practices may differ.

TABLE 3. Run-out Assessment Parameters

Scenario	Approximate Years	Estimated Volume (Mm^3)	Angle of Reach (°)	
			50% Exceedance Probability	2x Volume
A	1 to 23	30	18	17
B	4	0.4	33	31
	5 to 8	0.6	31	29
	9	0.9	30	27
	10 to 23	1.9	27	24

Notes:

1. Empirical method used to estimate angle of reach is presented in Figure 1.

FIGURES

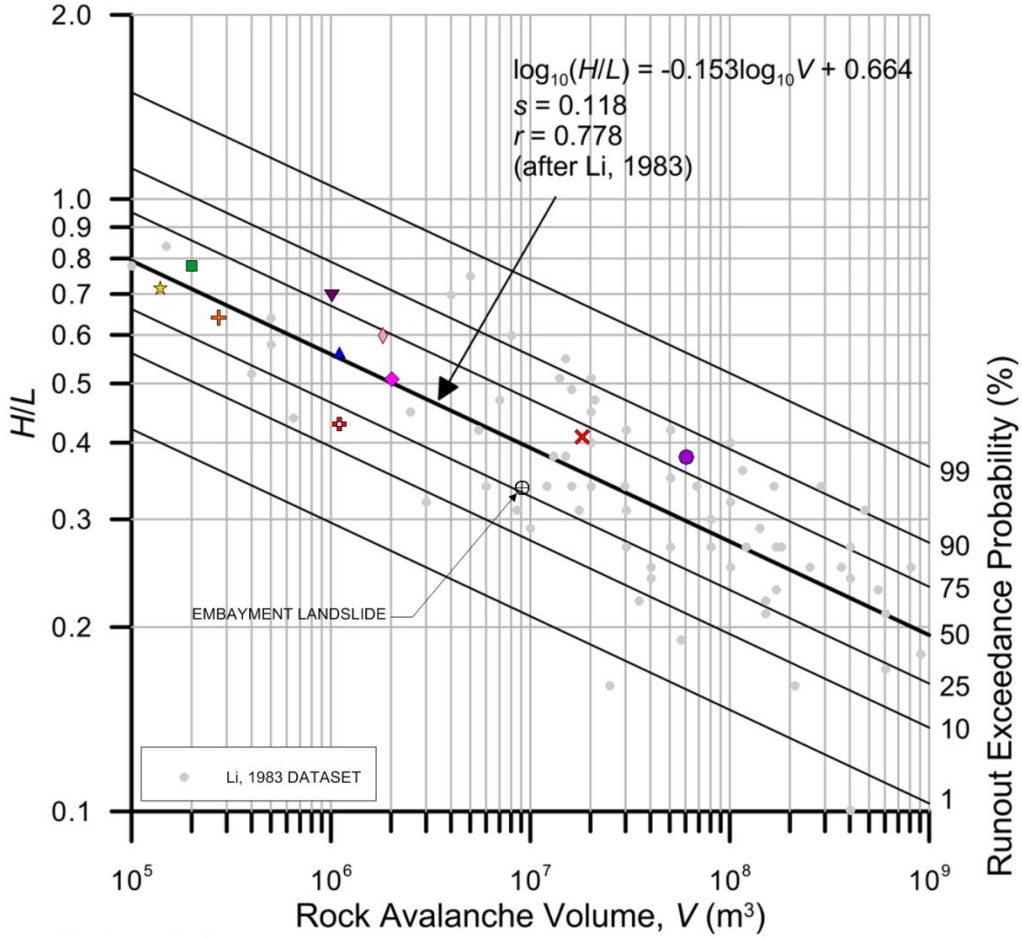

Table: Open Pit Slope Run-out Case Studies

Mine	Instability	Symbol	Estimated Volume (Mm^3)	H (m)	L (m)	H/L	Runout obstructed by opposing wall?
Bingham Canyon	10-Apr-13	●	60	828	2144	0.38	Yes
Goldstrike	2001 Southeast Wall	✖	18	-	-	0.41	Unknown
Goldstrike	2005 Southwest Wall	◆	2	-	-	0.51	No
Goldstrike	S-07-B[1]	■	0.2	-	-	0.78	Unknown
Goldstrike	S-09-B[1]	▲	1.1	-	-	0.56	Unknown
Huckleberry	2003 North Wall	✚	0.27	344	538	0.64	Yes
Afton	1986 Southeast Wall	☆	0.14	198	275	0.72	No
Nchanga	2004 North Wall	◊	1.8	180	302	0.60	Yes
Unknown[2]	Unknown[2]	▼	1	-	-	0.70	No
Grasberg	2003 South Wall	✚	1.1	294	686	0.43	No

Notes:
1. Goldstrike instability name, volume, and H/L estimates are provided in Rose, 2011.
2. Unknown slope instability is Case Example 2 from Rose and Hungr, 2007.

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REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FIGURE TITLE:
LANDSLIDE VOLUME AND ANGLE OF REACH DESIGN GRAPH

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638014-30

FIGURE No.:
1

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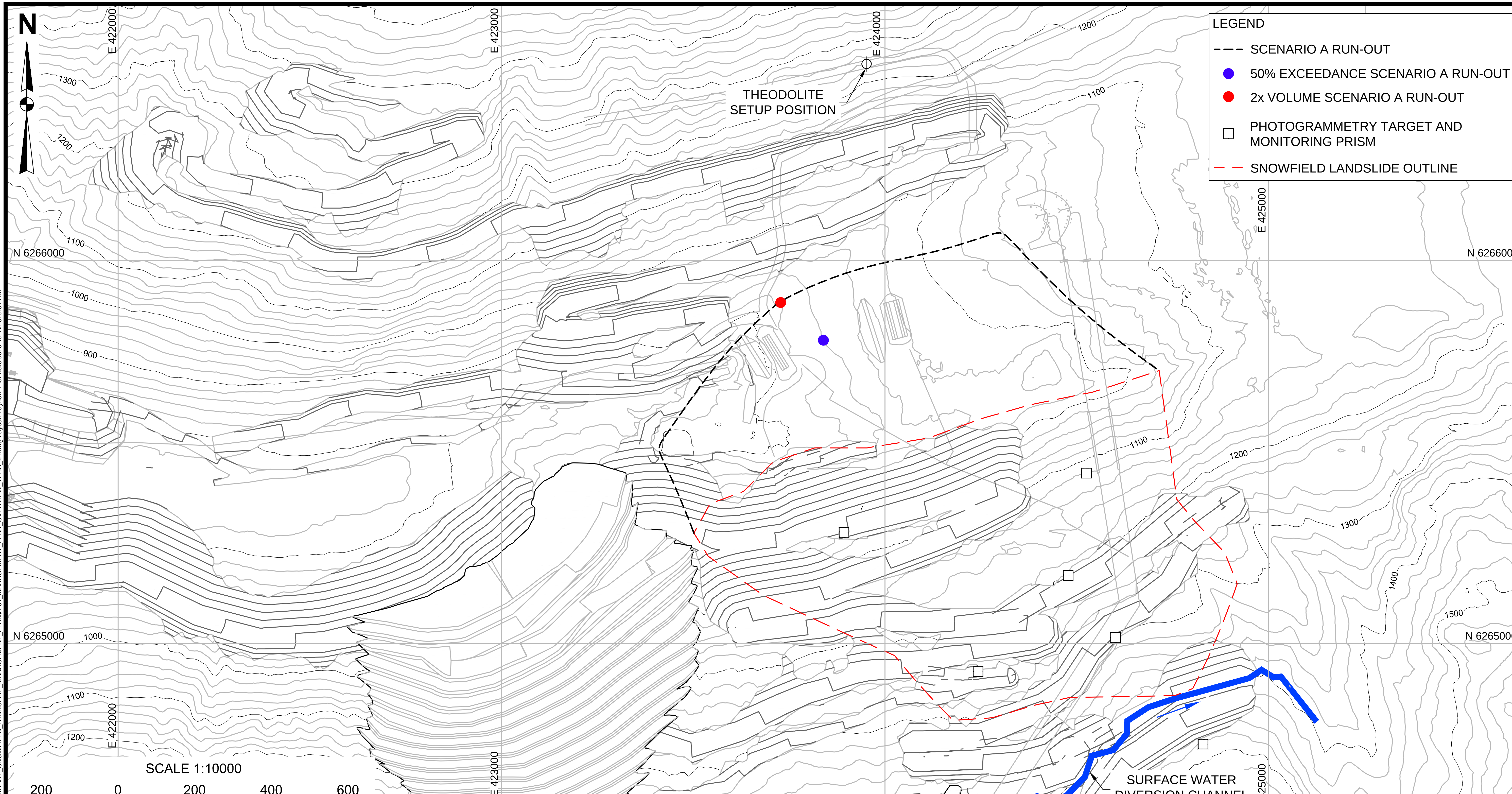
APPENDIX A
MANAGEMENT PLANS BY YEAR



NOTE:

1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

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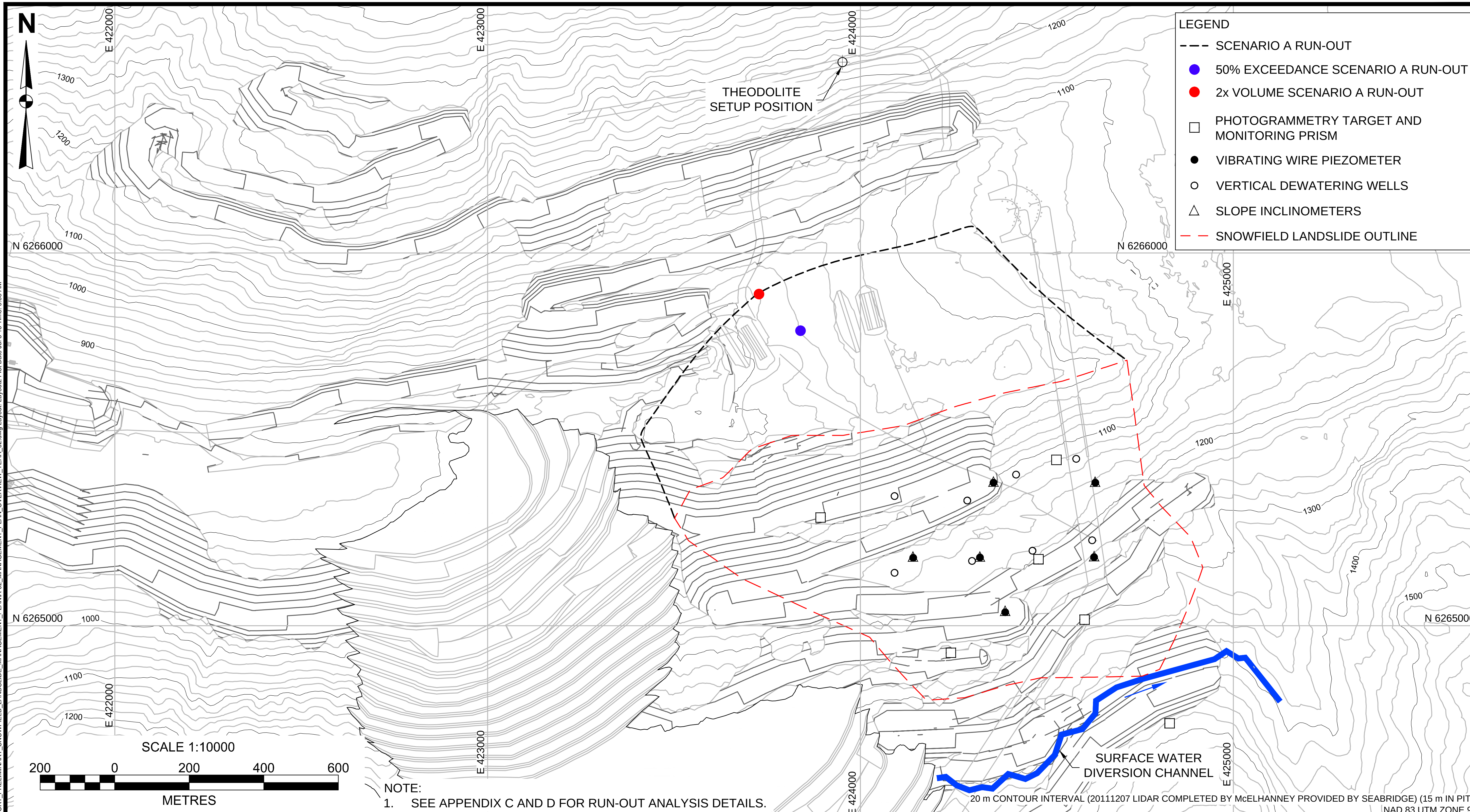

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

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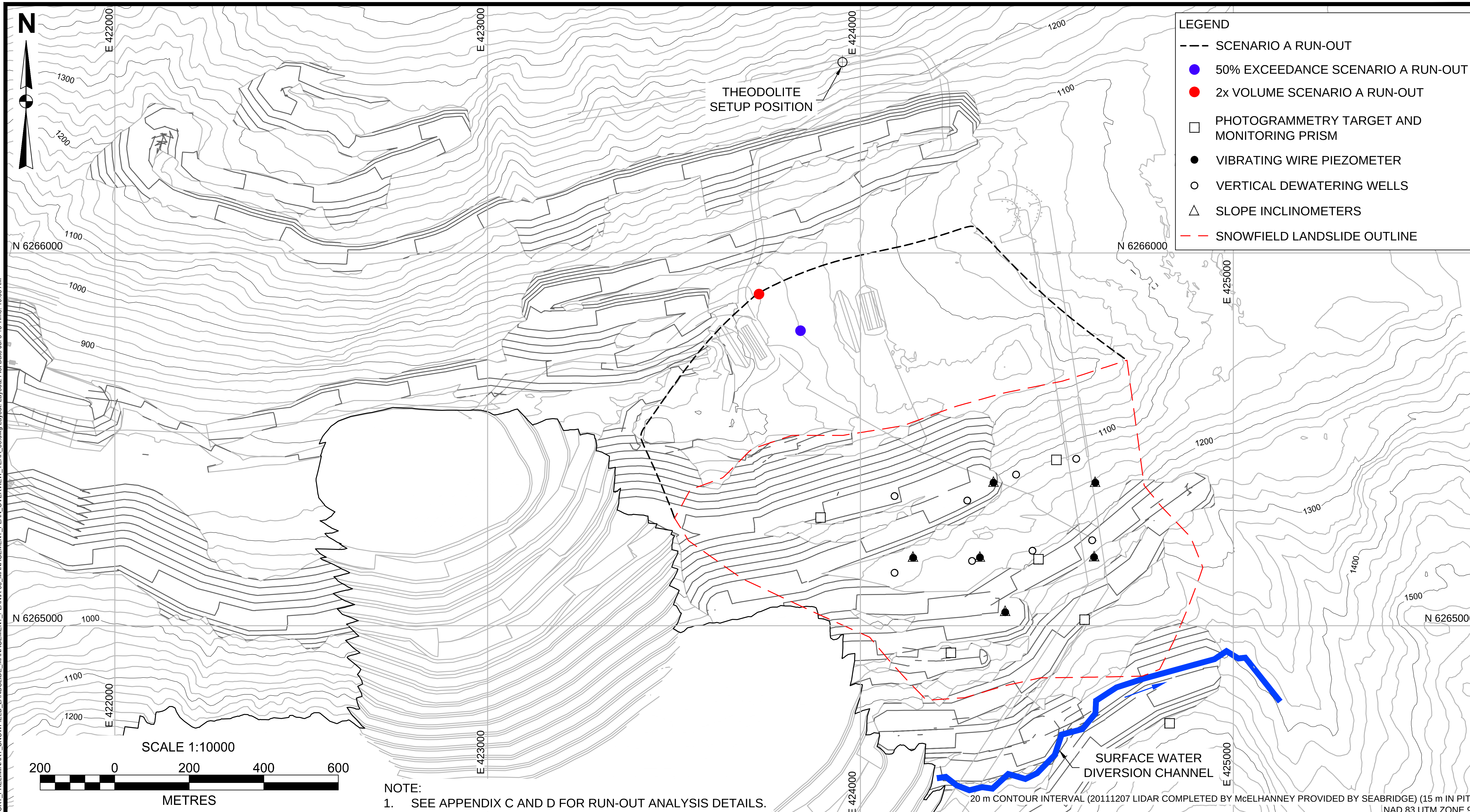

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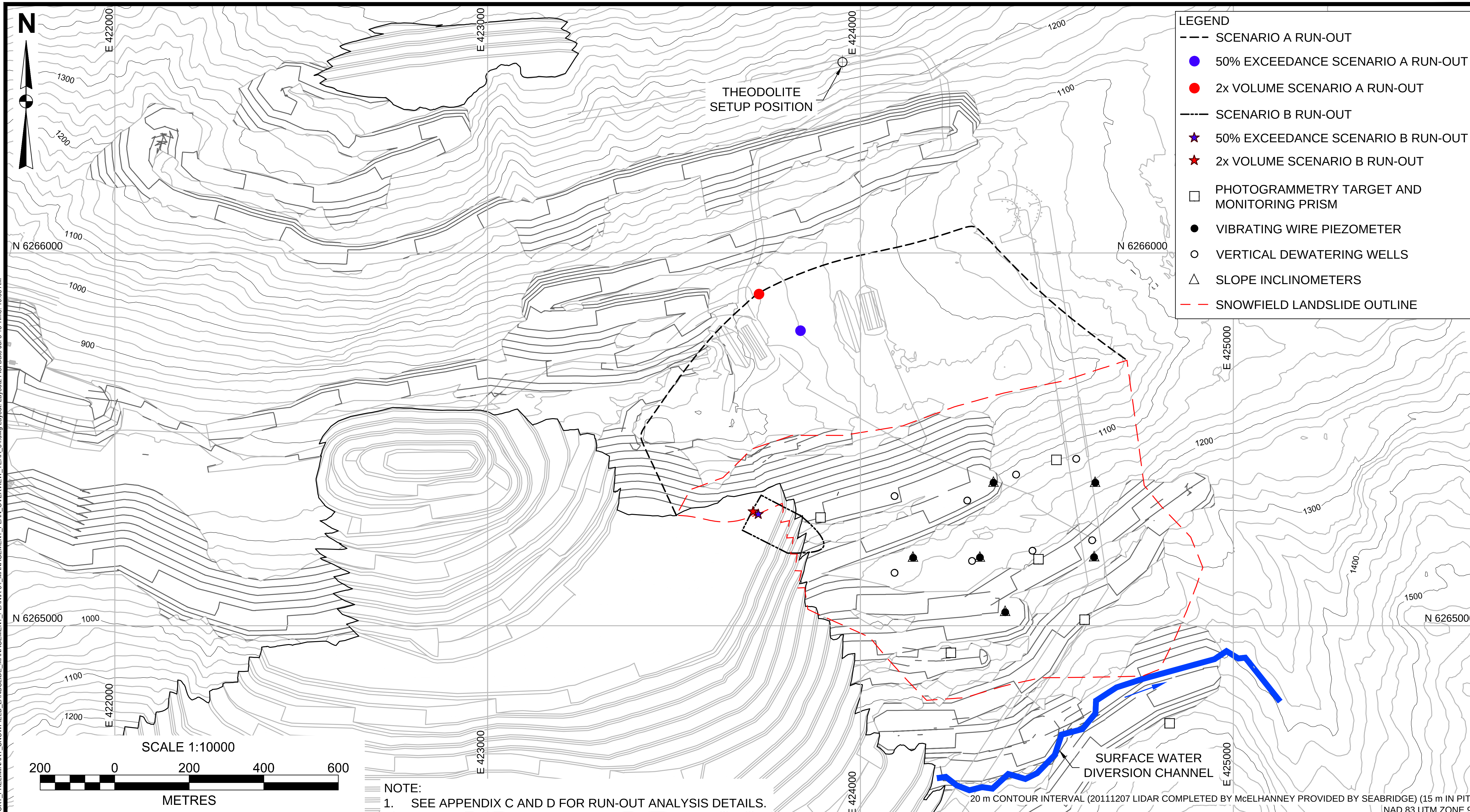

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

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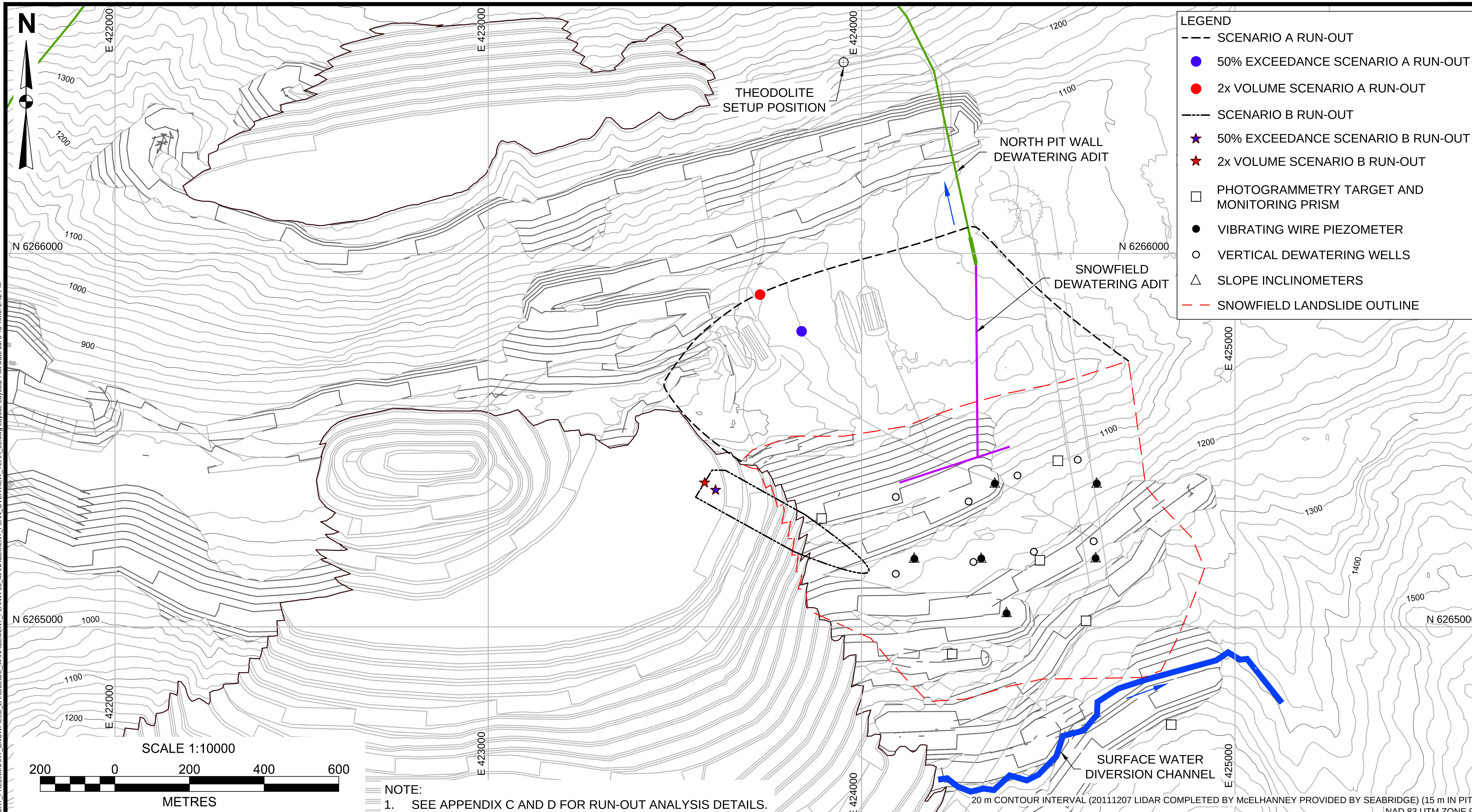

NOTE:

1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

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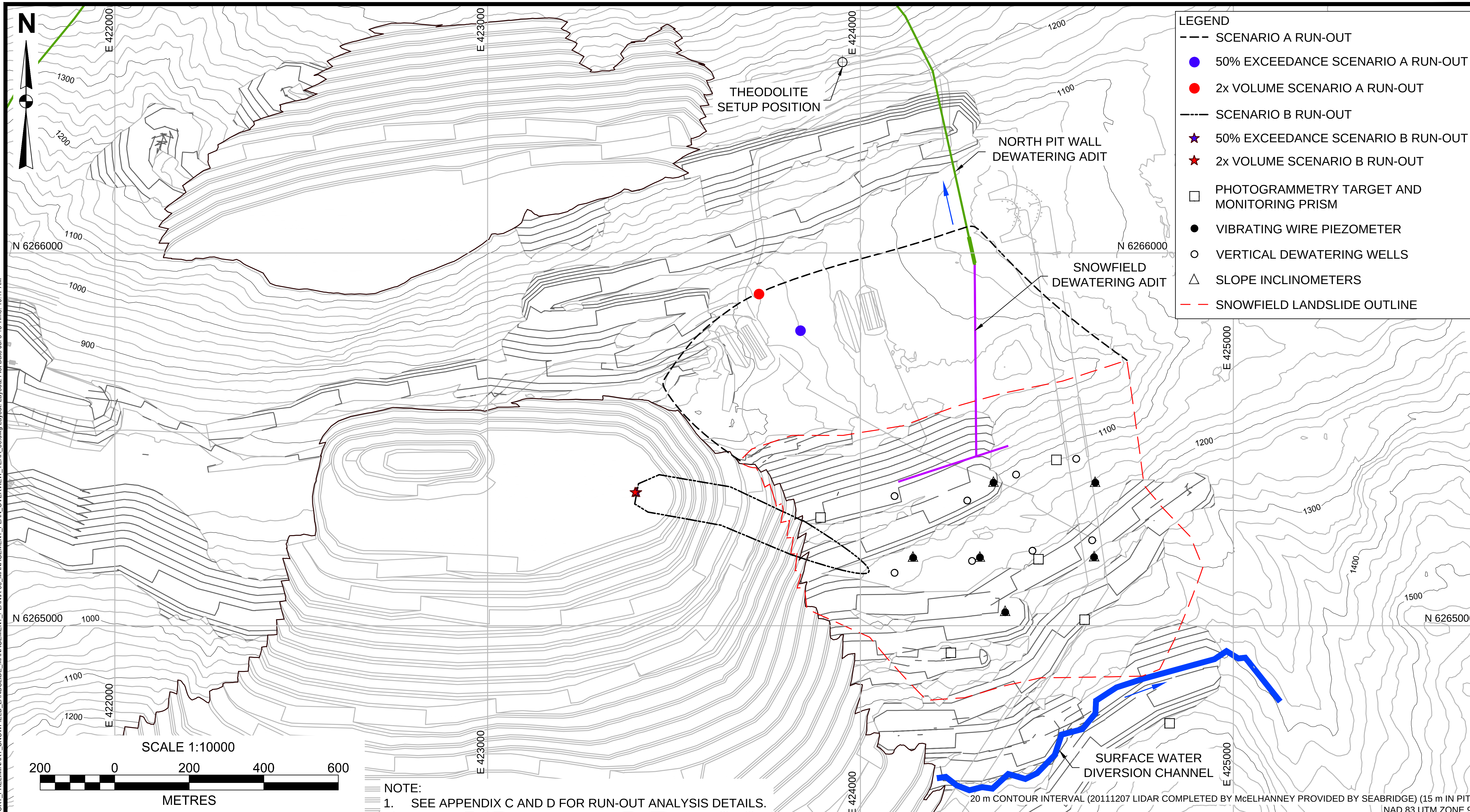

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

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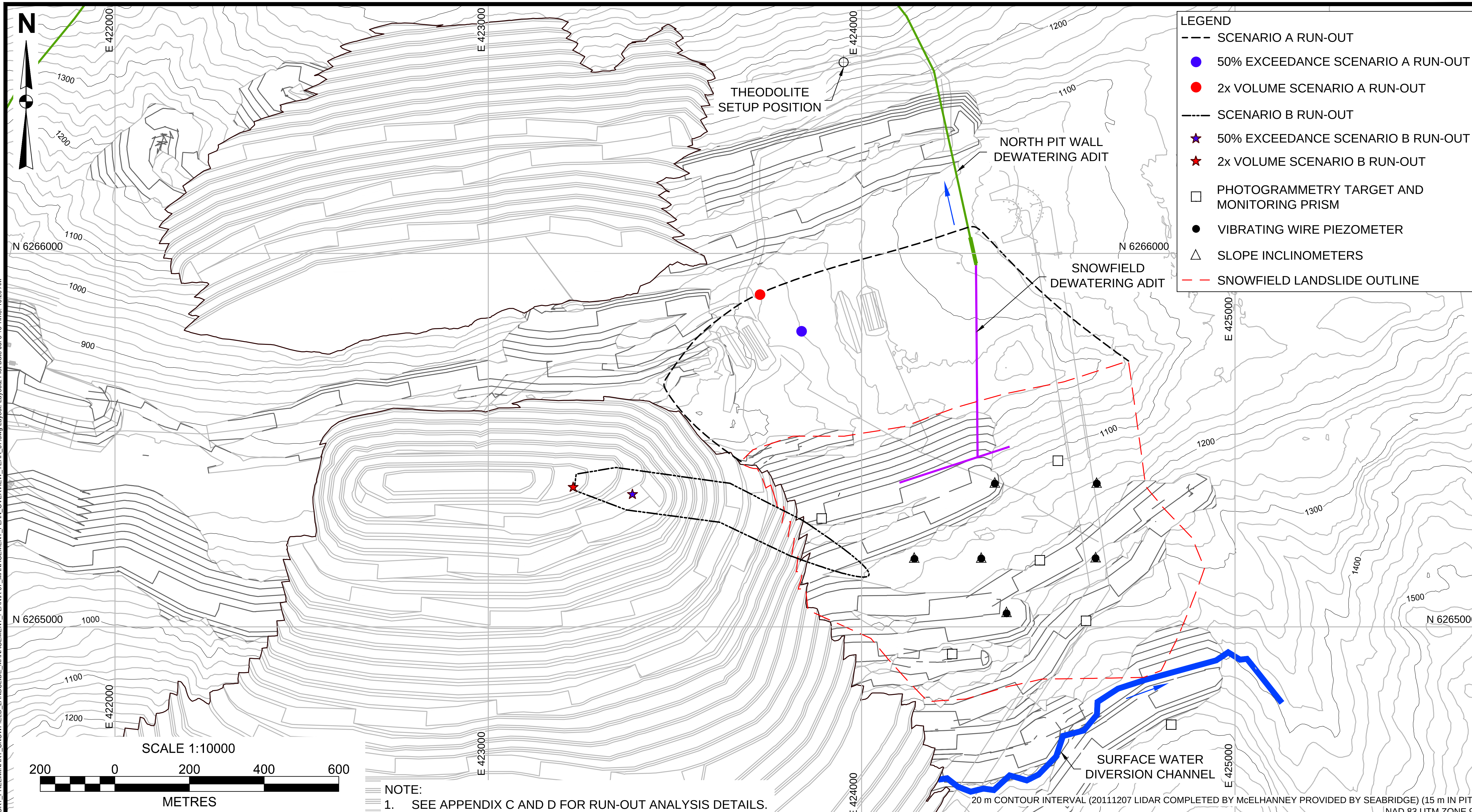

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

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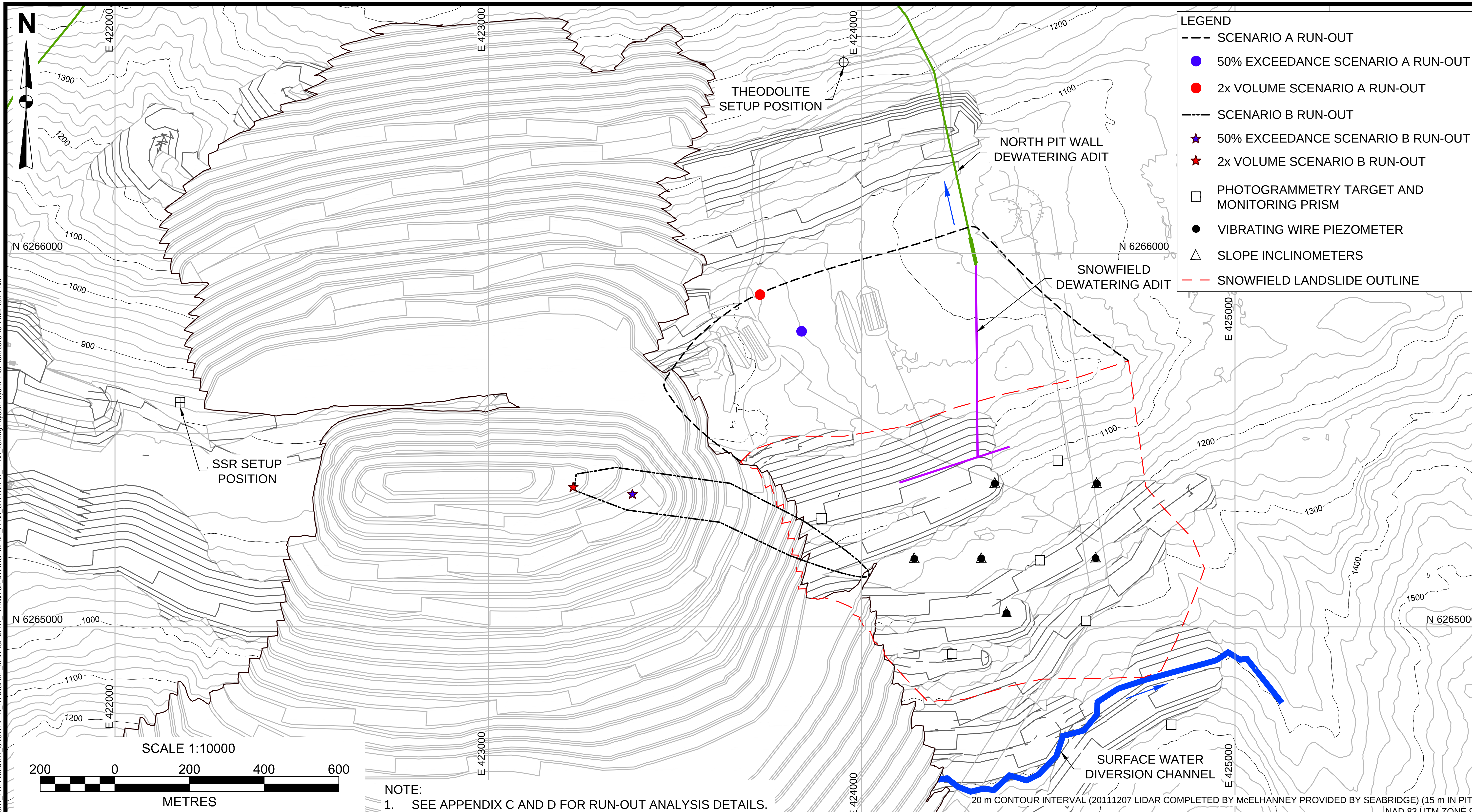

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

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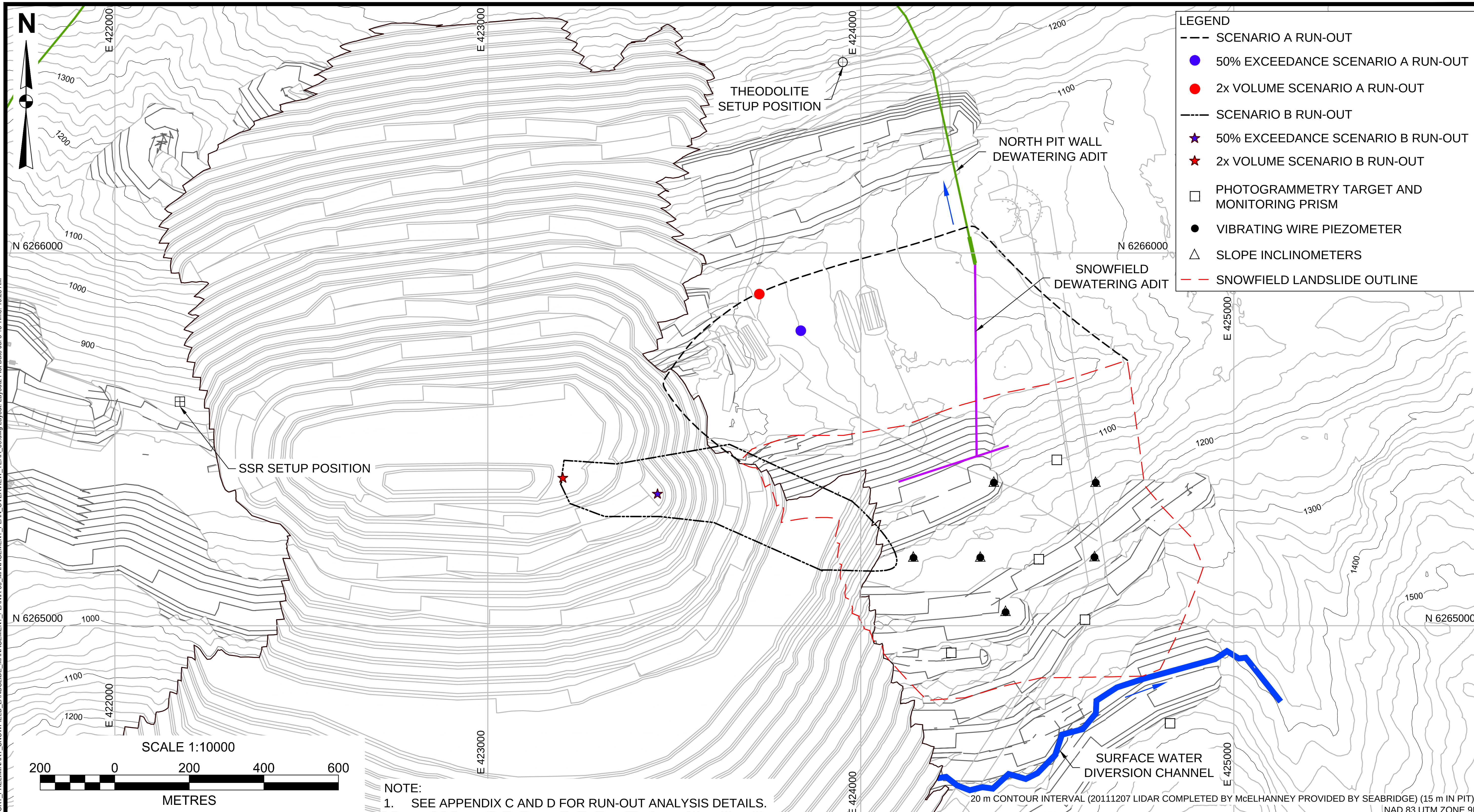

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DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 09

PROJECT No.:	DWG No:	REV.:
0638014-30	A-09	

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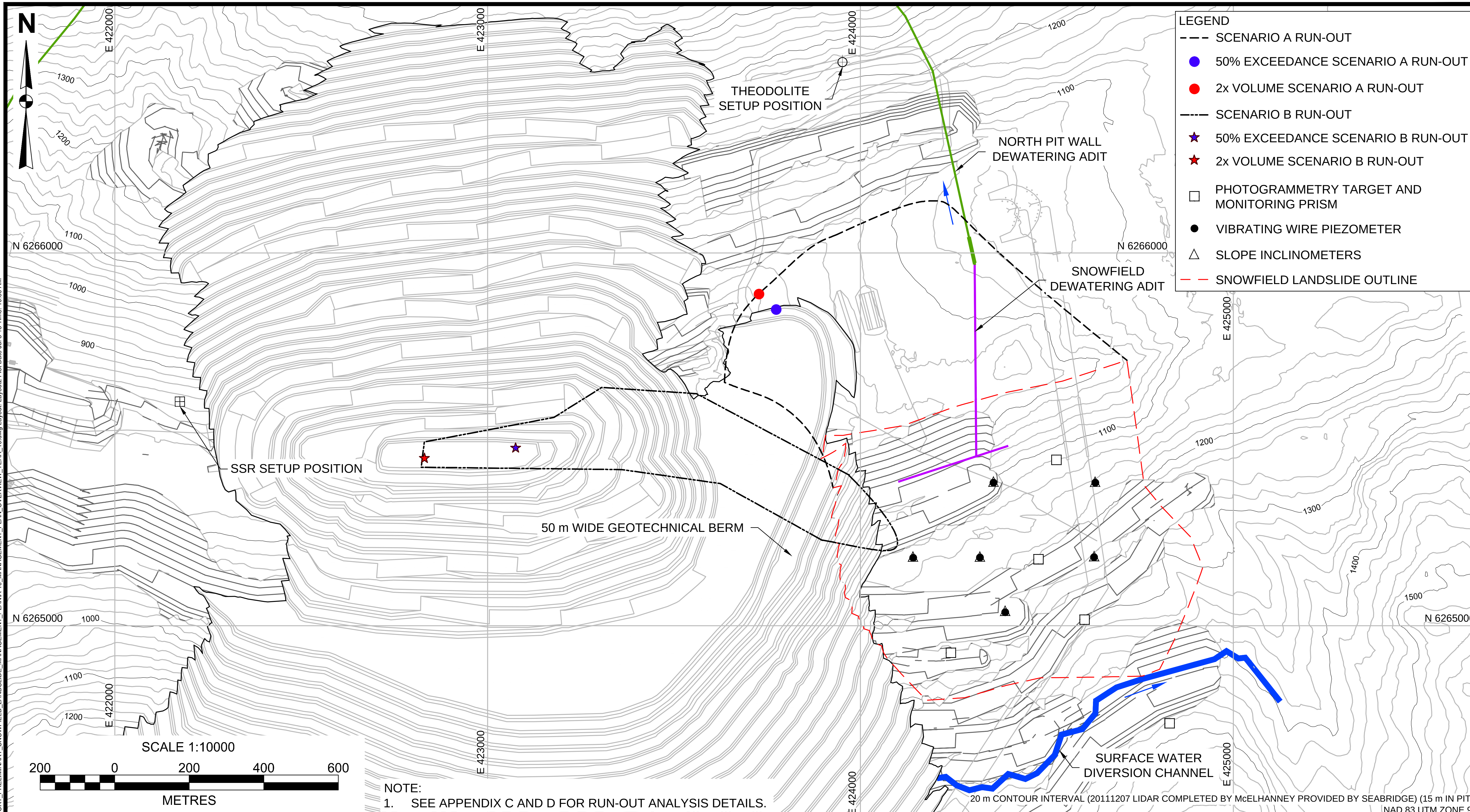

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 10

PROJECT No.:	DWG No:	REV.:
0638014-30	A-10	

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\A-10_MANAGEMENT_PLAN_OVERVIEW_YEAR_10.dwg Layout: Layout2 Plot Date Jul 5 13 Time: 10:30 AM

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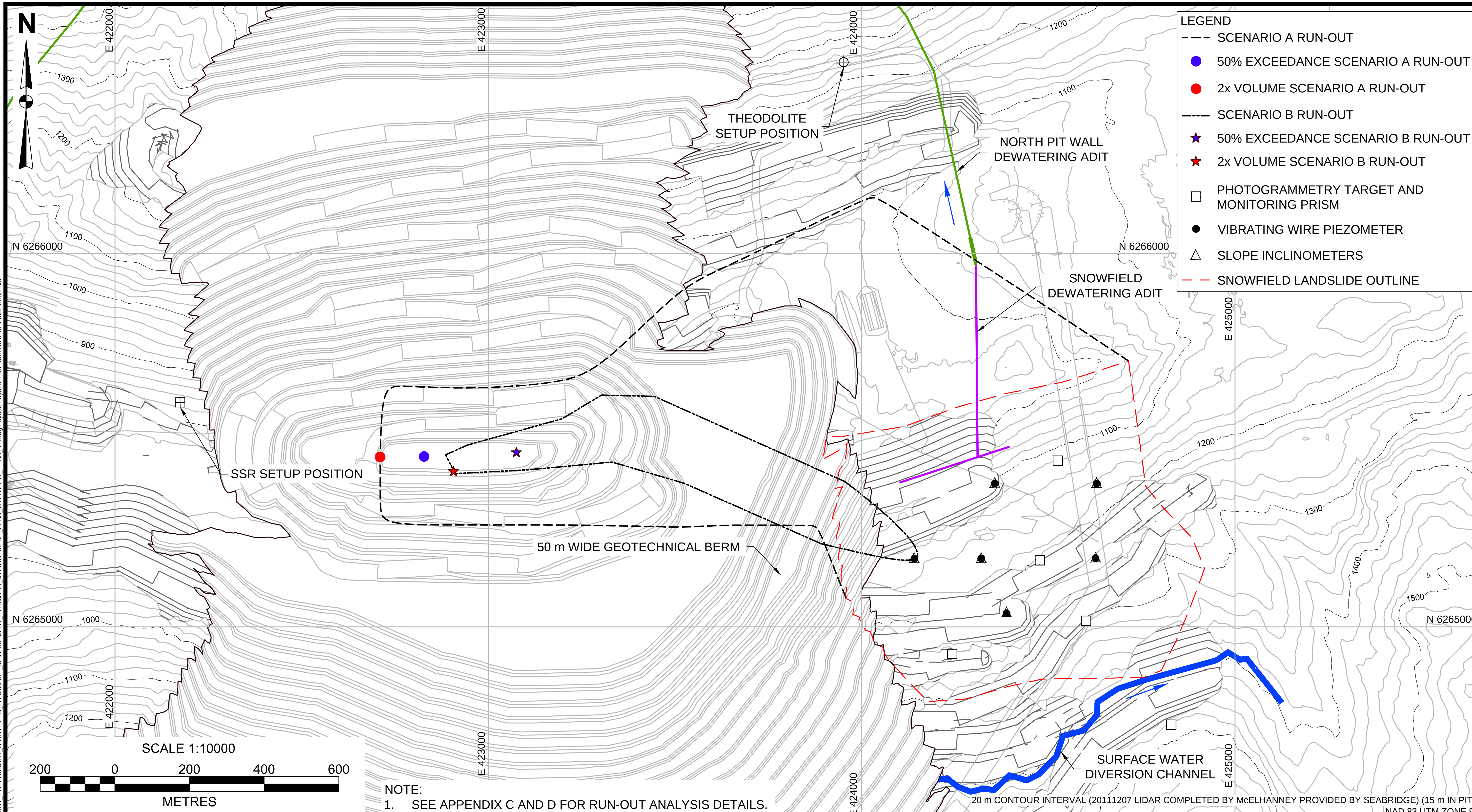

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 11

PROJECT No.:	DWG No:	REV.:
0638014-30	A-11	

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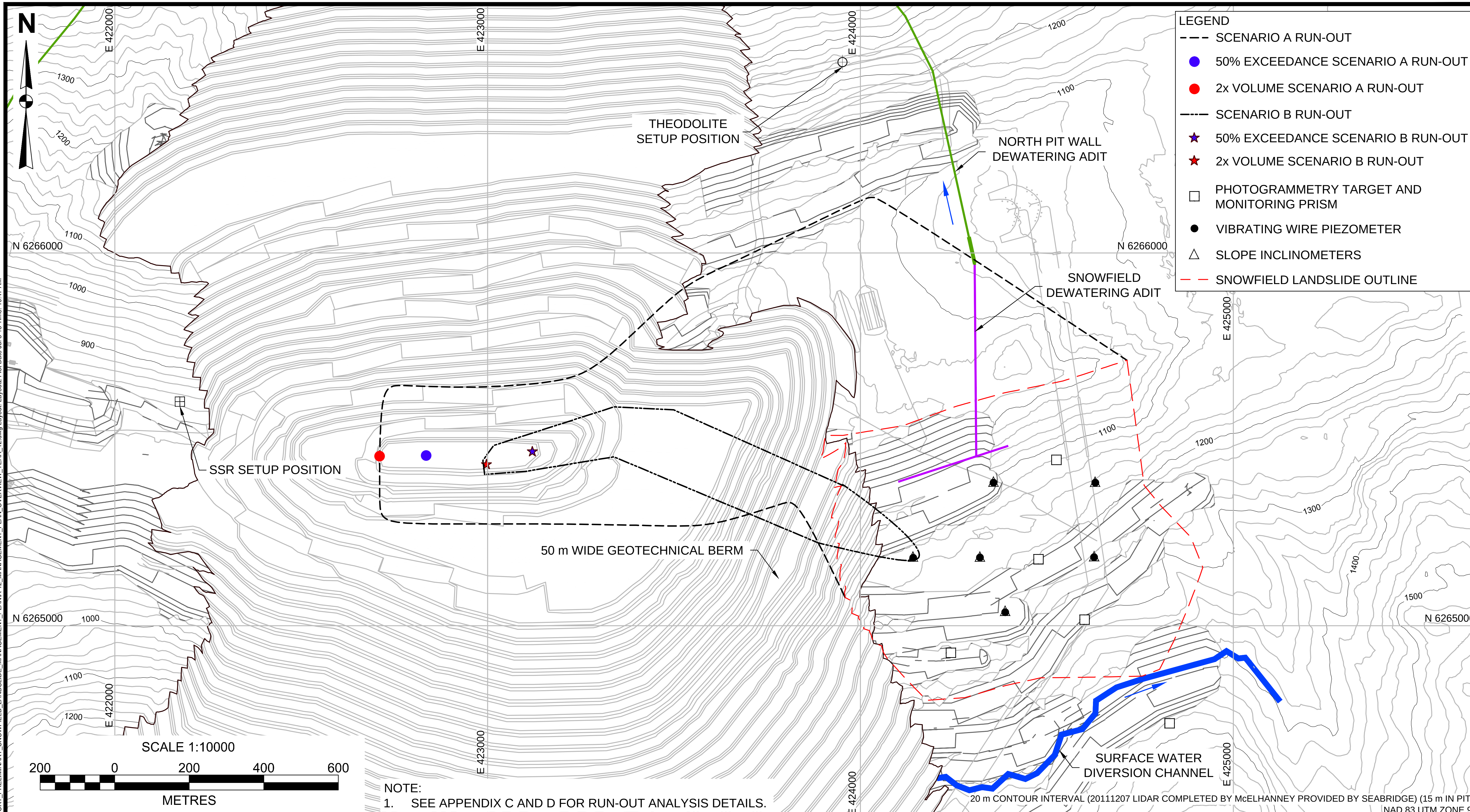

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 12

PROJECT No.:	DWG No:	REV.:
0638014-30	A-12	

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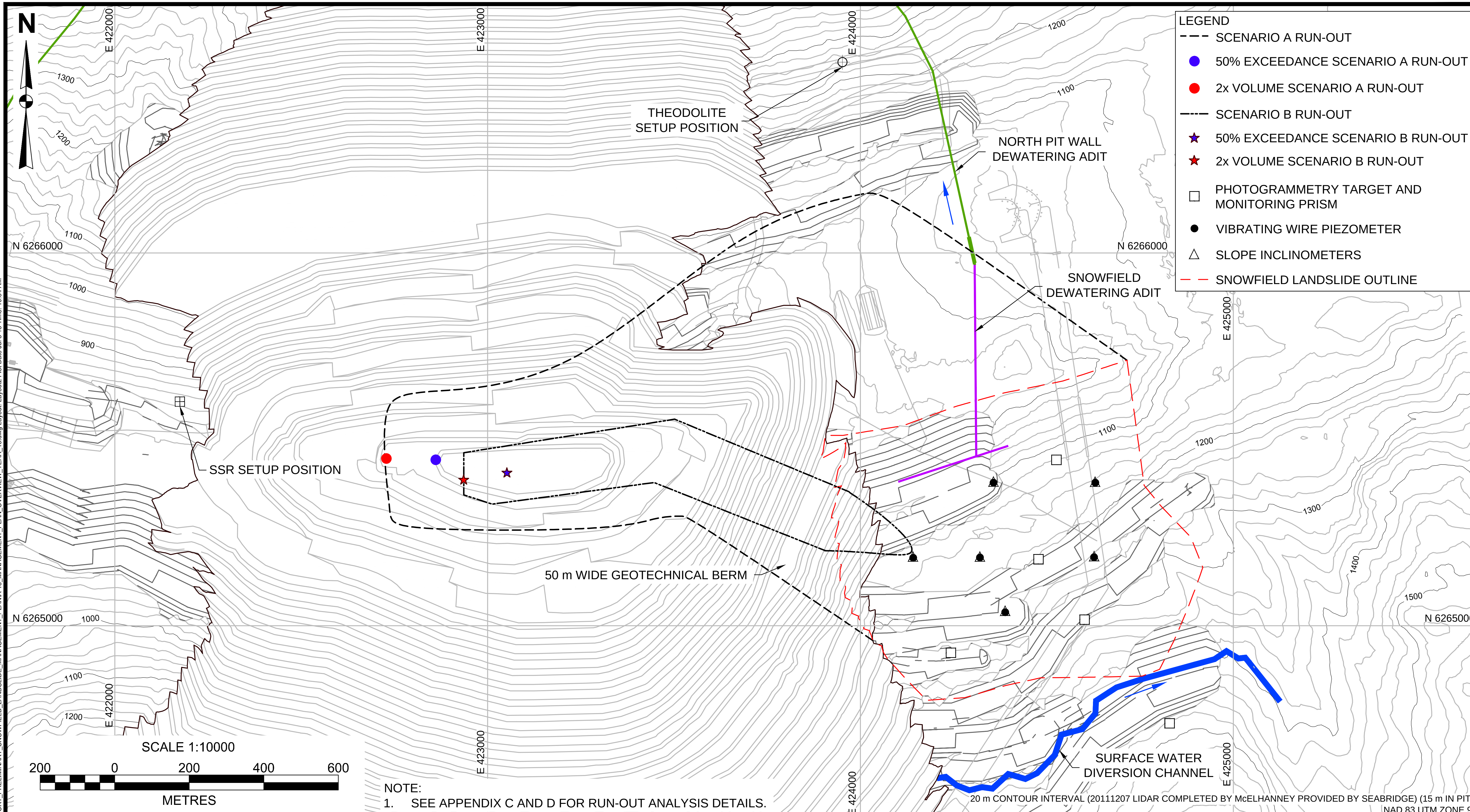

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 13

PROJECT No.:	DWG No:	REV.:
0638014-30	A-13	

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\A-13_MANAGEMENT_PLAN_OVERVIEW_YEAR_13.dwg Layout: Layout2 Plot Date Jul 5 13 Time: 10:54 AM

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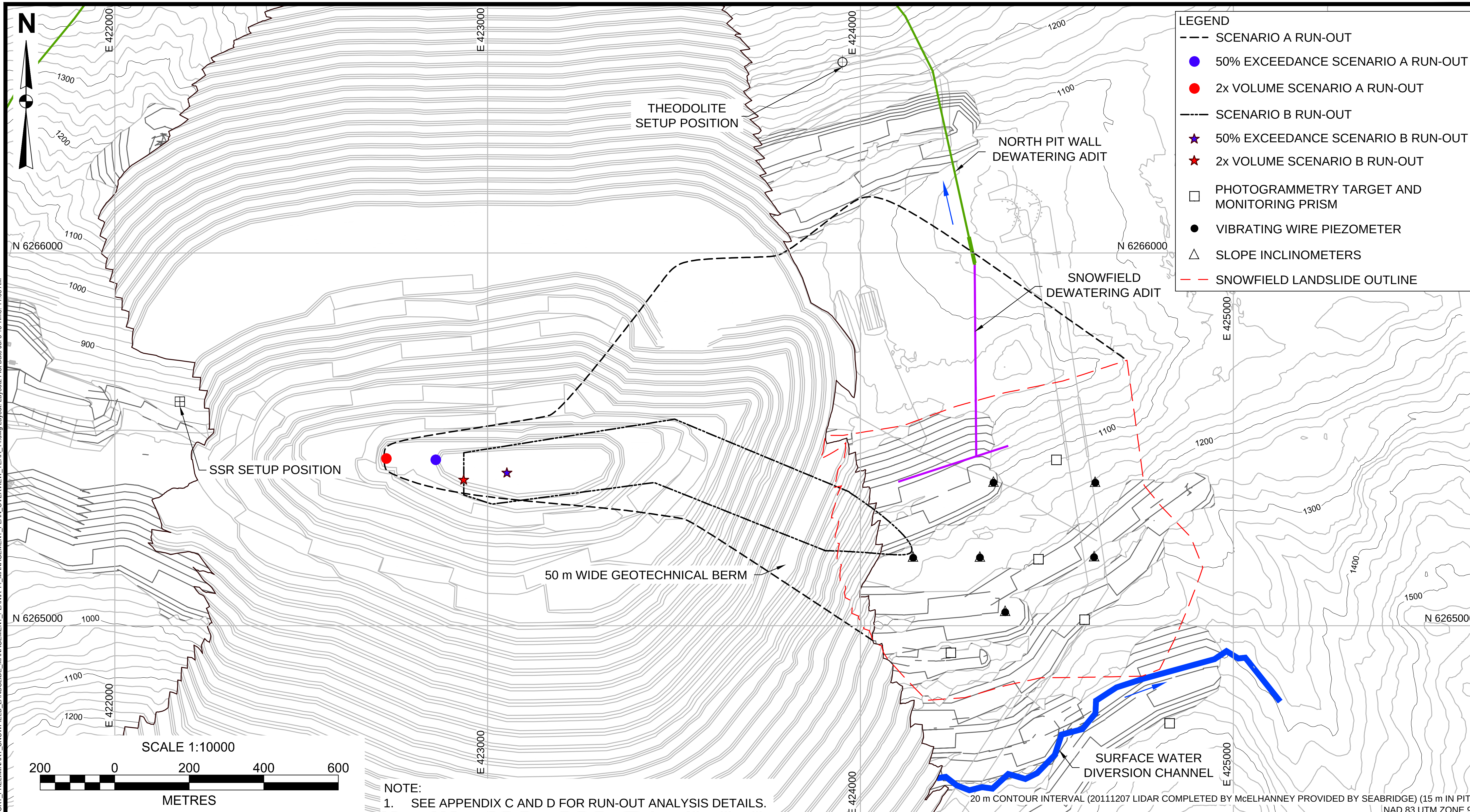

NOTE:

1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 14

PROJECT No.:	DWG No:	REV.:
0638014-30	A-14	

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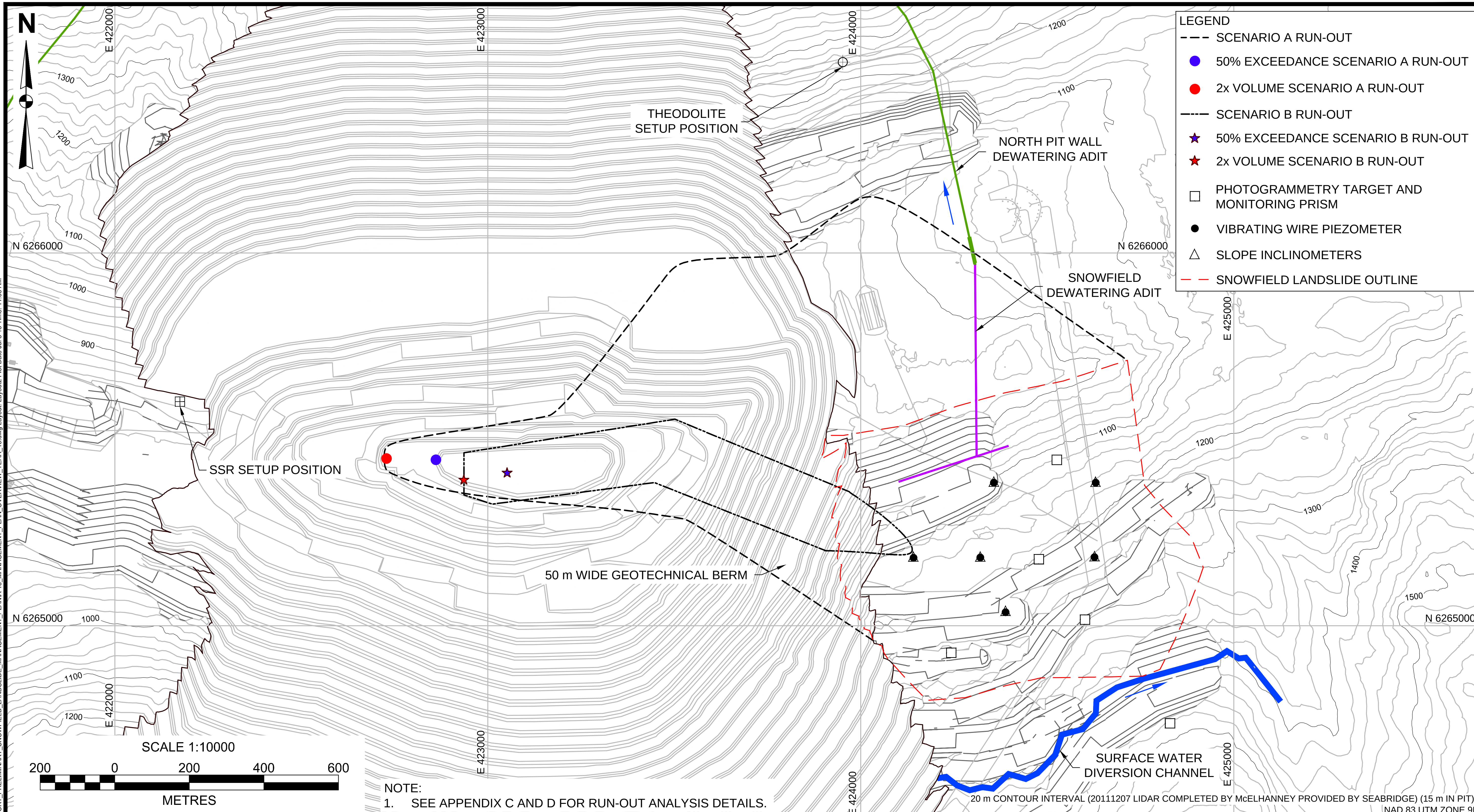

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 15

PROJECT No.:	DWG No:	REV.:
0638014-30	A-15	

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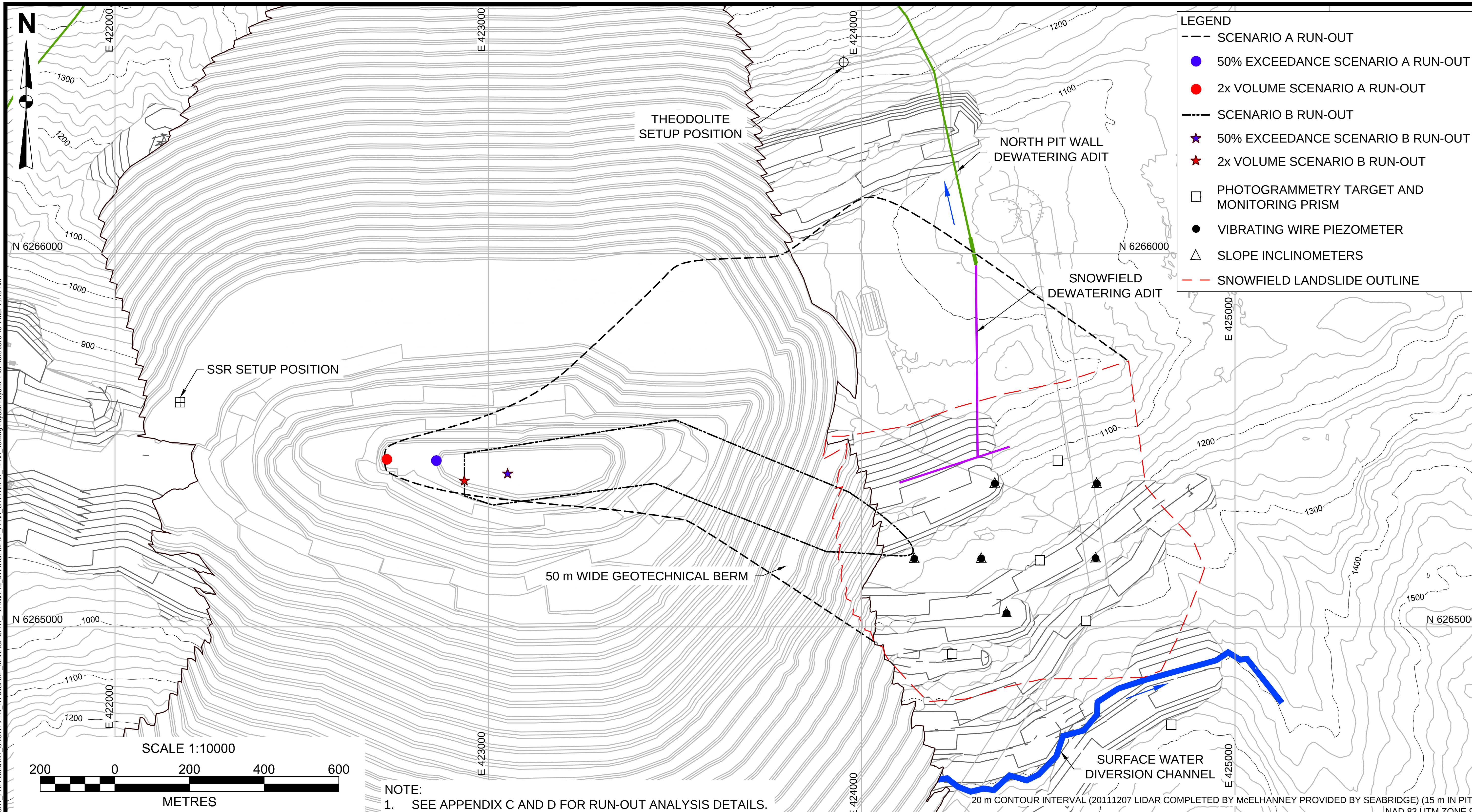

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

20 m CONTOUR INTERVAL (20111207 LIDAR COMPLETED BY McELHANNEY PROVIDED BY SEABRIDGE) (15 m IN PIT)
NAD 83 UTM ZONE 9N

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 16

PROJECT No.:	DWG No:	REV.:
0638014-30	A-16	

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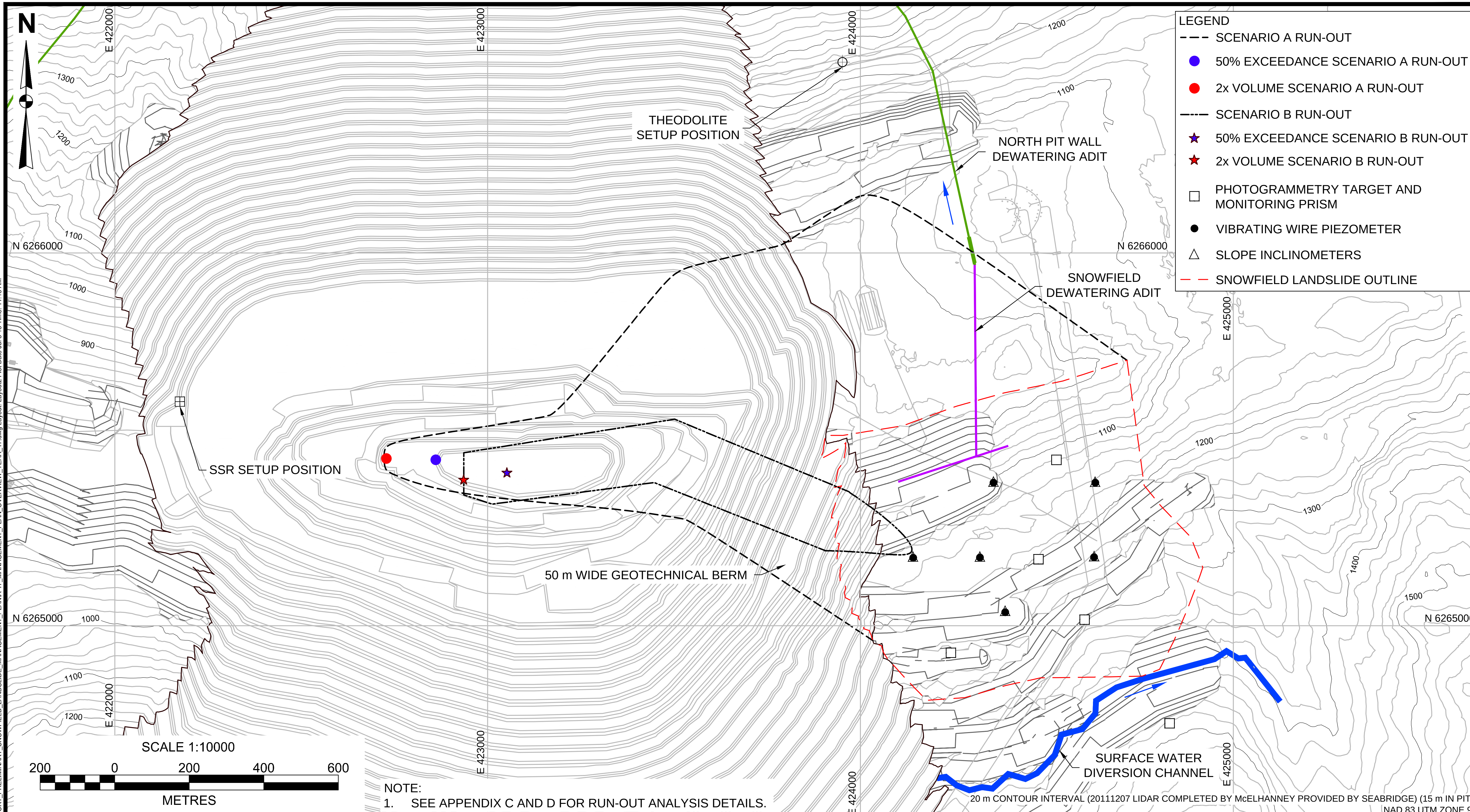

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 17

PROJECT No.:	DWG No:	REV.:
0638014-30	A-17	

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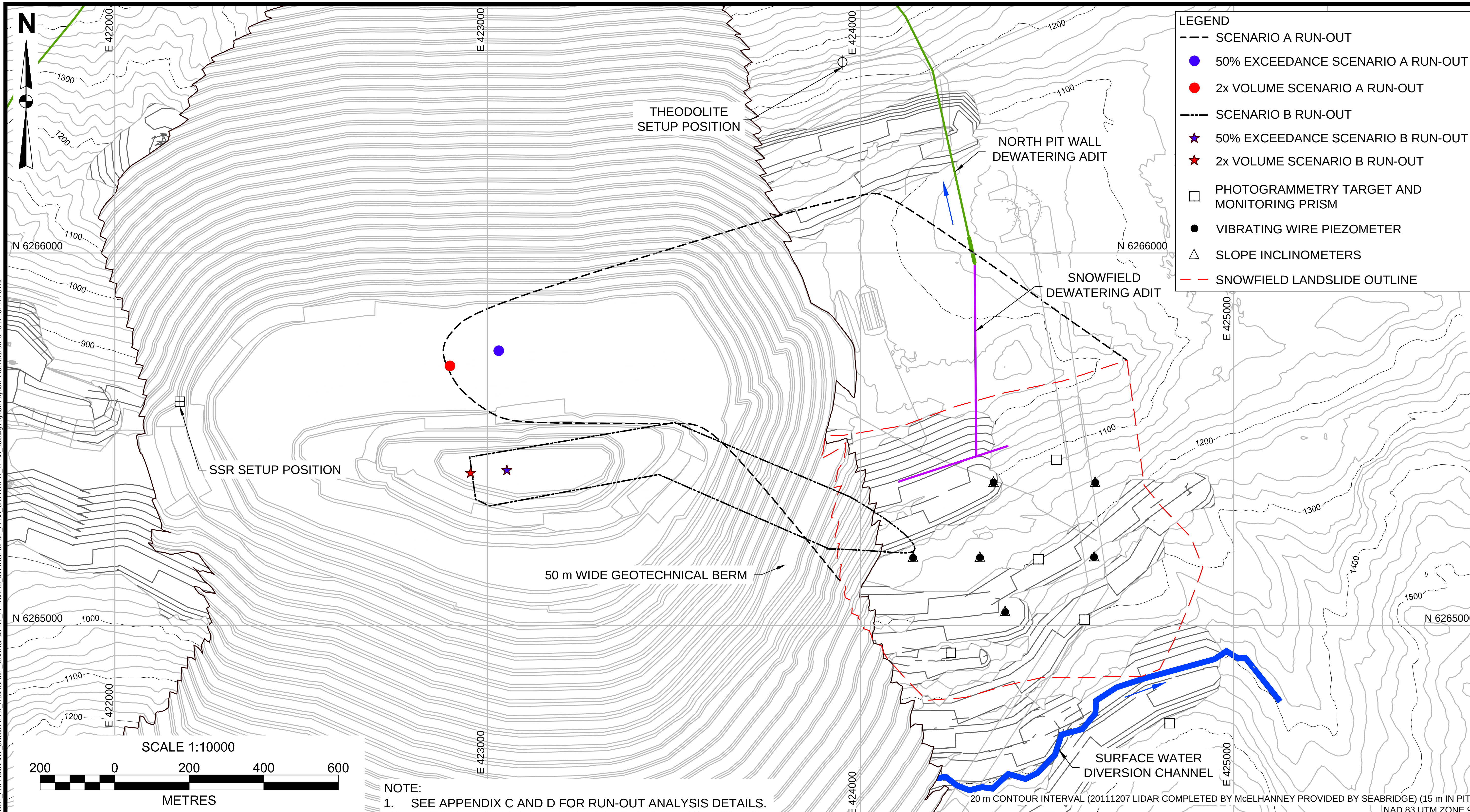

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 18

PROJECT No.:	DWG No:	REV.:
0638014-30	A-18	

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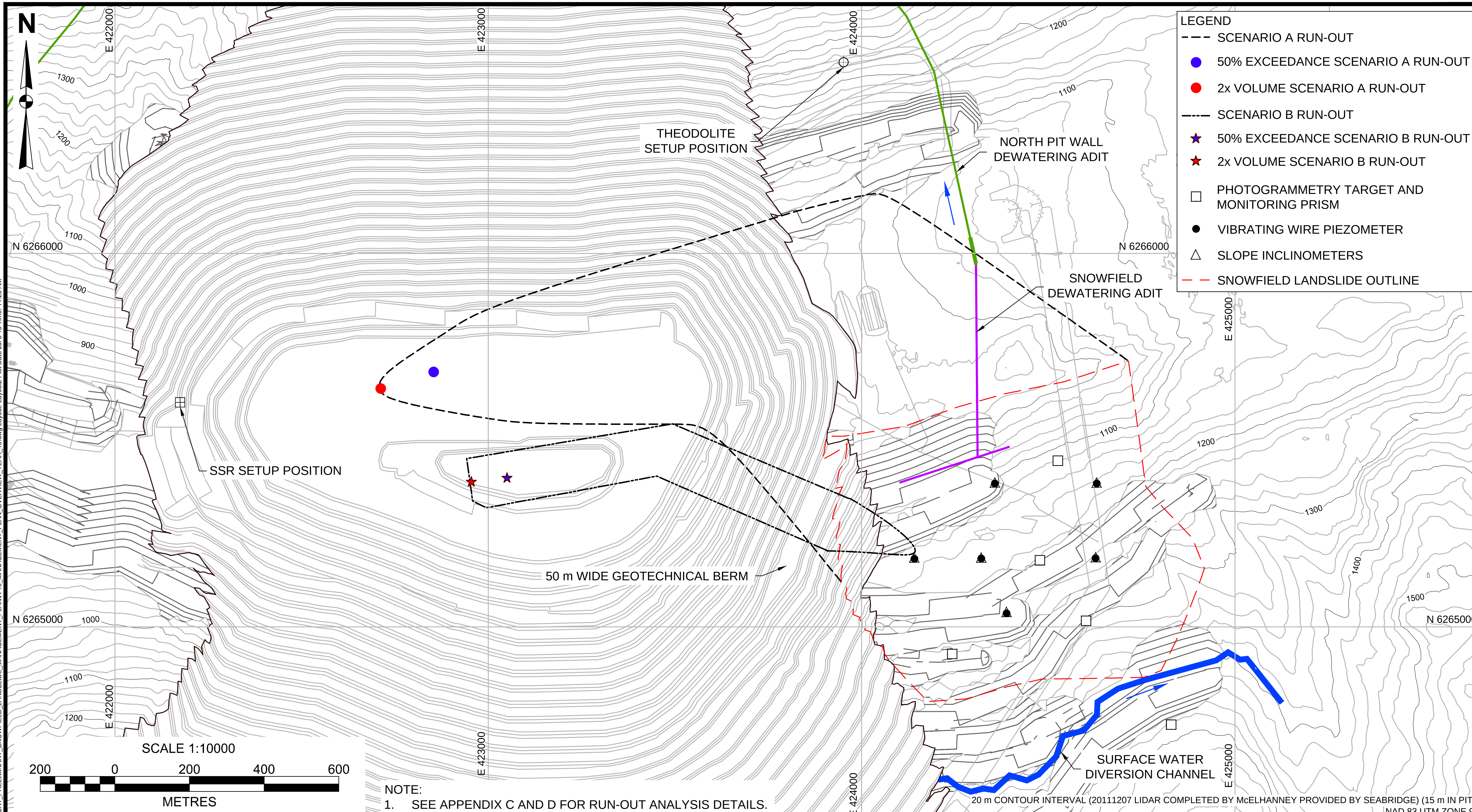

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

20 m CONTOUR INTERVAL (20111207 LIDAR COMPLETED BY McELHANNEY PROVIDED BY SEABRIDGE) (15 m IN PIT)
NAD 83 UTM ZONE 9N

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 19

PROJECT No.:	DWG No:	REV.:
0638014-30	A-19	

DWG TO BE READ WITH BGC MEMO TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

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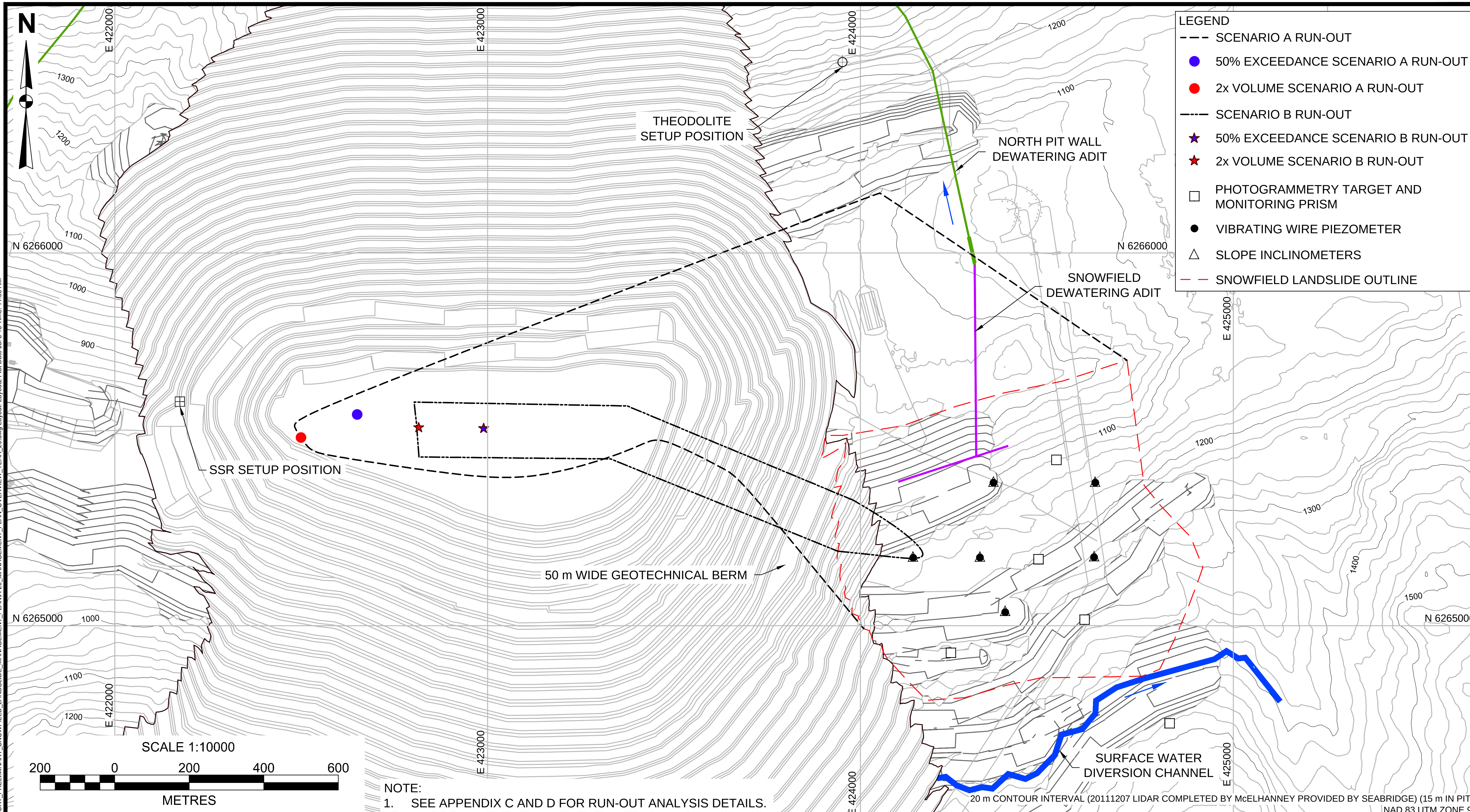

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 20

PROJECT No.:	DWG No:	REV.:
0638014-30	A-20	

DWG TO BE READ WITH BGC MEMO TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

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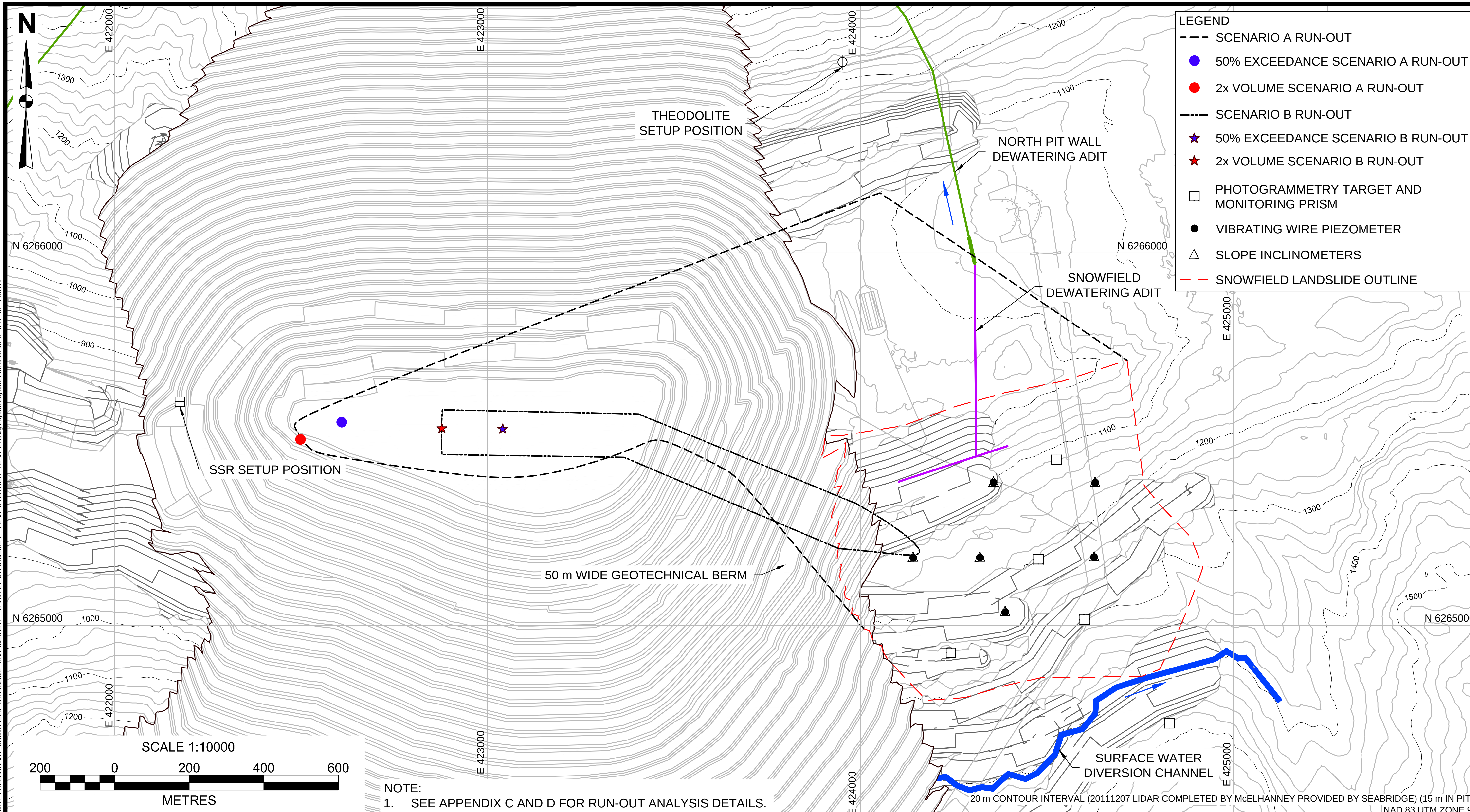

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

20 m CONTOUR INTERVAL (20111207 LIDAR COMPLETED BY McELHANNEY PROVIDED BY SEABRIDGE) (15 m IN PIT)
NAD 83 UTM ZONE 9N

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 21

PROJECT No.:	DWG No:	REV.:
0638014-30	A-21	

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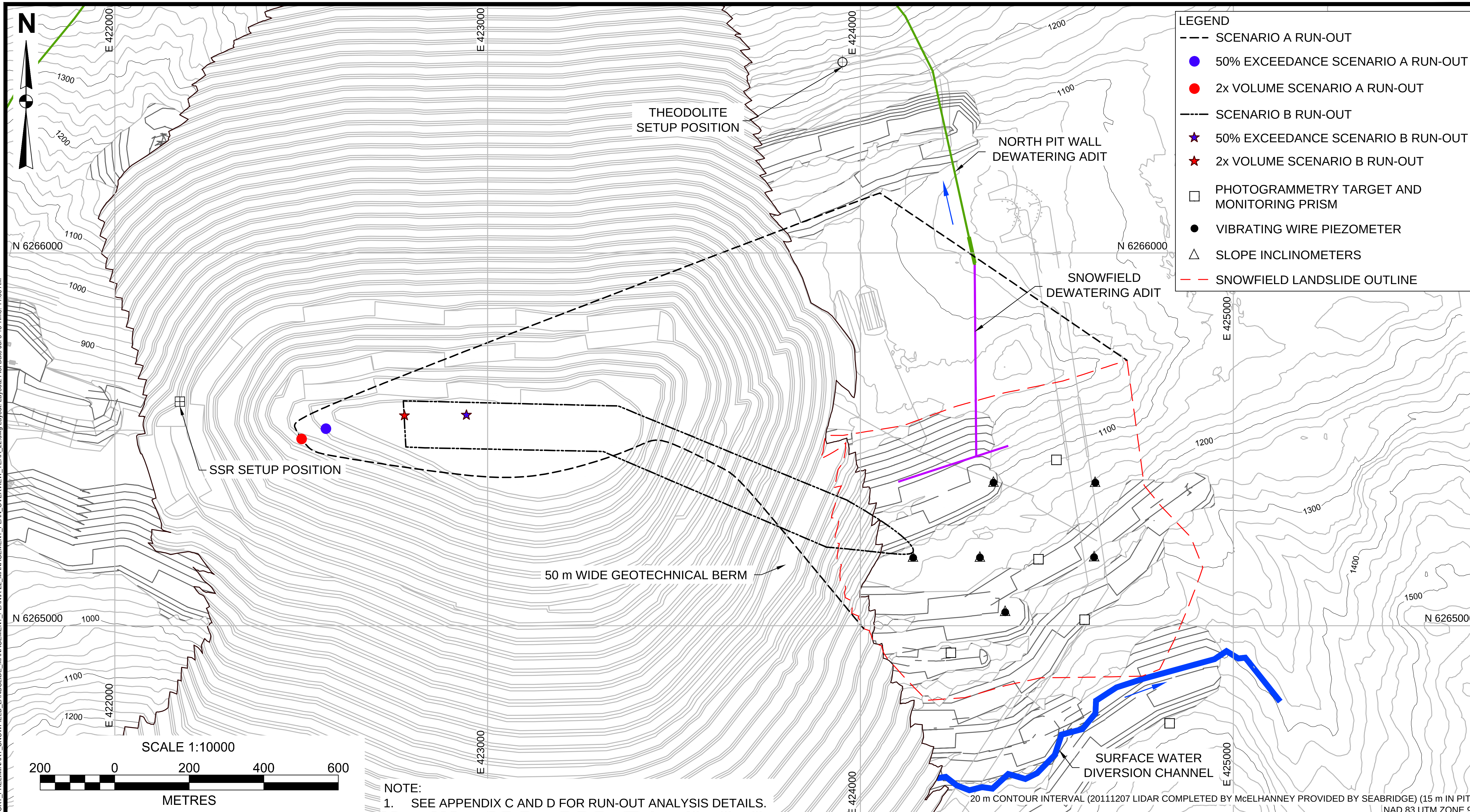

NOTE:
1. SEE APPENDIX C AND D FOR RUN-OUT ANALYSIS DETAILS.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 22

CLIENT: SEABRIDGE GOLD INC.

PROJECT No.: 0638014-30

DWG No: A-22

REV.:

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\A-22_MANAGEMENT_PLAN_OVERVIEW_YEAR_22.dwg Layout: Layout2 Plot Date Jul 5 13 Time: 11:36 AM

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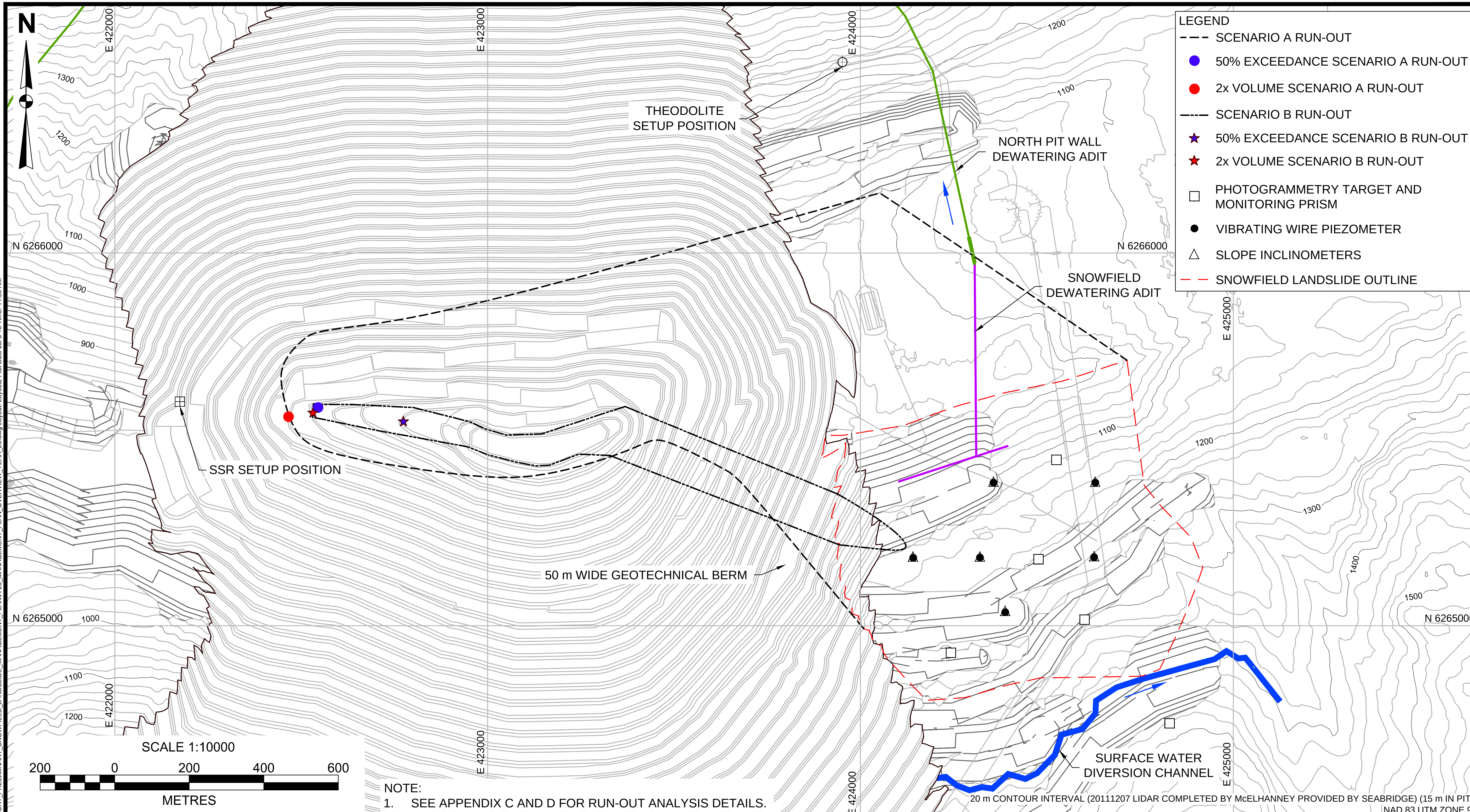


REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

DRAFT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 23

PROJECT No.:	DWG No:	REV.:
0638014-30	A-23	

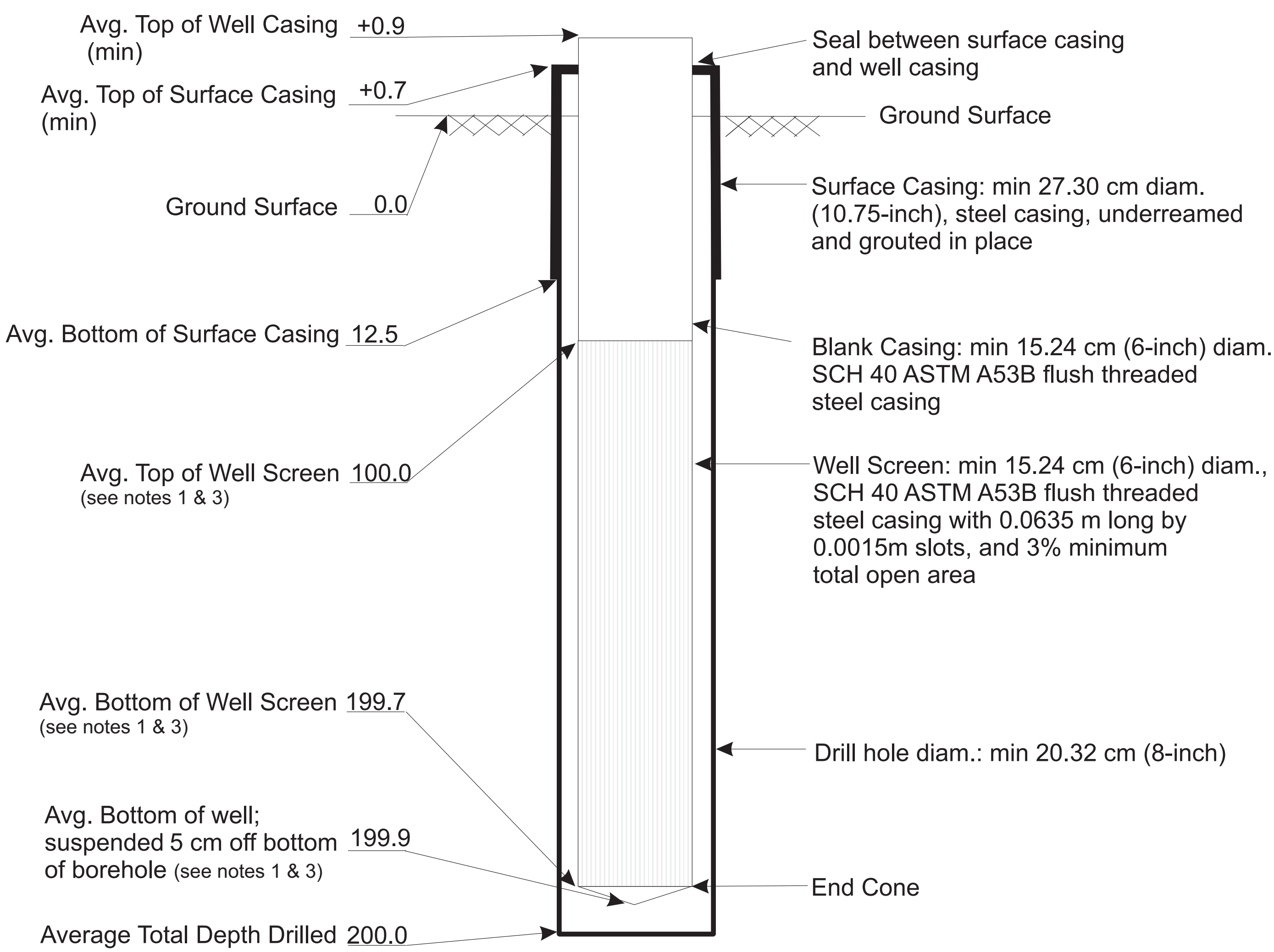
X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\A-23_MANAGEMENT_PLAN_OVERVIEW_YEAR_23.dwg Layout: Layout2 Plot Date: Jul 5 13 Time: 11:39 AM

DWG TO BE READ WITH BGC MEMO TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

APPENDIX B
ACTIVE CONTROLS

Vertical Dewatering Well Design Schematic

Completion Details	Depth (m) (bgs)	Completion Materials and Installation Specifications (note 2)



Notes:
1. Dimensions and depths indicated are for vertical dewatering wells.
2. Material types and specifications noted are based experience at similar sites. Alternate materials may be specified for well construction provided similar material performance can be demonstrated.
3. Anticipated pumping rates per well: 0.3 to 6.3 L/s (5 - 100 US gpm).
4. Drawing is not to scale.

SCALE:	NTS	DESIGNED:	RT
DATE:	JULY 2013	CHECKED:	RT
DRAWN:	RT	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

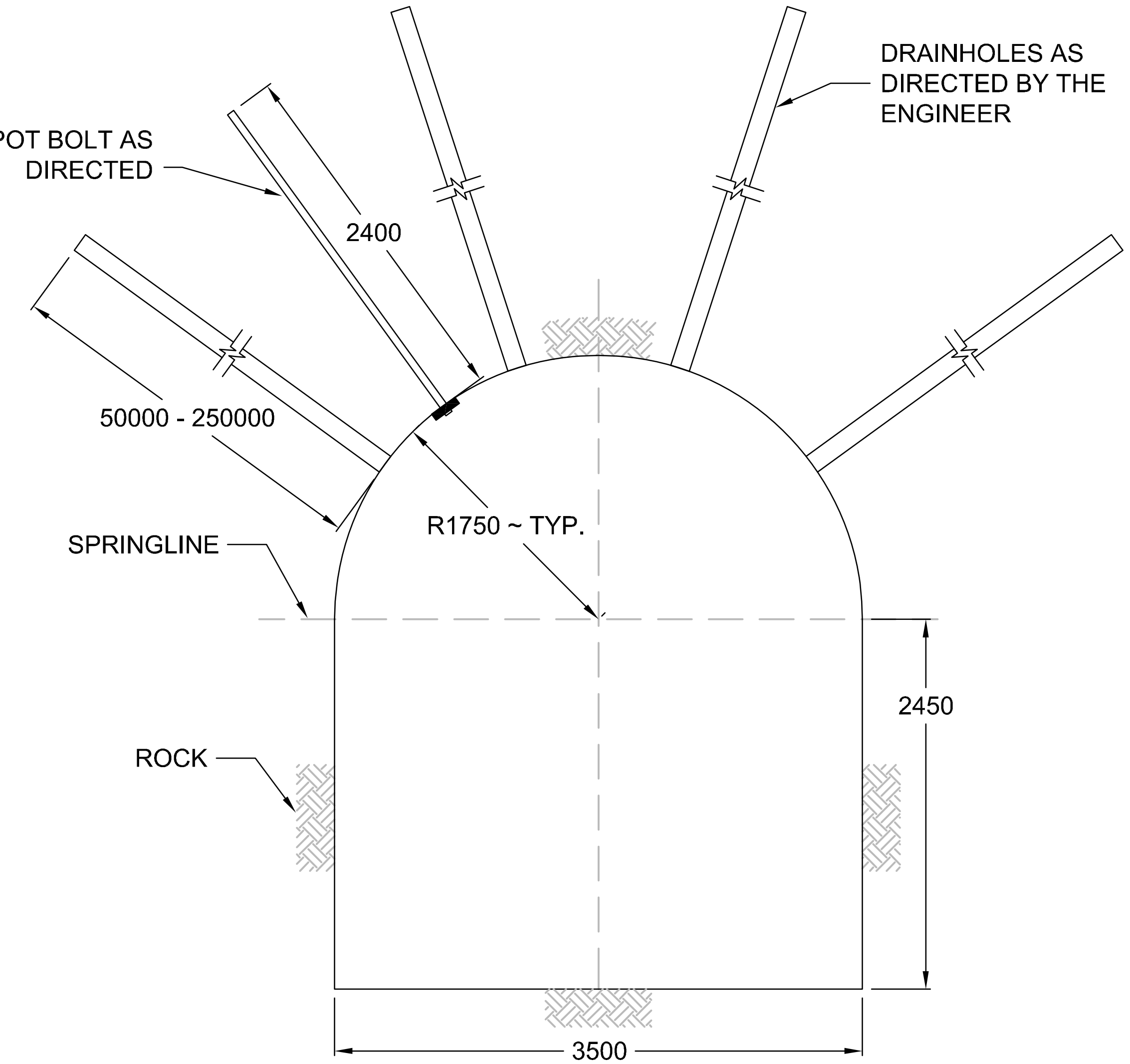
PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: DEWATERING WELL DESIGN SCHEMATIC

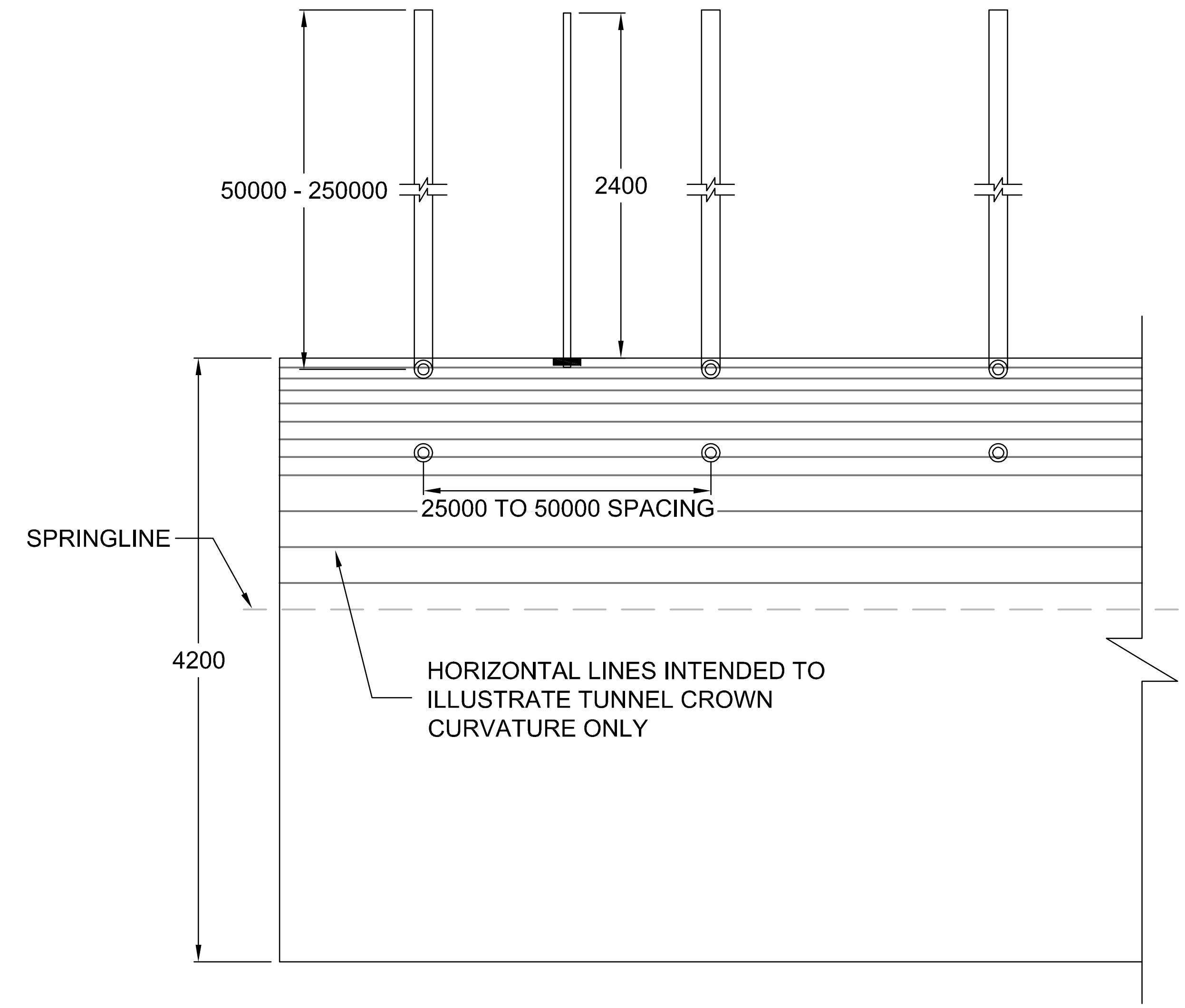
CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No.:	REV.:
0638014-30	B-01	

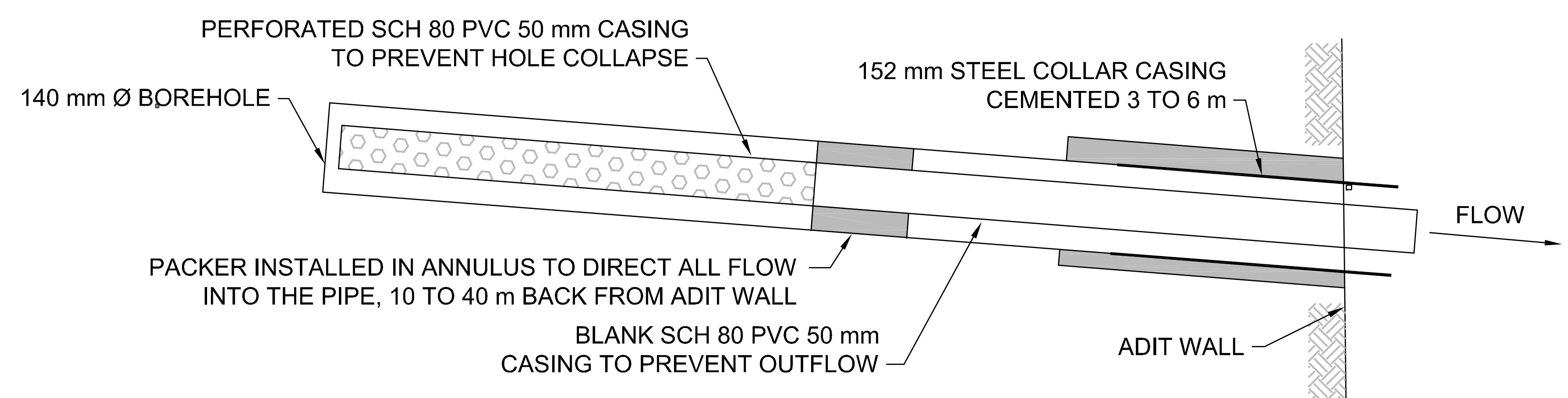
K:\Projects\0638-013 KSM PFS Update and EA Support\20 PFS Hydrogeo\Reporting\APPENDICES\APPENDIX D\AppendixD_WellSchematic_REV1.cdr



DEWATERING ADIT - SECTION



DEWATERING ADIT - PROFILE



DRAINHOLE SCHEMATIC
N.T.S.

SCALE 1:50

1 0 1 2 3

METRES

NOTE:
1. SPOT BOLT AS DIRECTED BY ENGINEER, USING FULLY-GROUTED #7 DWYIDAG BOLTS.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:50
DATE:	JUL 2013
DRAWN:	GCB
DESIGNED:	JRW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

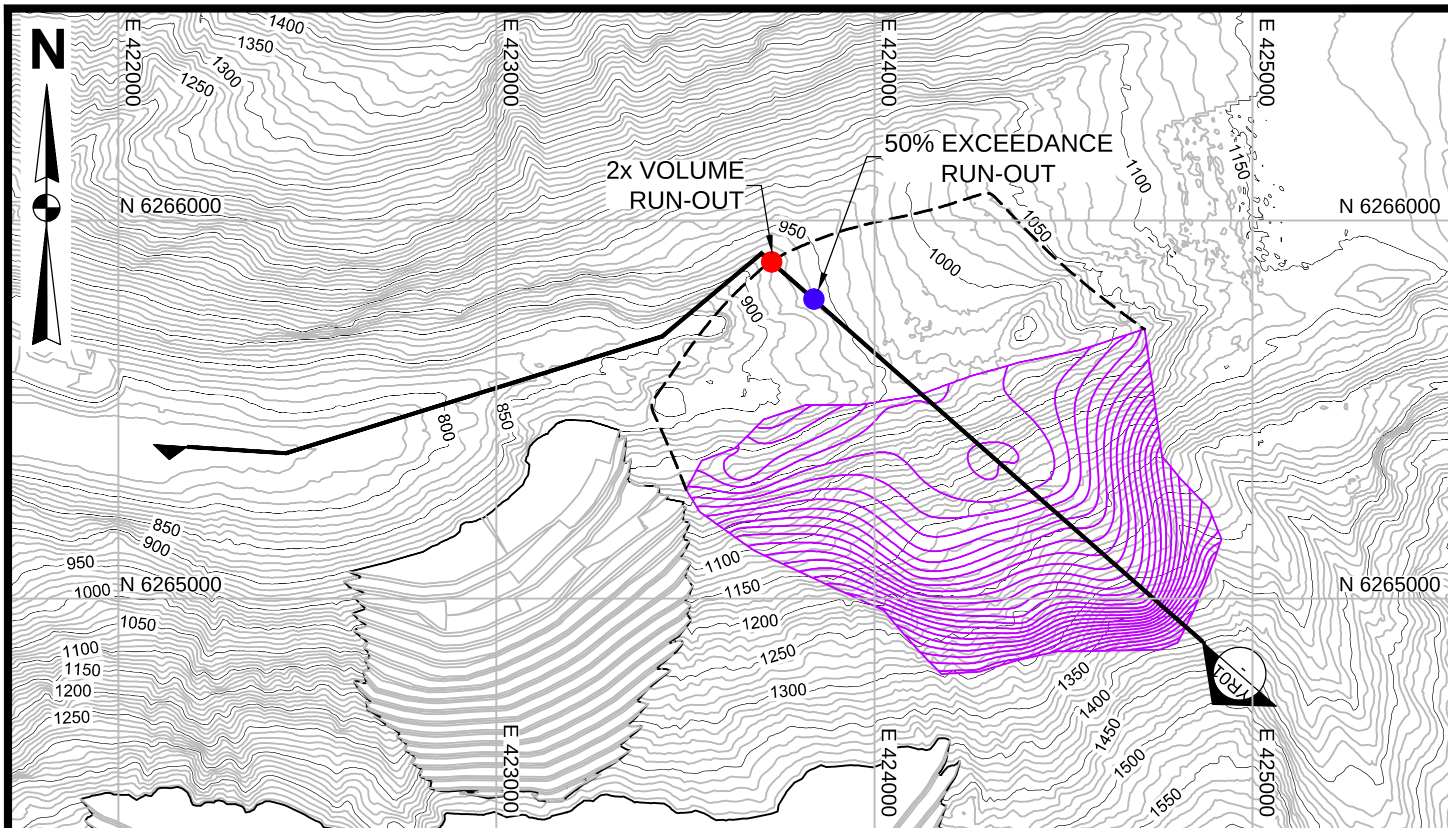
PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

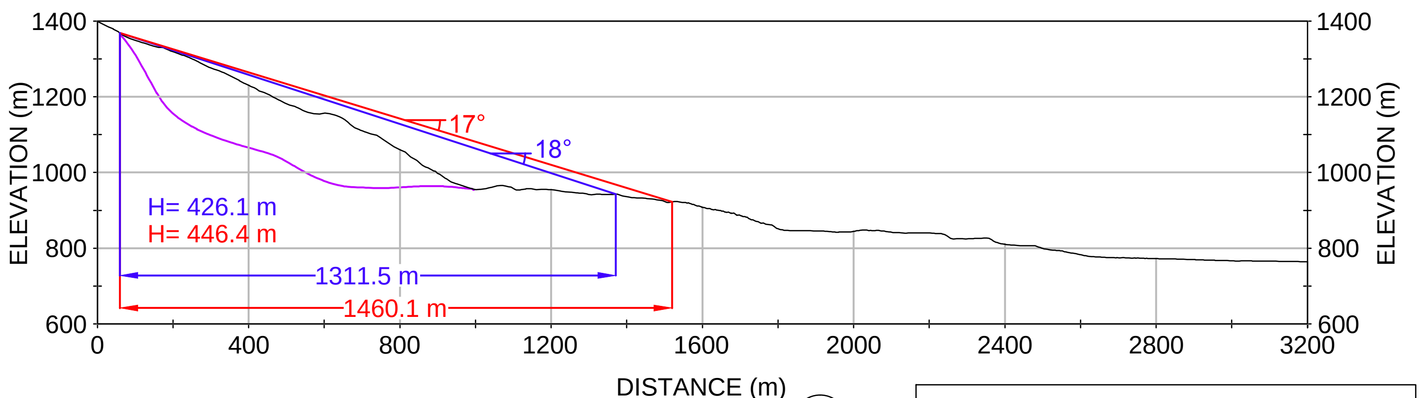
TITLE: SCHEMATIC OF SNOWFIELD DEWATERING ADIT

PROJECT No.:	DWG No.:	REV.:
0638014-30	B-02	-

DWG TO BE READ WITH BGC MEMO TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

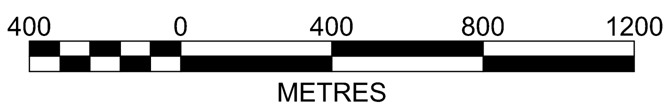
APPENDIX C
SCENARIO A RUN-OUT ANALYSES





CROSS SECTION YR01 / -

SCALE 1:20000



LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	WKL	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

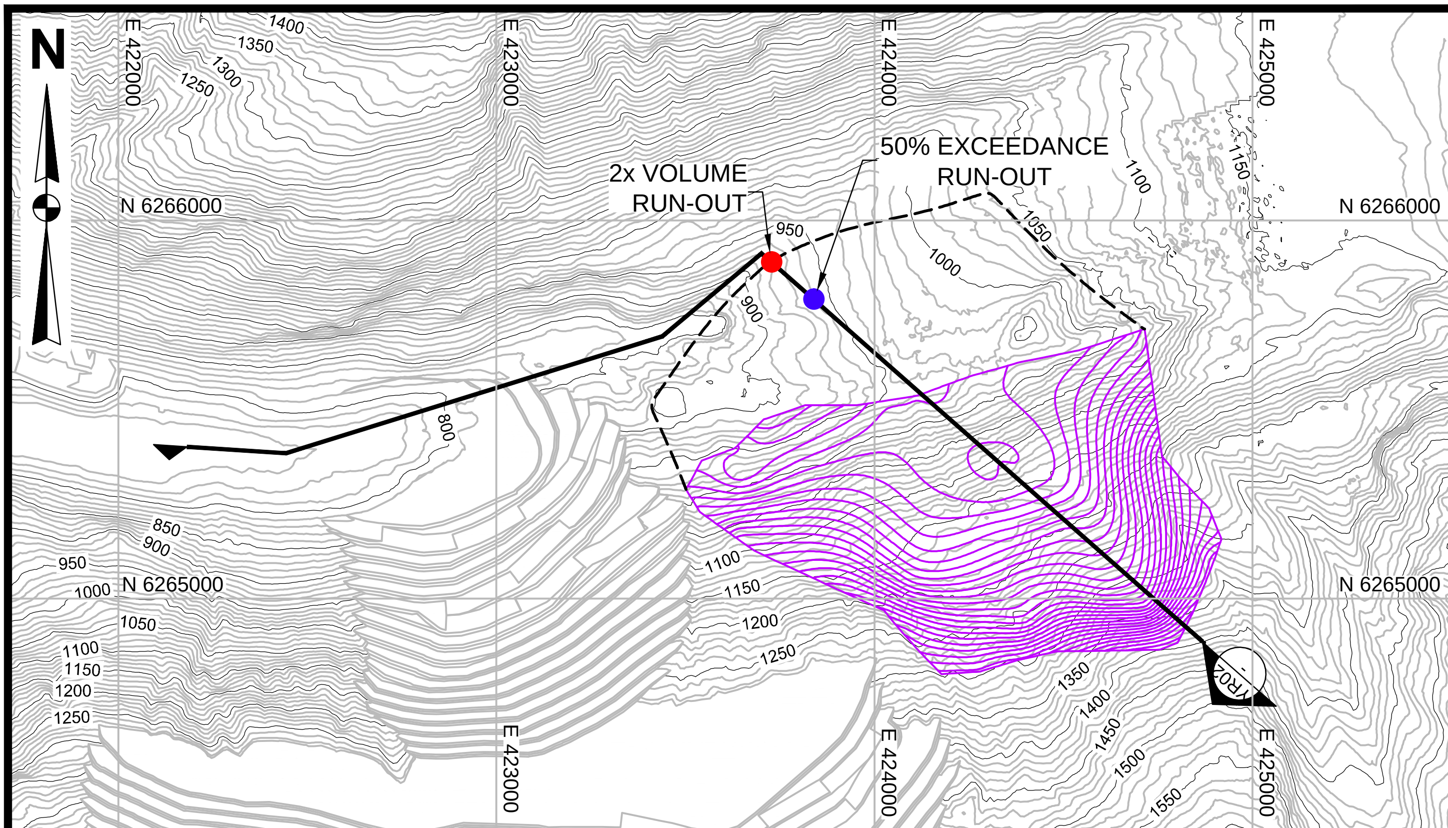
PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

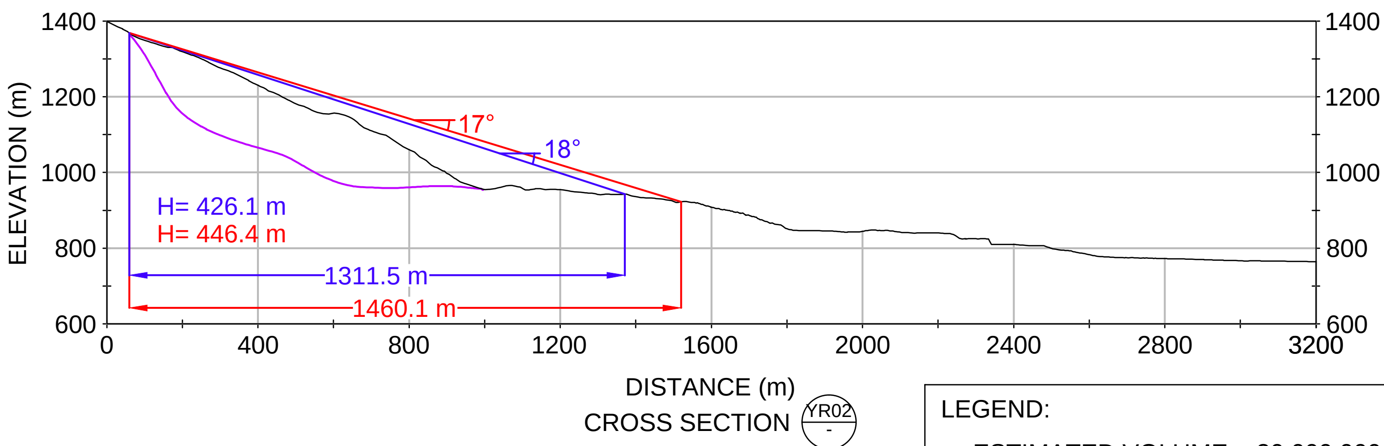
TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 01

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-01	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





SCALE 1:20000

400 0 400 800 1200

METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	WKL	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 02

CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-02	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

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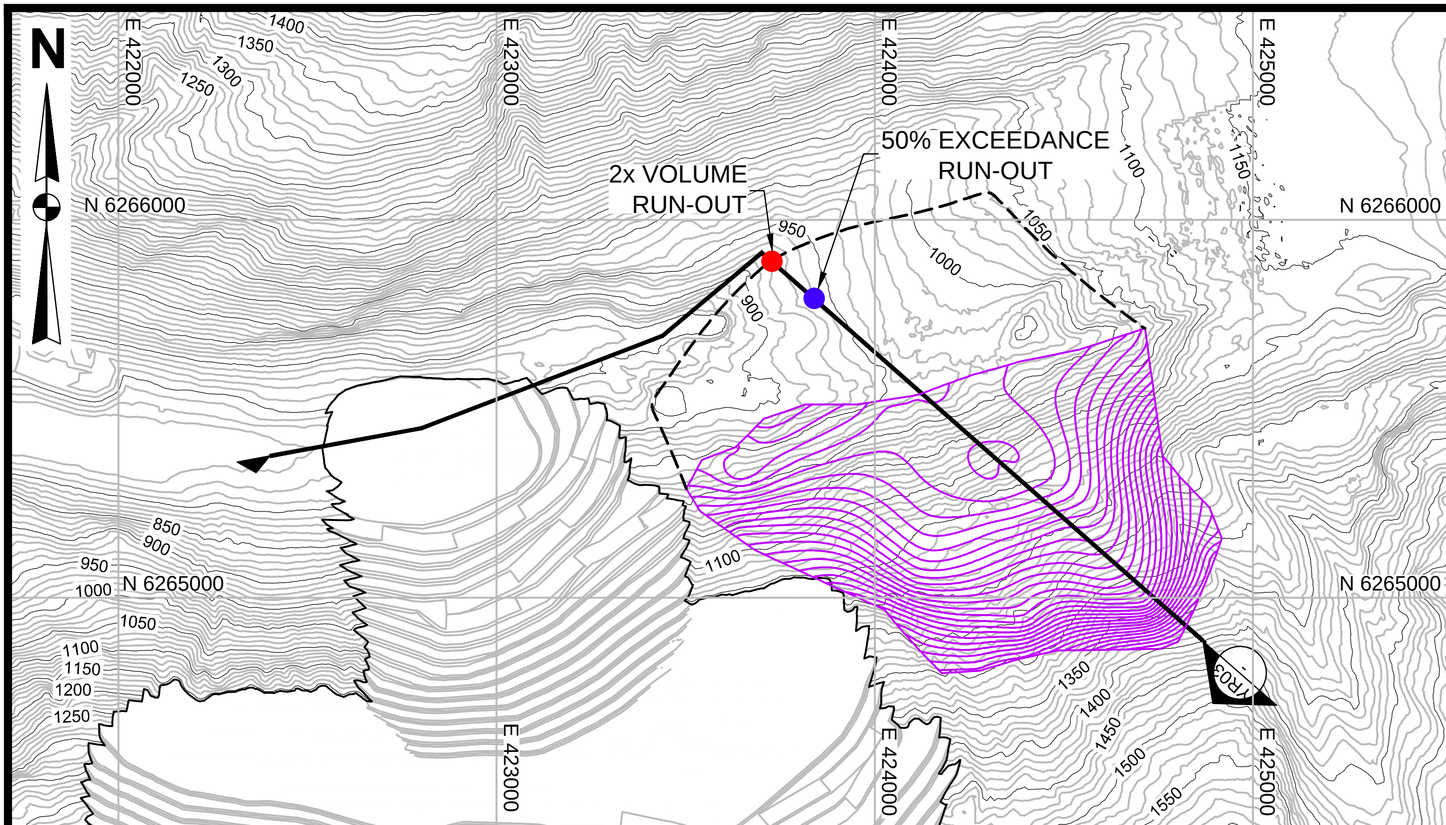
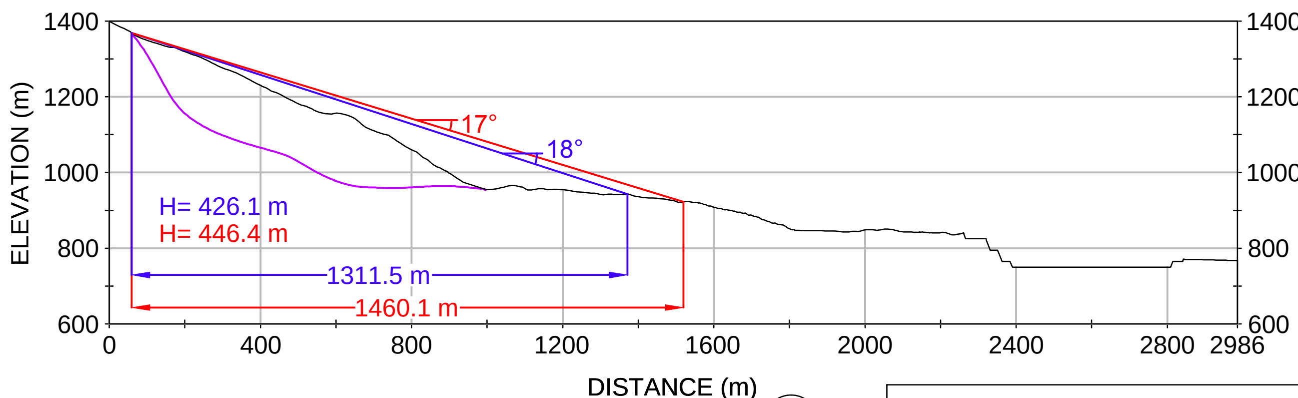
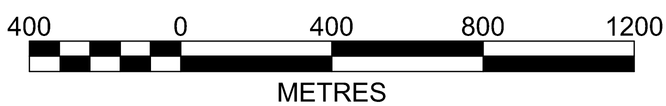




CROSS SECTION YR03 -

SCALE 1:20000



LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	WKL	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

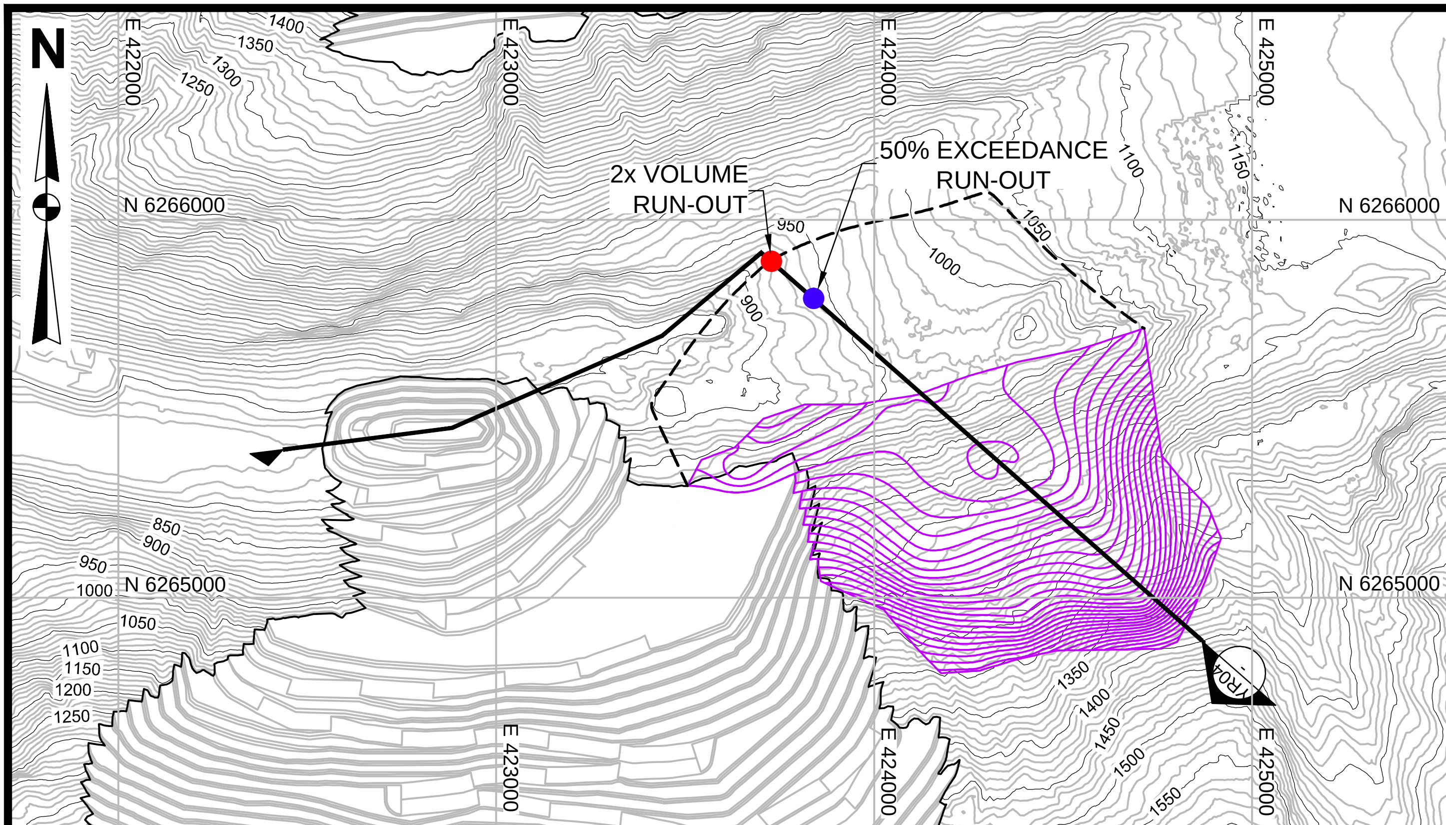
TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 03

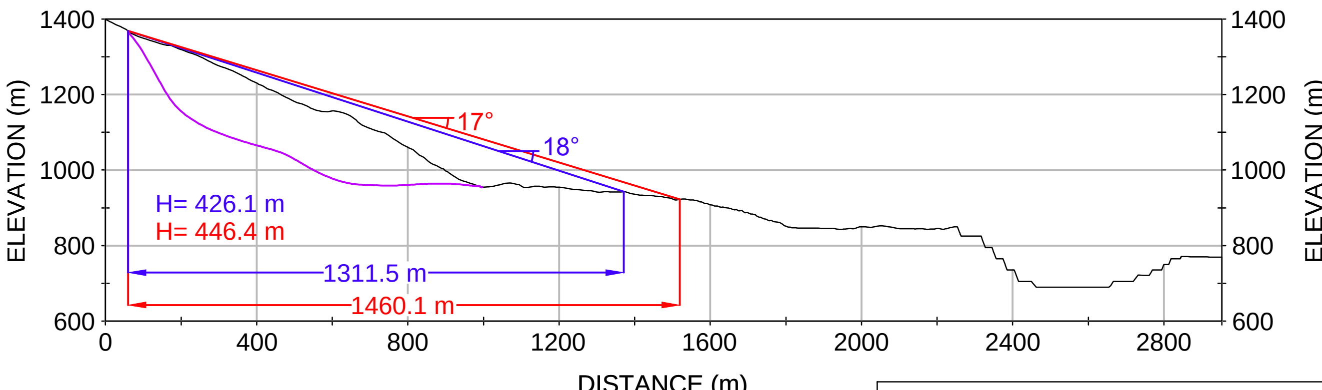
CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-03	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\C-03_SNOWFIELD_LANDSLIDE_RUN-OUT_YEAR_03.dwg Layout: Layout1 Plot Date Jul 5 13 Time: 1:04 PM





CROSS SECTION YR04 -

SCALE 1:20000

400 0 400 800 1200

METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	WKL	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

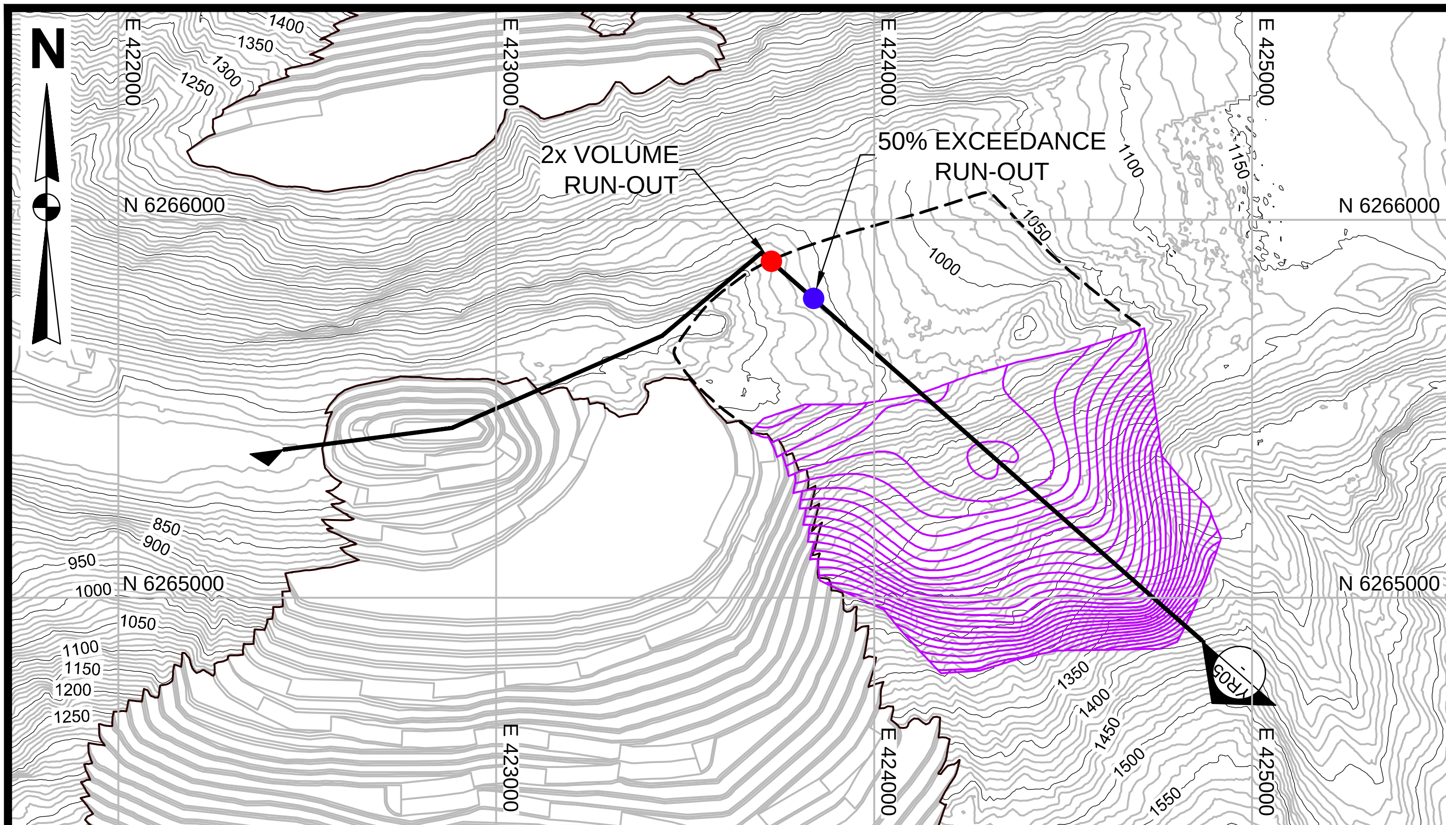
TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 04

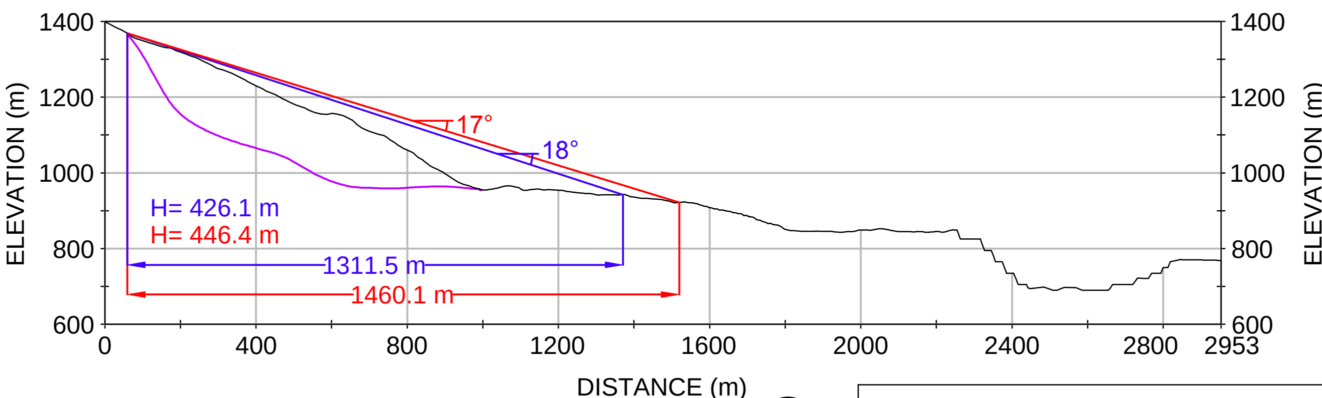
CLIENT: SEABRIDGE GOLD INC.

PROJECT No.: 0638014-30	DWG No: C-04	REV.:

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\C-04_SNOWFIELD_LANDSLIDE_RUN-OUT_YEAR_04.dwg Layout: Layout1 Plot Date Jul 5 13 Time: 12:09 PM





CROSS SECTION YR05 / -

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE 1:20000

400 0 400 800 1200

METRES

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

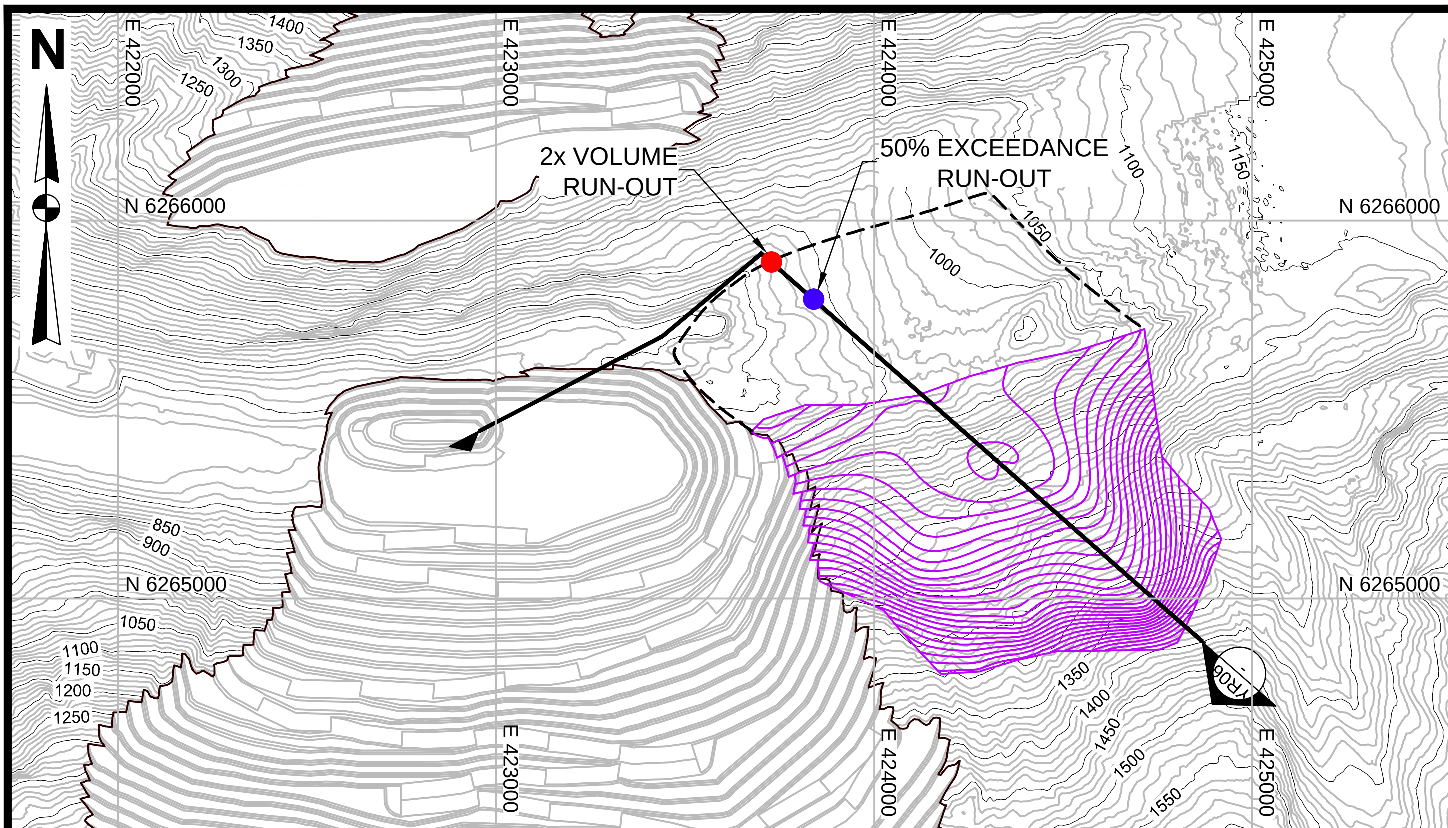
PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

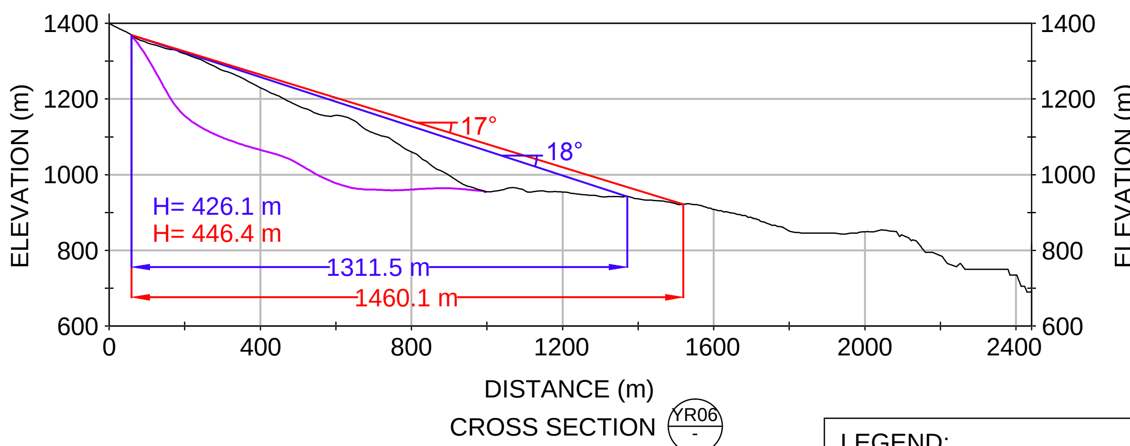
TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 05

CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-05	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





SCALE 1:20000

400 0 400 800 1200

METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

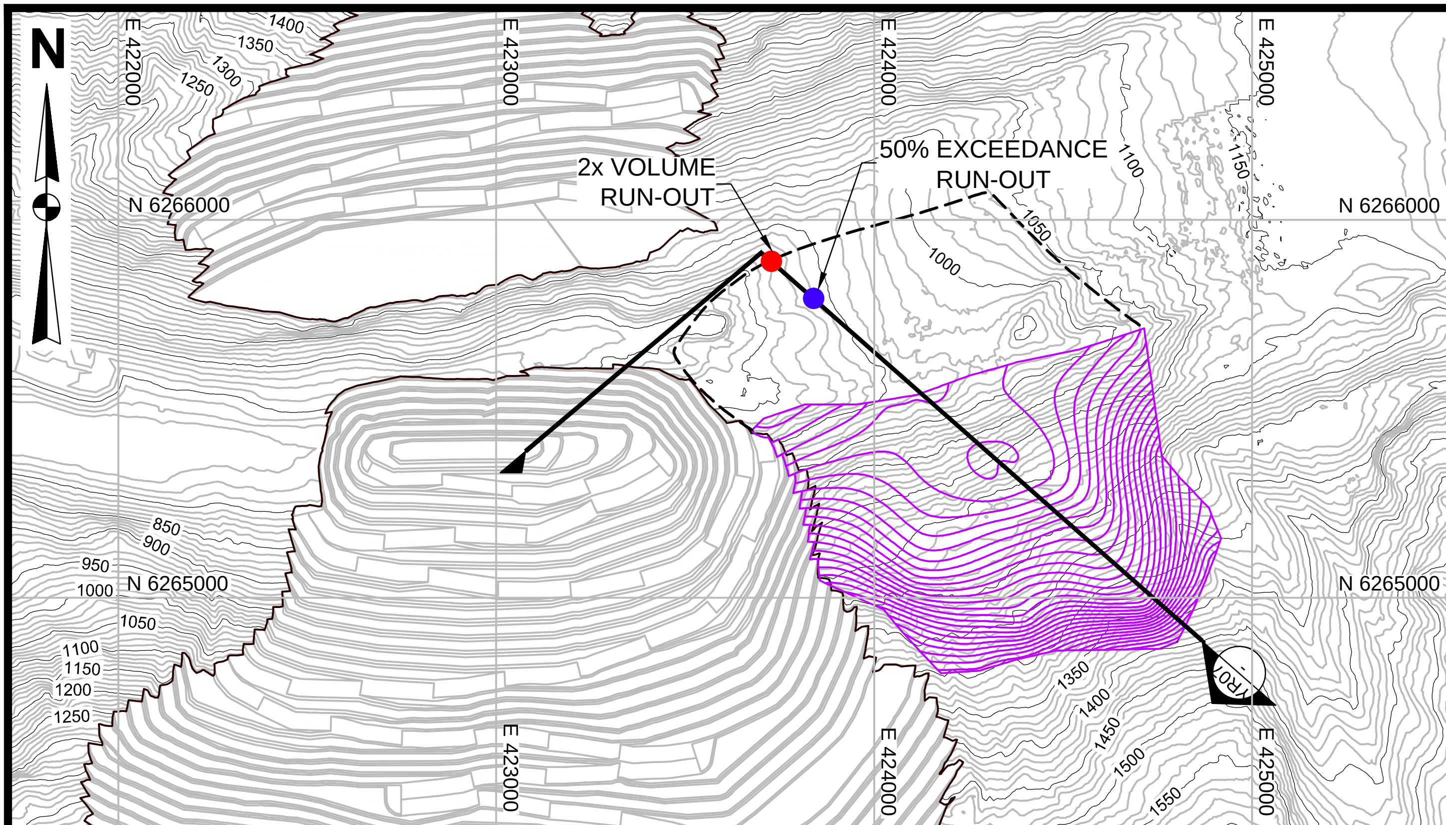
PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

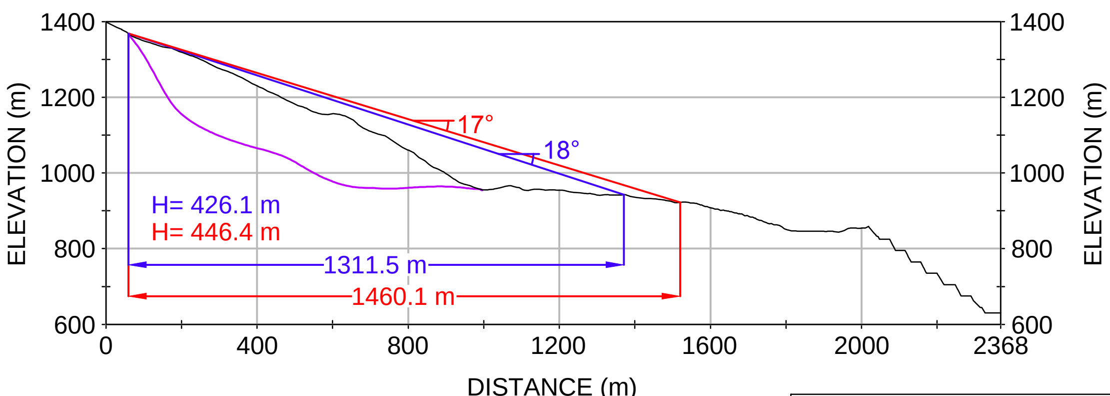
TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 06

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-06	

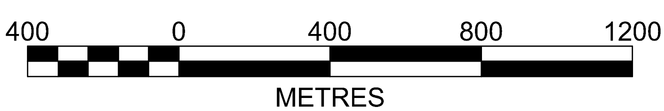
DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





CROSS SECTION YR07 / -

SCALE 1:20000



LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

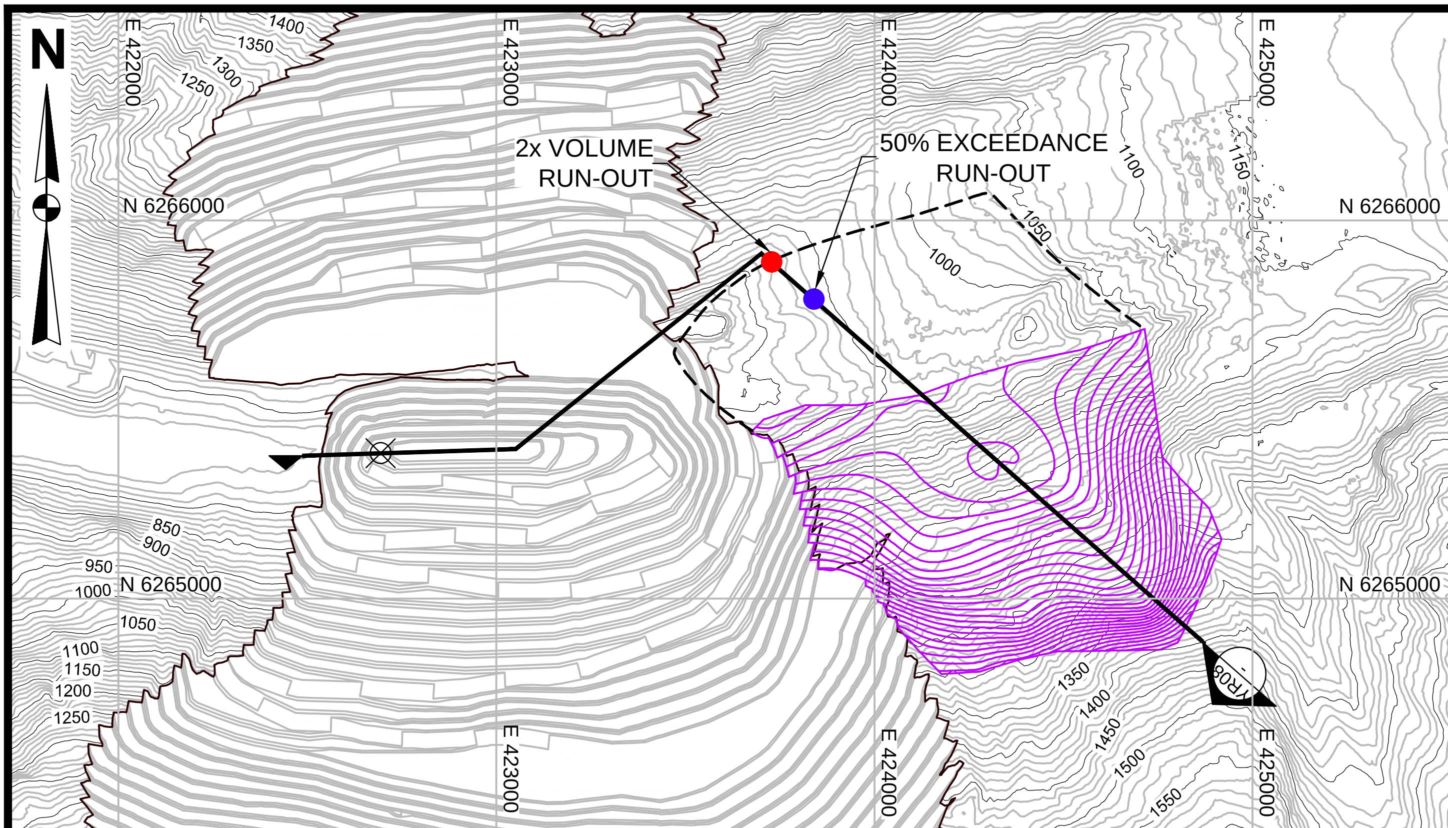
TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 07

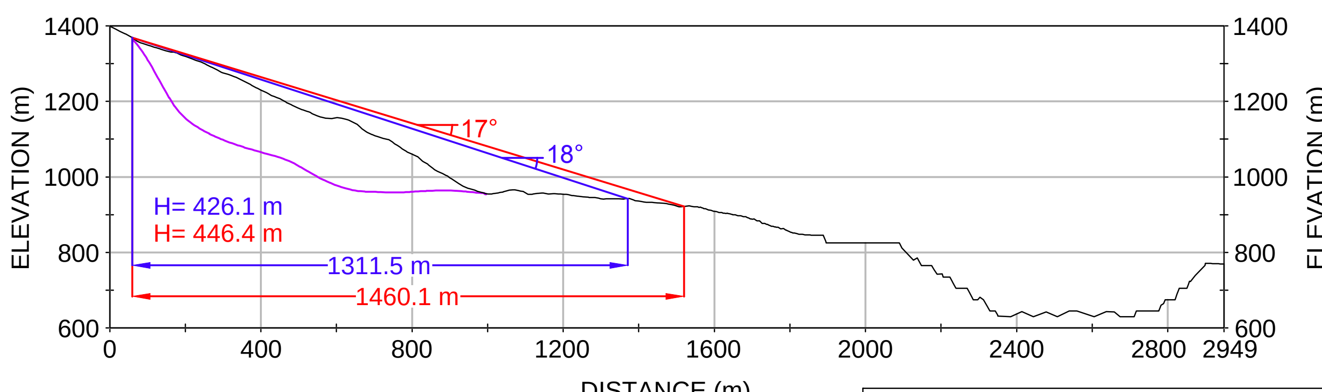
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-07	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\C-07_SNOWFIELD_LANDSLIDE_RUN-OUT_YEAR_07.dwg Layout: Layout1 Plot Date Jul 5 13 Time: 1:07 PM



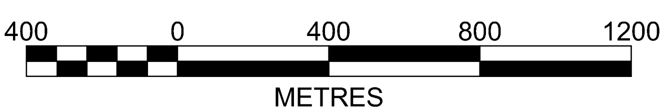


CROSS SECTION YR08 / -

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3
- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE 1:20000



SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

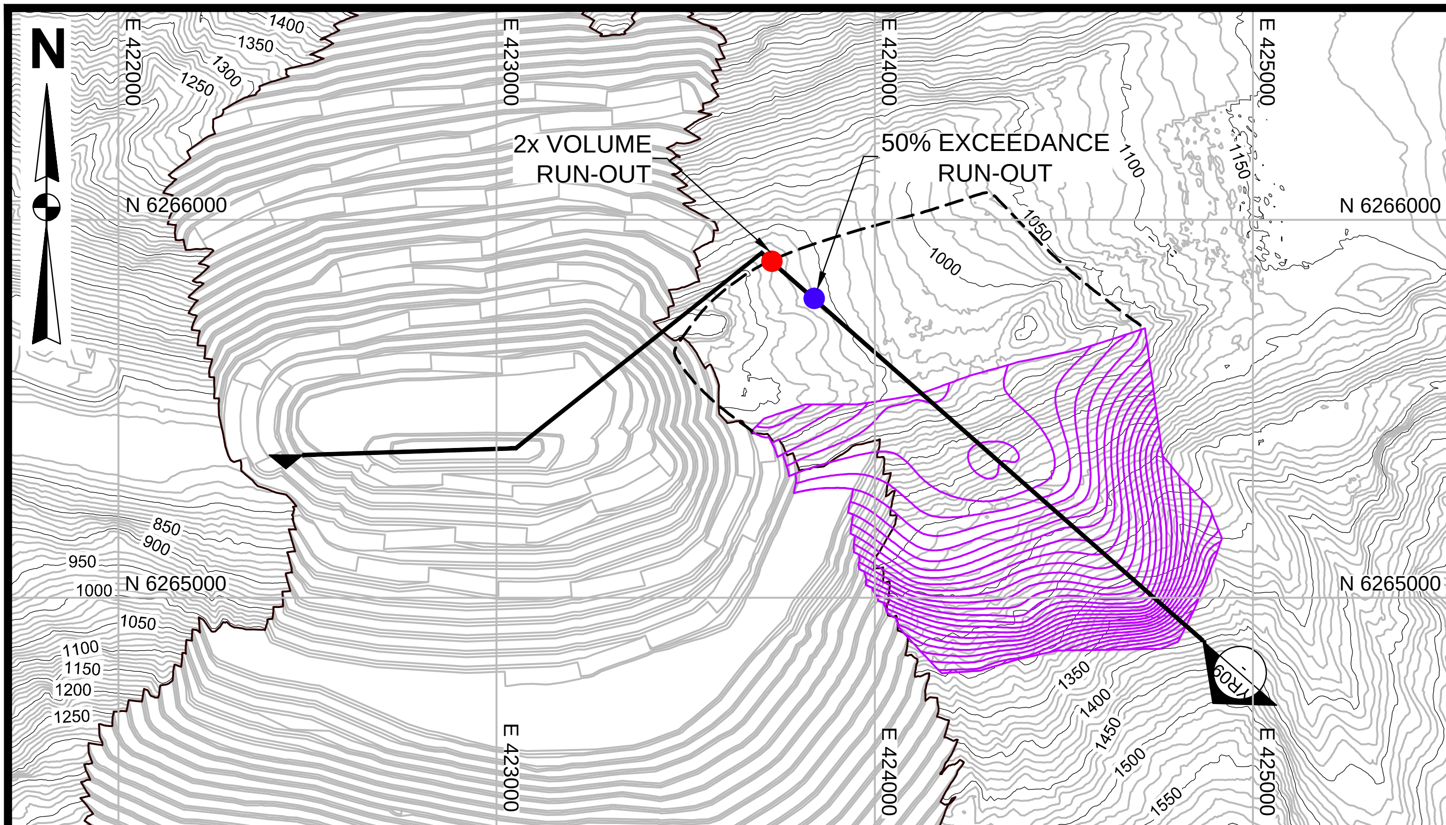
TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 08

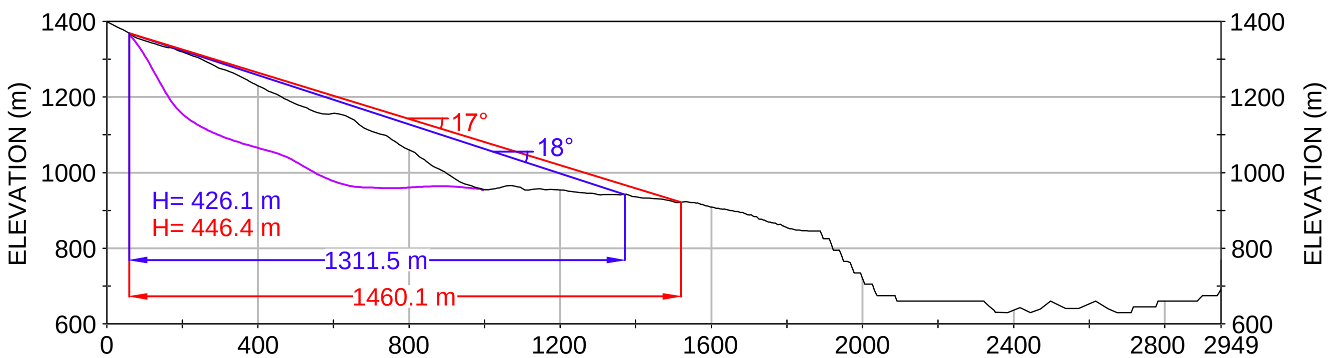
CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-08	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

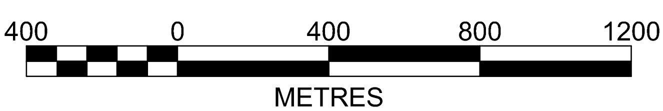
X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\C-08_SNOWFIELD_LANDSLIDE_RUN-OUT_YEAR_08.dwg Layout: Layout1 Plot Date Jul 5 13 Time: 1:08 PM





CROSS SECTION YR09 / -

SCALE 1:20000



LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

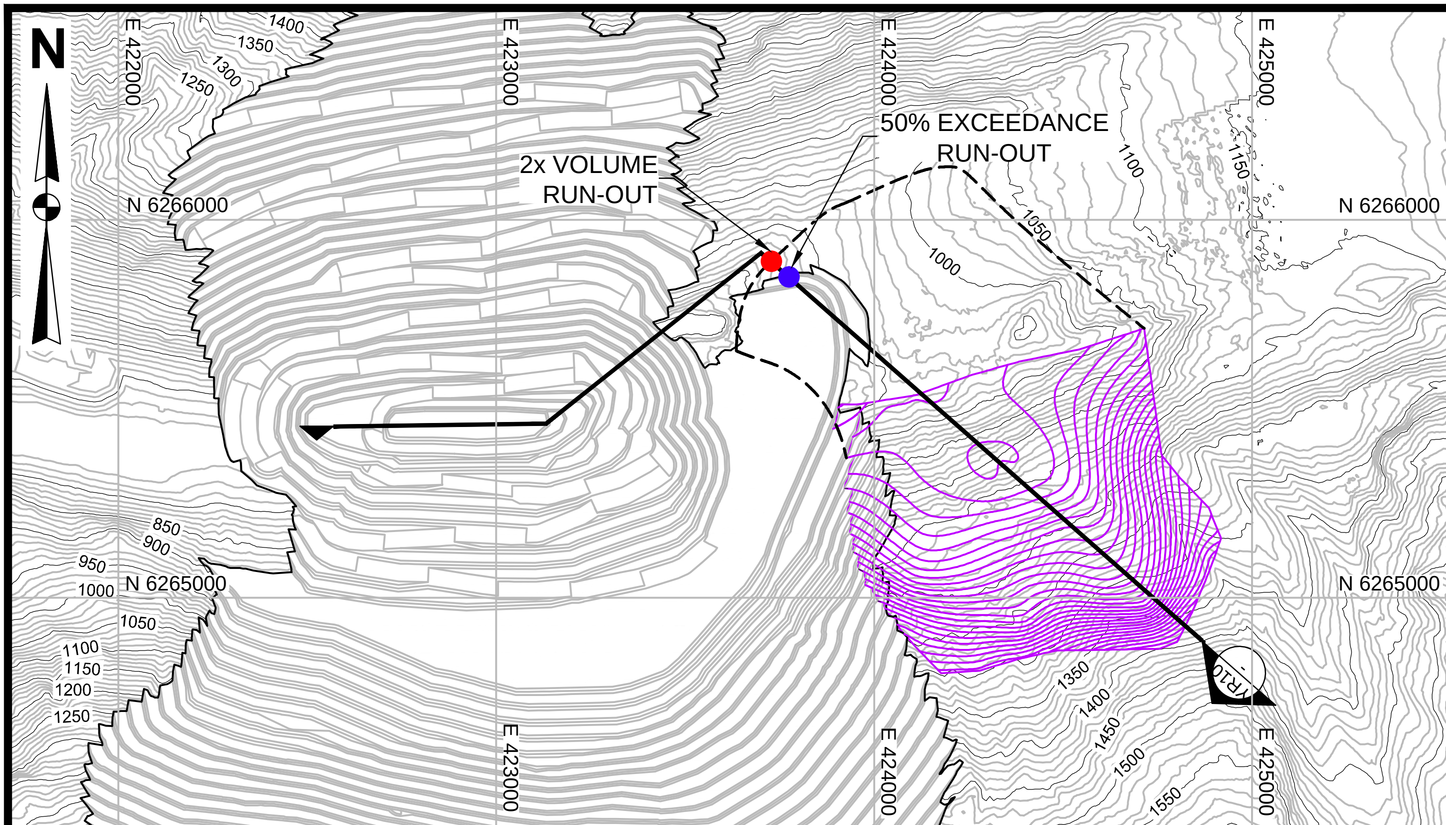
TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 09

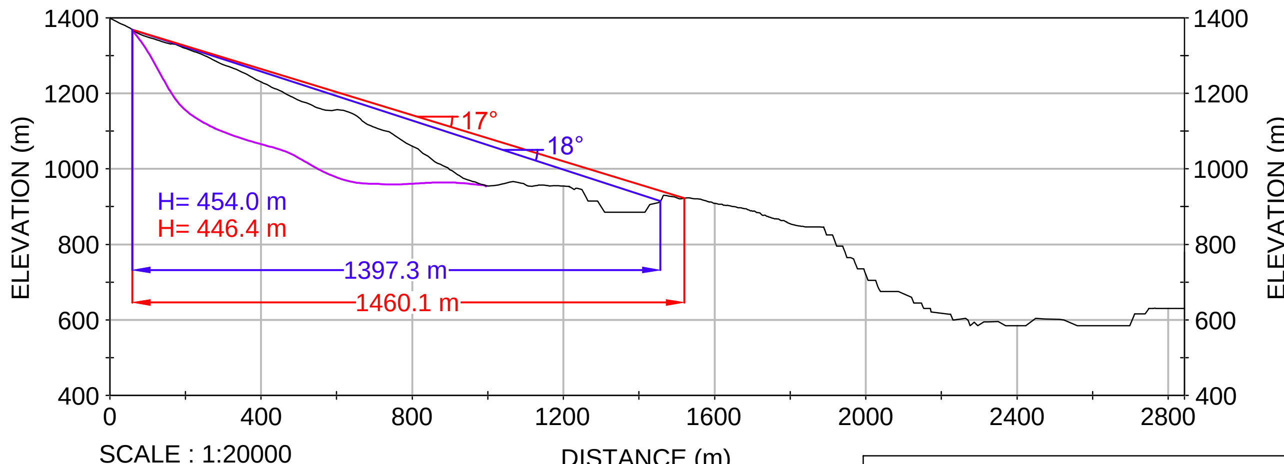
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-09	

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\C-09_SNOWFIELD_LANDSLIDE_RUN-OUT_YEAR_09.dwg Layout: Layout1 Plot Date Jul 5 13 Time: 1:09 PM

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





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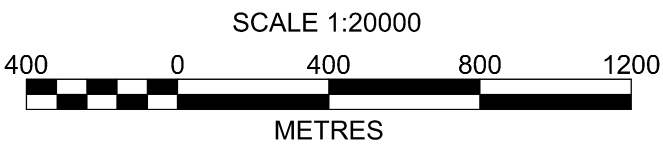


LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE: 1:20000	DESIGNED: JRW
DATE: JUL 2013	CHECKED: DK
DRAWN: SS	APPROVED: DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

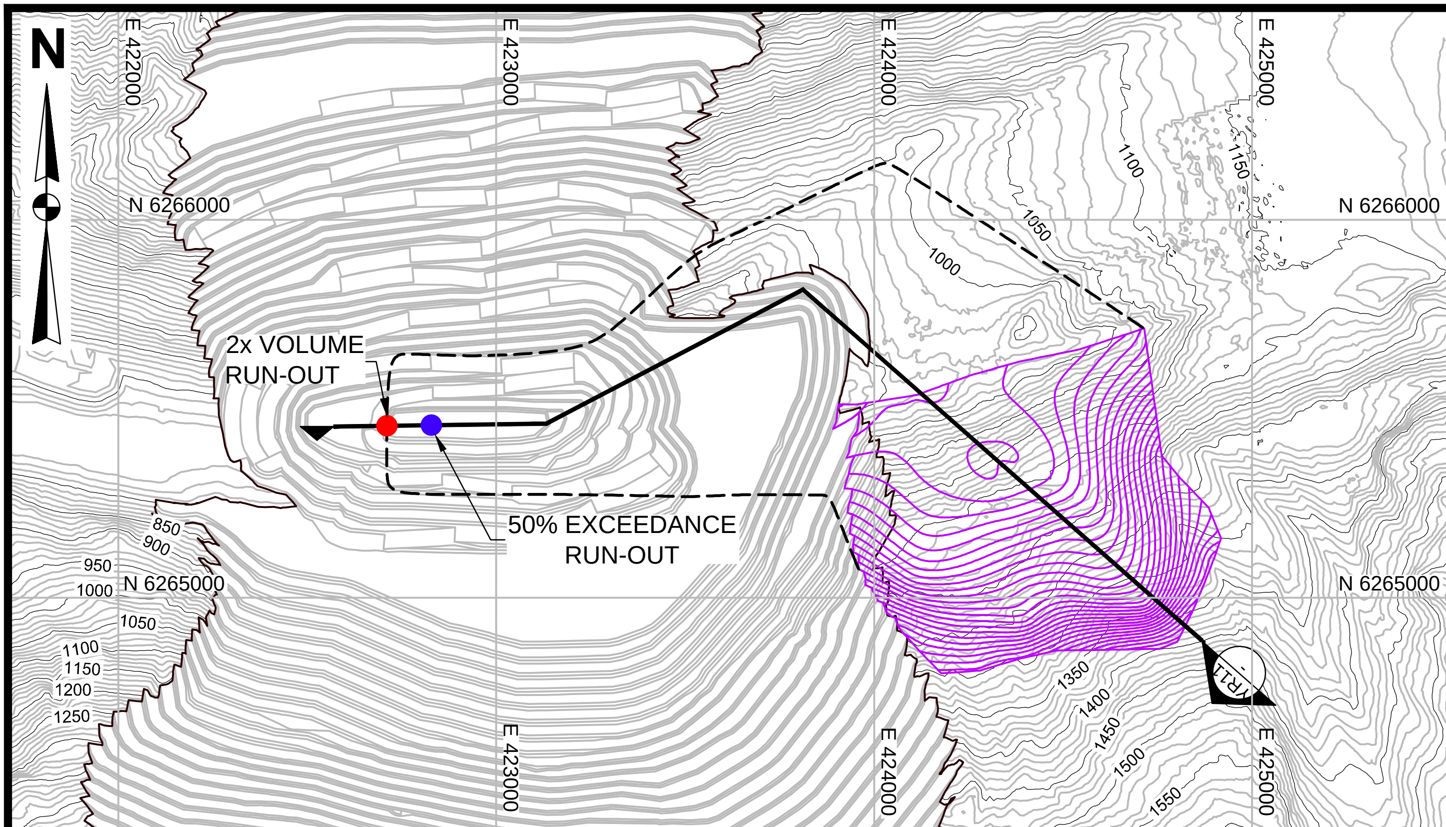
PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

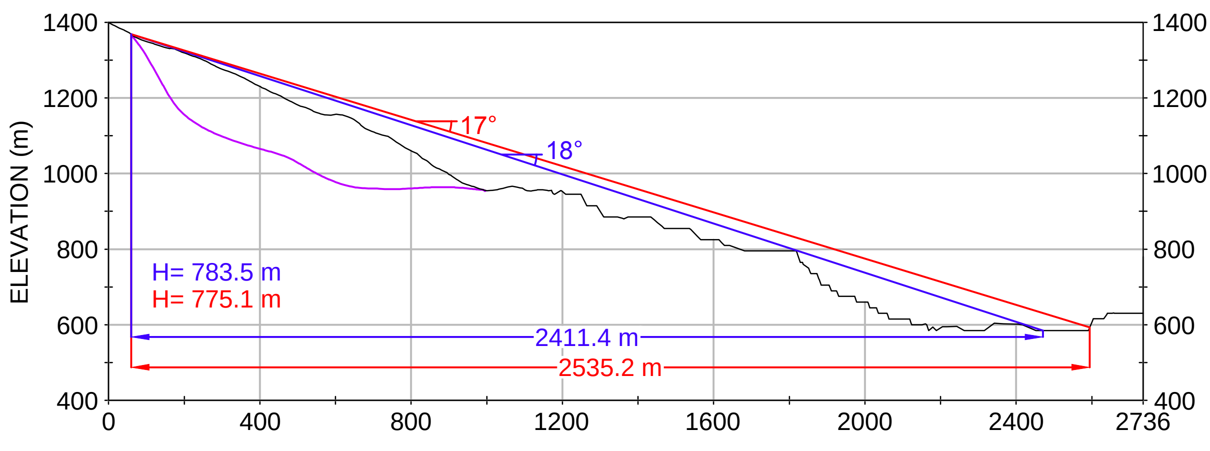
TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 10

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-10	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





CROSS SECTION YR11 / -

SCALE 1:20000

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METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

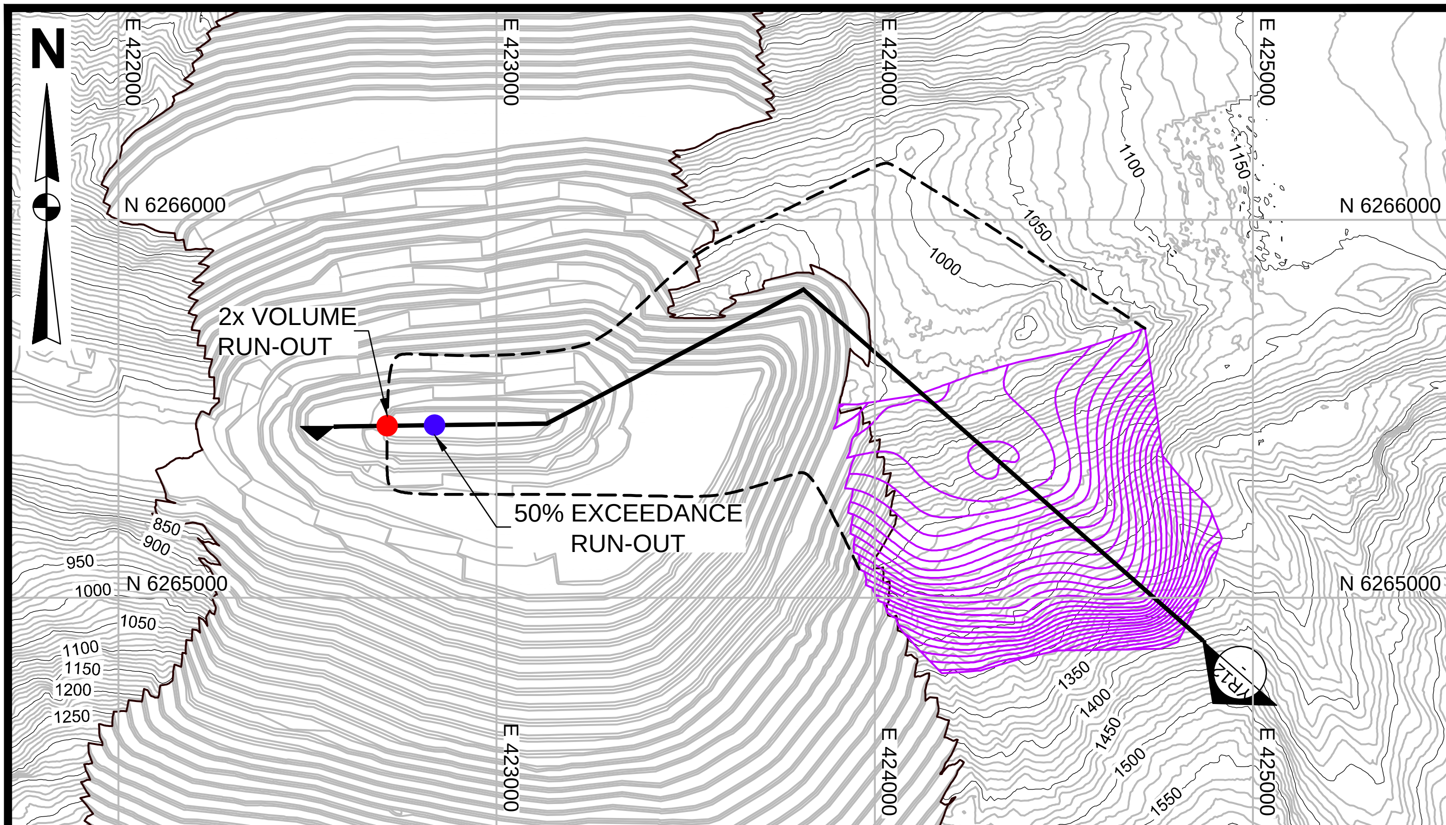
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

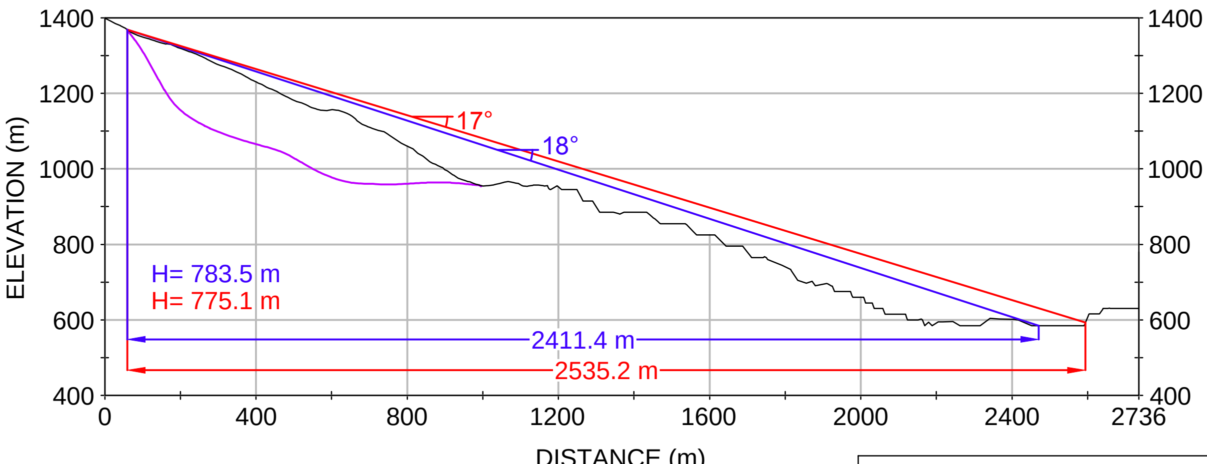
PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 11

CLIENT:	PROJECT No.:	DWG No:	REV.:
SEABRIDGE GOLD INC.	0638014-30	C-11	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





CROSS SECTION YR12 -

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3
- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE 1:20000

400 0 400 800 1200

METRES

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

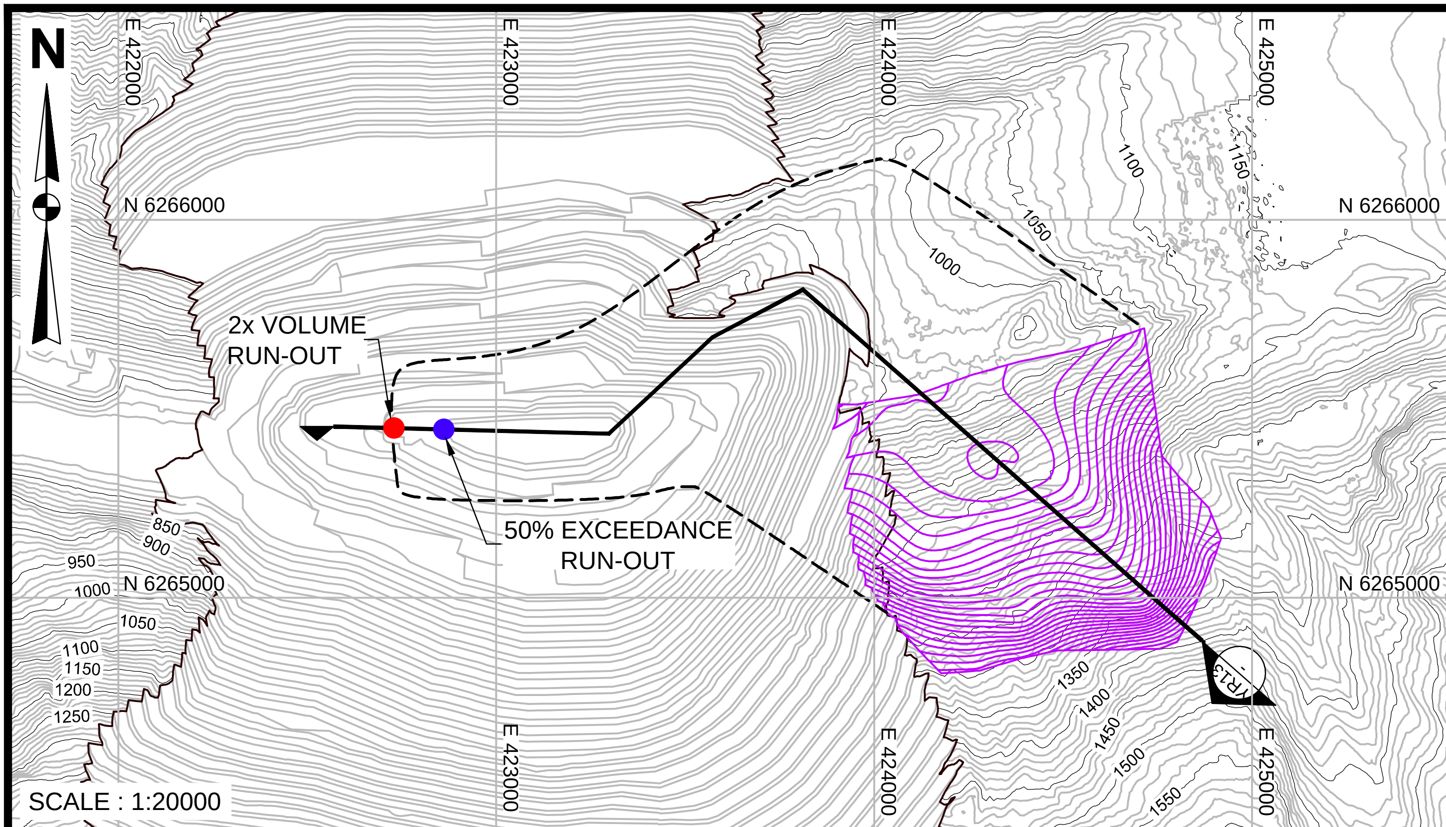
TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 12

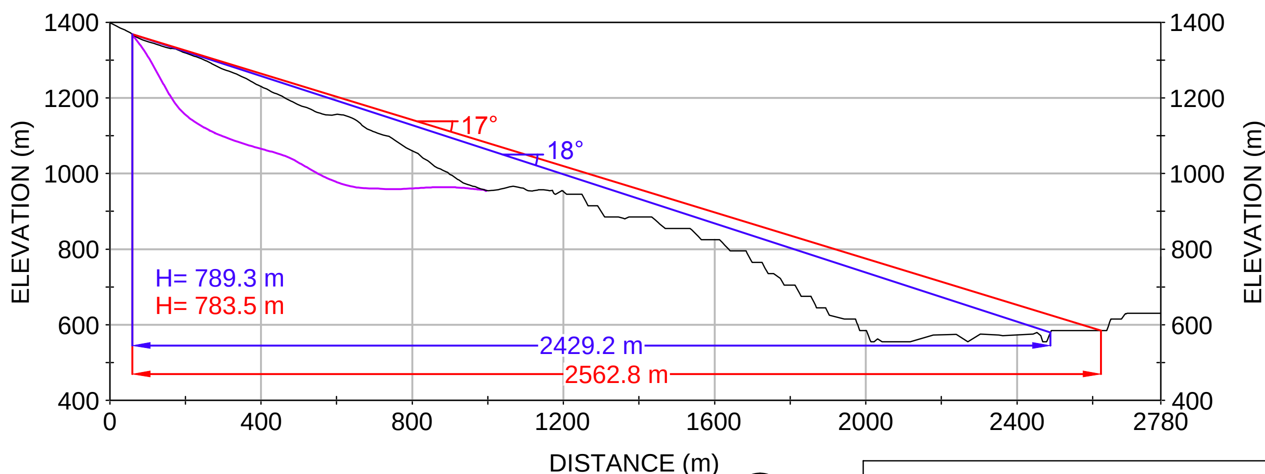
CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-12	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\C-12_SNOWFIELD_LANDSLIDE_RUN-OUT_YEAR_12.dwg Layout: Layout1 Plot Date Jul 5 13 Time: 12:30 PM





CROSS SECTION YR13 -

SCALE 1:20000

400 0 400 800 1200

METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3
50% EXCEEDANCE RUN-OUT PROBABILITY
2x VOLUME RUN-OUT
ESTIMATED LANDSLIDE PROFILE
ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

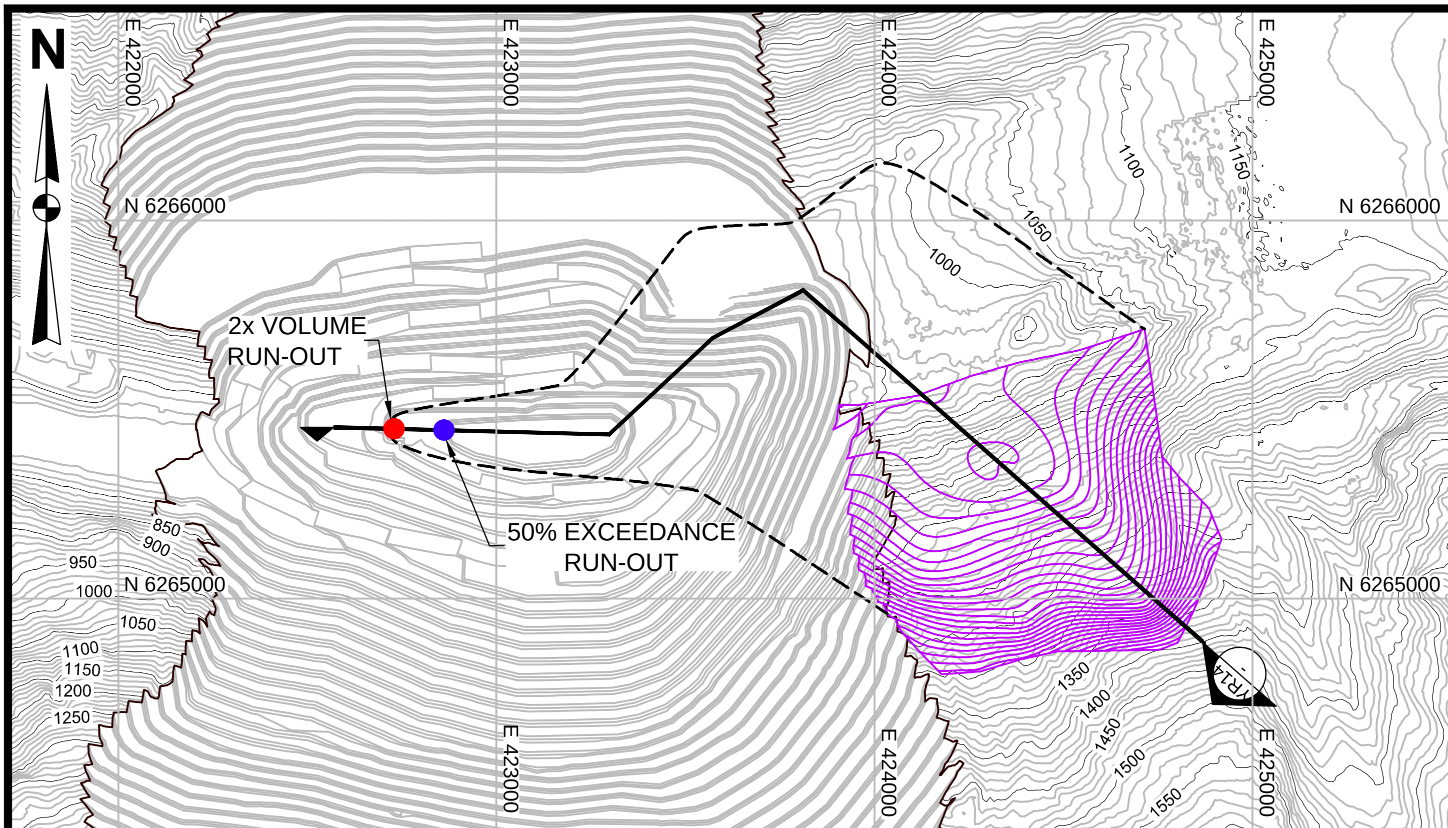
TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 13

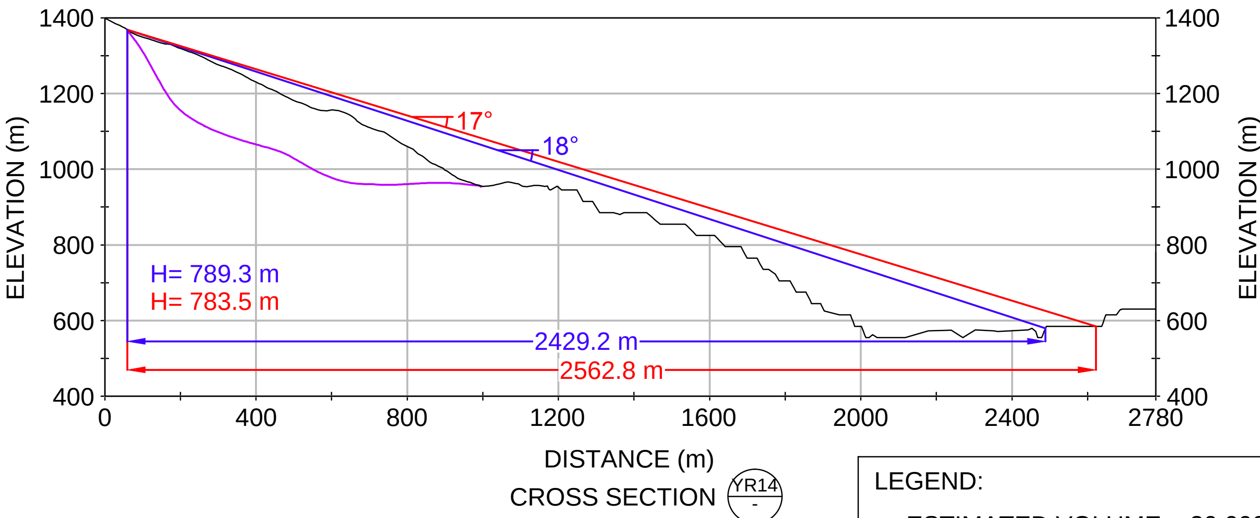
CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-13	

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\C-13_SNOWFIELD_LANDSLIDE_RUN-OUT_YEAR_13.dwg Layout: Layout1 Plot Date Jul 5 13 Time: 12:39 PM

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





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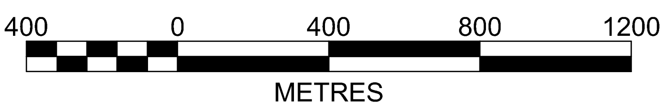


LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

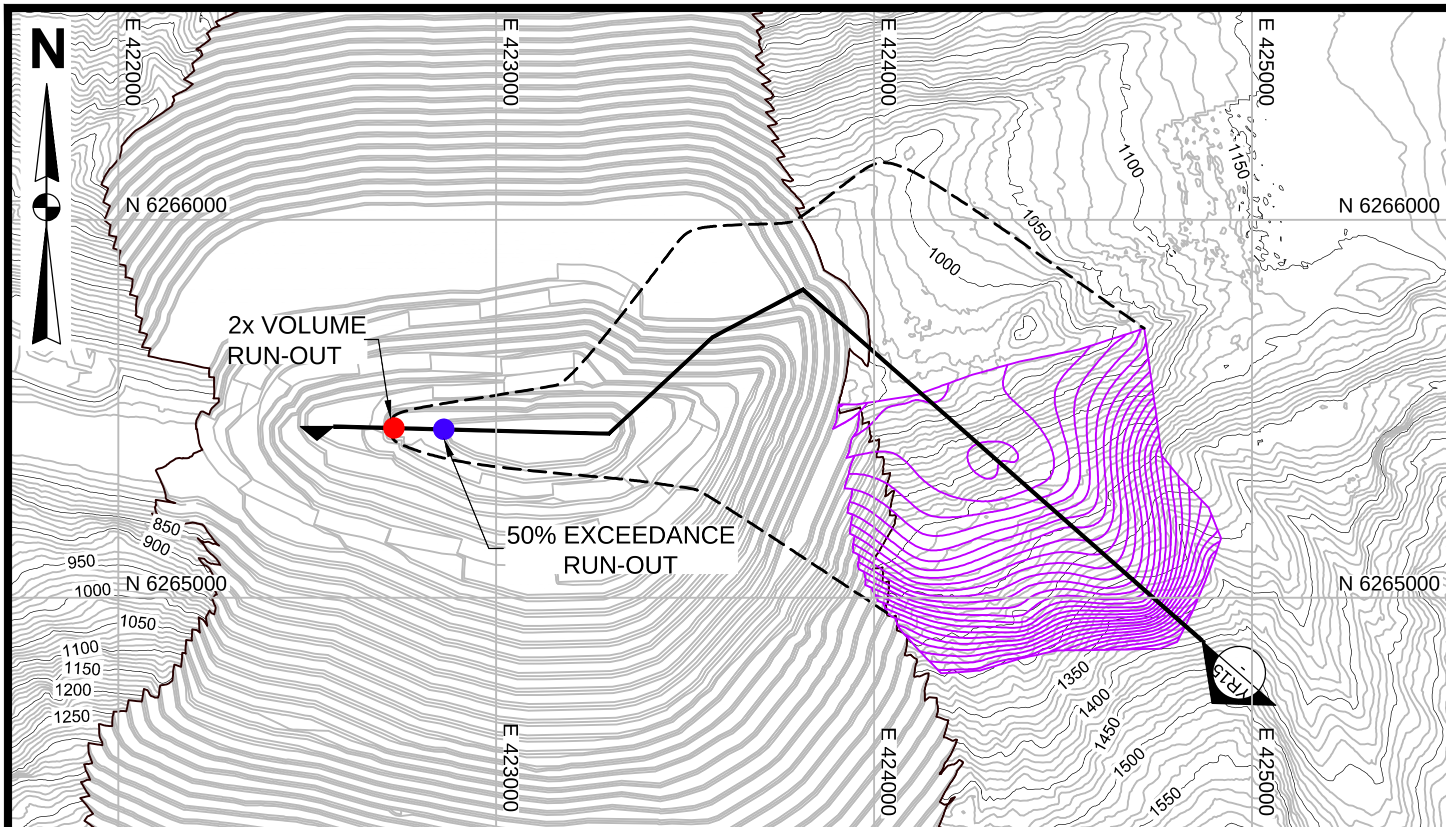
TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 14

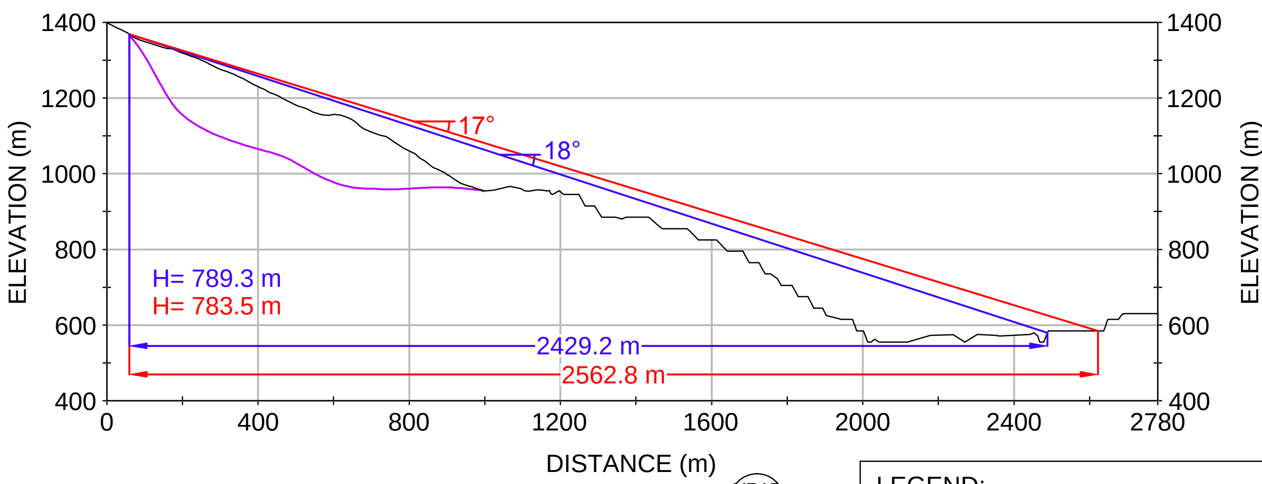
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-14	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

X:\Projects\0638\014\Workspace\20130627_REPORT_PRELIMINARY_SNOWFIELD_LANDSLIDE_MANAGEMENT_PLAN\C-14_SNOWFIELD_LANDSLIDE_RUN-OUT_YEAR_14.dwg Layout: Layout1 Plot Date Jul 5 13 Time: 12:41 PM





CROSS SECTION YR15 -

SCALE 1:20000

400 0 400 800 1200

METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 15

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-15	

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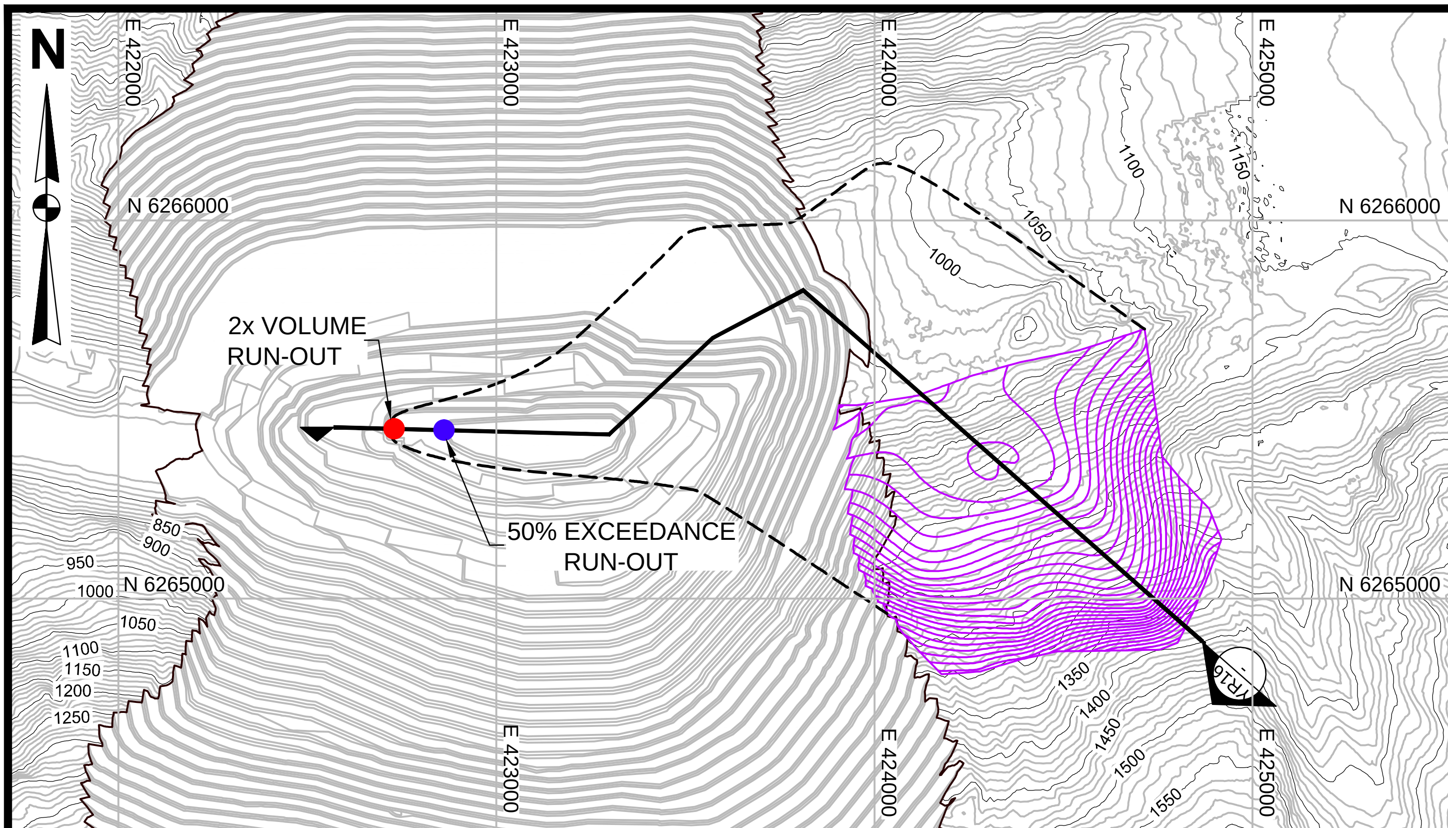

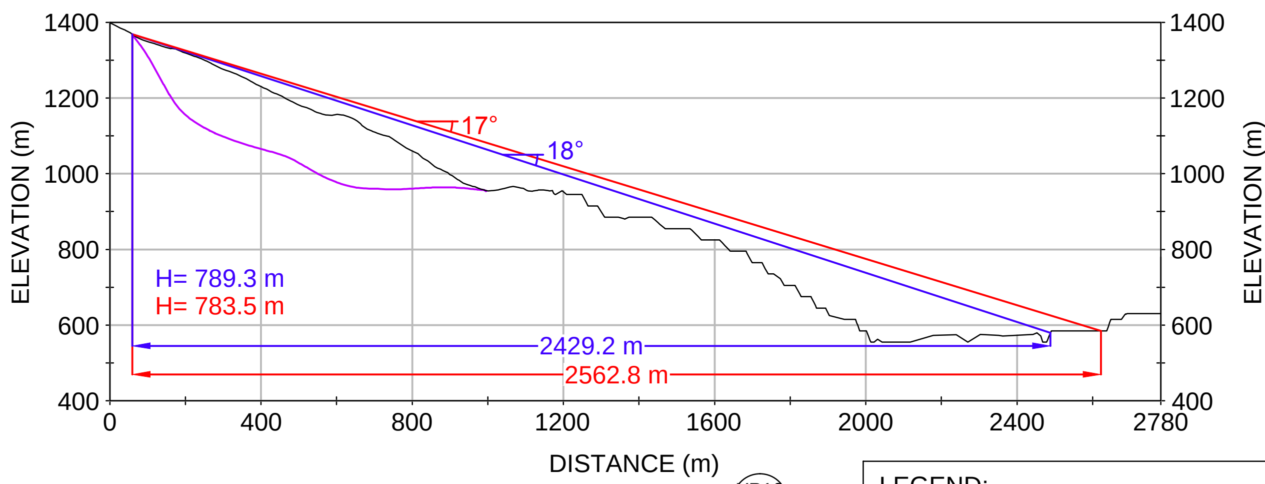

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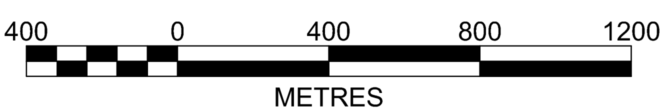

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 16

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-16	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

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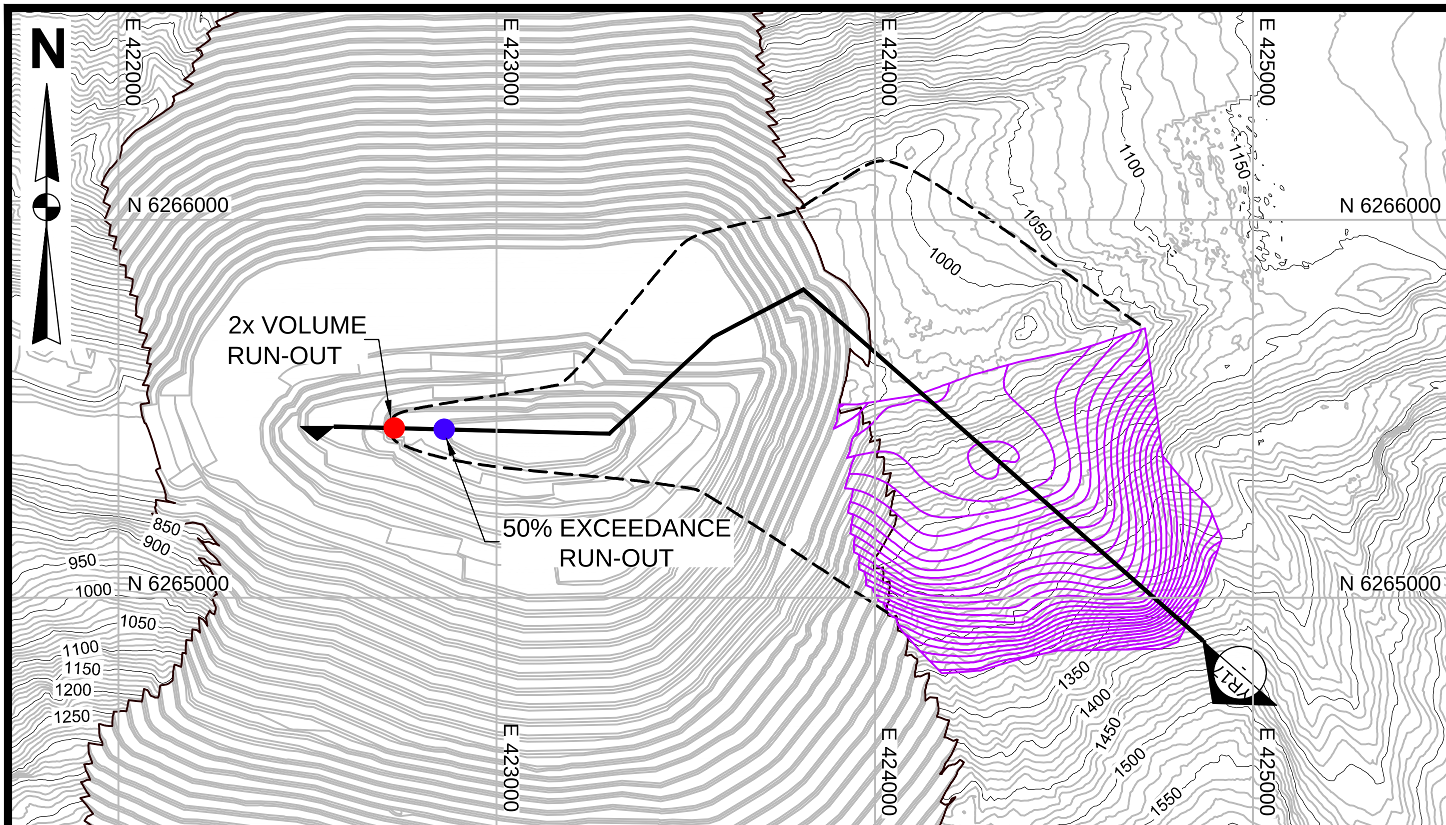
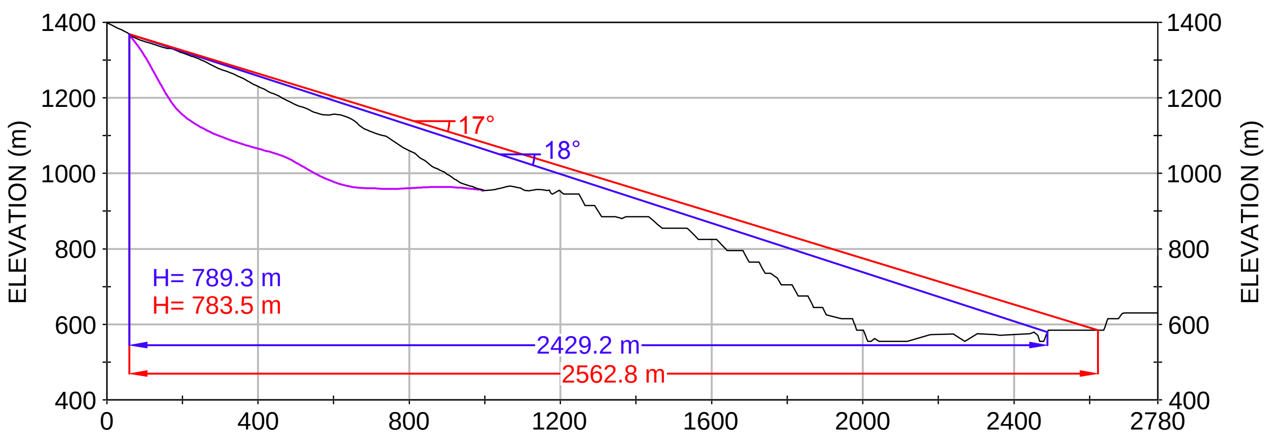




CROSS SECTION YR17 -

SCALE 1:20000

400 0 400 800 1200

METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

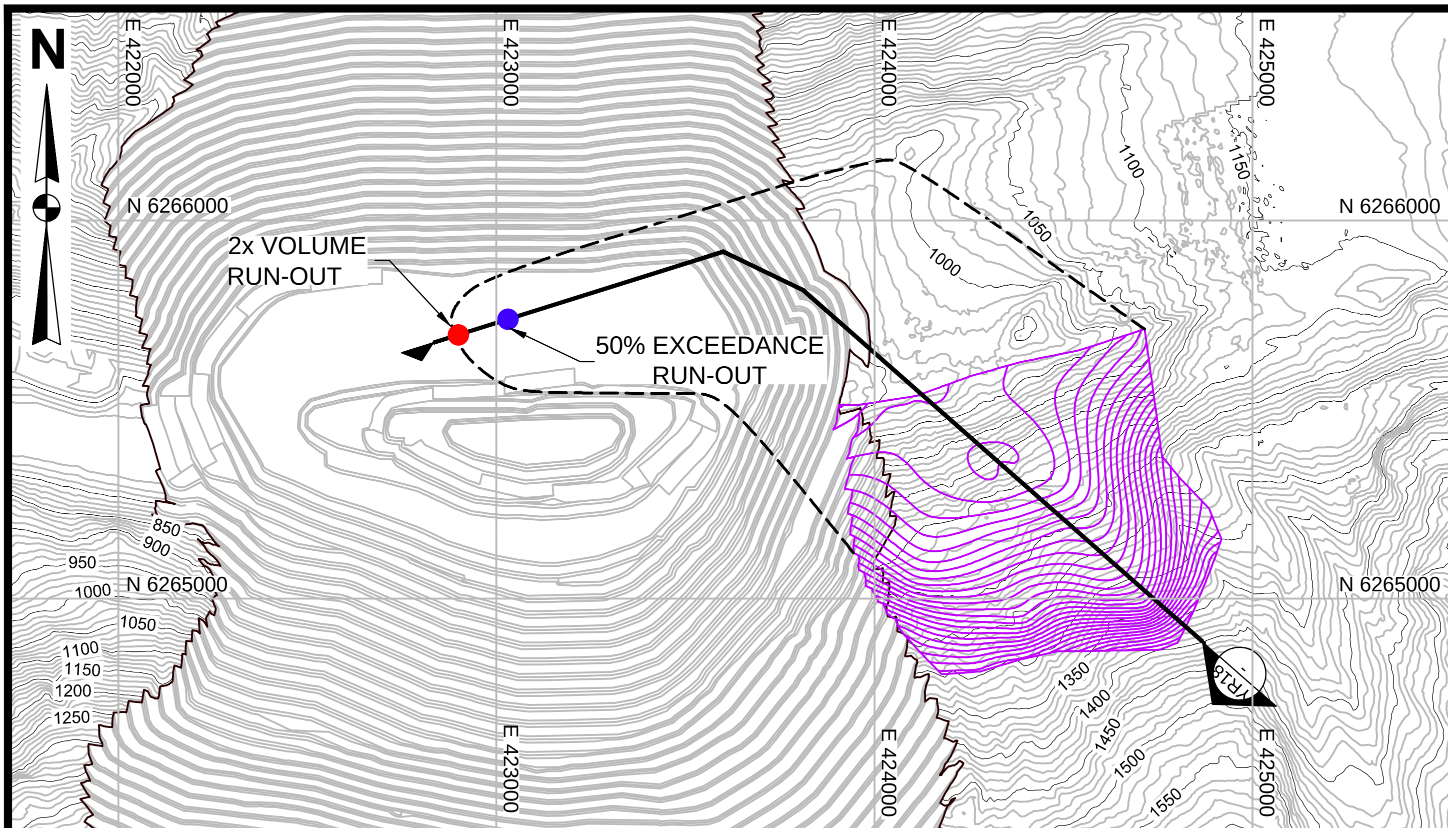
PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

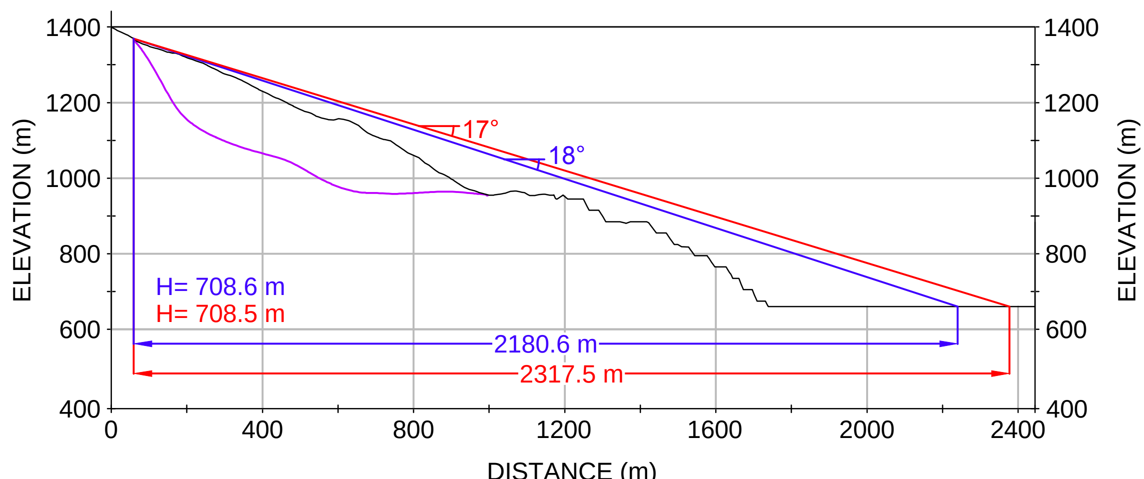
TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 17

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-17	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





CROSS SECTION YR18 / -

SCALE 1:20000

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METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 18

CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-18	

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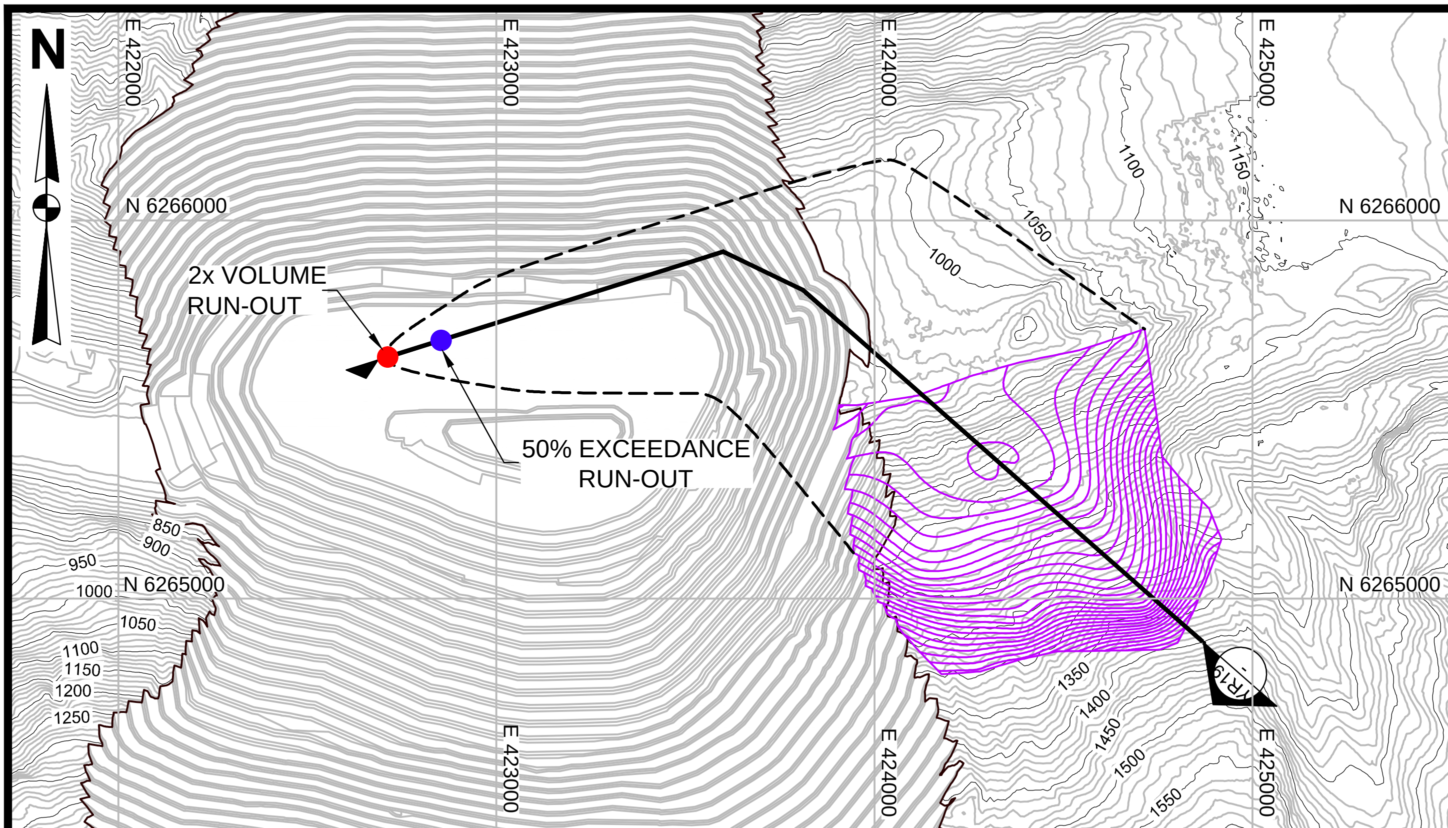

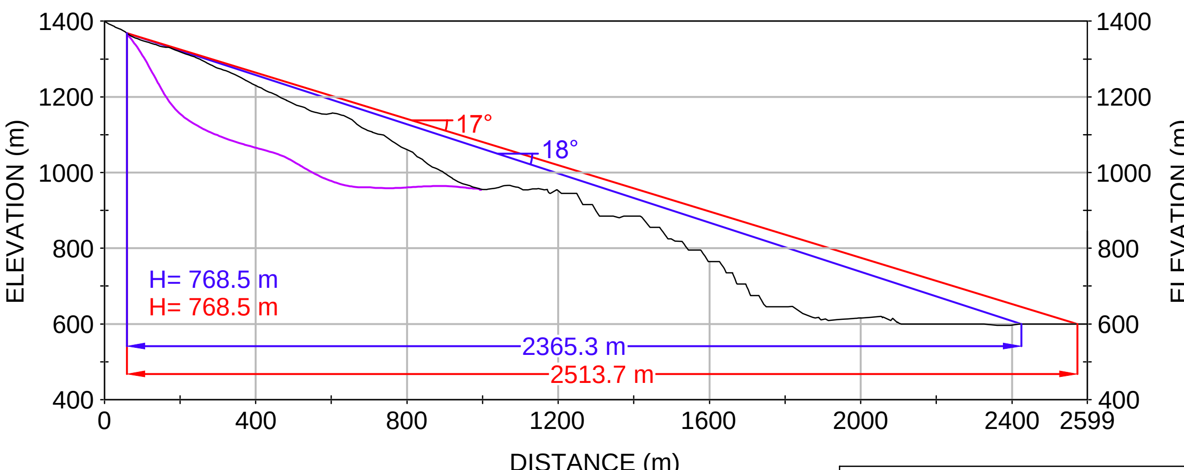

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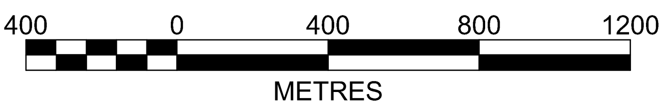


LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

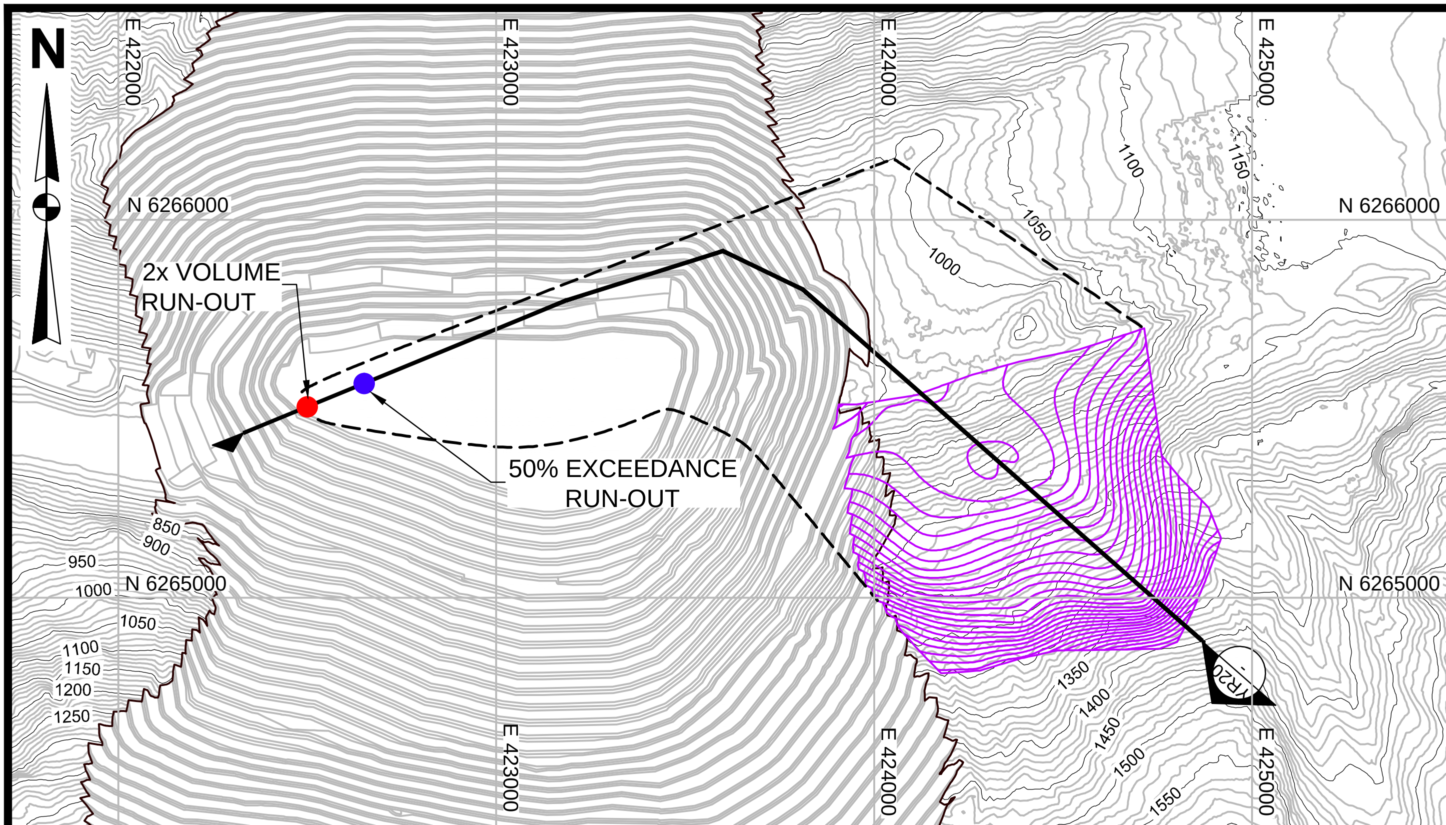
PROJECT:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

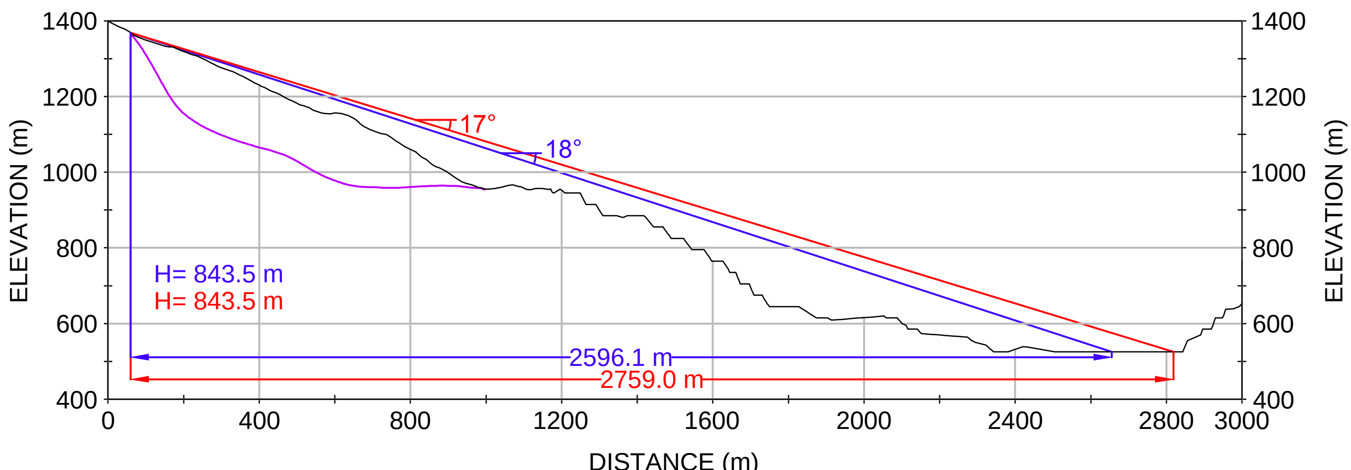
TITLE:
SNOWFIELD LANDSLIDE RUN-OUT YEAR 19

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-19	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





CROSS SECTION YR20 / -

SCALE 1:20000

400 0 400 800 1200

METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 20

CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-20	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

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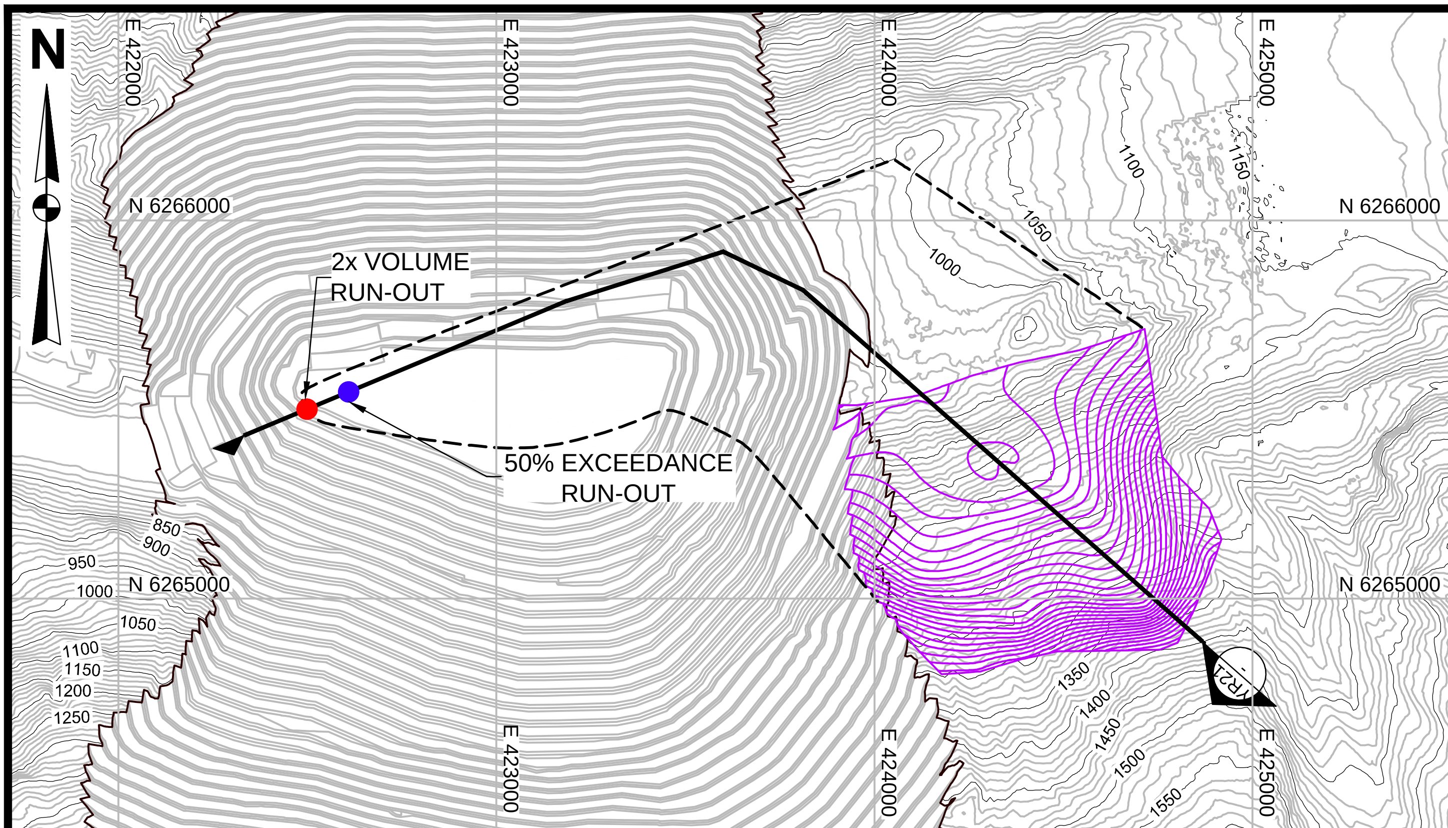
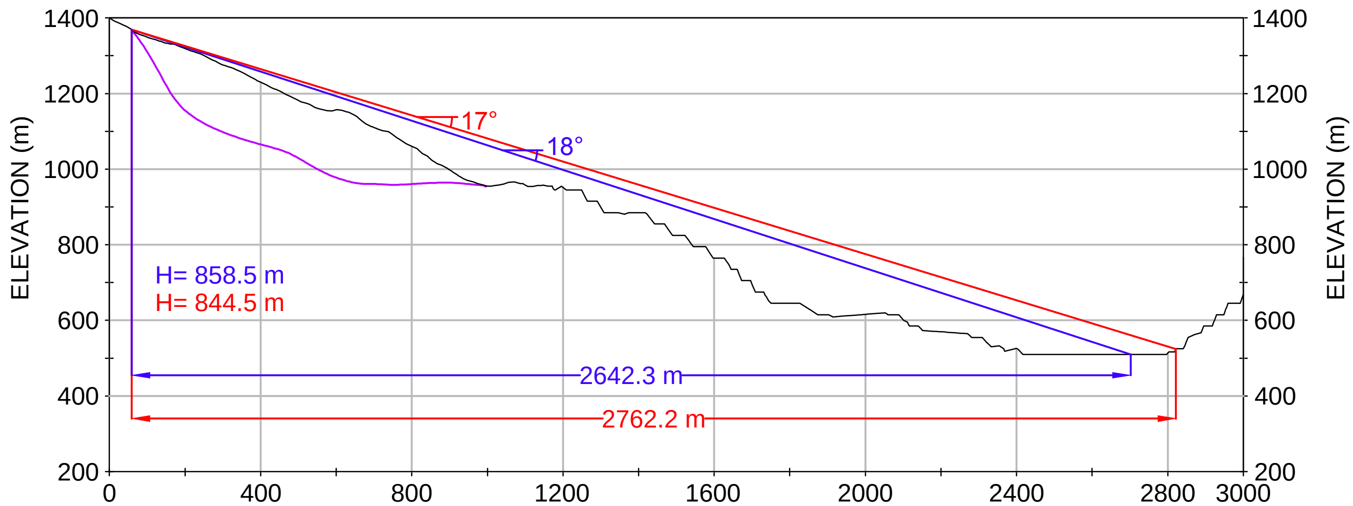




CROSS SECTION YR21 -

SCALE 1:20000

400 0 400 800 1200

METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3
- 50% EXCEEDANCE RUN-OUT PROBABILITY
- 2x VOLUME RUN-OUT
- ESTIMATED LANDSLIDE PROFILE
- ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

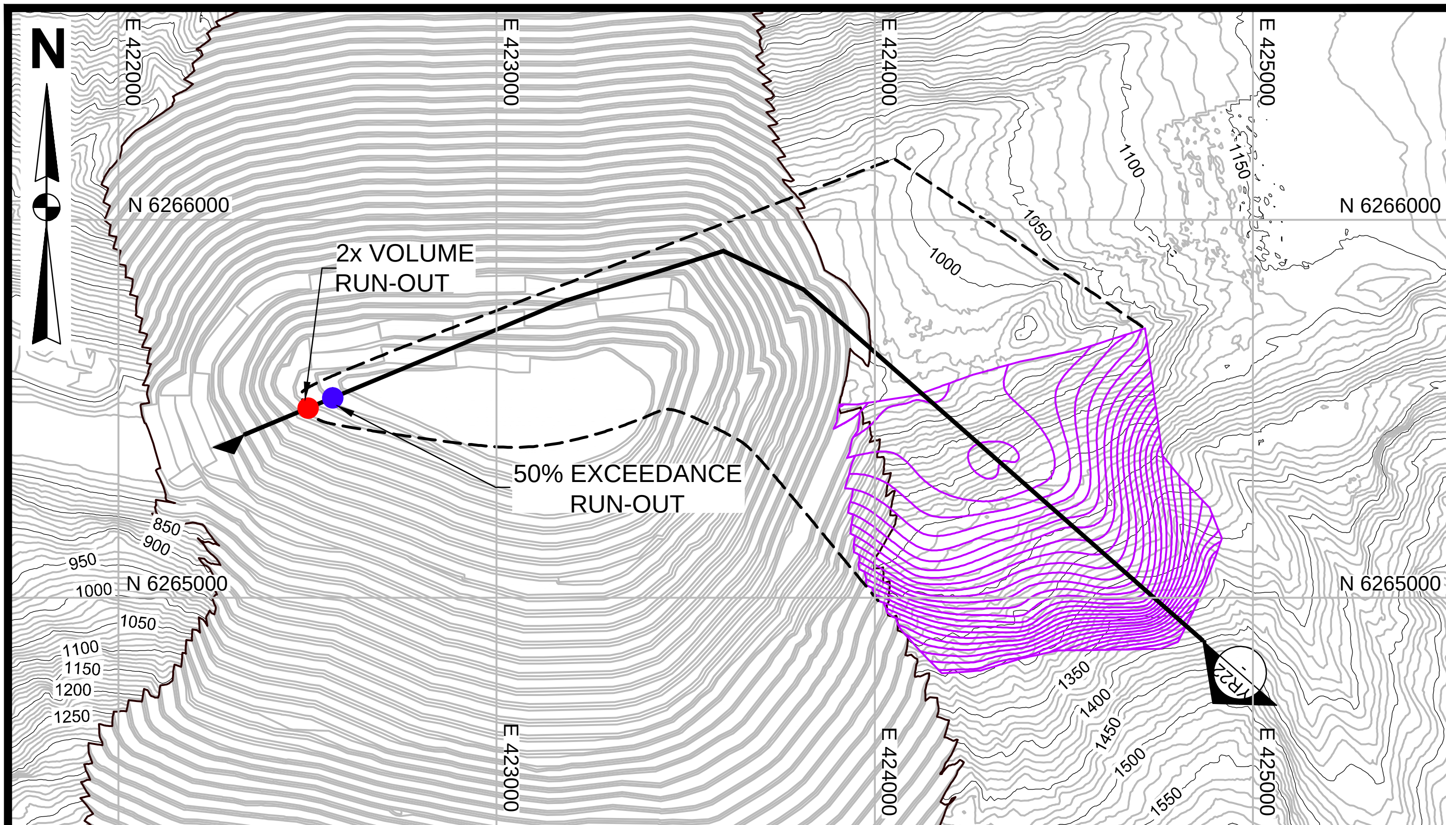
PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

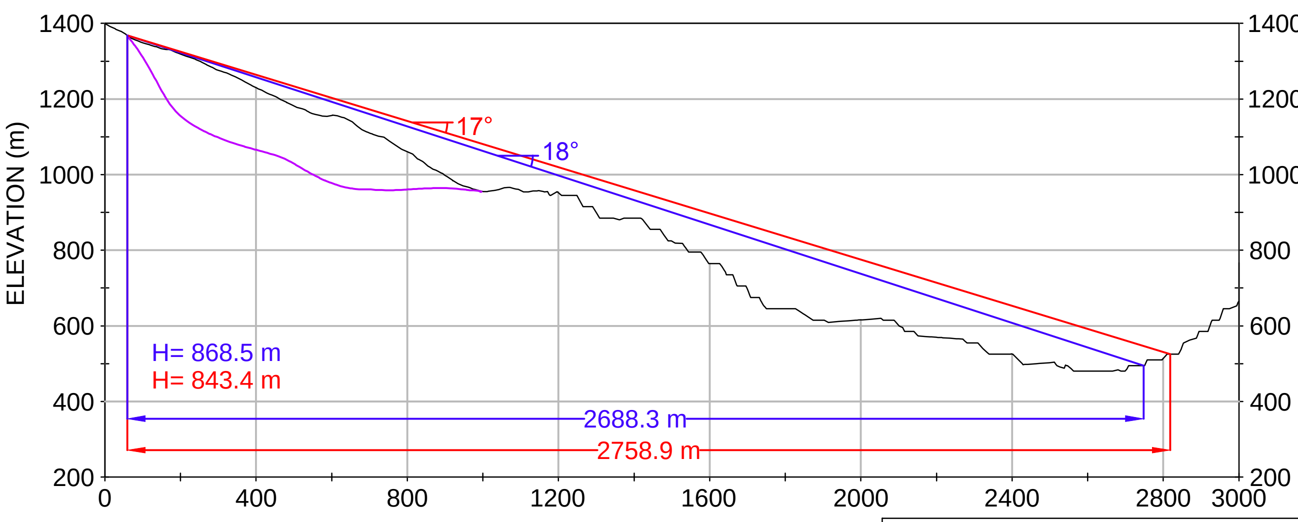
TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 21

CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-21	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013





CROSS SECTION YR22 -

SCALE 1:20000

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METRES

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 22

CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-22	

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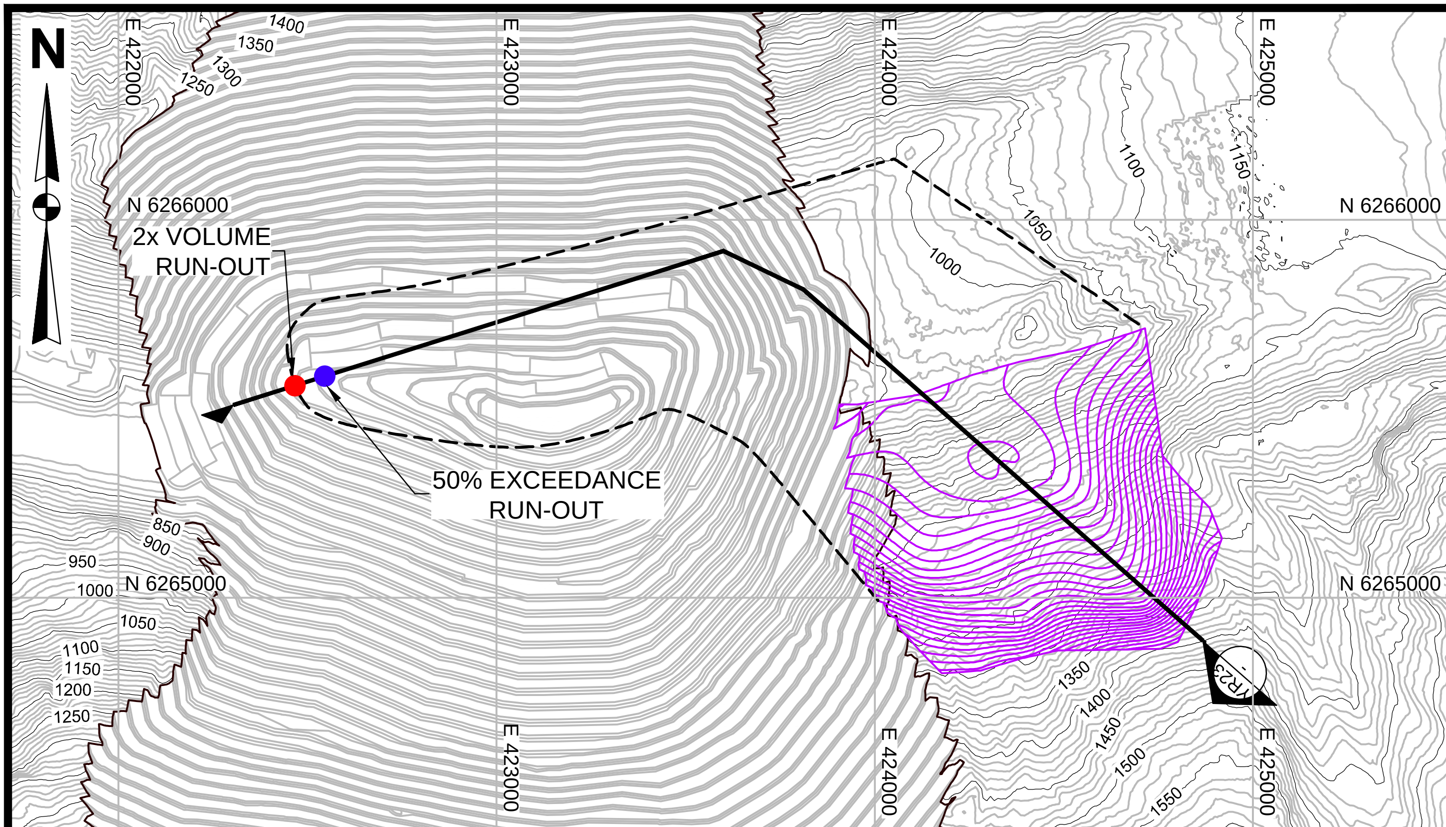
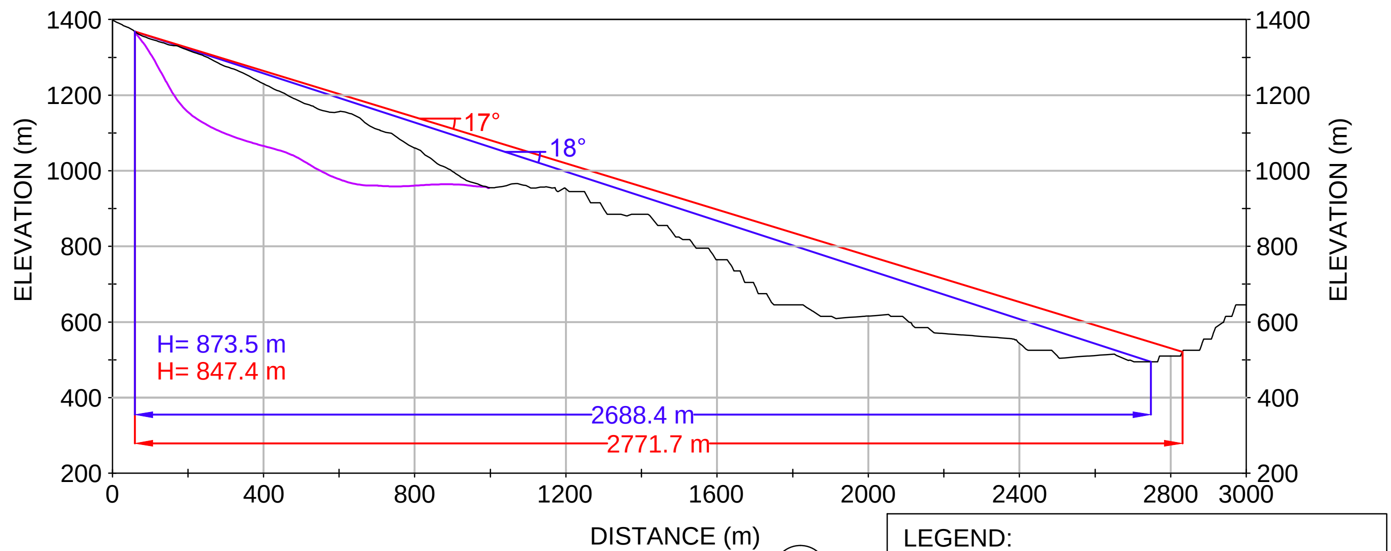




CROSS SECTION YR23 -

LEGEND:

ESTIMATED VOLUME = 30,000,000 m^3

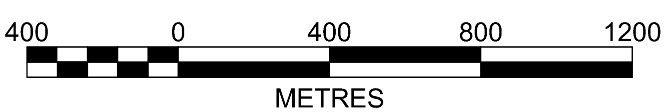
50% EXCEEDANCE RUN-OUT PROBABILITY

2x VOLUME RUN-OUT

ESTIMATED LANDSLIDE PROFILE

ESTIMATED FAILURE LIMIT

SCALE 1:20000



SCALE:	1:20000	DESIGNED:	JRW
DATE:	JUL 2013	CHECKED:	DK
DRAWN:	SS	APPROVED:	DK

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: SNOWFIELD LANDSLIDE RUN-OUT YEAR 23

CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No:	REV.:
0638014-30	C-23	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

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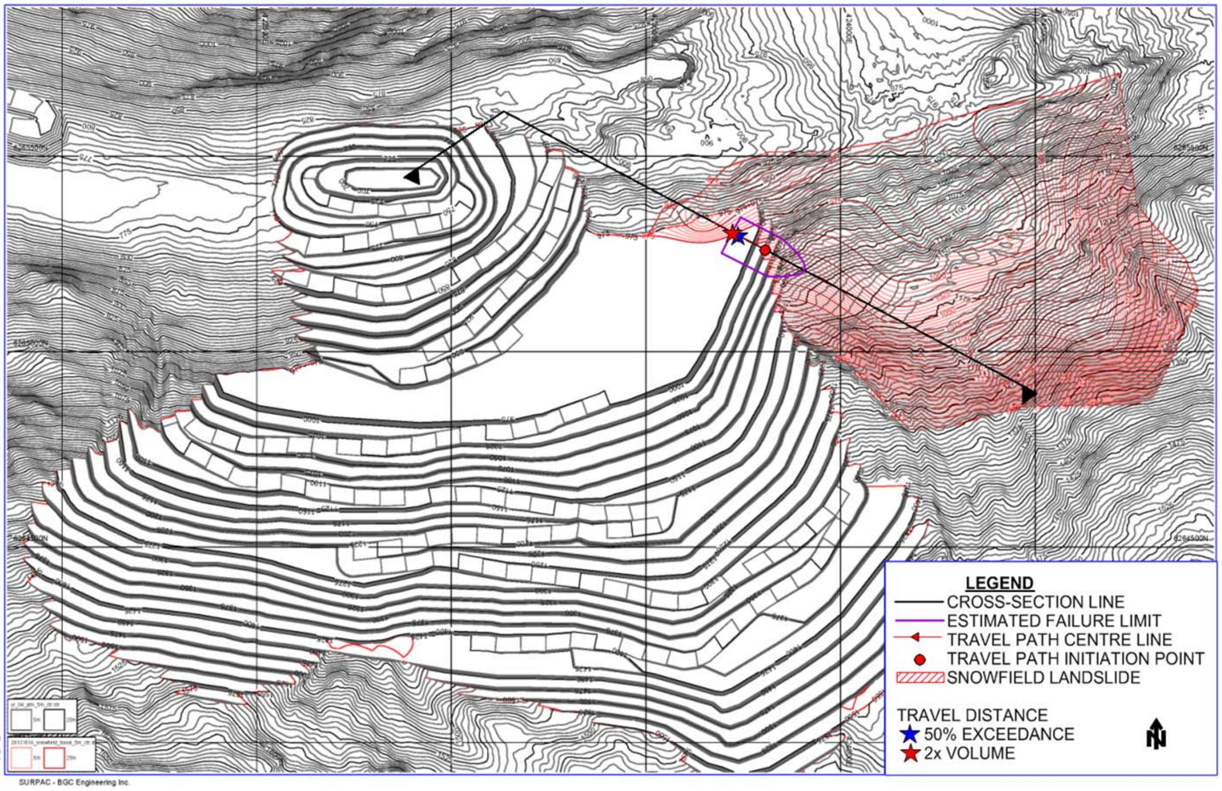
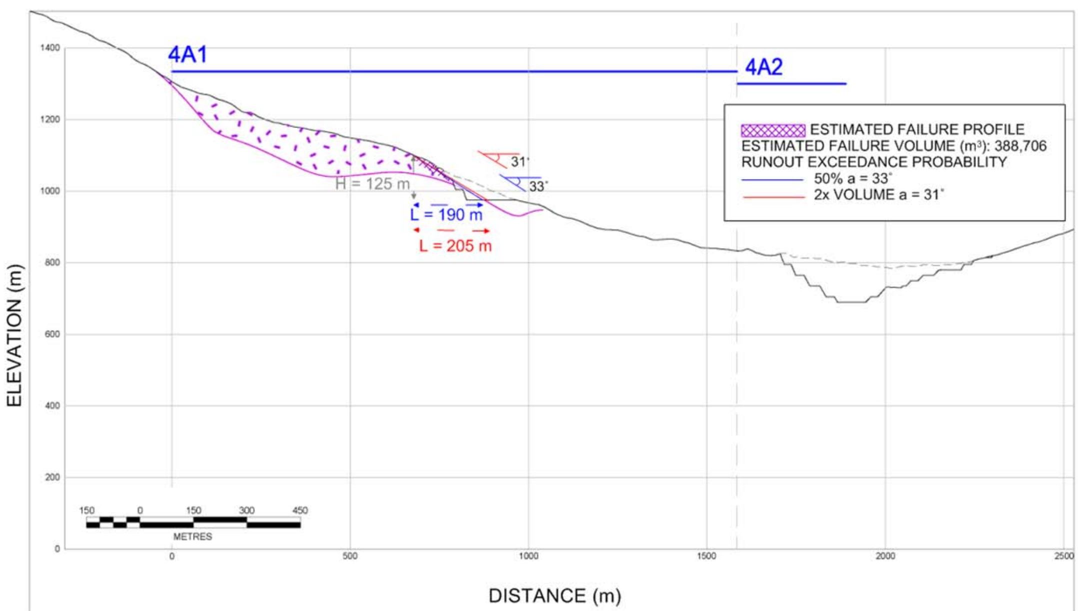
APPENDIX D
SCENARIO B RUN-OUT ANALYSES





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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

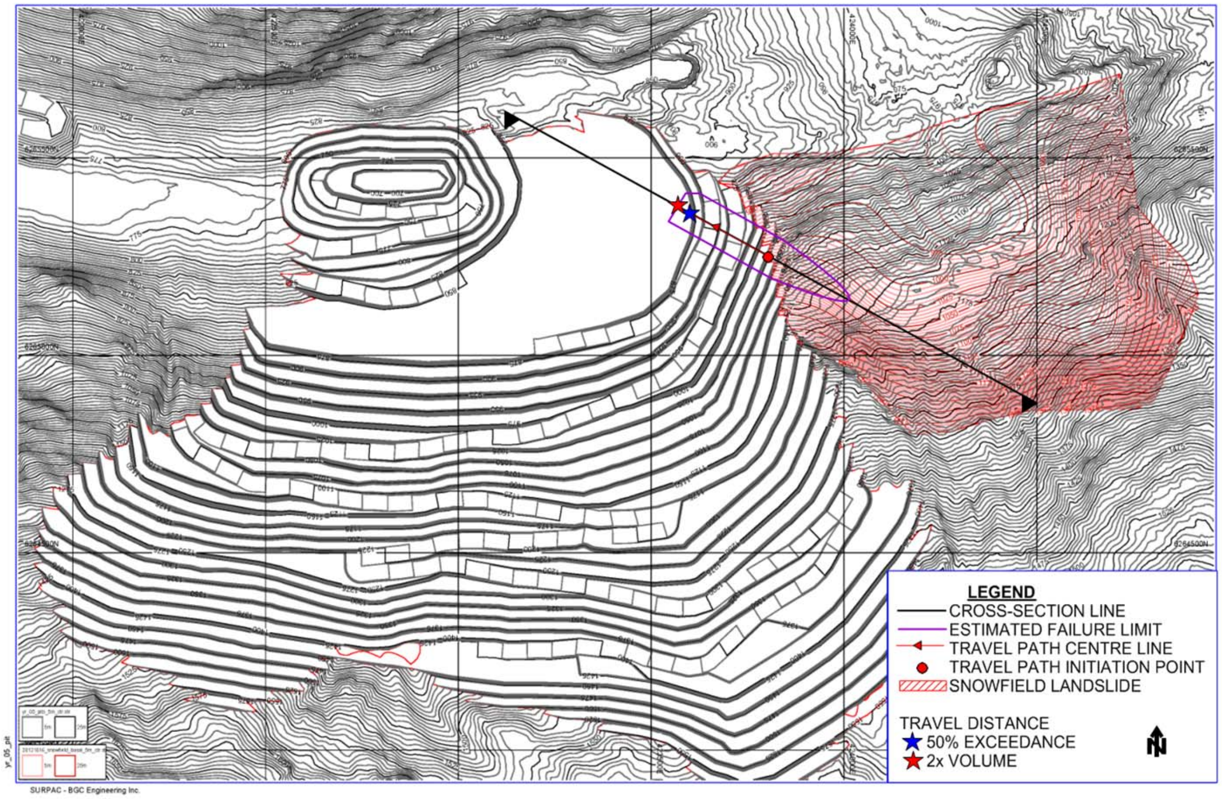
FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 4

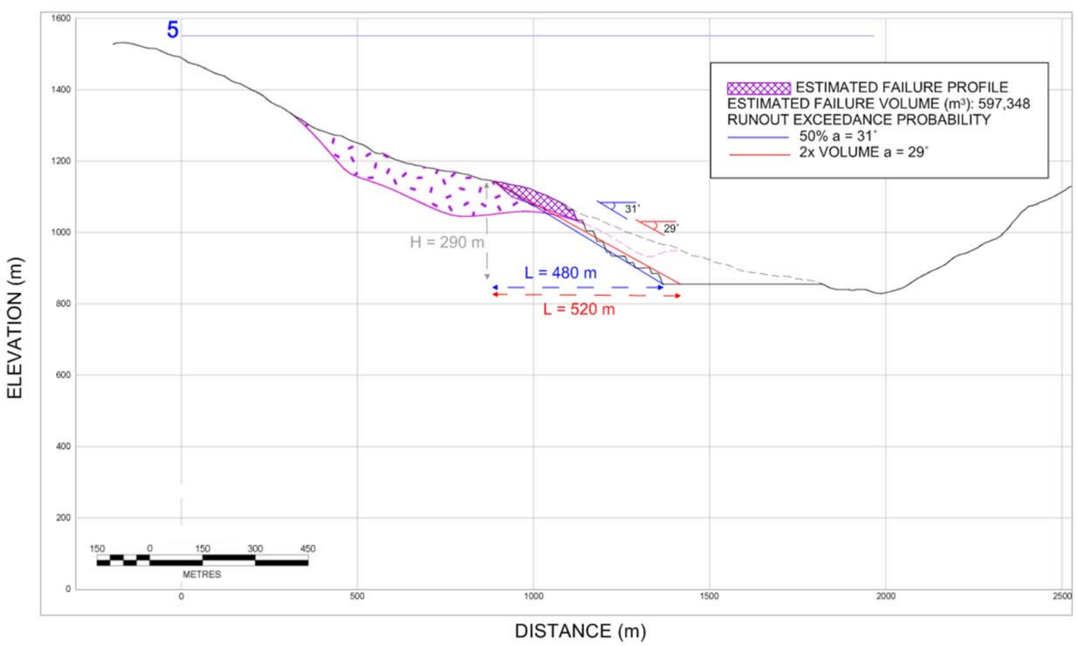
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638014-30

FIGURE No.:
D-01

JULY 5, 2013





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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

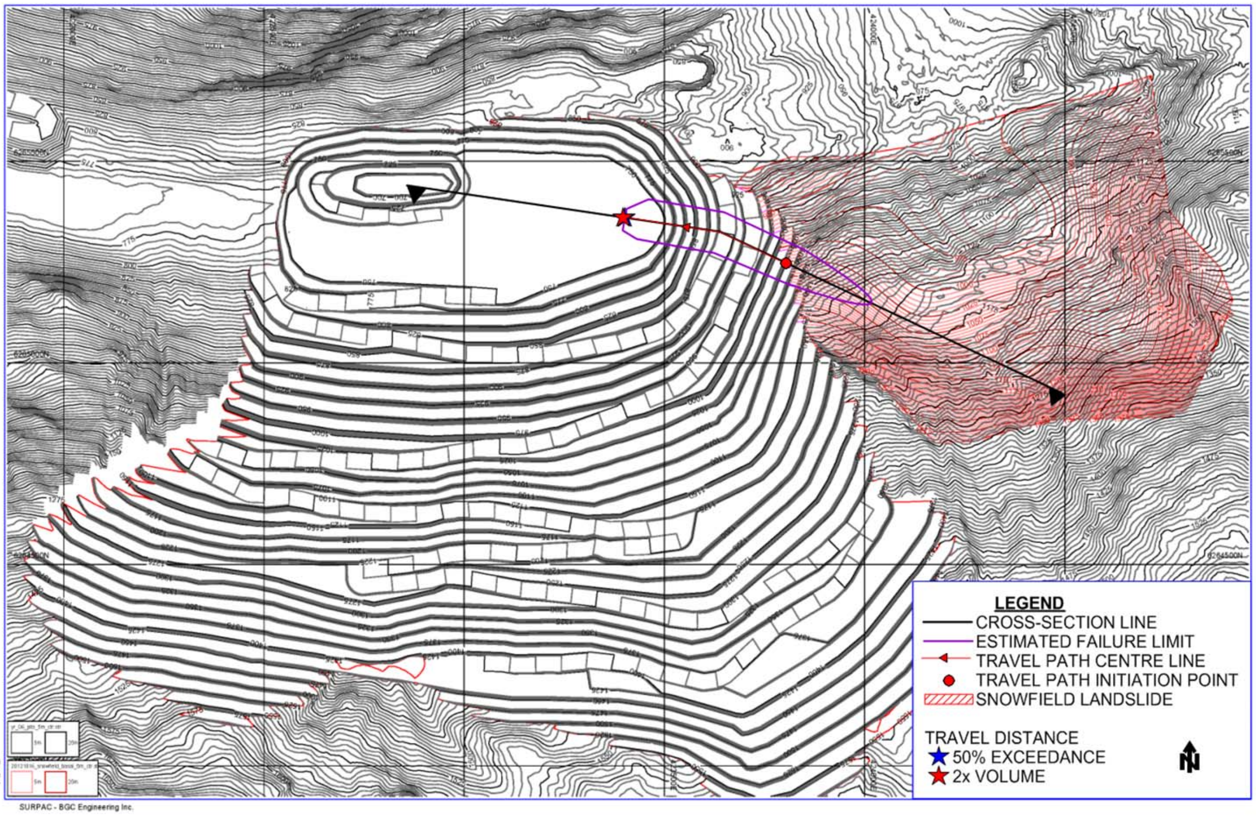
FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 5

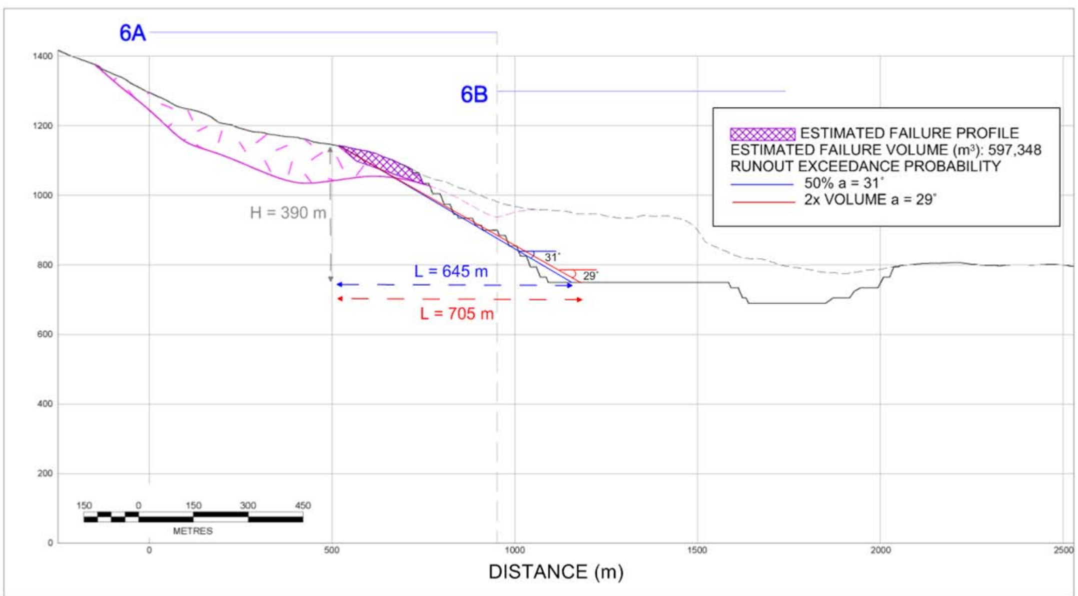
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638014-30

FIGURE No.:
D-02

JULY 5, 2013





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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

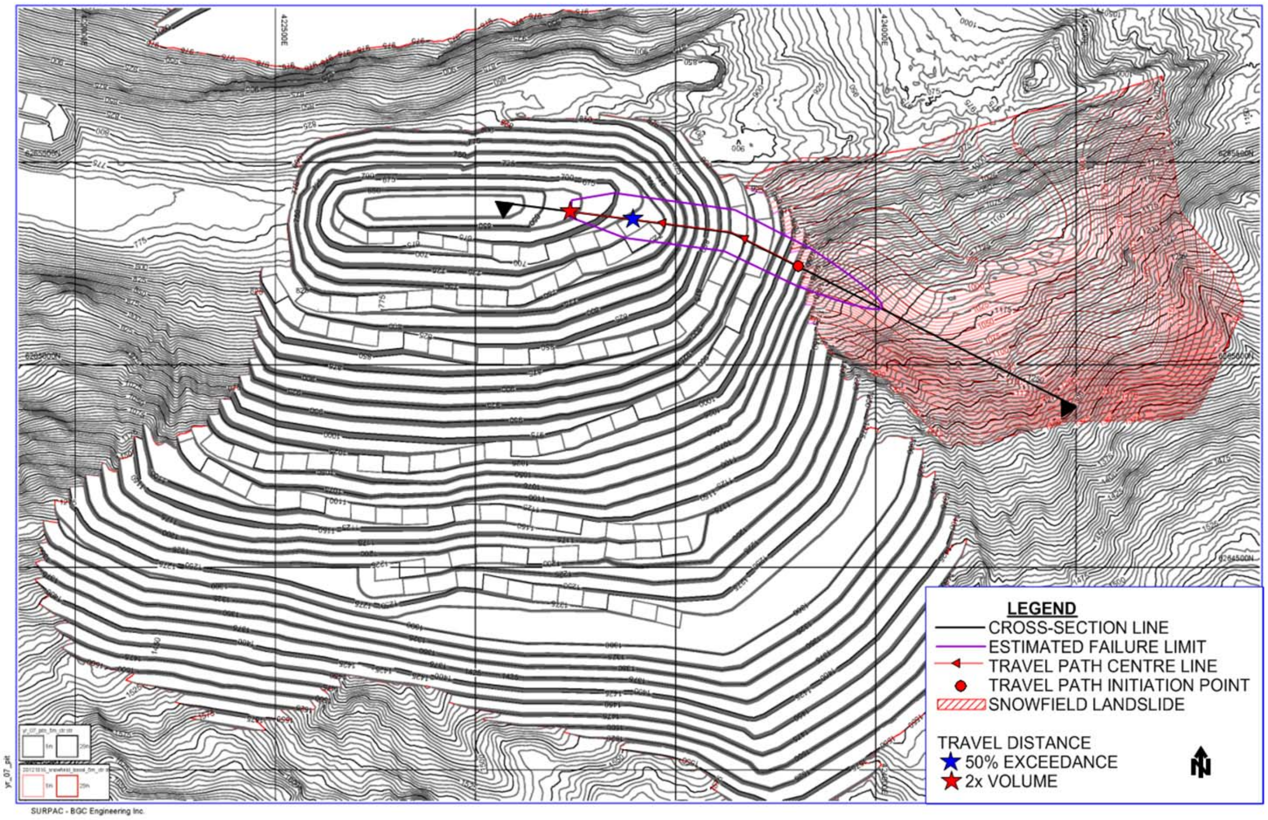
FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 6

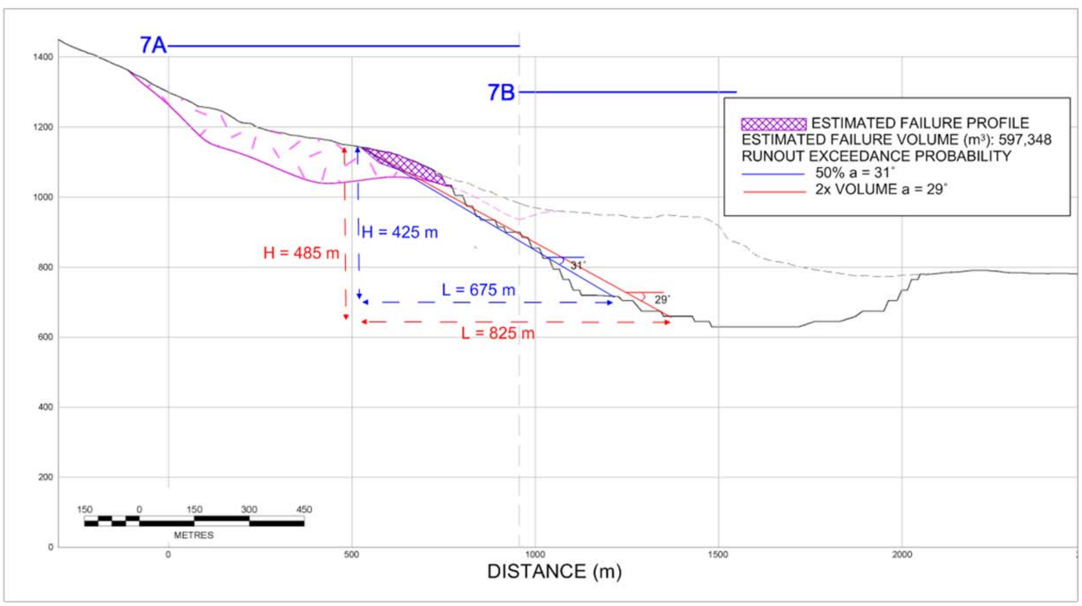
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638014-30

FIGURE No.:
D-03

JULY 5, 2013





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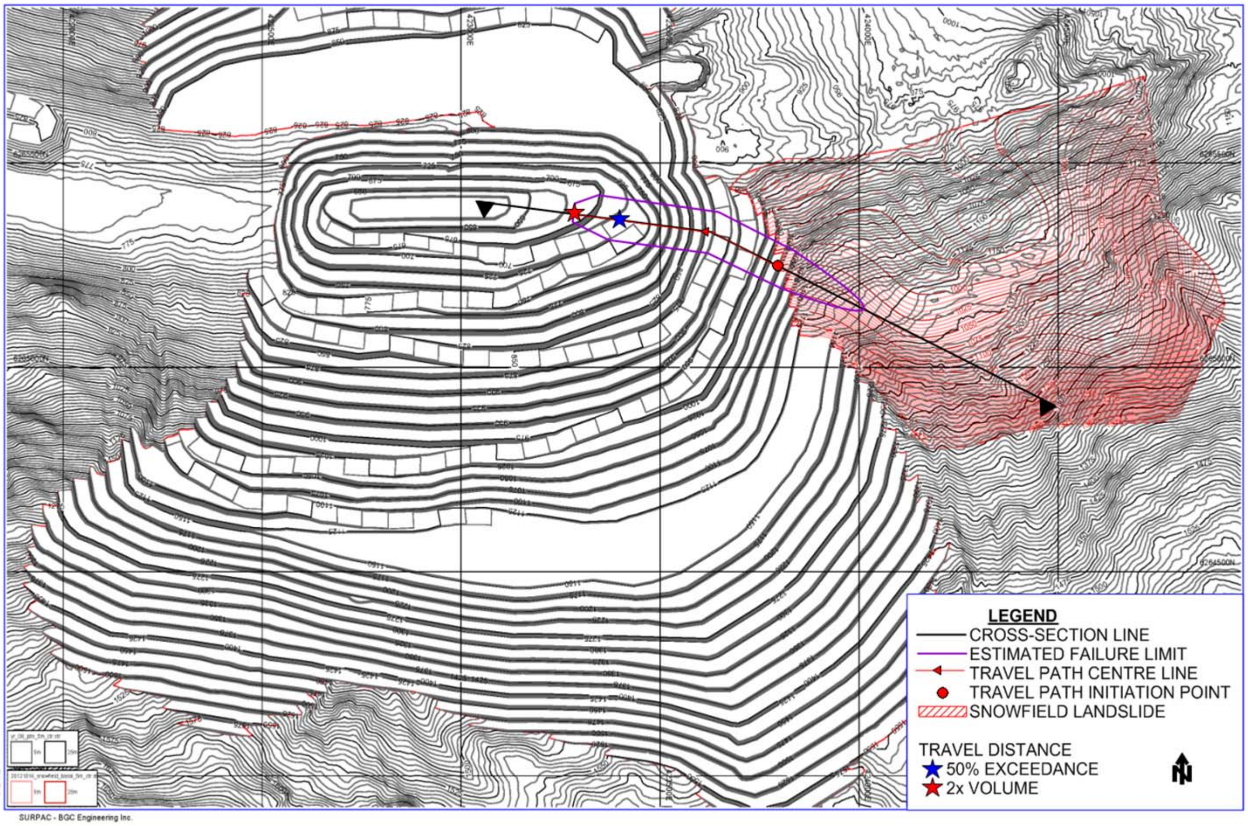
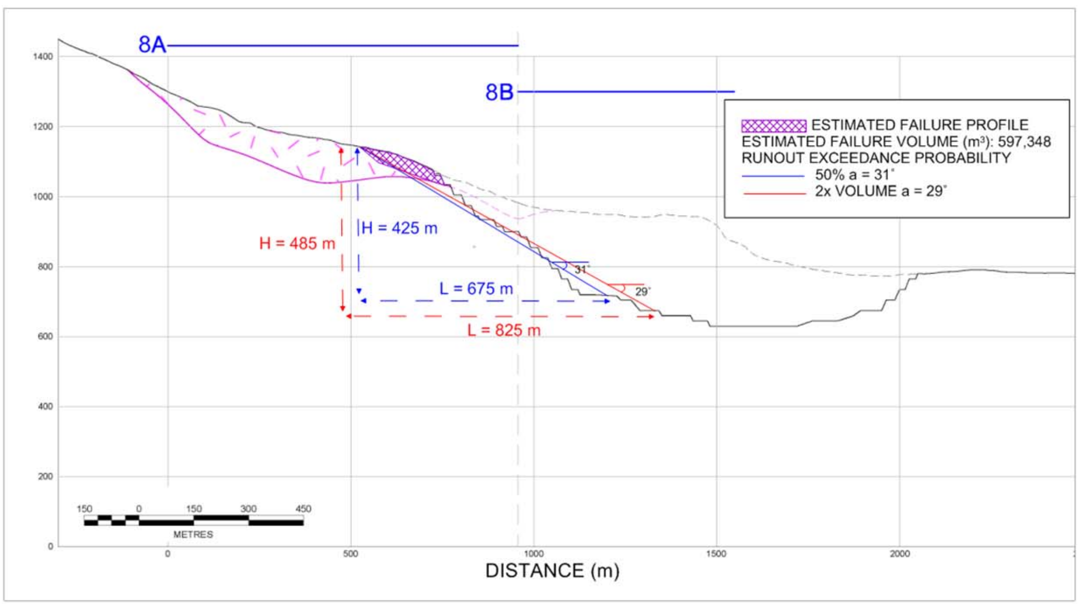
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN	
FIGURE TITLE: MULTI-BENCH RUN-OUT ANALYSIS YEAR 7	
CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638014-30
	FIGURE No.: D-04

JULY 5, 2013





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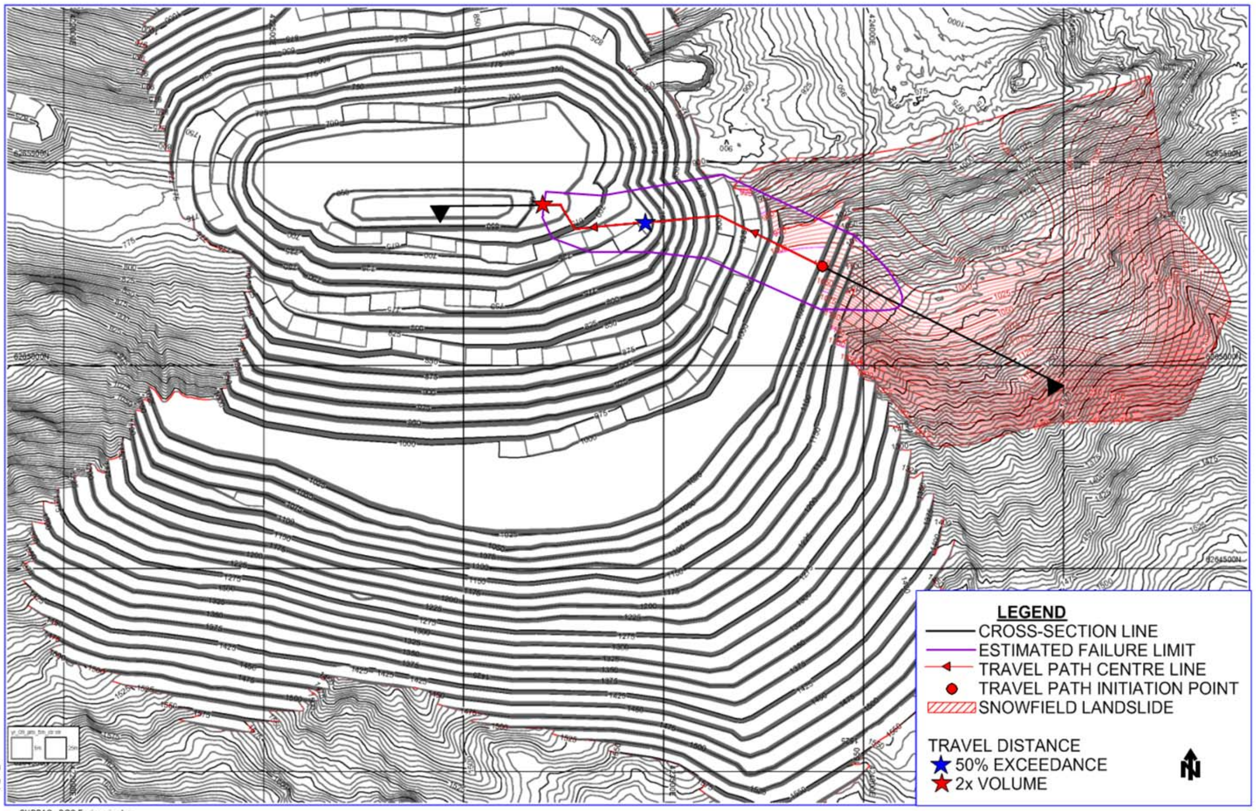
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

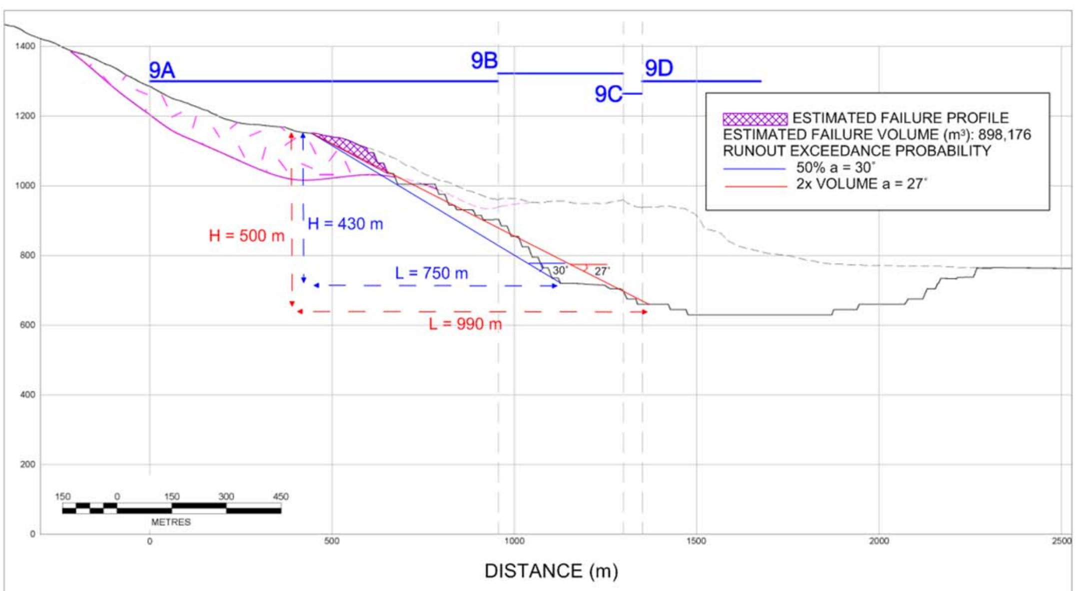
REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 8

CLIENT:	PROJECT No.:	FIGURE No.:
SEABRIDGE GOLD INC.	0638014-30	D-05

JULY 5, 2013





BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 9

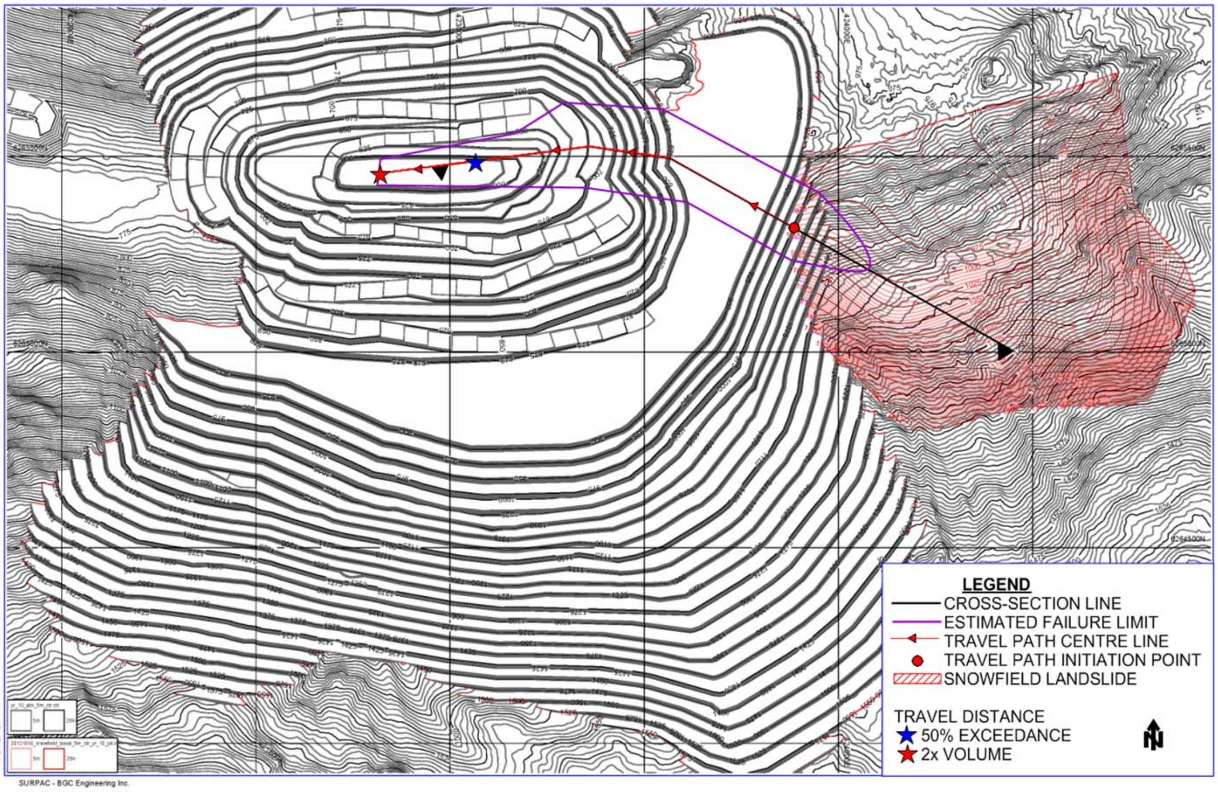
CLIENT:
SEABRIDGE GOLD INC.

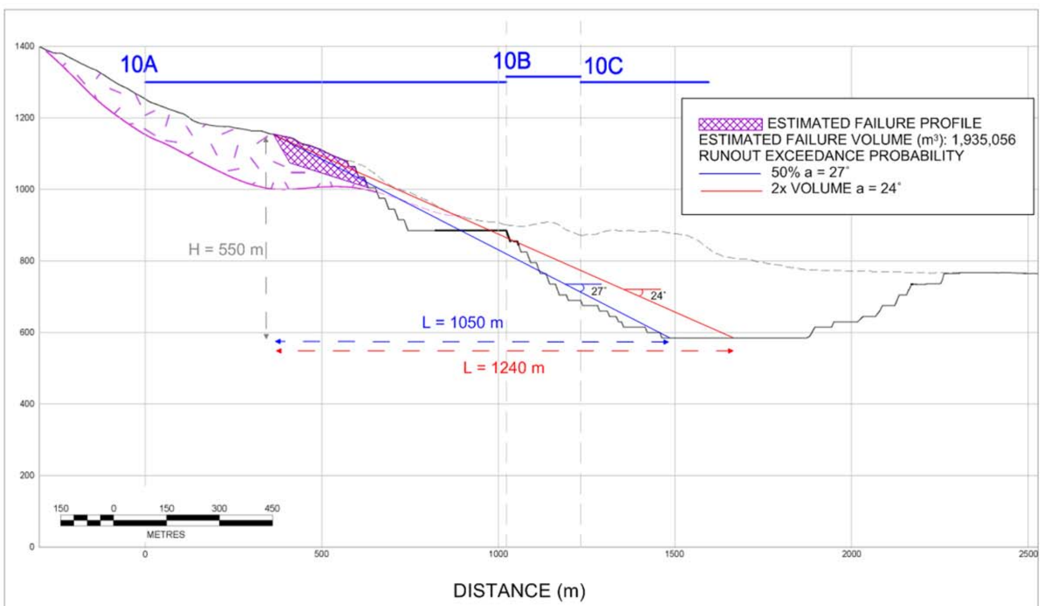
PROJECT No.:
0638014-30

FIGURE No.:
D-06

N:\BGC\PROJECTS\0638 SEABRIDGE\014 KSM EA SUPPORT\30 GEOTECH AND HYDROGEO\02 SNOWFIELD LANDSLIDE MANAGEMENT\02_ANALYSIS\RUNOUT FIGURES

JULY 5, 2013





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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

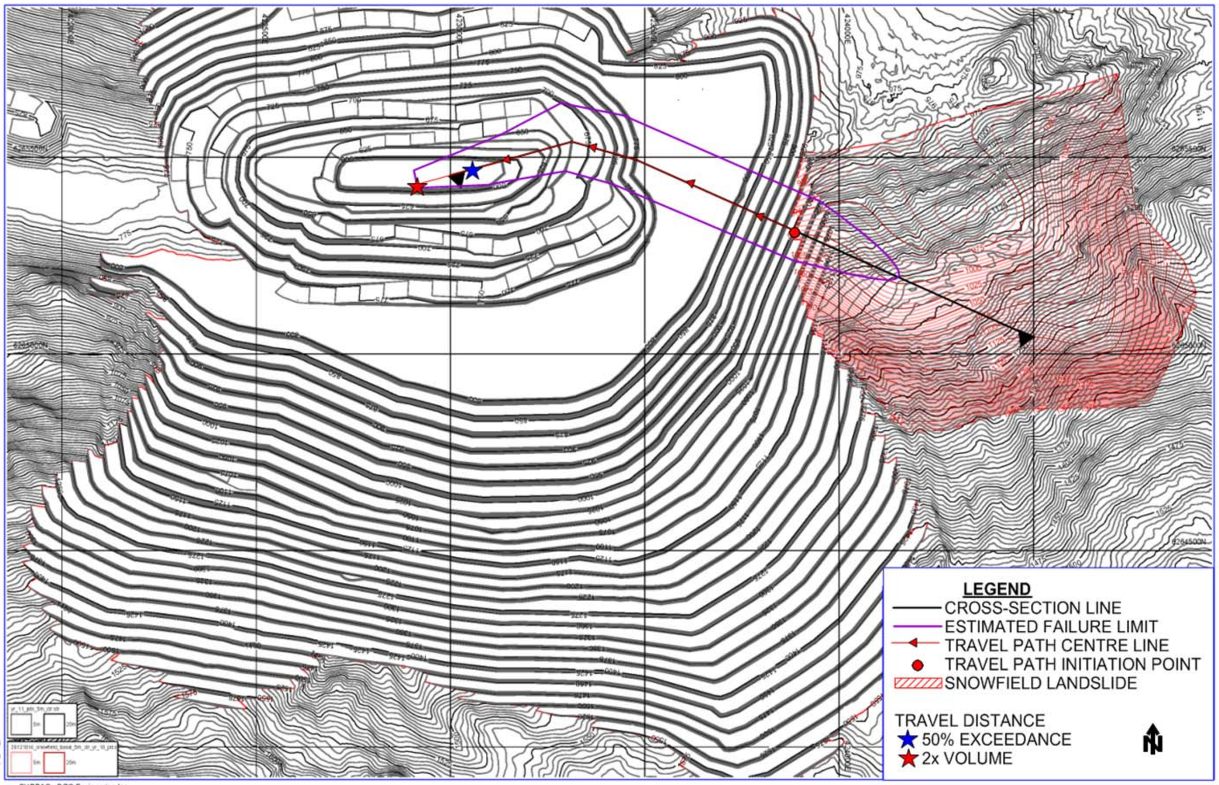
FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 10

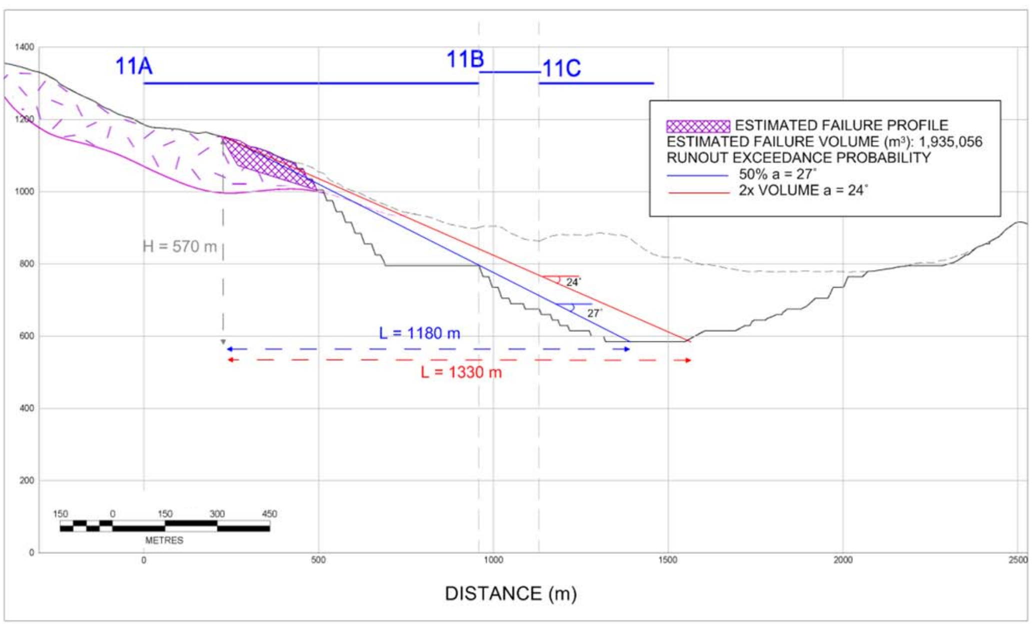
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638014-30

FIGURE No.:
D-07

JULY 5, 2013





BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
SEABRIDGE GOLD INC.

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 11

PROJECT No.:
0638014-30

FIGURE No.:
D-08

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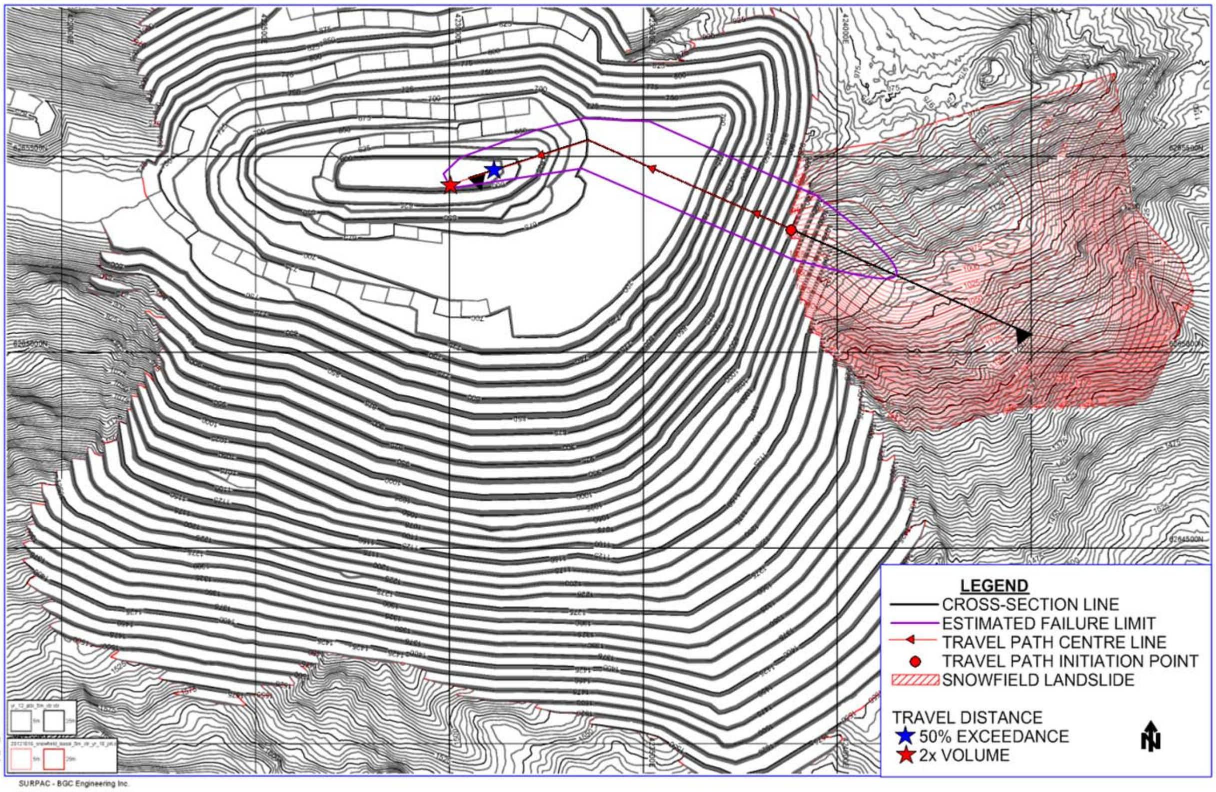
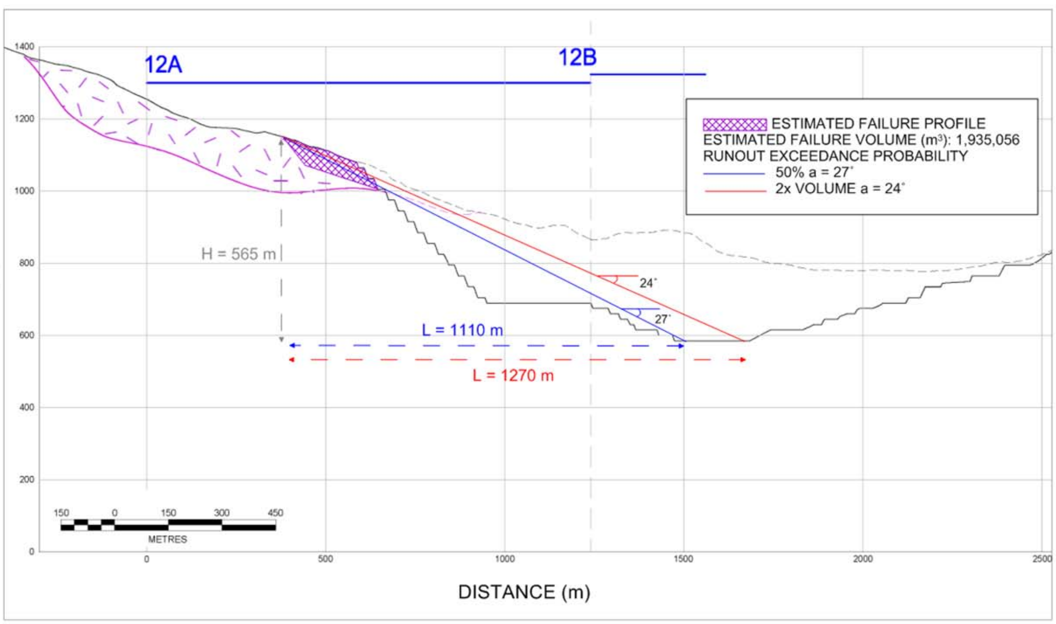
JULY 5, 2013





BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

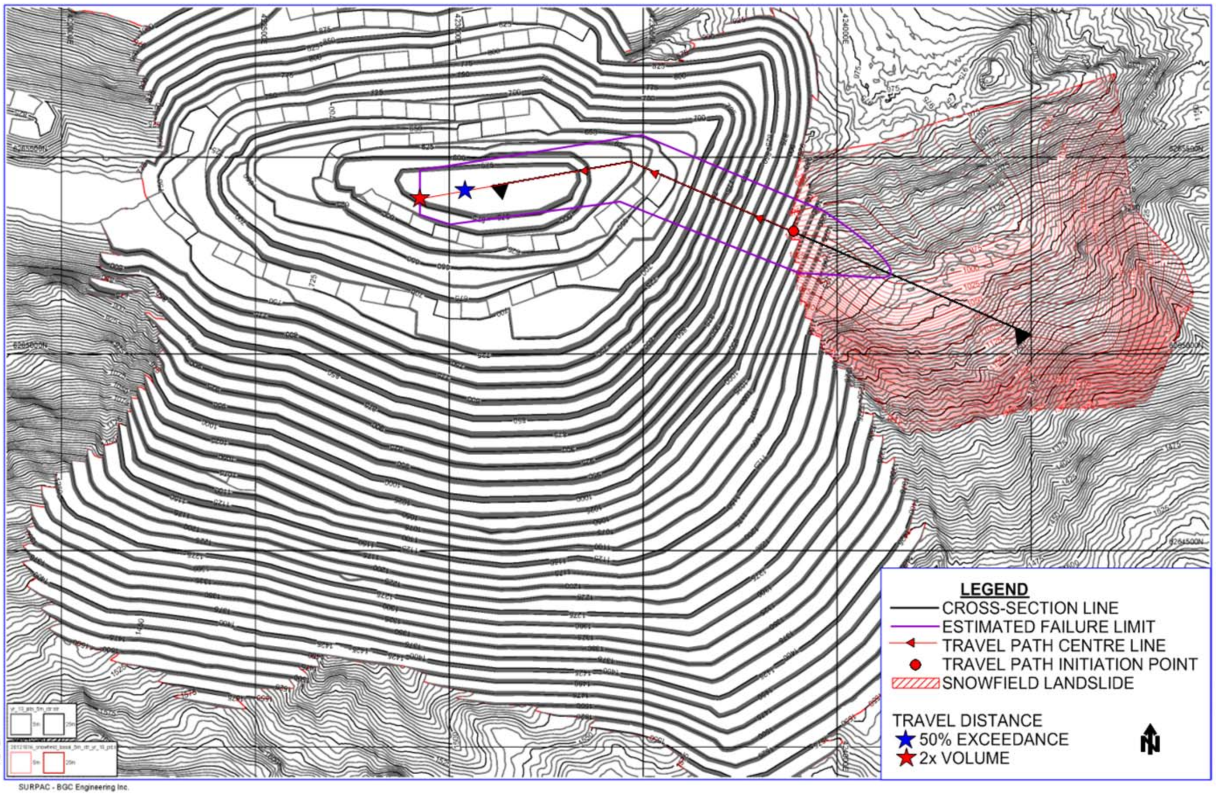
REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

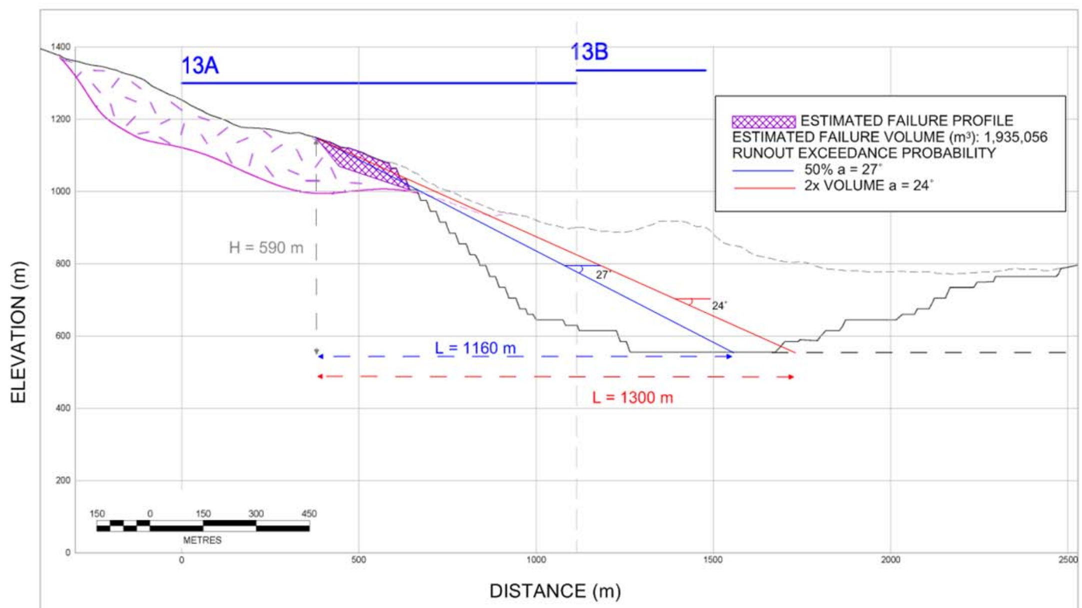
FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 12

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638014-30

FIGURE No.:
D-09





BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 13

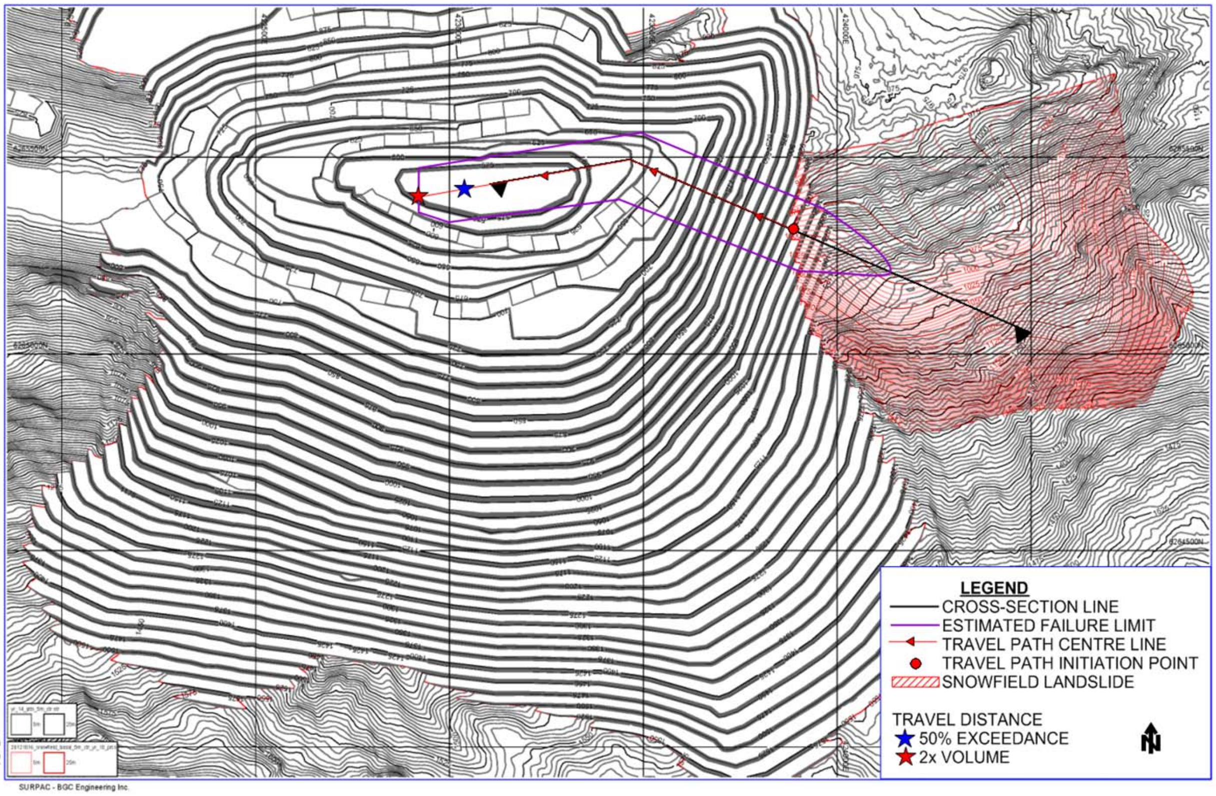
CLIENT:
SEABRIDGE GOLD INC.

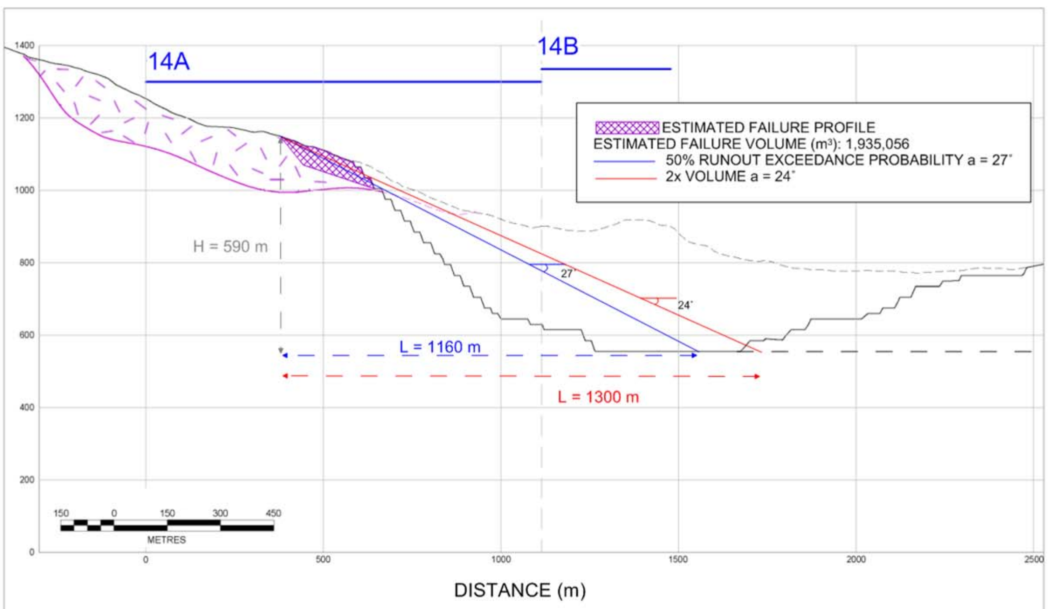
PROJECT No.:
0638014-30

FIGURE No.:
D-10

N:\BGC\PROJECTS\0638 SEABRIDGE\014 KSM EA SUPPORT\30 GEOTECH AND HYDROGEO\02 SNOWFIELD LANDSLIDE MANAGEMENT\02_ANALYSIS\RUNOUT FIGURES

JULY 5, 2013



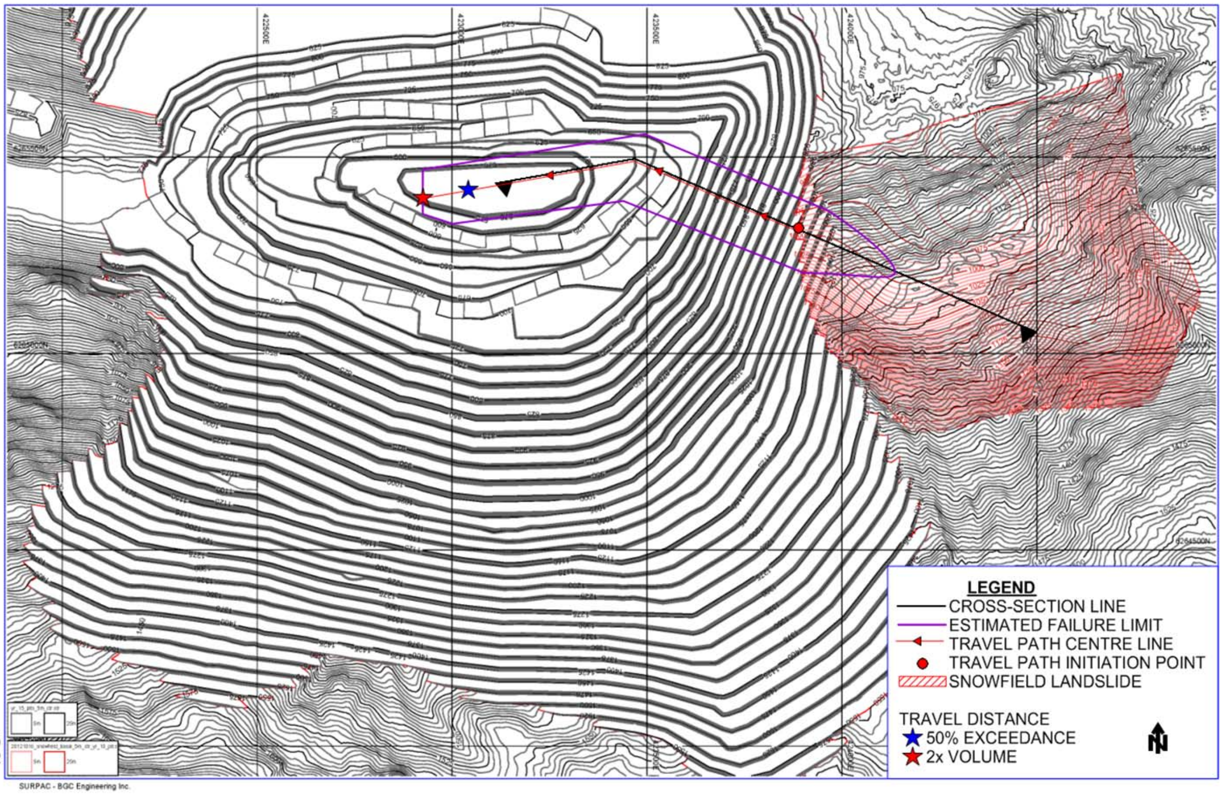


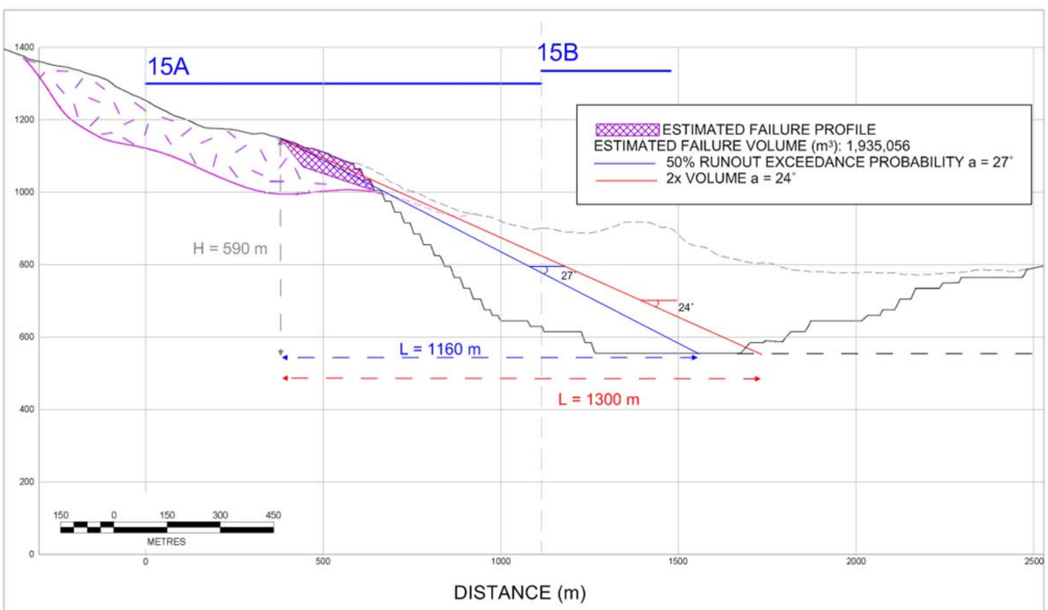
N:\BGC\PROJECTS\0638 SEABRIDGE\014 KSM EA SUPPORT\30 GEOTECH AND HYDROGEO\02 SNOWFIELD LANDSLIDE MANAGEMENT\02_ANALYSIS\RUNOUT FIGURES

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:	PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN
FIGURE TITLE:	MULTI-BENCH RUN-OUT ANALYSIS YEAR 14
CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638014-30
	FIGURE No.: D-11

JULY 5, 2013





BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 15

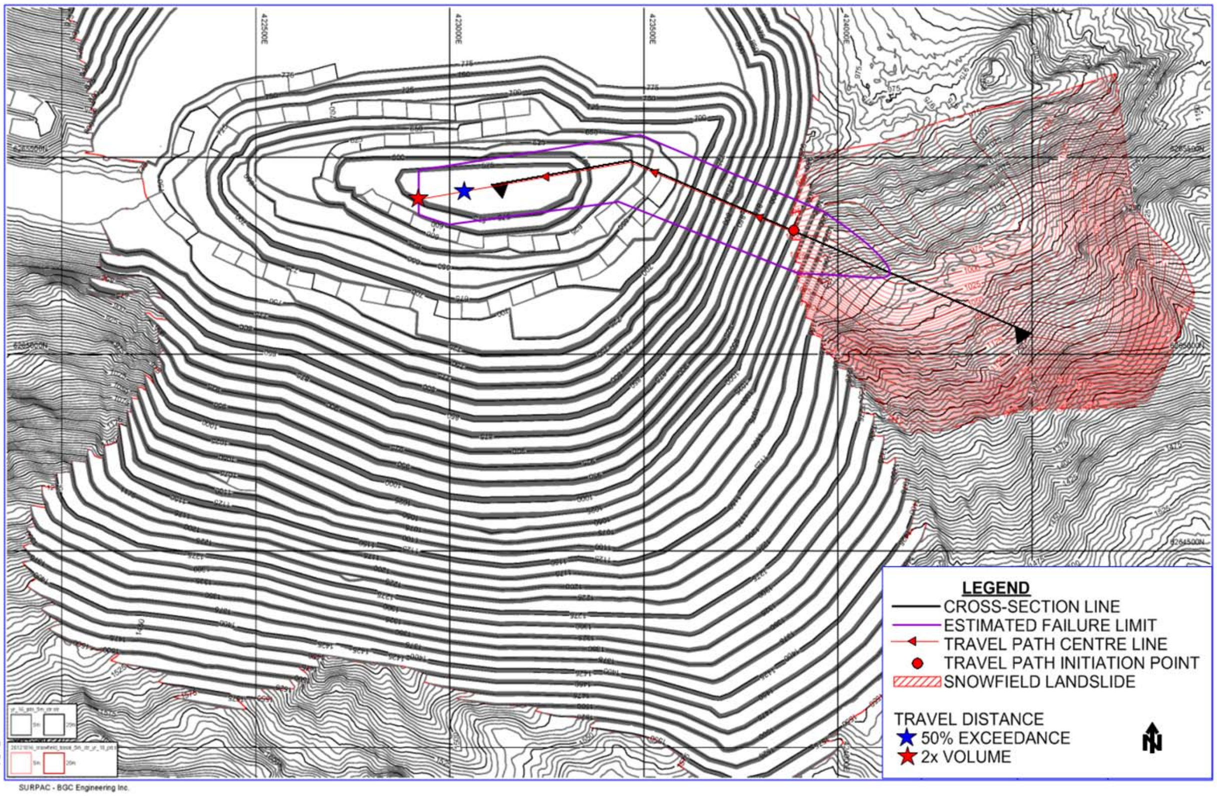
CLIENT:
SEABRIDGE GOLD INC.

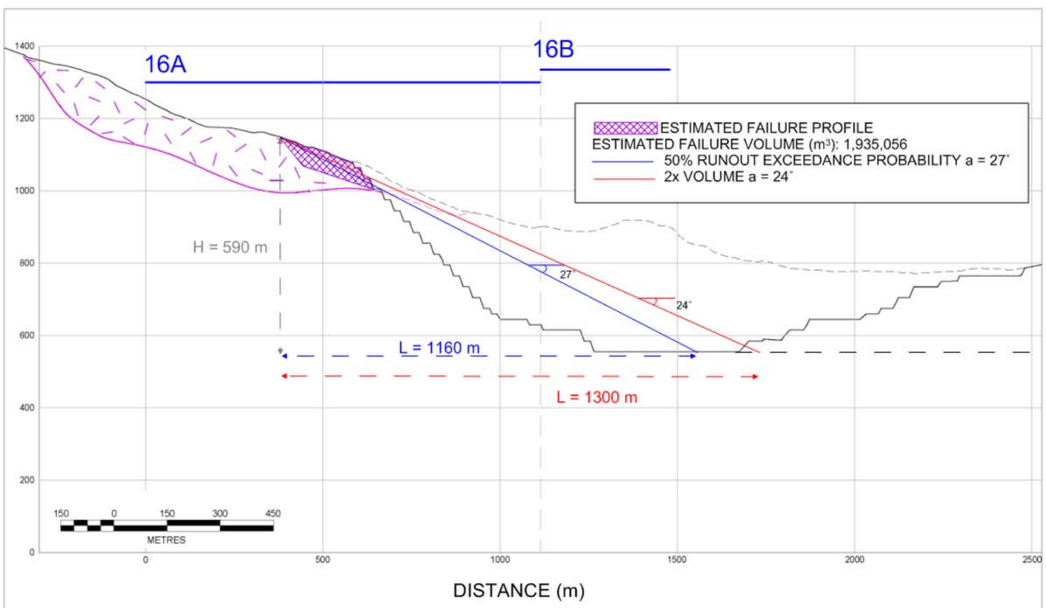
PROJECT No.:
0638014-30

FIGURE No.:
D-12

N:\BGC\PROJECTS\0638 SEABRIDGE\014 KSM EA SUPPORT\30 GEOTECH AND HYDROGEO\02 SNOWFIELD LANDSLIDE MANAGEMENT\02_ANALYSIS\RUNOUT FIGURES

JULY 5, 2013





REPORT TITLE:

PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FIGURE TITLE:

MULTI-BENCH RUN-OUT ANALYSIS
YEAR 16

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:

SEABRIDGE GOLD INC.

PROJECT No.:

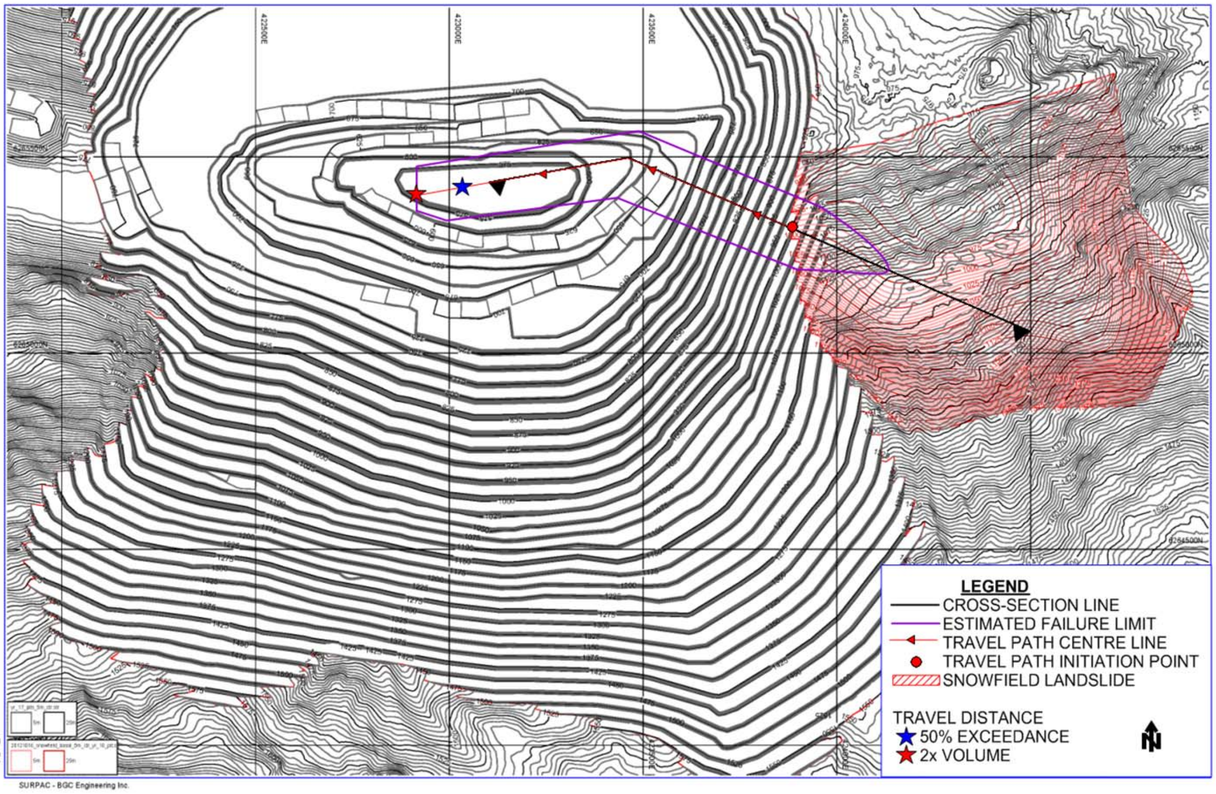
0638014-30

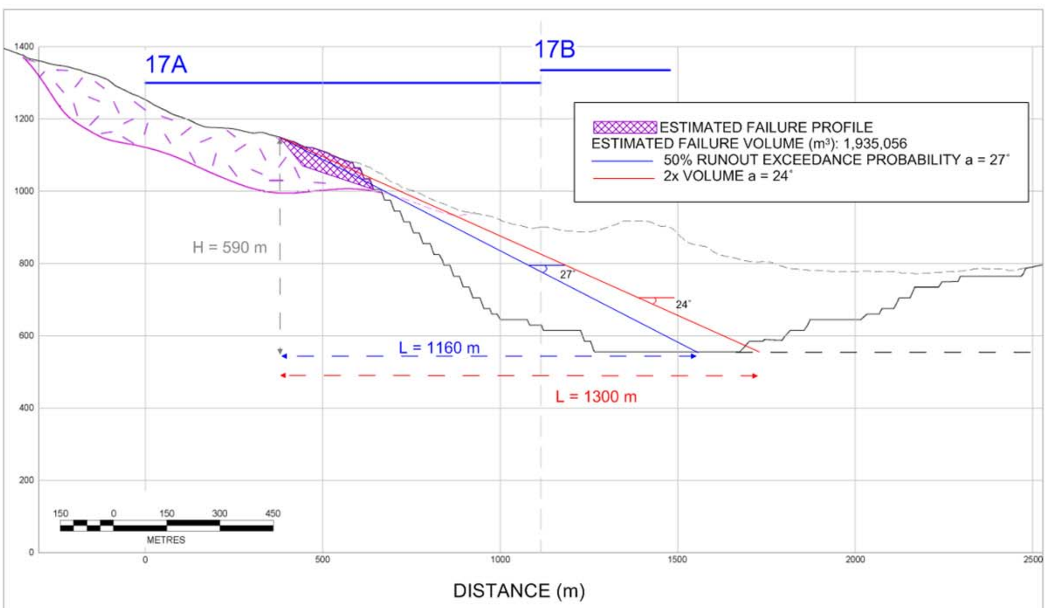
FIGURE No.:

D-13

N:\BGC\PROJECTS\0638 SEABRIDGE\014 KSM EA SUPPORT\30 GEOTECH AND HYDROGEO\02 SNOWFIELD LANDSLIDE MANAGEMENT\02_ANALYSIS\RUNOUT FIGURES

JULY 5, 2013





BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

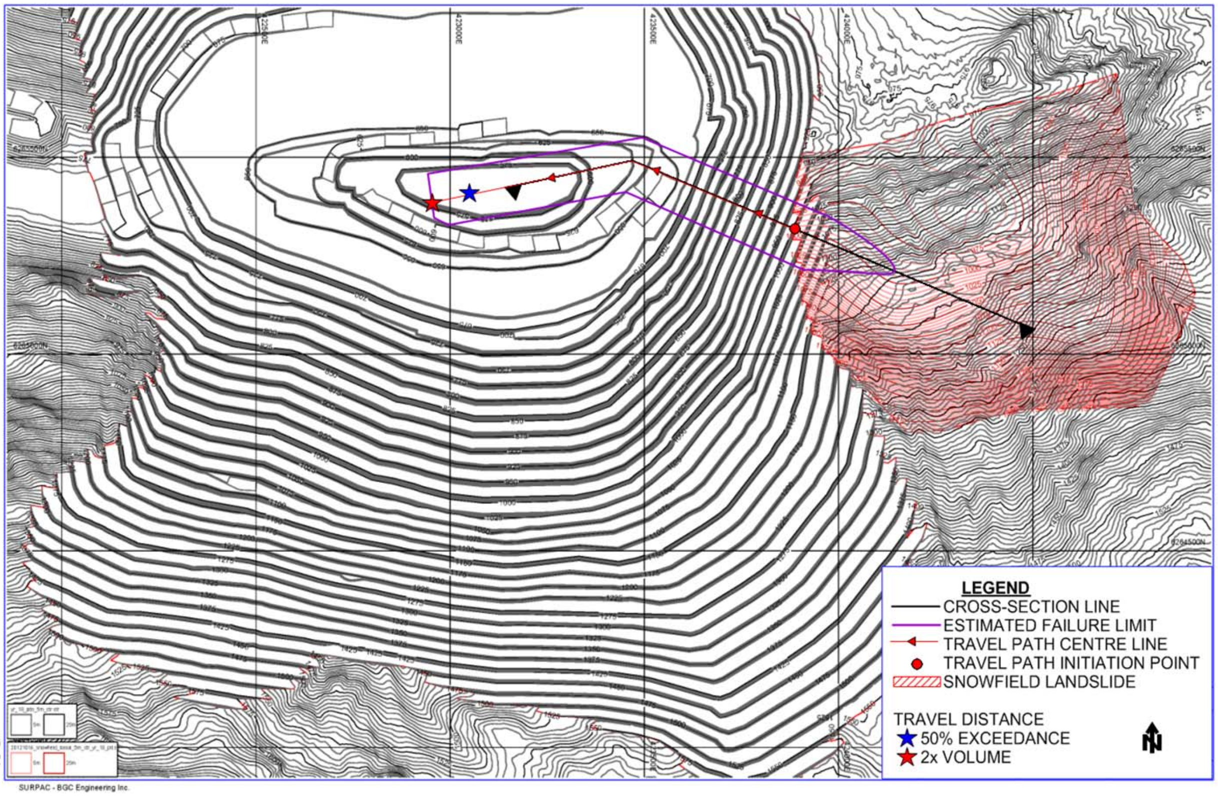
REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

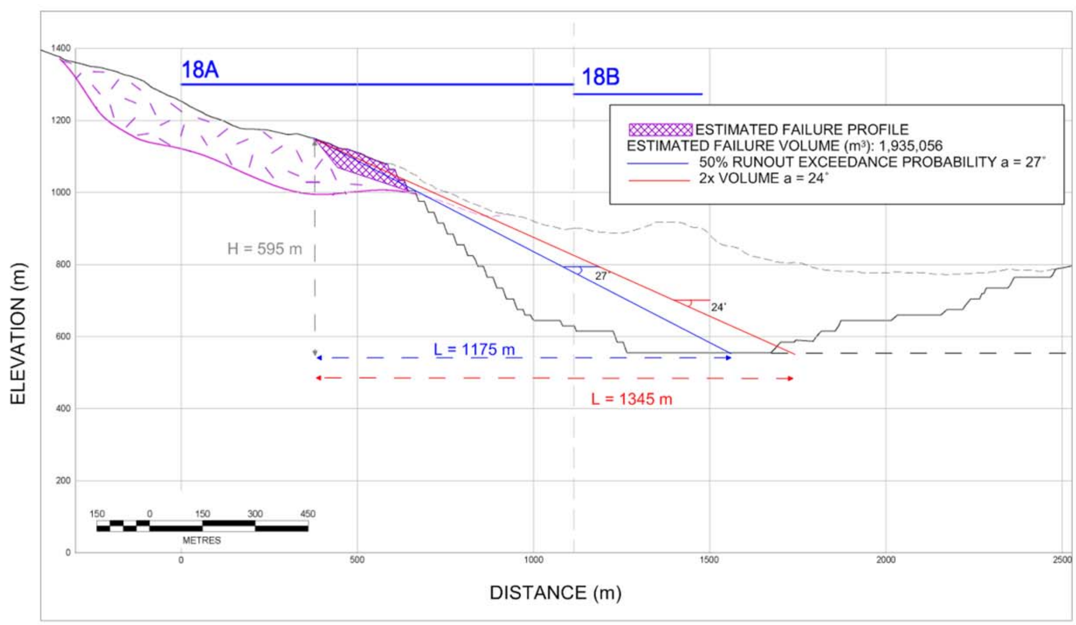
FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 17

CLIENT:	PROJECT No.:	FIGURE No.:
SEABRIDGE GOLD INC.	0638014-30	D-14

N:\BGC\PROJECTS\0638 SEABRIDGE\014 KSM EA SUPPORT\30 GEOTECH AND HYDROGEO\02 SNOWFIELD LANDSLIDE MANAGEMENT\02_ANALYSIS\RUNOUT FIGURES

JULY 5, 2013





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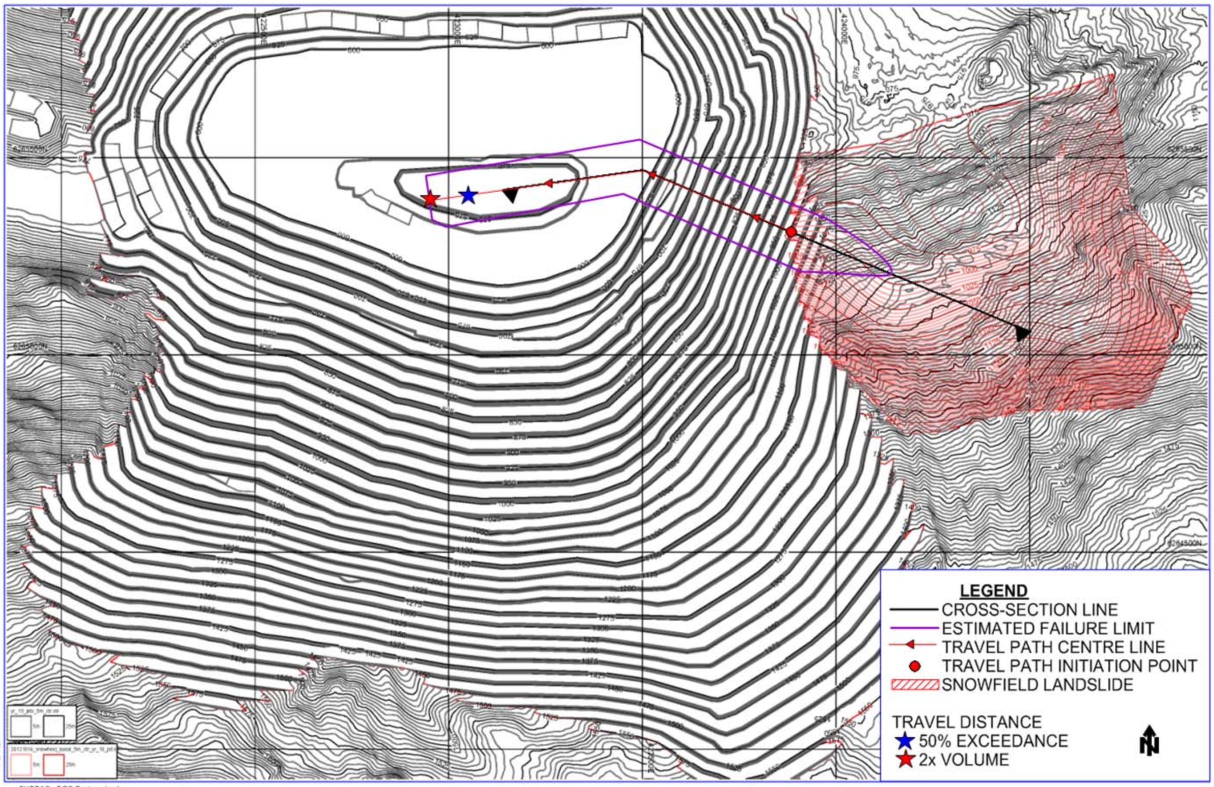
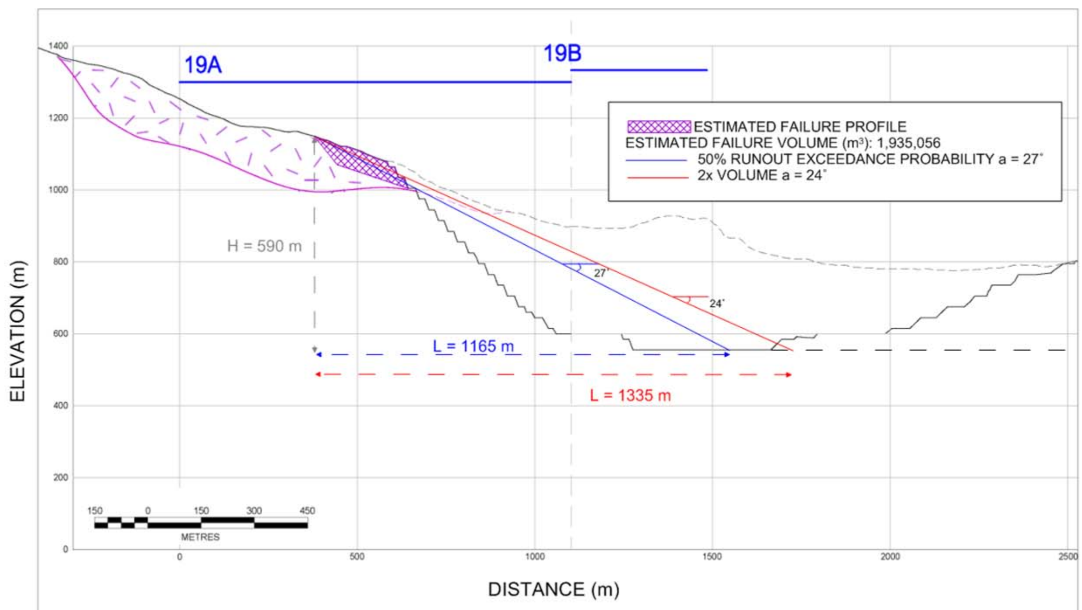
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN		
FIGURE TITLE: MULTI-BENCH RUN-OUT ANALYSIS YEAR 18		
CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638014-30	FIGURE No.: D-15

JULY 5, 2013





BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

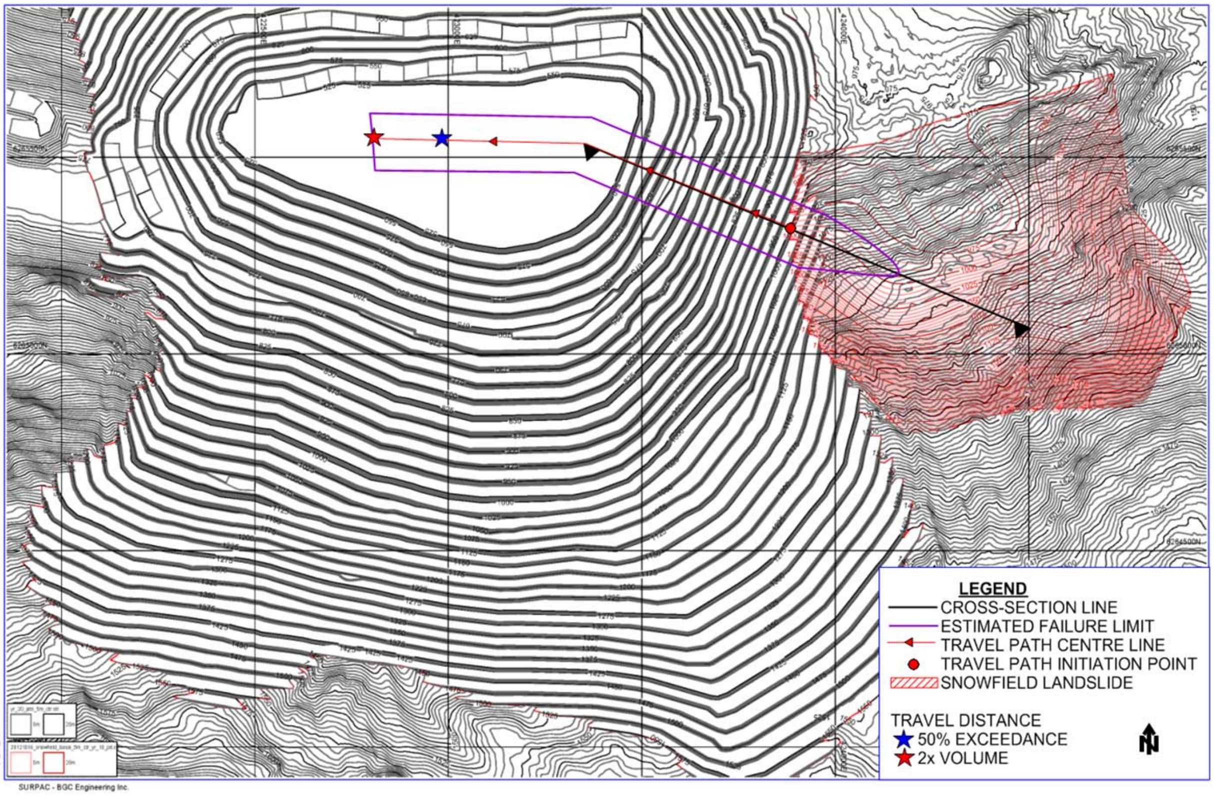
FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 19

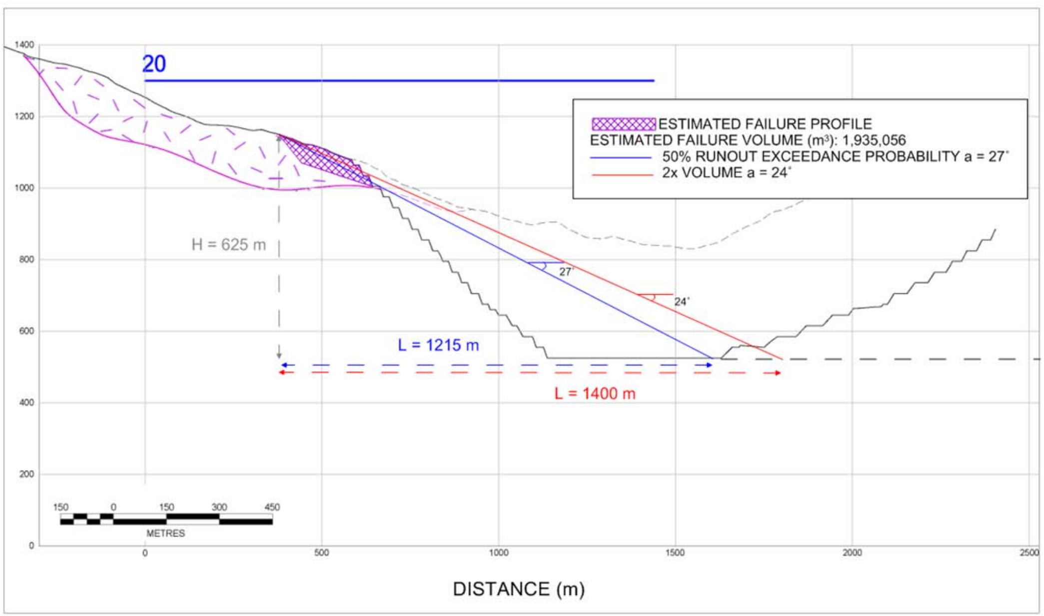
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638014-30

FIGURE No.:
D-16

JULY 5, 2013



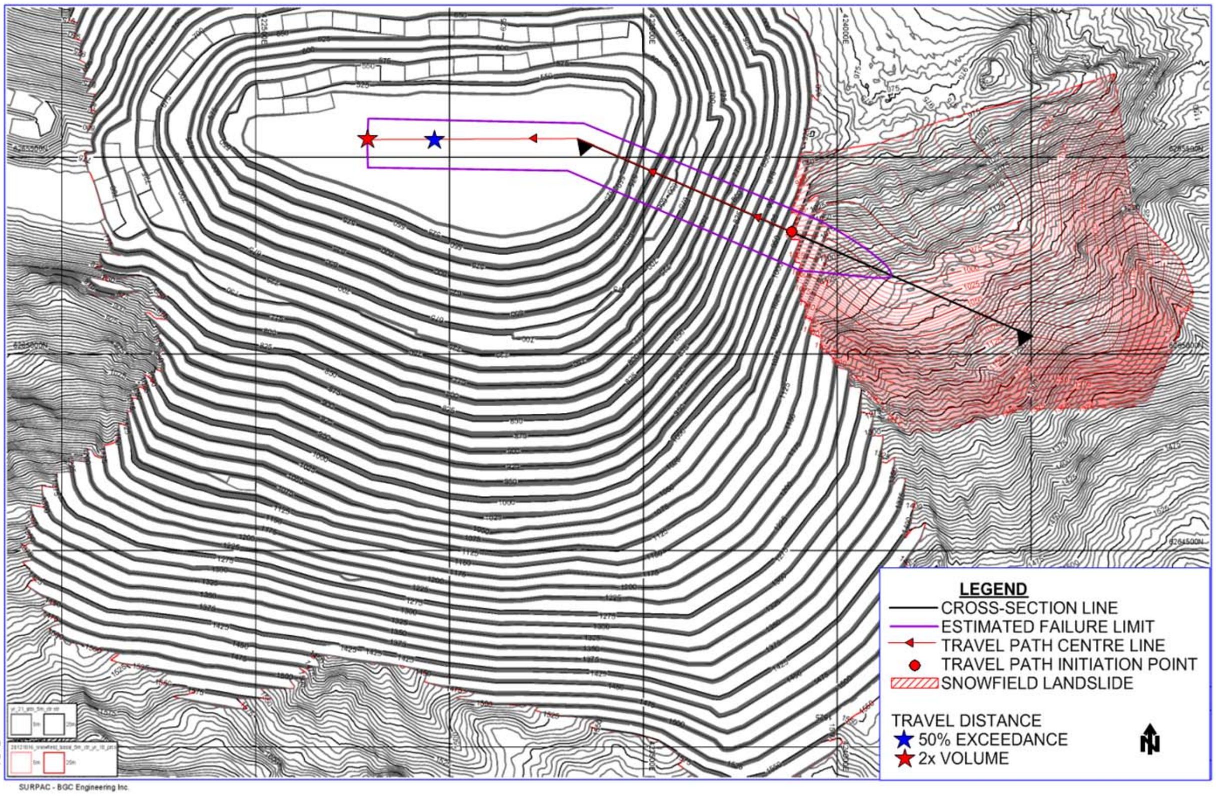


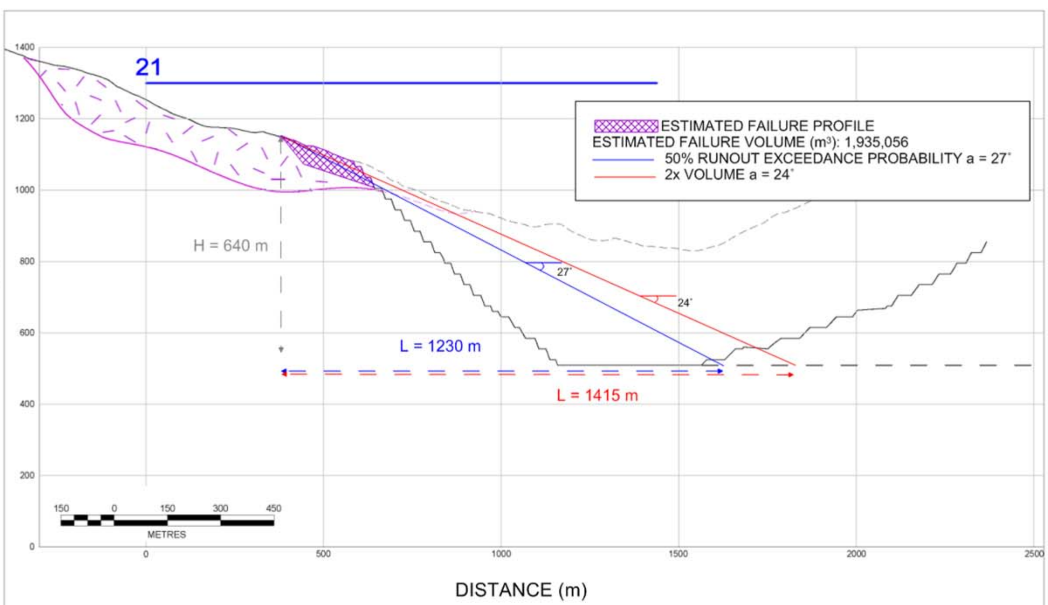
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN		
FIGURE TITLE: MULTI-BENCH RUN-OUT ANALYSIS YEAR 20		
CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638014-30	FIGURE No.: D-17

N:\BGC\PROJECTS\0638 SEABRIDGE\014 KSM EA SUPPORT\30 GEOTECH AND HYDROGEO\02 SNOWFIELD LANDSLIDE MANAGEMENT\02_ANALYSIS\RUNOUT FIGURES

JULY 5, 2013





BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 21

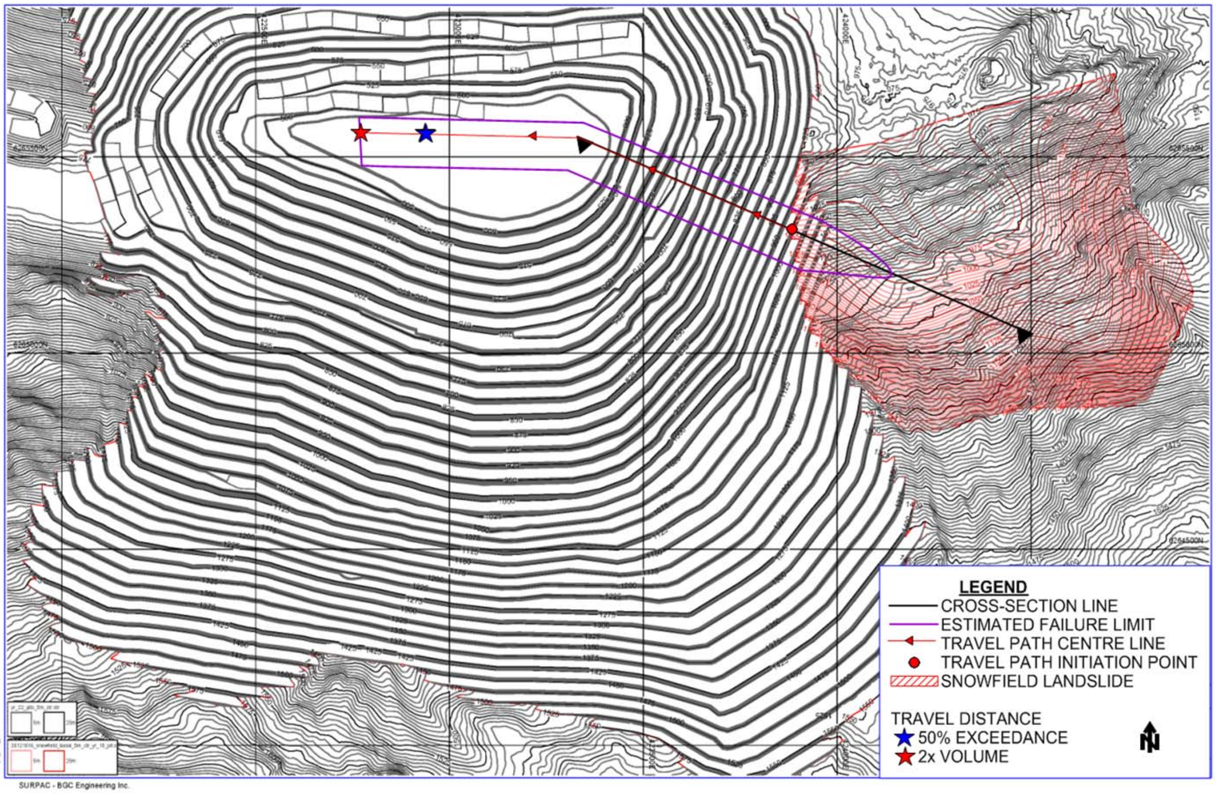
CLIENT:
SEABRIDGE GOLD INC.

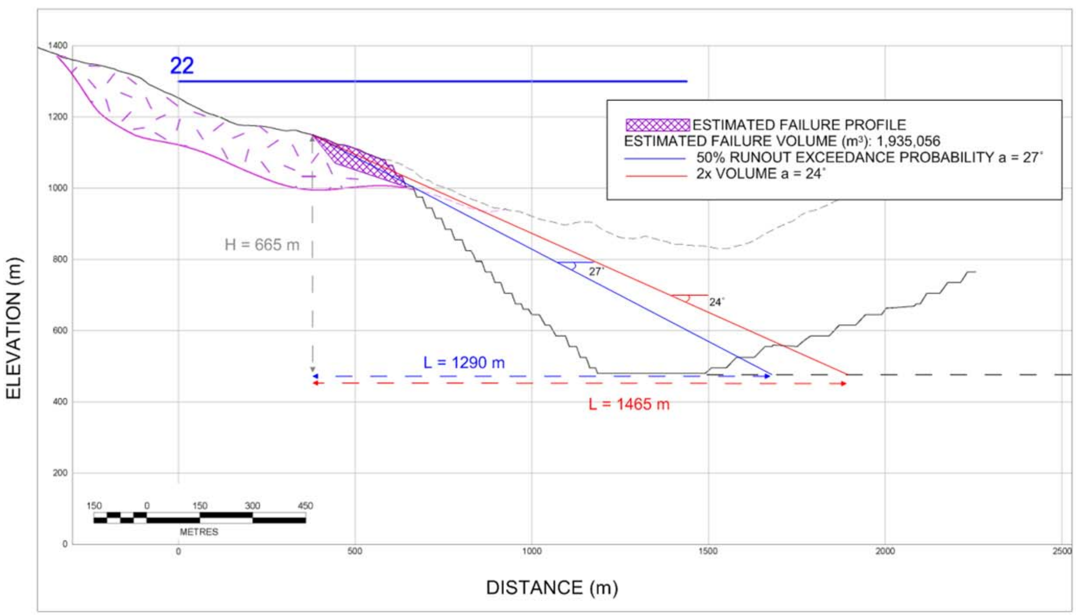
PROJECT No.:
0638014-30

FIGURE No.:
D-18

JULY 5, 2013

N:\BGC\PROJECTS\0638 SEABRIDGE\014 KSM EA SUPPORT\30 GEOTECH AND HYDROGEO\02 SNOWFIELD LANDSLIDE MANAGEMENT\02_ANALYSIS\RUNOUT FIGURES



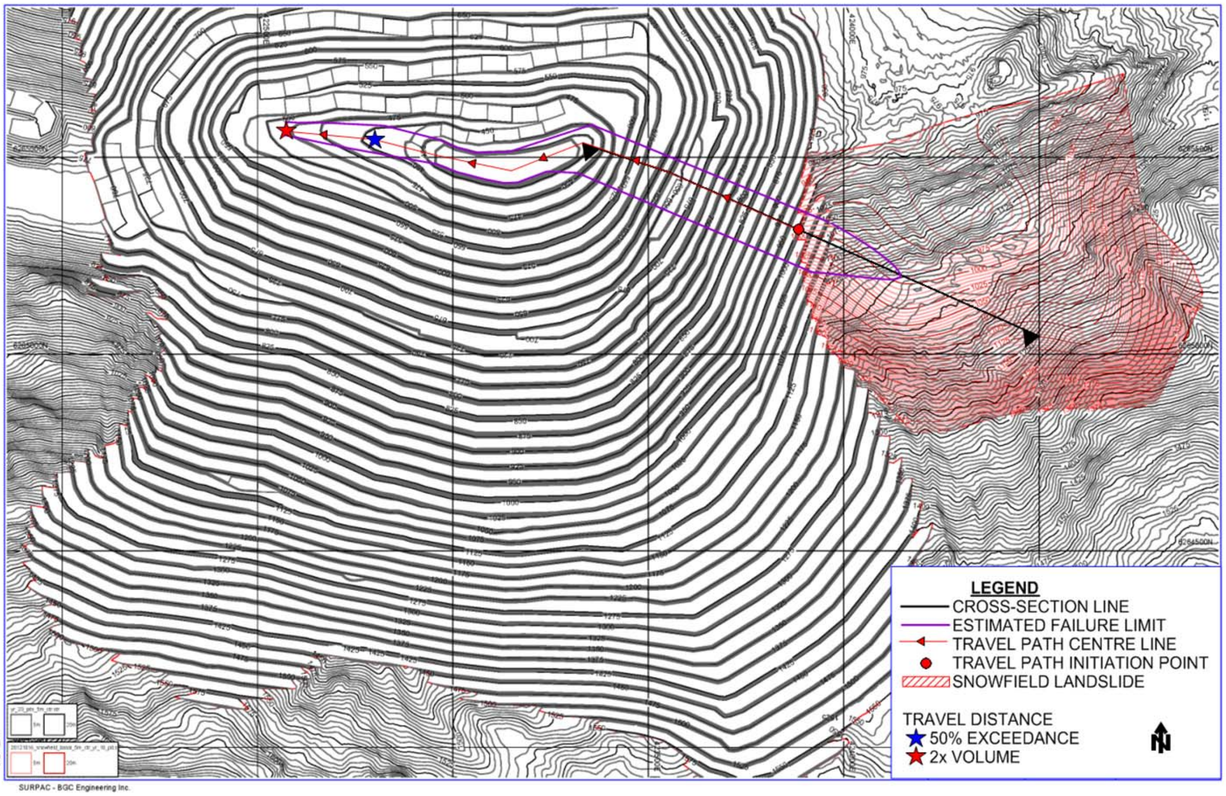


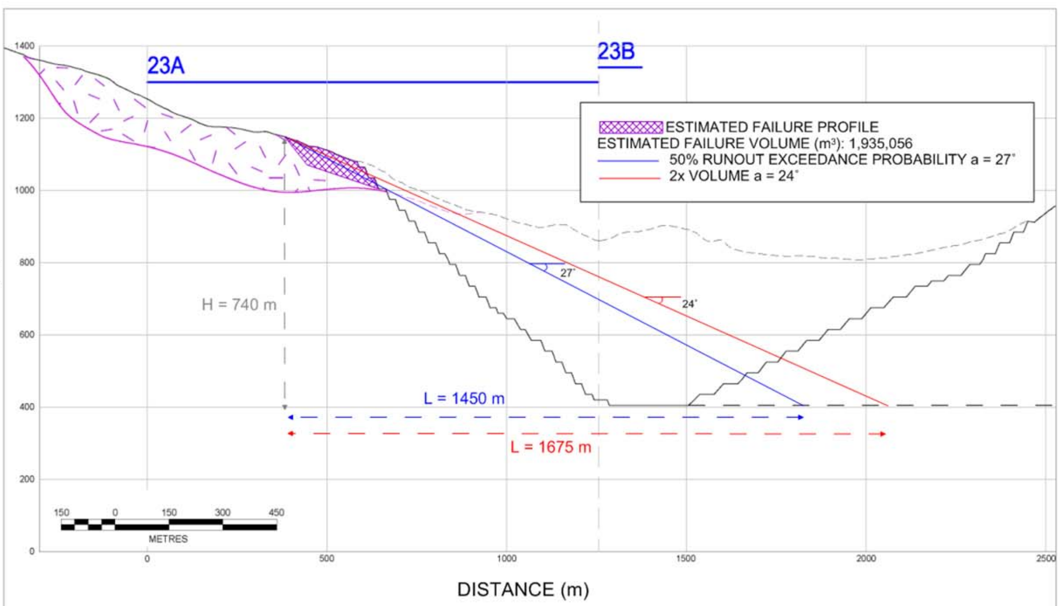
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:	PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN
FIGURE TITLE:	MULTI-BENCH RUN-OUT ANALYSIS YEAR 22
CLIENT:	SEABRIDGE GOLD INC.
PROJECT No.:	0638014-30
FIGURE No.:	D-19

N:\BGC\PROJECTS\0638 SEABRIDGE\014 KSM EA SUPPORT\30 GEOTECH AND HYDROGEO\02 SNOWFIELD LANDSLIDE MANAGEMENT\02_ANALYSIS\RUNOUT FIGURES

JULY 5, 2013





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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

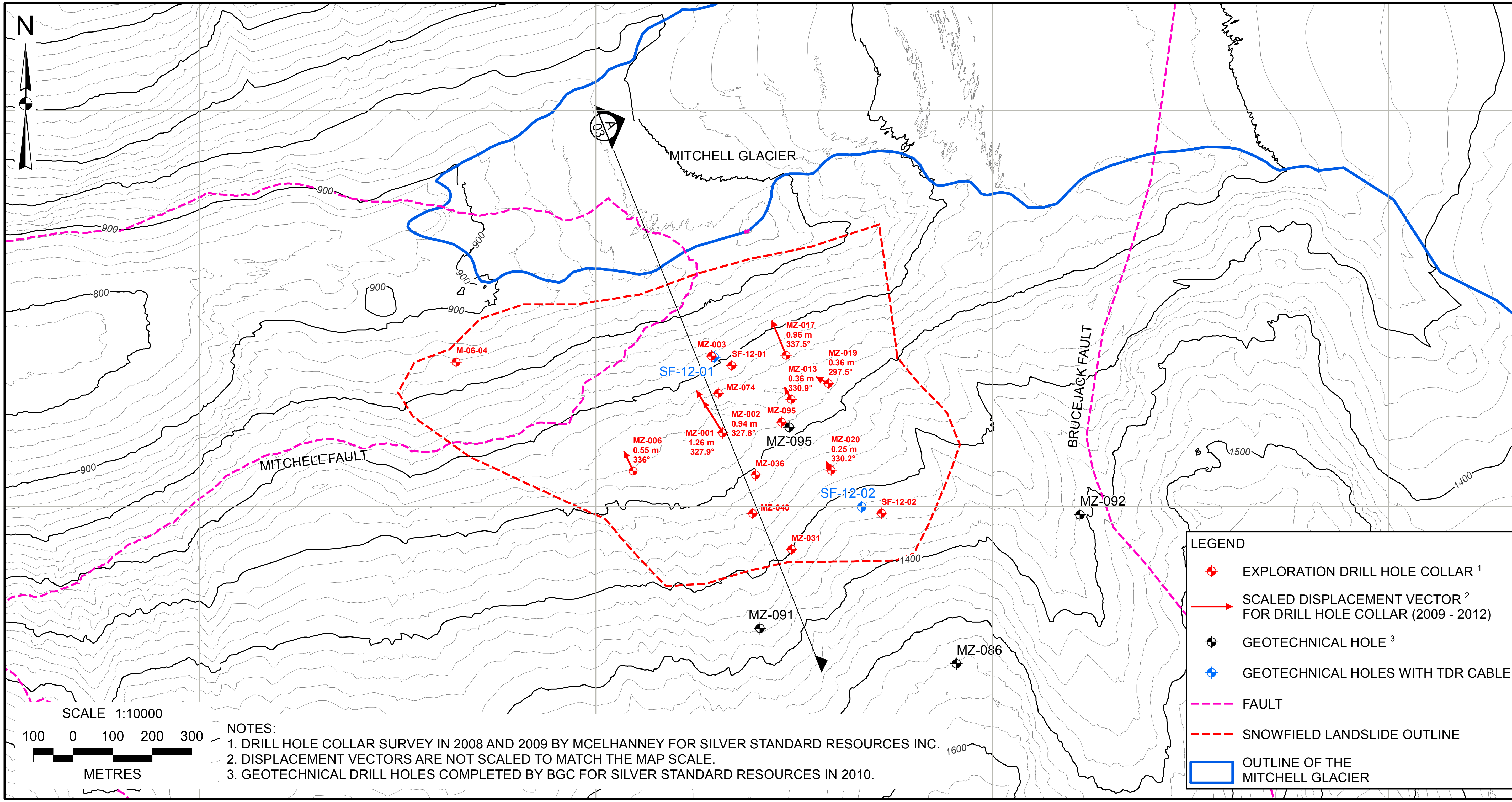
REPORT TITLE:
PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

FIGURE TITLE:
MULTI-BENCH RUN-OUT ANALYSIS
YEAR 23

CLIENT:	PROJECT No.:	FIGURE No.:
SEABRIDGE GOLD INC.	0638014-30	D-20

JULY 5, 2013

DRAWINGS



20 m CONTOUR INTERVAL
NAD 1983 UTM Zone 9N

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	ST, MIB, GLT-C
DESIGNED:	DK, ML
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: SNOWFIELD LANDSLIDE OVERVIEW

PROJECT No.:	DWG No.:	REV.:
0638014-30	01	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

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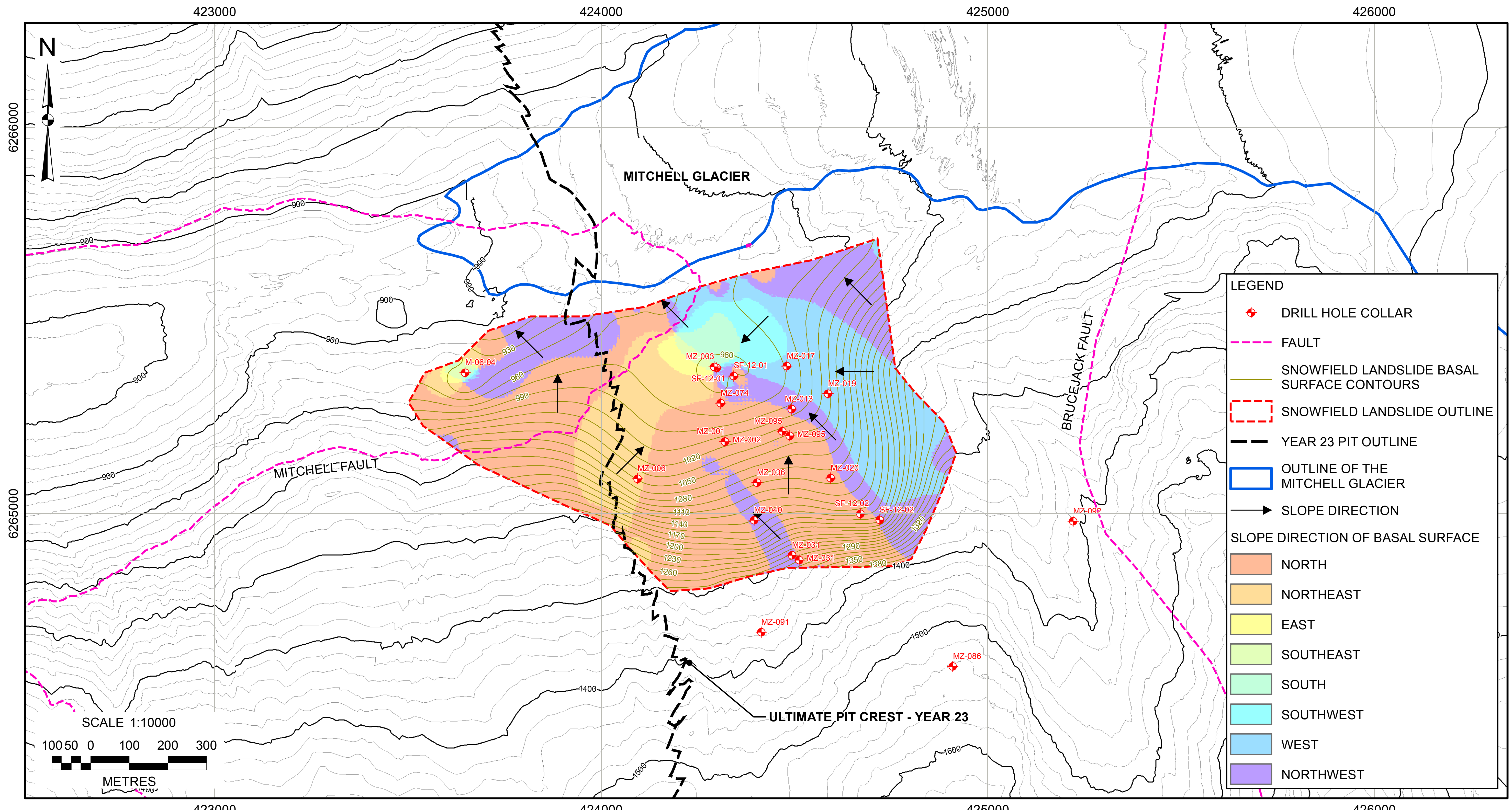

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE: 1:10000
DATE: JUL 2013
DRAWN: LL, MIB, GLT-C
DESIGNED: JRW
CHECKED: DK
APPROVED: DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: INTERPRETED BASAL SURFACE OF THE SNOWFIELD LANDSLIDE

PROJECT No.: 0638014-30
DWG No.: 02
REV.:

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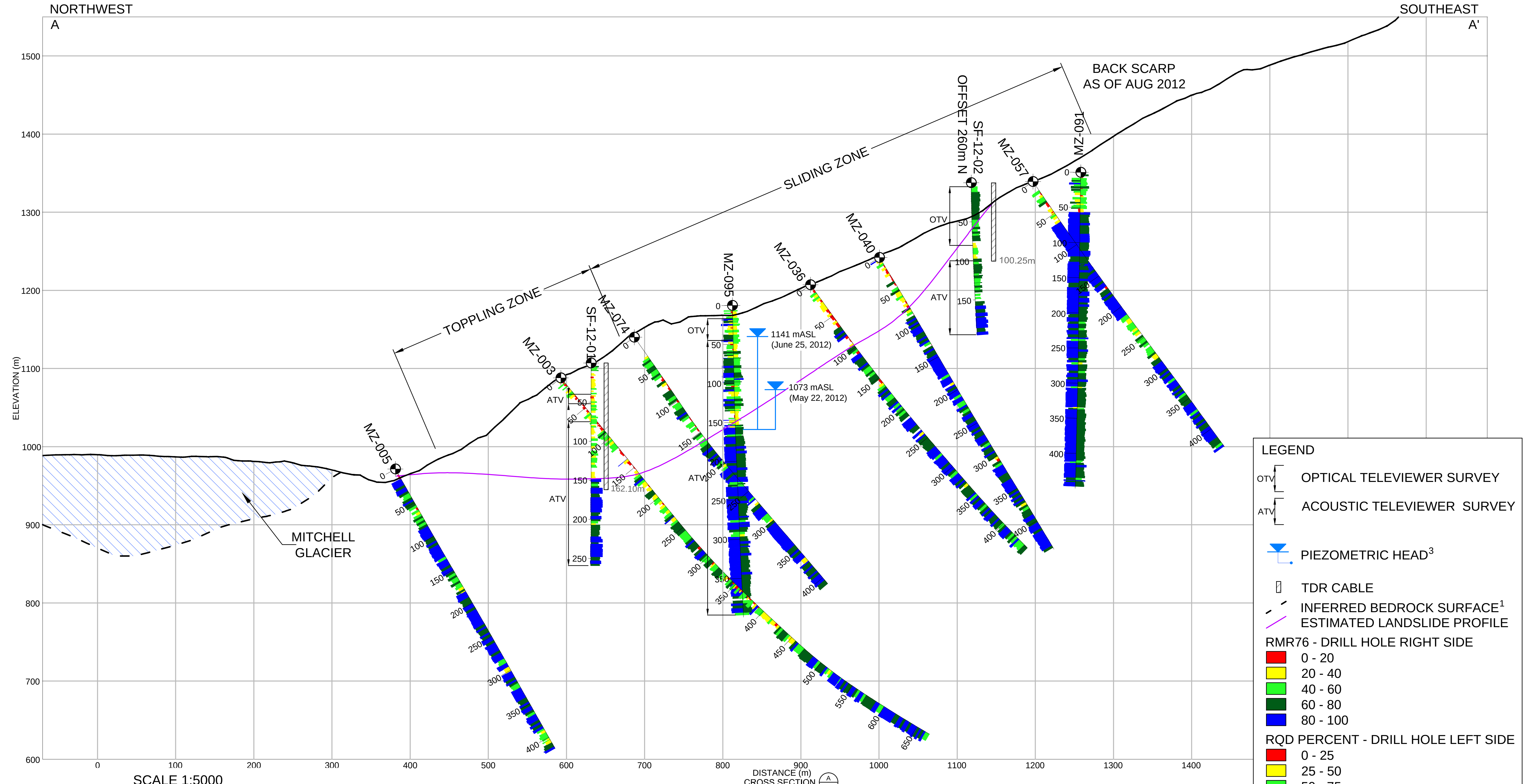

SCALE 1:5000

100m 0 100m 200m 300m

METRES

NOTES:

1. BEDROCK SURFACE BELOW THE MITCHELL GLACIER IS BASED ON DATA SUPPLIED IN KCBL'S REPORT ON ICE RADAR INVESTIGATION (2012).
2. THE LOCATION OF THE MITCHELL THRUST FAULT IS BASED ON WORK BY SEABRIDGE IN 2012, IT HAS NOT BEEN UPDATED TO ACCOUNT FOR THE SUMMER 2012 DRILLING DATA.
3. PIEZOMETRIC DATA FROM MAY 22, 2012 AND JUNE 25, 2012.
4. SCARP LOCATIONS INTERPRETED FROM SATELLITE AND AERIAL PHOTOGRAPHY.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:5000
DATE:	JUL 2013
DRAWN:	WKL / AP
DESIGNED:	JRW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: CROSS SECTION A

PROJECT No.:	DWG No.:	REV.:
0638014-30	03	

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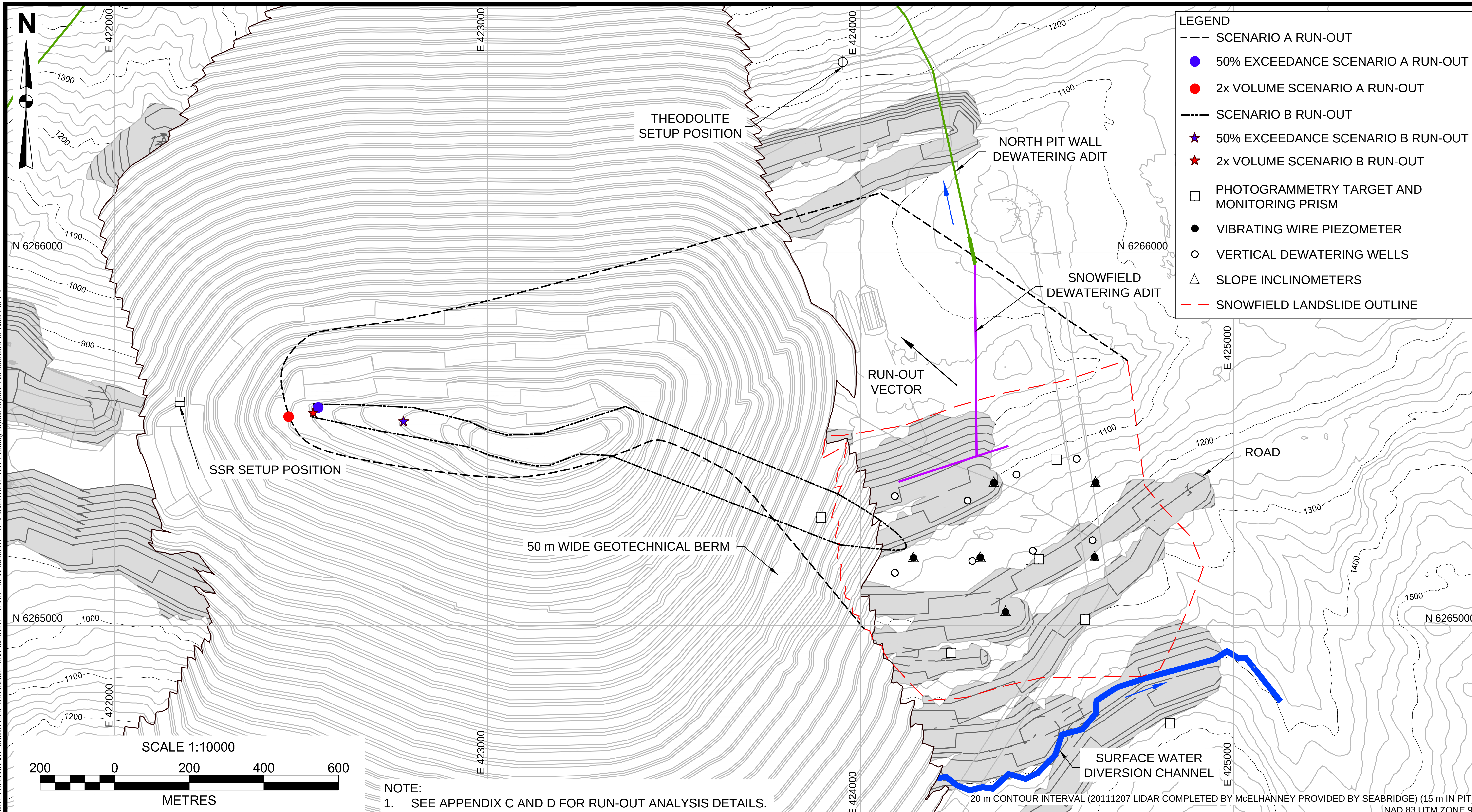

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SCALE:	1:10000
DATE:	JUL 2013
DRAWN:	SS
DESIGNED:	JW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: MANAGEMENT PLAN OVERVIEW - YEAR 23

PROJECT No.:	DWG No:	REV.:
0638014-30	04	

DWG TO BE READ WITH BGC MEMO TITLED "PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN" DATED JULY 2013

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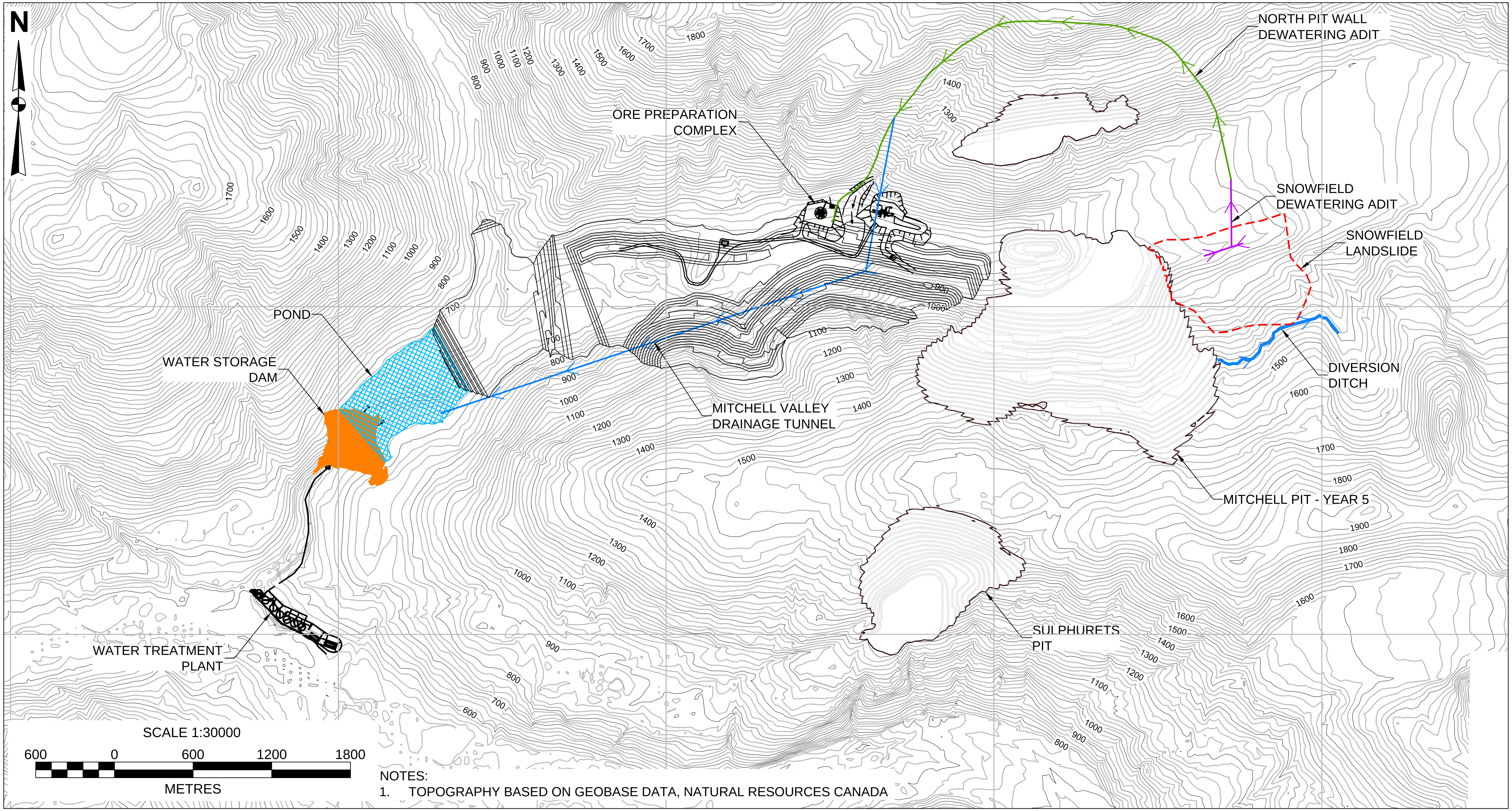

NOTES:
1. TOPOGRAPHY BASED ON GEOBASE DATA, NATURAL RESOURCES CANADA

20m CONTOUR INTERVAL
NAD83 UTM ZONE 9N

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:30,000
DATE:	JUL 2013
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DESIGNED:	JRW
CHECKED:	DK
APPROVED:	DK

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY SNOWFIELD LANDSLIDE MANAGEMENT PLAN

TITLE: SNOWFIELD DEWATERING ADIT WATER HANDLING PLAN

PROJECT No.:	DWG No.:	REV.:
0638014-30	05	

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