APPENDIX 4-K
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

SEABRIDGE GOLD INC.

KSM PRELIMINARY FEASIBILITY STUDY UPDATE

PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FINAL

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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
#500-1045 Howe Street
Vancouver, B.C.
Canada V6Z 2A9
Tel: 604.684.5900
Fax: 604.684.5909

December 24, 2012
Project No: 0638-013-31

Mr. T. Jim Smolik, Pre-Feasibility Study Manager
Seabridge Gold Inc.
108 Front Street East
Toronto, Ontario, M5A 1E1

Dear Mr. Smolik,

Re: Preliminary Assessment of Open Pit Slope Instability due to the Mitchell Block Cave – FINAL

Please find attached the above referenced report. Thank you for the opportunity to work on this interesting project. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Yours sincerely,

BGC ENGINEERING INC.
per:

Derek Kinakin, M.Sc., P.Geo. (BC)
Senior Engineering Geologist

EXECUTIVE SUMMARY

The Mitchell Zone is the largest of the four exploration targets comprising Seabridge Gold Inc.'s KSM Project and is the only zone where a combination of open pit and block caving mining methods is proposed. The open pit will be mined with ultimate north and south wall heights reaching approximately 1,200 m. Block cave mining will be undertaken following the completion of the open pit; extending the depth of the resource extraction approximately 180 m below the ultimate pit floor. Estimates of the extent of macro-deformation and the magnitudes of ground deformations surrounding the mine due to instability of the overall slope induced by the development of the block cave are required to site near-pit infrastructure.

Geotechnical assessments were undertaken for eight cross sections using two dimensional limit-equilibrium and finite element slope stability analyses of the overall excavation geometry at the end of block cave mining. The zone of macro-deformation related to open pit slope instability due to the development of the block cave is estimated to extend up to 200 m beyond the ultimate pit crest at the ground surface; the macro-deformation zone also extends below the ultimate pit level. Currently planned infrastructure within or near the zone of macro-deformation includes:

- Portions of the Mitchell Diversion Tunnel
- The Mitchell Diversion Inlet structure
- The Mitchell North Dewatering Adit

The Mitchell-Teigen Tunnel and Ore Processing Complex are outside of the limits of the estimated critical open pit slope instabilities and macro-deformation zone.

A finite element model of the open pit – block cave was developed to simulate the progressive mining of the block cave for the purpose of estimating magnitude of deformations in the areas of the Mitchell Diversion Inlet and the Mitchell North Dewatering Adit. Sections of the Mitchell North Dewatering Adit, as currently aligned, could be displaced 10 to 20 m by the completion of the Mitchell Block Cave. The models for the Mitchell Diversion Inlet predict displacements of less than 1 m by the end of caving operations. A summary of the principal stresses at the Mitchell North Dewatering Adit and Mitchell Diversion Inlet Structure has also been compiled to assist in the design of underground infrastructure adjacent to the open pit slopes.

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1.0 INTRODUCTION

1.1. Overview

The Kerr-Sulphurets-Mitchell (KSM) Project is a copper and gold project owned by Seabridge Gold Inc. (Seabridge) and located approximately 65 km north of Stewart, B.C (Figure 1). BGC Engineering Inc. (BGC) has contributed to Scoping and Preliminary Feasibility level studies for the proposed mine completed in 2009 and 2010/2011, respectively. A Preliminary Feasibility Study Update (PFSU) was completed in June 2012. The mine plan proposed in the PFSU targets four mineralized zones; one of which, the Mitchell Zone, will be mined using a combination of open pit and block caving methods.

The current study was conducted to estimate the extent of overall open pit slope instability which could be induced by the development of the block cave. It is our understanding that the results of this work may be used in the siting of near-pit infrastructure by Seabridge and their consultants. In this report we present a model for the open pit – block cave interactions and the resulting zones of instability that may develop by the end of block cave mining. We have undertaken a series of numerical analyses based on a conceptual model, the results of previous geomechanical characterization work, and the current mine plan to estimate the potential extent of the overall slope instabilities due to the block cave mine.

1.2. Study Background

The Mitchell Zone is the largest of the four proposed development targets of the KSM Project and is the only zone where a combination of open pit and block caving mining methods is proposed. The Mitchell zone will initially be mined using open pit methods for approximately 25 years, with ultimate north and south wall heights of approximately 1,200 m. Block cave mining will follow the completion of the open pit, extending the depth of the resource extraction another 180 m below the ultimate pit floor over approximately 30 years.

Following a project update meeting on January 26, 2012 with Seabridge, Golder Associates Ltd. (Golder), Klohn Crippen Berger Ltd. (KCBL), Rescan Environmental Services Ltd. (Rescan), Tetra Tech Wardrop (Wardrop), and Moose Mountain Technical Services (MMTS), it was requested that BGC review available geotechnical data to estimate a minimum set-back distance for the Mitchell Diversion Tunnel (MDT) inlet structure from the eastern limit of the “subsidence zone” of the proposed ultimate Mitchell Open Pit and Mitchell Block Cave. BGC completed a review of existing case histories and literature to develop a conceptual model of the expected “subsidence zone” and a preliminary assessment of the extent of the “macro-deformation” of the open pit crest adjacent to the MDT Inlet; the results of this study were presented to the project team in a draft letter report on February 28, 2012. Upon review of these results, Seabridge requested BGC expand our assessment to include additional cross sections through the open pit slopes adjacent to other near-pit infrastructure and the Snowfield Landslide. An expanded draft report was issued on April 23, 2012.

During the KSM Project Risk Assessment and Fatal Effect meeting on September 26 and 27, 2012, Mr. Peter Stacey of the Seabridge's expert review panel recommended that BGC further expand the scope of this work to include finite-element deformation analyses for the cross sections through the North and East walls of the Mitchell Pit. BGC undertook this additional work; the results are summarized here-in. The current report supersedes all previous reports regarding the block cave and open pit slope interactions and summarizes the results of the total scope of work.

1.3. Scope and Limits of the Current Work

The current work provides preliminary estimates of the spatial extent of open pit slope instabilities and magnitude of deformations which could be induced by the developed of the Mitchell Block Cave. In this study, unstable slopes are those sections of pit wall where the factor of safety (FOS), estimated using limit-equilibrium method-of-slices stability analysis techniques, is 1.0 or less. Instability of the open pit slopes adjacent to the cave limits may result in significant ground deformation behind the ultimate open pit slope crest. Estimates of the magnitude of ground deformations are provided by the finite element method analyses. Mine infrastructure required during the block cave phase of the mine plan should be located outside of this estimated instability limit. It is expected that Seabridge and their consultants will use the results from the current work in considering the layout of the mine infrastructure.

This study relies on previous work completed as part of the updated Pre-Feasibility studies for the KSM Project. The geological interpretations for the study area have been completed by Seabridge. The geotechnical characterization of the rock mass of the open pit adjacent to the block cave is based on work completed by BGC (2010, 2011a, 2012a). The open pit geometry is based on a design by MMTS using slope design parameters provided by BGC. The geometry of the block cave and estimates of the ground disturbance adjacent to the cave limits have been provided by Golder. The hydrogeological conditions included in the current work are based on simulations completed by BGC for the open pit slope design assessments. The available information has been used to develop cross sections for the slope stability analyses.

At this preliminary stage of study, the extent of the slope instability around the block cave has been estimated using two-dimensional (2D) limit-equilibrium analysis methods (Butcher and Jenkins, 2006). Limit-equilibrium (LE) methods include the approaches of Hoek (1974), Karzulovic (1990), or Lupo (1996) for progressive hanging wall failure above a cave. In the current work, the extent and geometry of the "fractured zone" adjacent to the caved area has been estimated by Golder (R. Hammett, 2012a) based on experience with other projects. BGC first completed limit-equilibrium stability analyses, based on the method-of-slices approach, to estimate the extent of pit slope instability above the edge of the block cave. This analytical approach is consistent with the methods used for the PFS and PFSU level evaluations of the open pit slope stability previously completed in the Mitchell Zone (BGC, 2010, 2011a, and 2012a). The current work also estimates the magnitude ground

deformations associated with the development of the Mitchell Block Cave using the two-dimensional (2D) finite element method (FEM) for two critical cross sections.

The analyses completed consider the ultimate phase of the open pit combined with the estimated extent of the ultimate block cave provided by Golder. All rock of the ore column is assumed to be removed; buttressing effects of the broken ore column have not been included in these analyses. Only the final geometry of the pit and cave were considered in the macro-deformation limit analyses (Appendix B) but the incremental changes in the stability of the open pit slopes as the block cave develops and time dependent changes to the rock mass properties were included in the finite element method (FEM) analyses (Figures 2 and 3 and Appendices C and D). The limitations of the two dimensional analyses presented in the report include their inability to account for: the variation in three-dimensions of the rock mass properties, stresses and slope geometry, the interaction of multiple discontinuity sets controlling the rock mass deformation, and the presence of adversely oriented discrete structures with a long persistence. The extent of pit slope instability obtained in the models depends strongly on the estimated fractured zone associated with the development of the Mitchell Block Cave.

2.0 OPEN PIT – BLOCK CAVE INTERACTION MODEL

2.1. Conceptual Model

Caving (block caving, sub-level caving) below an operating or end-of-life open pit is proposed or underway for several of the largest mines in the world including: Chuquicamata, Bingham Canyon, Grasberg, and Palabora. We have reviewed the published literature to develop a description of the ground deformations associated with a combined open pit and cave mine plan (Figure 4). Table 1 provides a description of each zone and associated features; some of the terminology used for the zones associated with the excavations differs by author and we have listed "equivalent" terms, where possible.

The conceptual model of the ground deformation associated with an open pit and block cave can be broadly divided based on the extent and magnitude of the ground disturbance observed into two zones (Butcher and Jenkins, 2006):

1. "Macro-deformation" zone
2. "Micro-deformation" zone

The macro-deformation zone, or "crater", includes the glory-hole above the undercut level and the area of unstable ground around the glory-hole limit. The area of unstable ground may be further divided into a "fractured" zone associated with the limits of the main cave area and an area of induced open pit slope relaxation or instability above the cave limits. The well documented failure of the Palabora open pit (Moss et al., 2006) is an example of features that may be found in the macro-deformation zone. Important infrastructure for the mine must be located outside the limits of this zone to avoid damage due to the large ground displacements expected. The extent of the glory hole has been estimated by Golder (R. Hammett, 2012a).

The micro-deformation zone is considered to be an area where little or no cracking of the ground is observed. Displacements due to the adjacent excavation are expressed as ground-tilting or "continuous" subsidence, where the ground is not disrupted by discrete cracks or down-dropped blocks. Ground displacements are expected to be a few meters or less, decreasing as the distance from the cave increases. This zone may extend hundreds of metres from the limit of the cave.

2.2. Cross Section Geometry

A total of eight cross sections (Drawing 1) were constructed to analyze the macro-deformation limit of the overall open pit slopes once the block cave has been fully developed and cross sections A and D were further analyzed to estimate the magnitude of expected deformations in the areas of the Mitchell Diversion Inlet and the Mitchell North Dewatering Adit.

The analysis cross sections have been selected based on the geometry of the ultimate pit with consideration of the currently planned near-pit infrastructure. The geometry of each

cross section used in the analysis is based on information compiled from multiple data sources, as summarized in the following:

- The topography is based on data provided by Seabridge and publically available digital elevation model data from the Government of British Columbia.
- The geometry of the Mitchell Glacier has been estimated based on BGC's work assessing the mass balance and potential for mining of the ice (BGC, 2011e).
- The limits of the open pit excavation and the excavation sequences are based on the "EOP50 Mitch.dxf" shell provided by Moose Mountain Technical Services (MMTS) on March 20, 2012.
- The block cave geometry and limits of the glory hole are based on preliminary assessments carried out by Golder and provided to BGC on February 1, 2012.

The material boundaries within each cross section are based on:

- The geological units from the three-dimensional model provided to BGC by Seabridge on January 28, 2011.
- The geotechnical units and geotechnical domains from previous work by BGC (BGC, 2010; 2011a).
- The extent of the "Fractured Zone" adjacent to glory hole has been estimated by Golder and was provided to BGC on February 1, 2012.

The cross section geometry assumes all of the ore targeted by the block cave is completely removed; no zone of "broken ore" is included in these analyses. The cross sections used for the macro-deformation limit estimates are included in Appendix B. The cross sections analyzed with the FEM analyses are provided in Appendices C and D.

2.3. Geomechanical Properties

To complete the macro-deformation limit analyses, estimates of the geomechanical properties were required of:

- the geotechnical units,
- the major discontinuity sets,
- the ice of the Mitchell Glacier,
- the rock mass strength of the Snowfield Landslide, and
- the "Fractured Zone" adjacent to the block cave limits.

The geomechanical properties of the geotechnical units used in the macro-deformation analyses (Table 2) are consistent with previous open pit slope stability assessments completed for the KSM Project (BGC, 2010; 2011a; 2011b; 2011c, 2012a). The geotechnical units have been defined based on alteration types, rock type, and / or the location of the unit

with respect to the Mitchell Thrust Fault (MTF). The estimated properties of each unit are based on geotechnical logging of core recovered from drill holes and laboratory testing of rock samples. For the FEM deformation analyses, residual strength properties were estimated for each unit following the approach of Crowder and Bawden (2004) for jointed rocks (Table 3).

Major discontinuity sets, such as faults or foliation, have been incorporated into the cross sections for analysis where appropriate. The design stereonets for each geotechnical domain as defined in previous work (BGC, 2010; 2011a; 2011b; 2011c) have been included for reference in Appendix A. Discontinuity sets that were identified as potential controls on slope stability for a given cross section were included in the analyses as anisotropic functions with Mohr-Coulomb shear strengths estimated in previous work (BGC, 2010). Anisotropic functions are shown on each of the cross sections in Appendix B, for the cross sections in which they were used. Strength anisotropy was represented explicitly as joint network in the FEM analyses (Appendices C and D).

Glacial ice of the Mitchell Glacier occurs on Cross Section D. The glacial ice has been treated as a surcharge load. The material has been given a unit weight; but no shear strength.

The Snowfield Landslide is intersected by Cross Section C. Preliminary geomechanical properties for the rock mass of the landslide have been estimated based on a back-analysis of this failing slope. The landslide is assumed to be actively deforming, i.e. is marginally stable with a FOS near unity (1.0). Initial properties for the back-analysis were estimated from information collected by BGC (2011f) and reduced until a FOS near 1.0 was achieved; the geomechanical properties presented in Table 2 are based on this back analysis.

The “Fractured Zone” adjacent to the block cave is a zone where the rock mass is highly disturbed and damaged by the caving process. The rock mass of this zone is assumed to be at residual strength. The geomechanical properties of this zone are based on the approach of Cai et al. (2007) for estimating the “residual strength” of a rock mass. An increased density of fracturing in this zone has been assumed, resulting in an overall decrease of the in-situ block size in the “fractured zone.” Displacement along existing discontinuities within this zone results in a reduction of their shear strength. The combined effects of the disturbance and damage to the rock mass in the “fractured zone” is simulated by a reduction of the Geological Strength Index or “GSI” (Hoek and Brown, 1997); which results in an overall reduction of the rock mass strength of this unit. Table 2 presents the properties for geotechnical units within the “Fractured Zone”.

2.4. Hydrogeologic Conditions

The hydrogeologic conditions used in the analyses have been inferred from the results of 3D depressurization modeling completed for the open pit (BGC, 2011d; 2012b). It has been assumed that the groundwater conditions at the end of the open pit mine life will be modified by:

1. The loss of man-access to in-pit pumping wells once caving initiates, resulting in a loss of the active slope depressurization system.
2. Damage to the rock mass in the “fractured zone”, resulting in an essentially free draining zone adjacent to the block cave.

The groundwater profile for each cross section is assumed to recover to the “unmitigated” condition (BGC, 2011d; 2012b) in areas where the vertical pumping well and horizontal drain components of the open pit dewatering system are lost. The North Dewatering Adit is assumed to continue functioning; the groundwater profile used in analyses of the north wall of the open pit account for this. It is assumed that the horizontal drains installed during open pit mining fail during the cave operation as the walls deform. The water tables estimated from these assumptions are shown for each cross section in Appendices B, C, and D.

3.0 MACRO-DEFORMATION LIMIT ESTIMATE

3.1. Overview

Limit-equilibrium method-of-slices stability analyses were conducted to determine the macro-deformation limit around the Mitchell Pit. The commercial software Slide 6.0 (Rocscience, 2012a) and the GLE/Morgenstern-Price solution algorithm have been utilized to calculate of the global minimum FOS for each analysis cross section. Typically, the safety factors of 50,000 potential failure surfaces were estimated in the analyses. Potential failure surfaces were generated by two methods:

1. Circular slip surfaces generated by a "grid-search" were generated where only homogenous and isotropic materials where included in the cross section to be analyzed.
2. Non-circular slip surfaces were generated by a "path search" where strength anisotropy directions due to major discontinuity sets are included in analysis cross sections.

Initial analyses were carried out for each cross section to assess the potential tension cracking zones. Following the method proposed by Rocscience (2012a), where negative interslice forces were present in the initial analysis, a zone of tension cracking was then added to the model; and the model was then re-run.

Sections of the open pit slopes that are defined by potential slip surfaces with a calculated factor of safety (FOS) of 1.0 or less are assumed to collapse into the cave and therefore will be within the zone of macro-deformation associated with the cave development. The sensitivity of the macro-deformation limit was assessed by considering the extent of the slip surfaces with a calculated FOS of 1.1 or less. The pore pressure condition analyzed for the north and south slopes of the Mitchell Open Pit, where reflect conditions where some of the depressurization system is assumed to be maintained during cave operations. The results for each cross section analyzed are discussed below and are summarized in Table 4. The extent of deformation limits associated with the different modelling assumptions is presented on Drawing 1 for each cross section.

3.2. Cross Section A1

Cross Section A1 intersects the south wall of the open pit. The south wall is approximately 1,100 m high with the bottom of the pit around 400 masl and the crest of the pit wall intersects the ridge at approximately 1,500 masl (Figure B1). The proposed Mitchell Diversion Tunnel is located behind the pit slope in the Mitchell-Sulphurets Ridge on this cross section. This cross section intersects geotechnical Domains I and III; the QSP and SI geotechnical units have been applied to the model. Based on the orientation of this cross section, an anisotropic fabric following the foliation orientation in the rock in Domain I (Figure B1) has been included in the analysis. The hydrogeologic scenario (base case) considered assumes that the some depressurization of the south slope is maintained during caving.

Prior to caving the pit slope has a factor of safety of 1.6 against overall slope failure and the overall slope angle is 39°. At the end of the block cave, the south slope will approach 1,260 m in height with a 45° overall slope angle. The global minimum potential slip surface after caving has a FOS of 1.07 and daylights at the ground surface approximately 200 m behind the ultimate crest of the open pit (Figure B2). This global minimum FOS has been treated as approximately equal to 1.0 for purposes of estimating macro-deformation limits. The maximum extent of the potential slip surfaces with FOS ≤ 1.1 daylights at the ground surface approximately 300 m behind the ultimate crest of the open pit (Figure B3). If slope depressurization similar to that assumed for operation of the open pit can be maintained during the operation of the block cave, the global minimum FOS is 1.2 (Figure B4). In either scenario, the currently proposed Mitchell Diversion Tunnel is located well behind the potential critical failure plane and outside of the zone of macro-deformation estimated by these analyses.

3.3. Cross Section A2

Cross Section A2 intersects the north wall of the open pit. The north wall is approximately 1,200 m high reaching from 400 masl in the bottom of the pit to nearly 1,600 masl (Figure B5). The proposed North Dewatering Adit is located behind the pit wall in this section. The cross section intersections Domains I, II, and IV. Geotechnical units QSP, KP-MTH, and SHW-S are included in the model. Based on the orientation of this cross section with respect to the major discontinuity sets, no anisotropic fabric has been included in the analysis.

Prior to caving, the overall slope has a FOS of 1.3 with an overall slope angle of 45°. At the completion of the block cave, the overall excavation will approach 1,300 m high with an overall angle of 54° (Figure B5). The global minimum potential slip surface has a FOS of 1.04 (Figure B6); assuming the North Dewatering Adit and associated drainage galleries can be maintained. This global minimum FOS has been treated as approximately equal to 1.0 for purposes of estimating macro-deformation limits. The potential slip surface with the maximum spatial extent and a FOS ≤ 1.1 daylights approximately 620m behind the crest of the open pit. The North Wall Dewatering Adit is located within this estimate of the macro-deformation zone.

3.4. Cross Section B

Cross Section B intersects the Southeast wall of the open pit; the pit wall is approximately 1,100 m high, reaching from 400 masl in the bottom of the pit to 1,500 masl on the Mitchell-Sulphurets Ridge (Drawing 1). This cross section intersects geotechnical Domains I and III. Geotechnical units QSP and SI are included in the model. Based on the orientation of this cross section, anisotropy matching the foliation in Domain I has been included in the model. The proposed Mitchell Diversion Tunnel is located behind the pit slope in the Mitchell-Sulphurets Ridge on this cross section.

Prior to caving, the overall slope has a factor of safety of 1.4 with an overall slope angle of 37°. At the end of the block cave, the overall excavation will approach 1,270 m in height with

a 43° overall angle (Figure B7). The potential slip surface with the maximum spatial extent and a FOS ≤ 1.0 daylights within the limits of the open pit at approximately 1,000 masl on this cross section (Figure B8). The potential slip surface with the maximum spatial extent and a FOS ≤ 1.1 daylights within the limits of the open pit at approximately 1,200 masl on this cross section (Figure B9).

The Mitchell Diversion Tunnel as planned is located outside of the limit of the critical slope surfaces estimated by this analysis. If the slope depressurization during block caving can be maintained at the same level during open pit mining, the maximum extent of the potential slip surfaces with FOS ≤ 1.0 is reduced (Figure B10).

3.5. Cross Section C

Cross Section C intersects the southeast wall of the Mitchell Pit, including the Snowfields Landslide; the pit wall is approximately 700 m high, reaching from 400 masl in the pit bottom to 1200 masl (Drawing 1). This cross section intersects geotechnical Domains I and III. Geotechnical units included in the model include the rock mass of the Snowfield Landslide, QSP, and SI. Based on the orientation of the cross section with respect to the major discontinuity sets, no anisotropies have been applied. The proposed Mitchell Diversion Tunnel is located directly behind the pit slope below the Snowfield Landslide in this section.

Prior to caving, the overall slope has a factor of safety of 1.6 with an overall slope angle of 44°. At the end of the block cave mining, the overall excavation will approach 900 m in height with an overall angle of 50° (Figure B11). The maximum extent of the potential slip surfaces with FOS ≤ 1.0 daylights at the ground surface approximately 170 m behind the ultimate crest of the open pit (Figure B12). The proposed Mitchell Diversion Tunnel is located at the edge of the critical slip surface estimated by this analysis. The maximum extent of the potential slip surfaces with FOS ≤ 1.1 daylights at the ground surface approximately 260 m behind the ultimate crest of the open pit (Figure B13).

3.6. Cross Section D

Cross Section D intersects the East Wall of the open pit. The overall slope at the end of the open pit mining is approximately 500 m high, reaching from 400 masl in the pit bottom to 900 masl (Drawing 1). This cross section located in Domain I and intersects the QSP geotechnical unit. Based on the orientation of this section, anisotropy along the MTF parallel fault set has been included in the model. The proposed Mitchell Diversion Inlet and Tunnel are located directly behind the pit slope in this section; the Mitchell Glacier is located upslope of the inlet.

Prior to caving, the overall slope has a factor of safety of 2.5 and the overall slope angle is 37°; over the life of the cave the slope will approach 635 m in height and a 55° slope angle (Figure B14). The maximum extent of potential slip surfaces with FOS ≤ 1.0 daylights at the ground surface approximately 200 m behind the ultimate crest of the open pit (Figure B15). The maximum extent of potential slip surfaces with FOS ≤ 1.1 daylights at the ground surface

approximately 320 m behind the ultimate crest of the open pit (Figure B16). The Stage 2 Mitchell Diversion Inlet structure, as currently proposed, is located within the zone of overall slope instability estimated by this analysis.

3.7. Cross Section E

Cross Section E intersects the northwest wall of the open pit. The overall slope is approximately 750 m high, reaching from 450 masl in the pit bottom to 1,200 masl (Drawing 1). This cross section intersects geotechnical Domains I, II, and IV. Geotechnical units QSP, KP-MTH, and SHW-S are included in the model. Based on the orientation of the cross section with respect to the major discontinuities sets, no anisotropies have been used. The proposed Mitchell-Teigen Tunnel and North Depressurization Adit are located behind the pit slope in this section.

Prior to caving, the overall slope has a factor of safety of 1.5 and the overall slope angle is 43°. At the end of the block cave, the overall excavation will approach 950 m in height with a 55° overall slope angle (Figure B17). The maximum extent of potential slip surfaces with FOS ≤ 1.0 daylights within the open pit limit at approximately 1,000 masl on this section (Figure B18). The maximum extent of potential slip surfaces with FOS ≤ 1.1 daylights approximately 60 m behind the crest of the open pit limit (Figure B19).

3.8. Cross Section F

Cross Section F intersects the west wall of the open pit. At the end of open pit mining, the pit wall is approximately 400 m high; reaching from 400 masl in the pit bottom to 800 masl (Drawing 1). This cross section is in Domain I and intersects the QSP geotechnical unit. Based on the orientation of the cross section with respect to the major discontinuities, no anisotropies have been used in the model. The proposed Ore-Processing Complex is located adjacent to the pit crest on this section.

Prior to caving, the overall open pit slope has a factor of safety of 3.1 and the overall slope angle is 25°. At the completion of caving the overall excavation will approach 590 m in height with an overall angle of 61° (Figure B20). The global minimum potential slip surface after caving has a FOS of 1.15 and daylights within the open pit limits (Figure B21). This global minimum FOS has been treated as approximately equal to 1.1 for purposes of estimating deformation limits.

3.9. Cross Section G

Cross Section G intersects the southwest wall of the open pit. The pit wall is approximately 1,100 m high, reaching from 450 masl in the pit bottom to 1,550 masl on the Mitchell-Sulphurets Ridge (Drawing 1). This cross section intersects geotechnical Domains I, III, and IV. The geotechnical units included in mode are QSP, SI, and SHW-V. Based on the orientation of the cross section with respect to the major discontinuities, no anisotropy has been included in the analysis.

Prior to caving, the FOS of the overall slope is 1.5 with an overall slope angle is 37°. At the end of block cave development, the overall excavation is 1,320 m in height with a slope angle of 52° (Figure B22). The maximum extent of potential slip surfaces with FOS ≤ 1.0 daylights at the ground surface approximately 200 m behind the ultimate crest of the open pit (Figure B23). The maximum extent of potential slip surfaces with FOS ≤ 1.1 daylights at the ground surface approximately 400 m behind the ultimate crest of the open pit (Figure B24). If the slope depressurization conditions achieved during open pit mining can be maintained during block cave mining, the maximum extent of potential slip surfaces with FOS ≤ 1.0 daylights within the pit limit at approximately 1,400 masl (Figure B25).

4.0 FINITE ELEMENT DEFORMATION ANALYSIS

4.1. Overview

Finite element elasto-plastic analyses were completed to assess the magnitude of deformation at the North Wall Dewatering Adit and the Mitchell Diversion Inlet. The commercial software Phase2 7.0 (Rocscience, 2012b) was used to calculate the total displacement, principal major stress (σ_1) and principal minor stress (σ_3) for analysis cross sections A and D. The analysis assumed plane-strain conditions and an initial ratio (K) of in-situ horizontal to vertical stresses equal to 1. The mesh setup used 3-noded triangles with a gradation factor of 0.03 and 50 nodes on all excavation faces.

The changes in topography were represented in the numerical models by 13 and 12 stages for sections A and D, respectively (Figures C1 and D1). The pre-mining topography was excavated in three stages in the models to approximate the stress history of the rock mass. The planned mining sequence of the open pit was represented by six (cross section A) and five (cross section D) stages based on pit shells provided by Moose Mountain Technical Services. The planned mine caving sequence was represented by four stages. The area of excavated rock in the cave was first represented as broken rock and then excavated in three steps from top to bottom.

4.2. Scenarios Considered in FEM Deformation Analyses

Three scenarios are considered for cross sections A and D to estimate the expected deformation and changes in stress conditions due to the excavation of the Mitchell Open Pit and the end of the block cave mining. The first scenario assumes dry isotropic rock mass conditions. The second scenario introduces a base case water table, representing conditions where vertical pumping wells do not continue to function during the block cave mining and an isotropic rock mass. The third scenario applies a joint network to represent the strength anisotropy direction identified in each cross section. This threefold approach allows for the contribution from the different factors (rock mass strength, groundwater, and strength along pervasive discontinuities) influencing the deformation of the area surrounding the Mitchell Pit to be isolated.

4.3. North Dewatering Adit

The estimated magnitude of deformation at the North Wall Dewatering Adit at the end of the open pit mining sequence (Stage 9 in Figure 5 and Tables C1, C2, C3) is less than 1 m and not sensitive to the assumptions of the three modelling scenarios. The estimated deformation magnitude at the North Wall Dewatering Adit at the end of the block caving sequence is strongly controlled by groundwater conditions (Figure 5). The calculated total displacement at the end of the caving at the adit, assuming a completely dry slope comprised of isotropic material, would be between 1 to 2 m (Figure C14 and Table C1). When incorporating the base case water table the calculated total displacement at the adit increases markedly and is on the order of 10 to 20 m (Figure C30 and Table C2). Introducing a strength anisotropy

associated with the Mitchell Thrust Fault does not increase significantly the total calculated displacement (Figure C46 and Table C3). These results are consistent with the macro-deformation limit estimates presented in section 3.3. The principal major and minor stresses for the open pit and adit at each stage of the models investigated are presented in Tables C1, C2, and C3. The FEM analyses along cross section A illustrate the increased magnitude of the deformation between stages 9 and 10 when the rock mass strength in the block cave footprint is transformed into broken rock (Figure 5, C10, and C11) and the critical importance of groundwater conditions on the magnitude of deformation (Figures 5, C15, and C31). The number of failed elements is also observed to increase with the larger magnitude of deformation associated with the presence of groundwater (Figures C15 and C31).

4.4. Mitchell Diversion Inlet

The estimated deformation magnitude at the Mitchell Diversion Inlet at the end of the open pit mining sequence (Stage 8 in Figure 6 and Tables D1, D2, D3) is less than 1 m and not sensitive to the assumptions of the three FEM modelling scenarios. The estimated deformation at the end of the caving program at the Mitchell Diversion Inlet structure assuming a completely dry slope comprised of isotropic material is also less than 1 m (Figure D13 and Table D1). The inclusion of a water table or a joint network in the model does not significantly change the total calculated displacement at the diversion inlet (Figures D28 and D43; Tables D2 and D3). Due to the difference in defining the rock mass strength properties of the fractured QSP unit between the limit equilibrium (Table 2) and finite element (Table 3) methods, the macro-deformation limit estimates presented in section 3.6 are more conservative than the FEM deformation analyses. Comparing Figures C15, C16, D28, and D29 demonstrates that the diversion inlet is located at the edge of the macro-deformation zone in the upper macro-deformation limit of the sensitivity analysis assuming a FOS of 1.1. The principal major and minor stresses for the open pit and diversion inlet at each stage of the models investigated are presented in Tables D1, D2, and D3.

5.0 SUMMARY AND DISCUSSION

A total of eight cross sections were analyzed to estimate the limit of macro-deformation and two cross sections were analyzed in detail for magnitude of expected deformation; the cross sections were selected based on the location of proposed near-pit infrastructure, including:

- The Mitchell Diversion Inlet
- The Mitchell Diversion Tunnels
- The Mitchell North Dewatering Adit
- Mitchell-Teigen Tunnel
- The Ore Processing Complex

The stability analyses results indicate that the overall zone of macro-deformation due to the development of the block cave could extend up to 200 m beyond the ultimate pit crest (Drawing 1) on the south, southeast and east walls of the proposed Mitchell Pit.

The Mitchell Diversion Inlet, located east of the proposed open pit, captures water from the Mitchell Glacier and diverts it into the Mitchell Diversion Tunnel. BGC understands that a set-back distance of 300 m is planned (G. Parkinson, 2012) to avoid a potential zone of macro-deformation associated with the block caving operation, based on preliminary recommendation from Golder (R. Hammett, 2012b). Based on the results of the preliminary stability analyses conducted by BGC, the 300 m setback proposed appears to be reasonable. However, during the operation of the block cave the diversion tunnel inlet structure will be critical to the water management plan and to maintain the safe operation of the underground mine. Therefore it will be important to confirm the magnitude of deformations that can be accommodated by the proposed Mitchell Diversion Inlet structure.

The Mitchell Diversion Tunnel transports water south from the Mitchell Valley through the Mitchell-Sulphurets Ridge into the Sulphurets Valley. The proposed tunnel alignment runs below the Snowfield Landslide and the southwest corner of the Mitchell Open Pit at an elevation of approximately 800 masl. Our analysis of Cross Section B suggests that the tunnel is outside of the critical overall slope slip surface; while the tunnel appears to be at the edge of the macro-deformation zone on Cross Section C (Appendix B).

The North Dewatering Adit provides access for the construction of a passive depressurization system, or drainage gallery, for the north wall of the open pit and is important to maintain the stability of the North Wall. We understand that the tunnel has been incorporated into the water management plan, diverting contact water around the open pit throughout the mine life. Our stability analyses indicate that there is potential for instability of the north slope of the open pit due to the block cave development and that ground deformations between 10 to 20 m can be expected at the current alignment of the North Wall Dewatering Adit. As this tunnel is important for water management during cave operations, the alignment may require revision at the next stage of design.

The preliminary assessment of the potential changes to the stability of the open pit slopes due to the development of the block cave presented in this report has been completed to identify hazards due to ground deformation associated with the development of the Mitchell Block Cave to near-pit infrastructure as currently planned. The results are based on appropriate analytical techniques considering the level of study, the available data, and the uncertainties with the locations of the block cave limits. The geotechnical database for the Mitchell pit is much smaller than that of an operating mine and slope and monitoring data is unavailable to calibrate any models constructed. Consequently, intensive 3D numerical studies like the ones conducted for the transition between large open pit and block cave operations, such as Grasberg (Srikant et al., 2007) or Chuquicamata (Olavarria et al., 2006) are not appropriate at the current stage of study. The results of current study are to provide guidance for the siting of the near-pit infrastructure and identify potential zone with expected large deformation.

6.0 CLOSURE

We trust the above satisfies your requirements at this time. Should you have any questions or comments, please do not hesitate to contact us.

Yours sincerely,

BGC ENGINEERING INC.
per:

Marc-André Brideau, Ph.D., GIT
Engineering Geologist

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

Reviewed by:

Warren Newcomen, P.Eng., P.E.
Senior Geotechnical Engineer

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TABLES

TABLE 1. COMBINED OPEN PIT - BLOCK CAVE MINING GROUND DEFORMATION ZONES

Zone	Feature	Description	Other Terms
Macro-Deformation	Glory-hole	An area of completely disturbed and broken rock directly above the footprint of the extraction level. This is the area of active caving which manifests as a collapse crater. The limits of the cave are generally steeply dipping to sub-vertical. Expect 10's to 100's of meters of discontinuous and highly disruptive deformation in this zone as the cave mining progresses.	"Crater / breakthrough" (Woo, 2011) "Primary subsidence zone" (Gilbride et al, 2005) "Caved zone" (van As et al., 2003)
	Surface cracking zone	An area of active tension cracking and displacement adjacent to the main cave limit. Natural or previously excavated slopes in this zone are undergoing failure due to debuttressing related to the glory hole and main cave area. Expect 1 to 10's of meters of displacement in this zone with scarps and open tension cracks. Large blocks of rock may be subject to rotation-shear failure or toppling toward the glory hole and main cave area.	"Relaxation zone" (Gilbride et al, 2005) "Fractured zone" (van As et al., 2003) "Failure zone" (Laubscher, 1994) "Surface cracking zone" (Lupo, 1998)
Micro-Deformation	Continuous subsidence	An area of minimal to no observable cracking with small strain and continuous deformations. Horizontal and vertical displacements or ground tilting may be measured in this zone. Displacements are expected to be less than 1 m and reduce with distance from the glory-hole edge. Strains may be detectable a few hundreds of meters from the edge of the main caving area.	

TABLE 2. GEOTECHNICAL UNITS AND GEOMECHANICAL PROPERTIES USED IN THE MACRO-DEFORMATION ANALYSES

Unit	Notes	Unit Weight[1] (MN/m^3)	UCS[1] (MPa)	m_i[1]	GSI[2]	D[3]
QSP	Domain I	0.028	61	12	75	0.85
SI	Domain III	0.028	92	15	61	0.85
MTH-KP	Domain II	0.026	90	15	53	0.7
STUHINI	Domain IV North	0.027	66	25	47	0.7
SHW-V	Domain IV - M-S ridge	0.028	53	15	62	0.85
Snowfield Landslide	Backanalyzed values	0.028	25	6	30	0
Ice	Surcharge load only	0.0096				
QSP in "Fractured Zone"	Residual strength rock mass	0.028	61	12	40	0
MTH-KP in "Fractured Zone"	Residual strength rock mass	0.026	90	15	35	0

NOTES:

1. Unit weight, uniaxial compressive strength (UCS), and the Hoek-Brown material constant (mi) for each unit are based previous work (BGC, 2010; 2011a; 2011b; 2011c).
2. Median GSI (RMR'76) values from KSM PFS (BGC, 2010) used for QSP. GSI for 'Fractured QSP' lowered to 'Residual GSI' as per Cai et al (2007).
3. Disturbance factors have been applied to the intact units according to the scheme used in BGC's previous work, 0.85 for Domains I and the south wall of the proposed pit and 0.7 for the north wall of the pit above the MTF. A 'D' of 0 has been used for 'Fractured Zone' as per the recommendations of Cai et al (2007).

TABLE 3. GEOTECHNICAL UNITS AND GEOMECHANICAL PROPERTIES FOR THE FEM DEFORMATION ANALYSES

Unit	Unit Weight[1] (MN/m^3)	UCS[1] (MPa)	m_i[1]	GSI[2]	D[3]	DIL	E_{rm} (GPa)	v	m_b	s	a	m_{br}	s_r	a_r	c (kPa)	phi (°)
QSP	0.028	61	12	75	0.8	0.4	13.0	0.20	2.71	0.0226	0.50	1.35	2.26E-03	0.50		
SI	0.027	92	15	61	0.8	0.2	8.3	0.20	1.47	0.0027	0.50	0.74	2.72E-04	0.50		
MTH-KP	0.027	90	15	53	0.8	0.2	4.0	0.20	0.91	0.0008	0.50	0.45	8.08E-05	0.50		
STUHINI (Undisturbed zone)	0.027	66	25	47	0	0.6	5.0	0.20	3.77	0.0028	0.51	1.88	2.77E-04	0.51		
Caved zone	0.020						0.5	0.40							0	37
QSP (Undisturbed zone)	0.028	61	12	75	0	0.7	29.4	0.20	4.91	0.0622	0.50	2.40	6.22E-03	0.50		
SI (Undisturbed zone)	0.027	92	15	61	0	0.6	25.0	0.20	3.73	0.0131	0.50	1.85	1.31E-03	0.50		
MTH-KP (Undisturbed zone)	0.027	90	15	53	0	0.4	13.2	0.20	2.80	0.0054	0.50	1.40	5.40E-04	0.50		
Ice	0.0096						9	0.35								

Notes:

1. Unit weight, uniaxial compressive strength (UCS), and the Hoek-Brown material constant (mi) for each unit are based previous work (BGC, 2010; 2011a; 2011b; 2011c).

2. Median GSI (RMR'76) values from KSM PFS (BGC, 2010) used for all units.

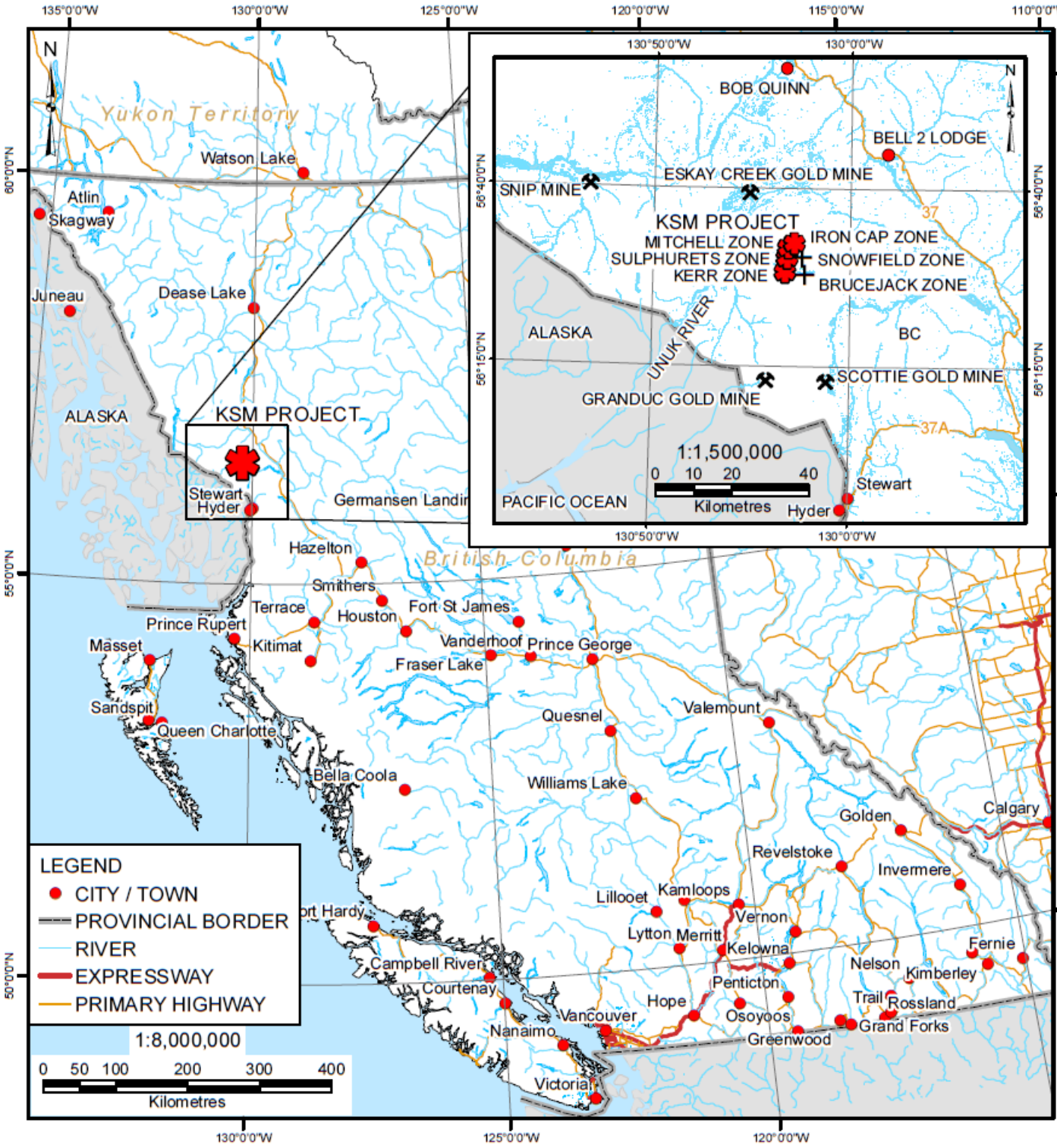
3. A disturbance factor of 0.8 has been applied to all units that will be disturbed as a result of mining activities and stress relief. No disturbance has been applied to units outside this zone of influence.

4. A normal stiffness of 20 GPa/m, shear stiffness of 2 GPa/m, and friction angle of 31 ° were assumed along the discontinuity surface in the models with anisotropy

TABLE 4. OPEN-PIT BLOCK CAVE MACRO-DEFORMATION SLOPE STABILITY ANALYSIS SUMMARY

Section ID	Location	Dominant Structure	Infrastructure Nearby	Pre-Cave Overall Slope Height (m)	Pre-Cave Overall Slope Angle (°)	Pre-Cave FOS	Post-Cave Overall Slope Height (m)	Post-Cave Overall Slope Angle (°)	Set-back to FOS 1.0 Limit at End of Block Cave	Comments
A1	South Highwall	Foliation	Mitchell Diversion Tunnel	1100	39	1.6	1260	45	206	For this analysis an anisotropy parallel to the regional foliation orientation has been used in Domain I. The MDT as planned is not located within the macro-deformation zone.
A2	North Highwall	None	Depressurization Adit	1150	45	1.3	1305	54	In-Pit	The depressurization adit as planned is not located within the macro-deformation zone. A second case has been considered for this slope where the depressurization adit is allowed to fail and no longer provides drainage for the slope. In this case the macro-deformation zone would extend to 600 m behind the pit face and the adit would also no longer be a reliable transportation option for contact water coming from east of the open pit to the water treatment plant.
B	SE Wall	Foliation	Mitchell Diversion Tunnel	1100	37	1.4	1265	43	In-Pit	For this analysis an anisotropy parallel to the regional foliation orientation has been used in Domain I. The MDT as planned is not located within the macro-deformation zone.
C	SE Wall, Snowfields Landslide	No Structure used in analysis - see discussion of Foliation and STF in text	Mitchell Diversion Tunnel	700	44	1.6	900	50	172	For this analysis no anisotropies have been used, although the intersection of foliation and regional thrust parallel structures may result in complex structural failure geometries as the macro-deformation zone develops. Additional investigation of the Snowfield Zone and Landslide mass are required to better define the zone of failure and confirm properties assumed for this work. Structure within the disturbed material could be significantly different from the Mitchell Zone.
D	East Wall, Mitchell Glacier	MTF Splays	MDT Inlet	500	37	2.5	635	55	204	For this analysis an anisotropy parallel to the Sulphurets Thrust Fault has been used. In the vicinity of the Mitchell Glacier KCBL has observed poor quality rock that may be associated with the regional thrusts and it is assumed that they could persist at depth
E	NW Wall	None	Depressurization Adit, Mitchell-Teigen Tunnel	750	43	1.5	950	55	In-Pit	The depressurization adit as planned is not located within the macro-deformation zone. A second case has been considered for this slope where the depressurization adit is allowed to fail and no longer provides drainage for the slope. In this case the macro-deformation zone would extend to 200 m behind the pit face.
F	West Wall	None	Ore-Processing Complex	400	25	3.1	590	61	In-Pit	The Ore-Processing Complex as planned is not located within the macro-deformation zone. Subsidence and strains could still be expected due to the block caving operation (within the "micro-deformation" zone).
G	SW Wall	None	None	1100	37	1.5	1325	52	211	For this analysis no anisotropies have been used. There is no near-pit infrastructure for this section. Based on the analysis, the macro-deformation zone will not extend through the Mitchell-Sulphurets ridge to the Sulphurets open pit.

FIGURES



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
LOCATION OF KSM PROJECT

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
1

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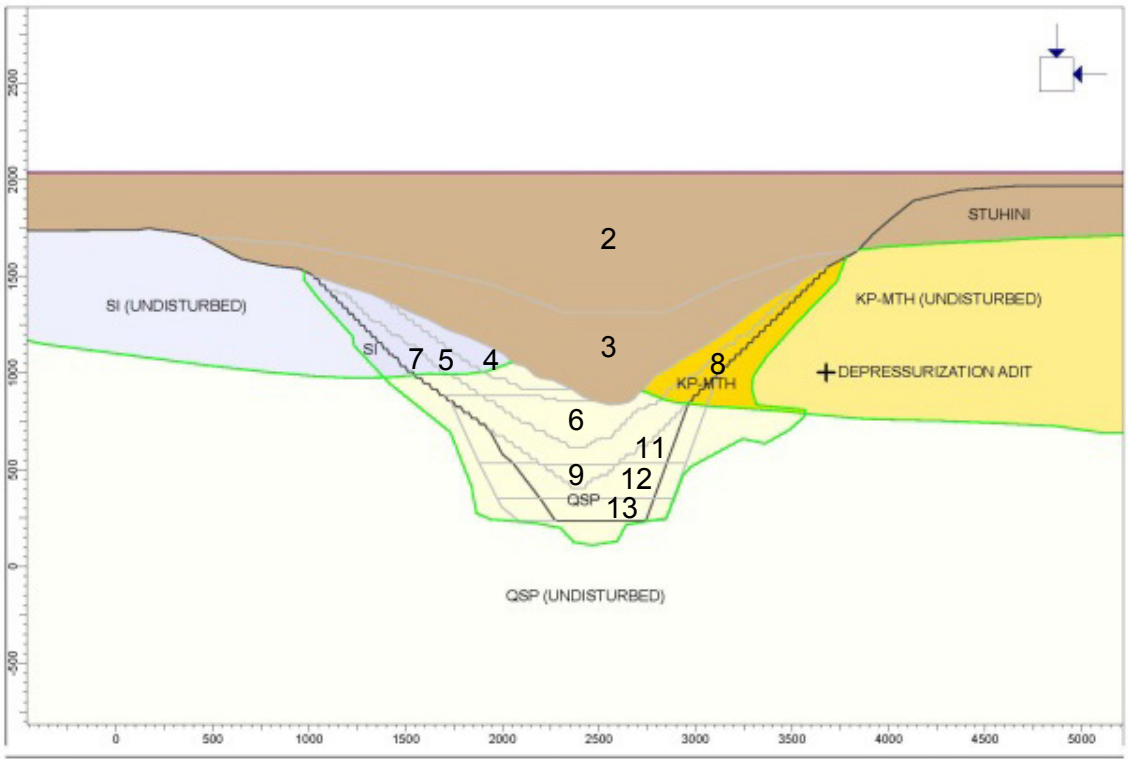
DECEMBER 24, 2012



Stage	End of Mining Period (years)	Description
1		Pre-mining topography set up[Note 1]
2		Pre-mining topography set up[Note 1]
3		Pre-mining topography
4	1	Mining of south slope begins
5	5	Mining continues
6		Mining of north slope begins
7	10	Mining continues
8	20	Mining continues
9	23	Mining continues
10	26	Caving commences in centre of pit
11		The first level of caved rock is mined
12		The second level of caved rock is mined
13	55	The final level of caved rock is mined

Notes:

1. Stages 1, 2, and 3 are used to model the estimated stress history of the rockmass

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
FINITE ELEMENT MODELLING STAGES FOR SECTION A

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
2

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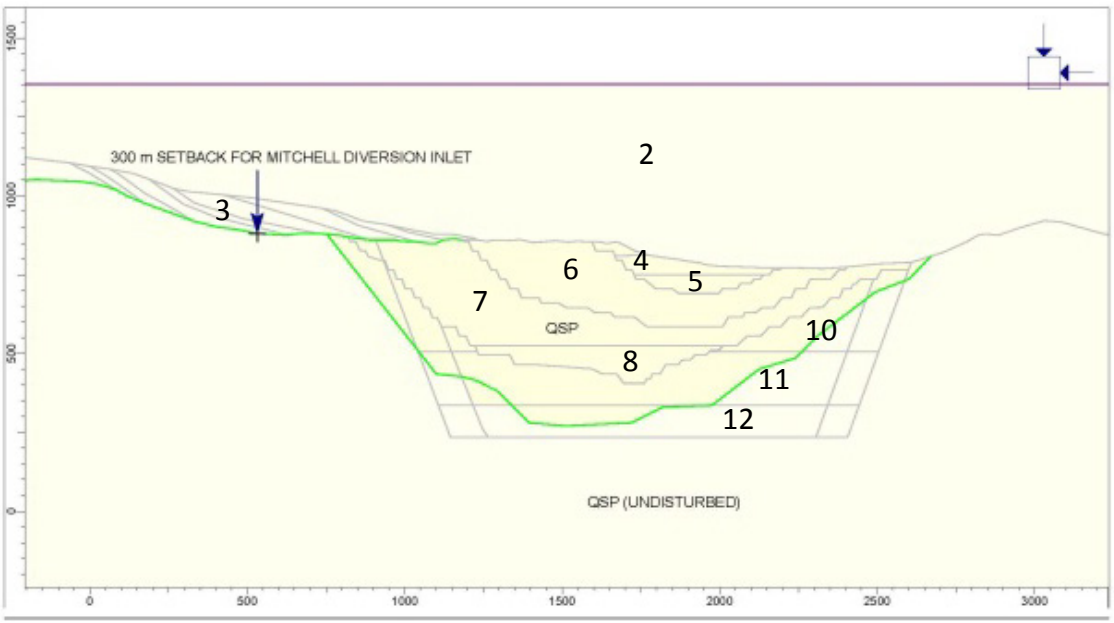

Stage	End of Mining Period (years)	Description
1		Pre-mining topography set up[Note 1]
2		Pre-mining topography set up[Note 1]
3		Pre-mining topography and glacier set up[Note 1]
4	3	Start of mining and glacial retreat
5	5	Mining and glacial retreat continue
6	10	Mining and glacial retreat continue
7	20	Mining and glacial retreat continue
8	23	Mining and glacial retreat continue
9	26	Caving commences in center of pit; glacial retreat continues
10		The first level of caved rock is mined
11		The second level of caved rock is mined
12	55	The final level of caved rock is mined

Notes:

1. Stages 1, 2, and 3 are used to model the estimated stress history of the rockmass

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
FINITE ELEMENT MODELLING STAGES FOR SECTION D

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
3

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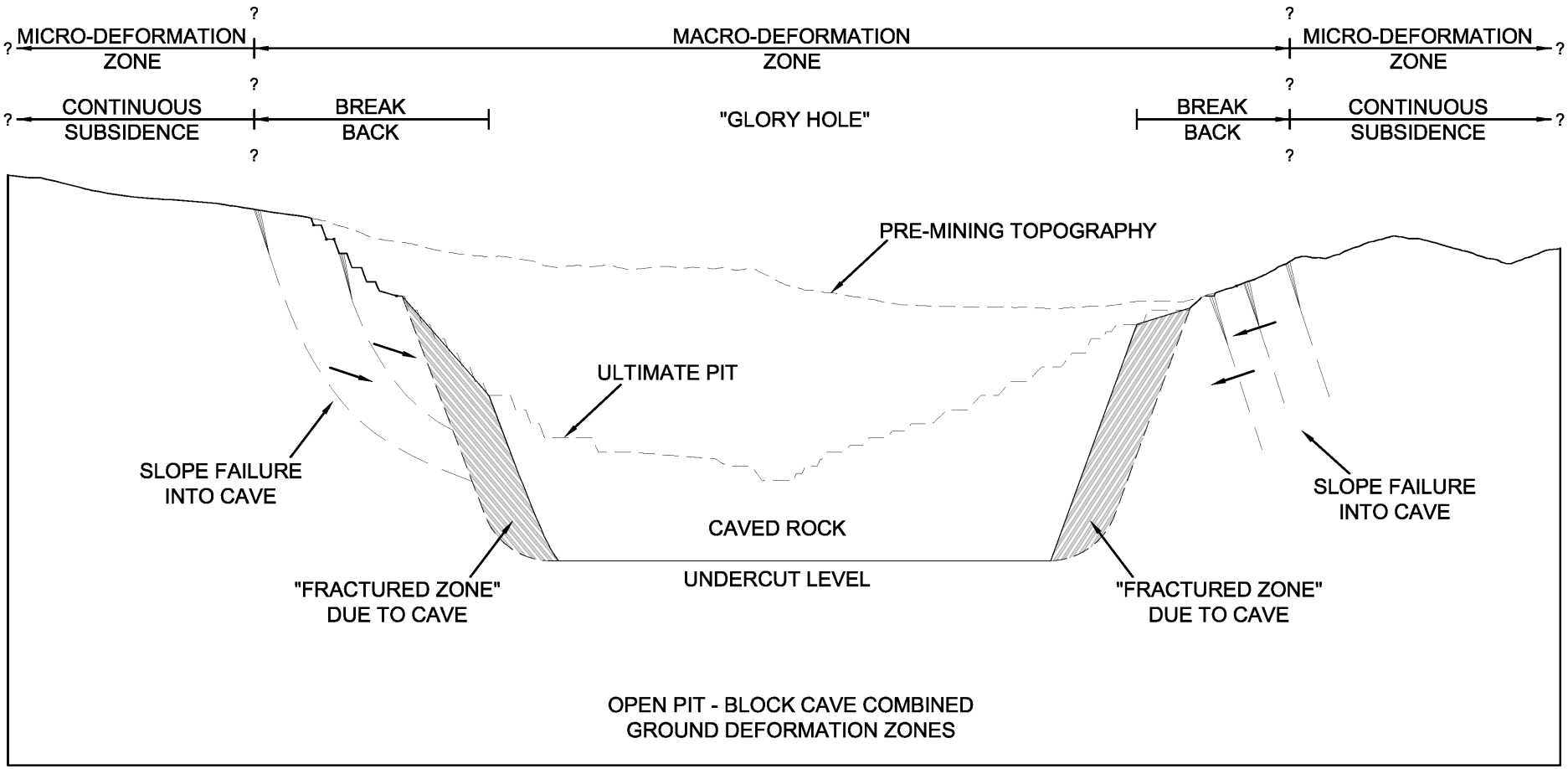

OPEN PIT - BLOCK CAVE COMBINED
GROUND DEFORMATION ZONES

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
CONCEPTUAL MODEL OF THE GROUND DISTURBANCE FROM A BLOCK CAVE DEVELOPED BELOW AN OPEN PIT

CLIENT:
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PROJECT No.:
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FIGURE No.:
4

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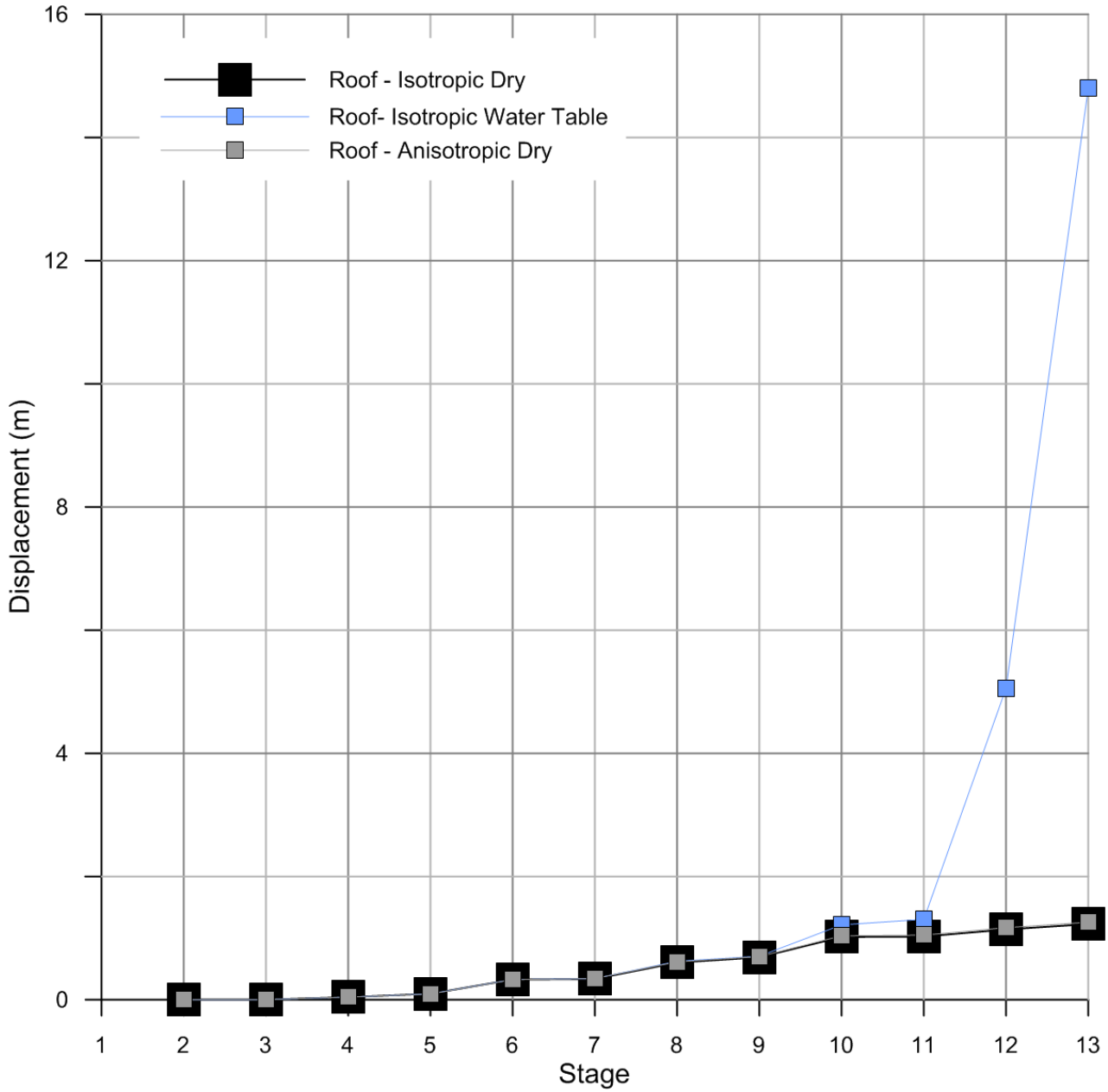

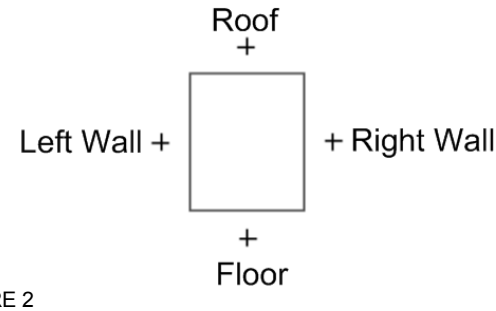

NOTES:

1. MODEL IS PRESENTED IN SECTION A
2. MODELLING STAGES ARE DESCRIBED IN FIGURE 2
3. DISPLACEMENT VALUES FOR OTHER COMPONENTS OF THE ADIT ARE PRESENTED IN TABLES C1, C2, AND C3

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
CALCULATED TOTAL DISPLACEMENT OF THE NORTH DEWATERING ADIT

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
5

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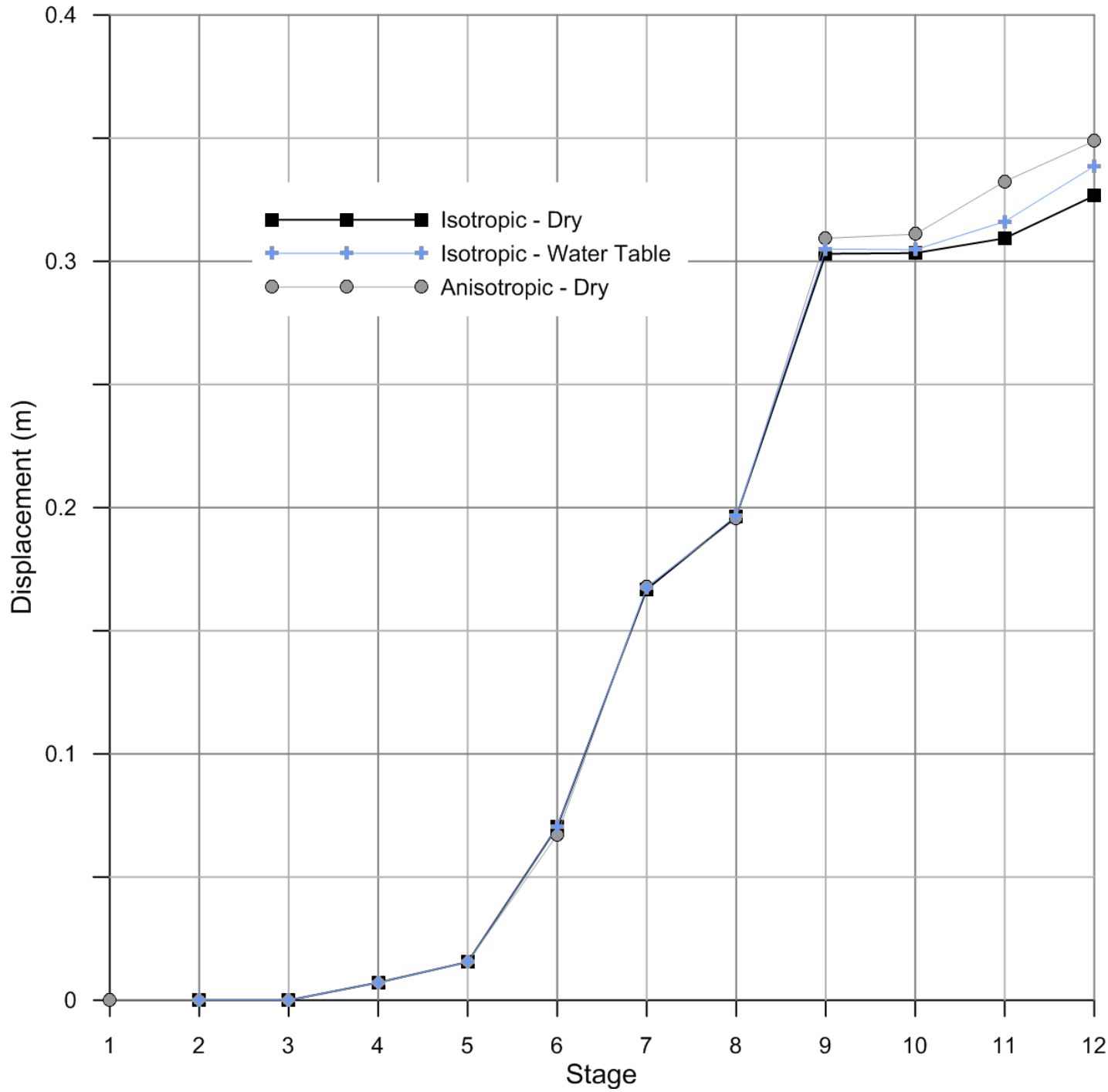
DECEMBER 24, 2012



NOTES:
1. MODEL IS PRESENTED IN SECTION D
2. MODELLING STAGES ARE DESCRIBED IN FIGURE 3

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
CALCULATED TOTAL DISPLACEMENT AT THE MITCHELL DIVERSION INLET

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
6

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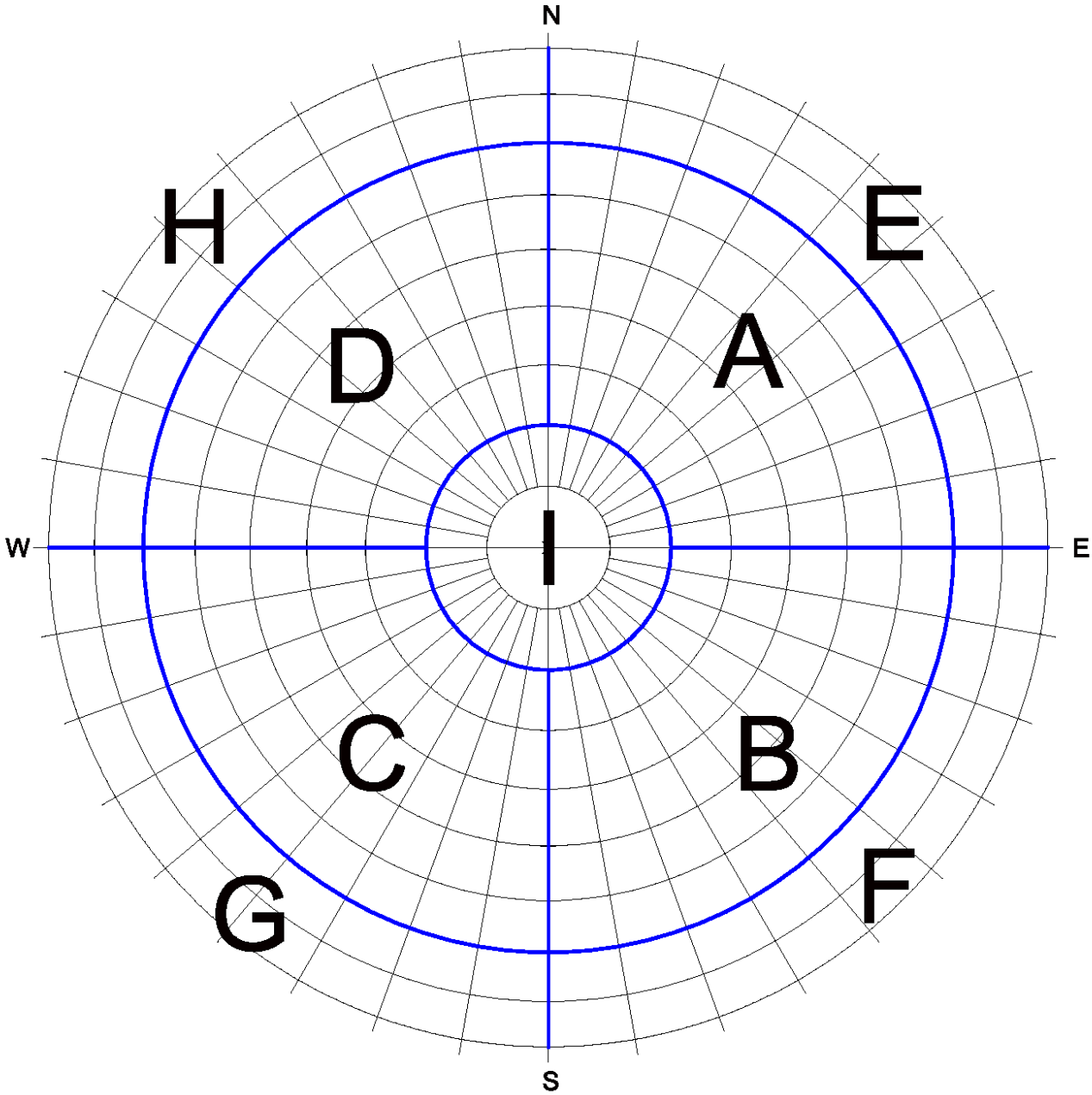
DECEMBER 24, 2012

APPENDIX A
DOMAIN STEREONETS

DISCONTINUITY SET NAMES



NOTES:
1. 1 - 2% CONTOUR INTERVAL USED AS CUT-OFF TO DEFINE SETS;

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
KEY FOR DISCONTINUITY SET NAME ATTRIBUTION

CLIENT:
SEABRIDGE GOLD INC.

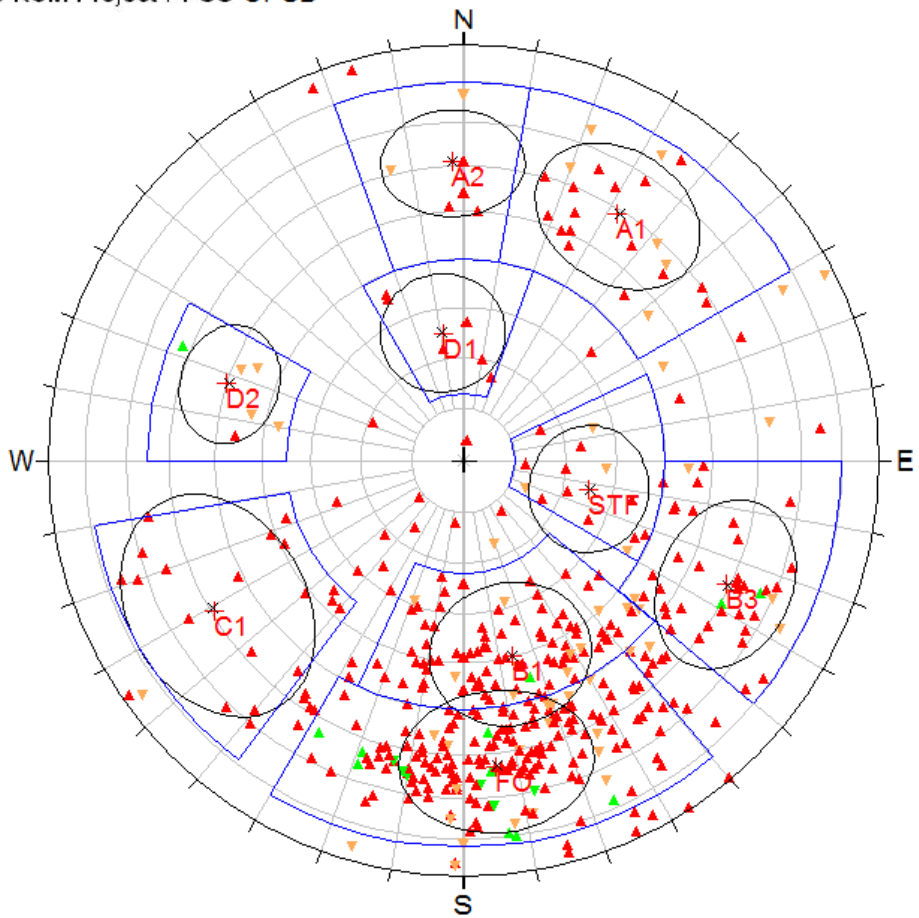
PROJECT No.:
0638-013-31

FIGURE No.:
A1

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX A

DECEMBER 24, 2012

0638006 KSM Project PFSU OPSD



Mitchell - DI Faults and Shears

MASTER TYPE

- F [358]
- F-C [3]
- F-O [12]
- F-V [3]
- S [55]
- S-O [6]
- S-V [1]

Equal Area
Lower Hemisphere
438 Poles
438 Entries

BGC ENGINEERING INC.
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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
DISTONTINUITY SETS IDENTIFIED IN GEOTECHNICAL DOMAIN I

CLIENT:
SEABRIDGE GOLD INC.

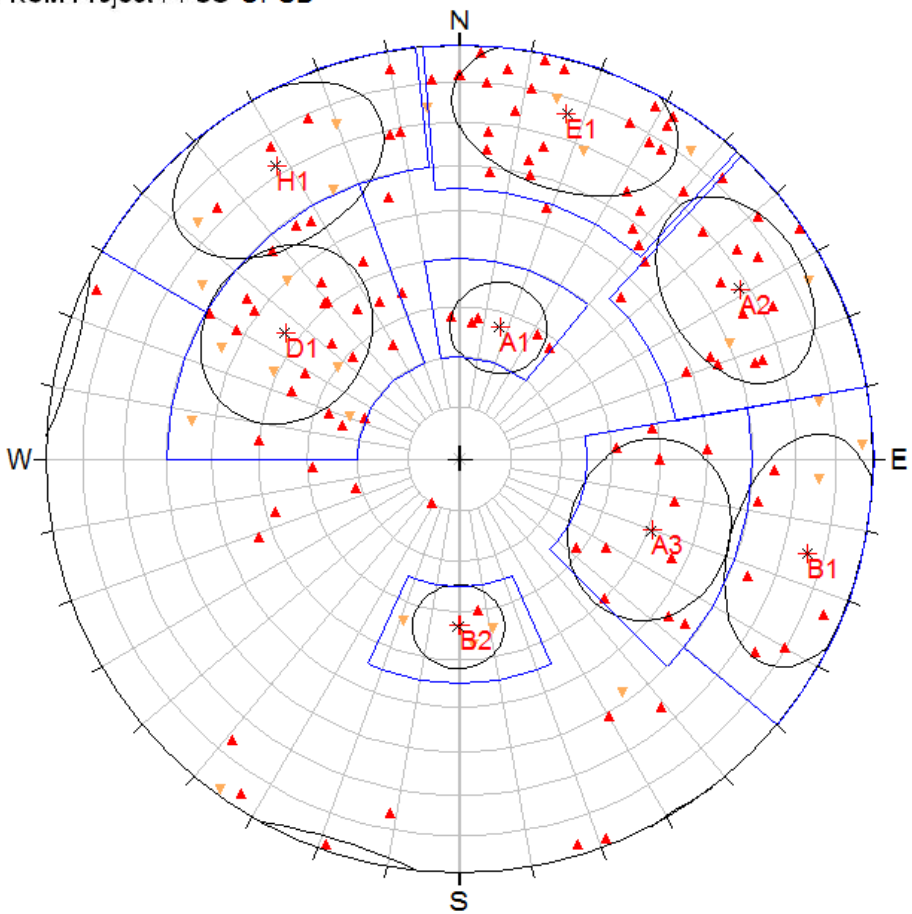
PROJECT No.:
0638-013-31

FIGURE No.:
A2

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX A

DECEMBER 24, 2012

0638006 KSM Project PFSU OPSD



Mitchell - DII - Faults and Shears

MASTER TYPE

- F [109]
- F-V [1]
- S [24]

Equal Area
Lower Hemisphere
134 Poles
134 Entries

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX A

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

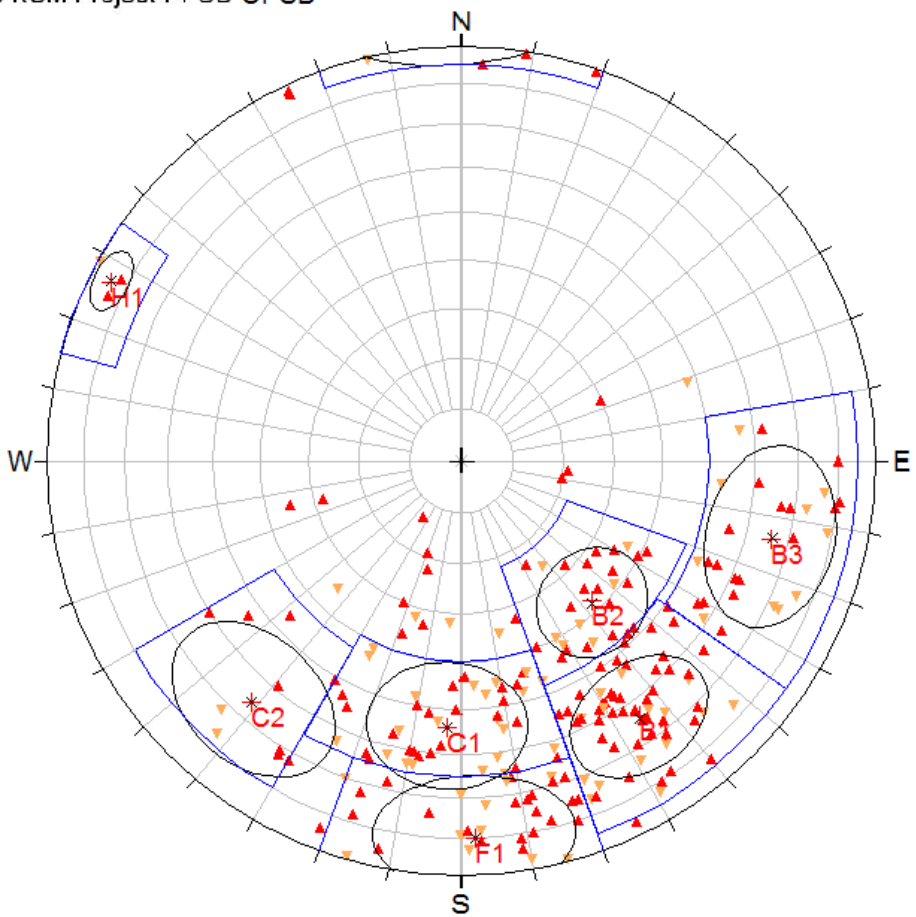
FIGURE TITLE:
DISTONTINUITY SETS IDENTIFIED IN GEOTECHNICAL DOMAIN II

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
A3

0638006 KSM Project PFSU OPSD



Mitchell - DIII Faults and Shears

MASTER TYPE

F [154]

S [73]

Equal Area
Lower Hemisphere
227 Poles
227 Entries

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
DISTONTINUITY SETS IDENTIFIED IN GEOTECHNICAL DOMAIN III

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
A4

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX A

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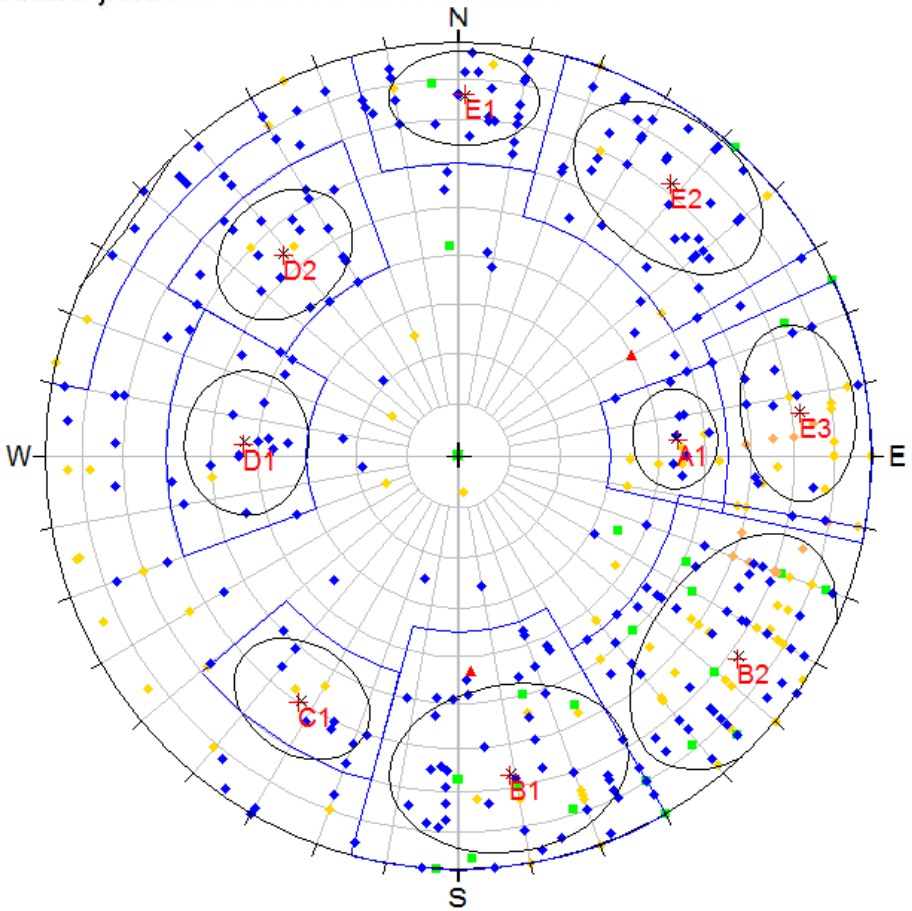
0638006 KSM Project PFSU OPEN PIT SLOPE DESIGN



IV - SEABRIDGE DATA

TYPE

- Bedding [93]
- Foliation [24]
- Inverted Bedding
- Joint [275]
- Normal Fault [2]

Equal Area
Lower Hemisphere
406 Poles
406 Entries

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX A

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

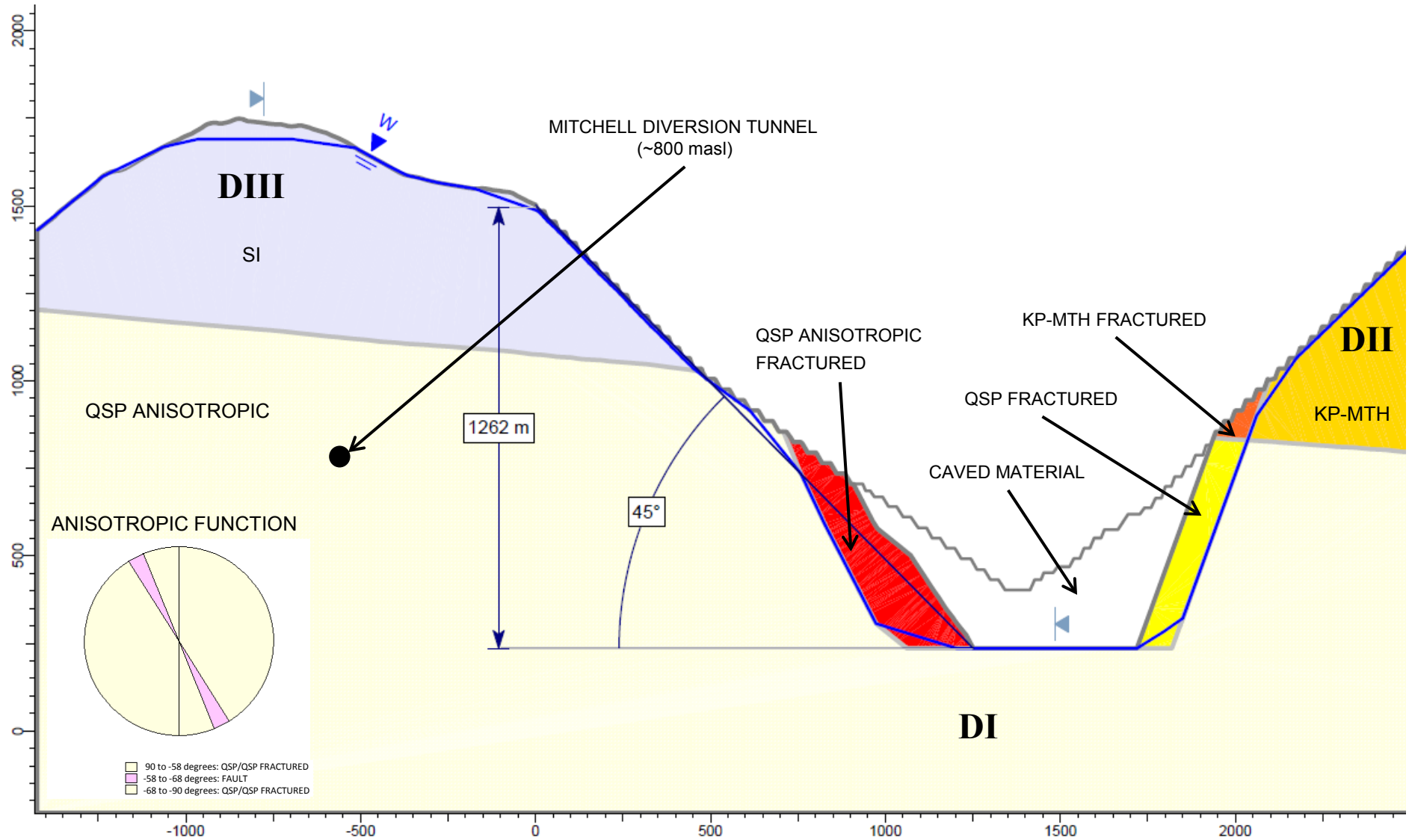
FIGURE TITLE:
DISTONTINUITY SETS IDENTIFIED IN GEOTECHNICAL DOMAIN IV

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
A5

APPENDIX B
MACRO-DEFORMATION LIMIT ANALYSIS RESULTS



NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A1 – MODEL GEOMETRY
BASE CASE WATER TABLE

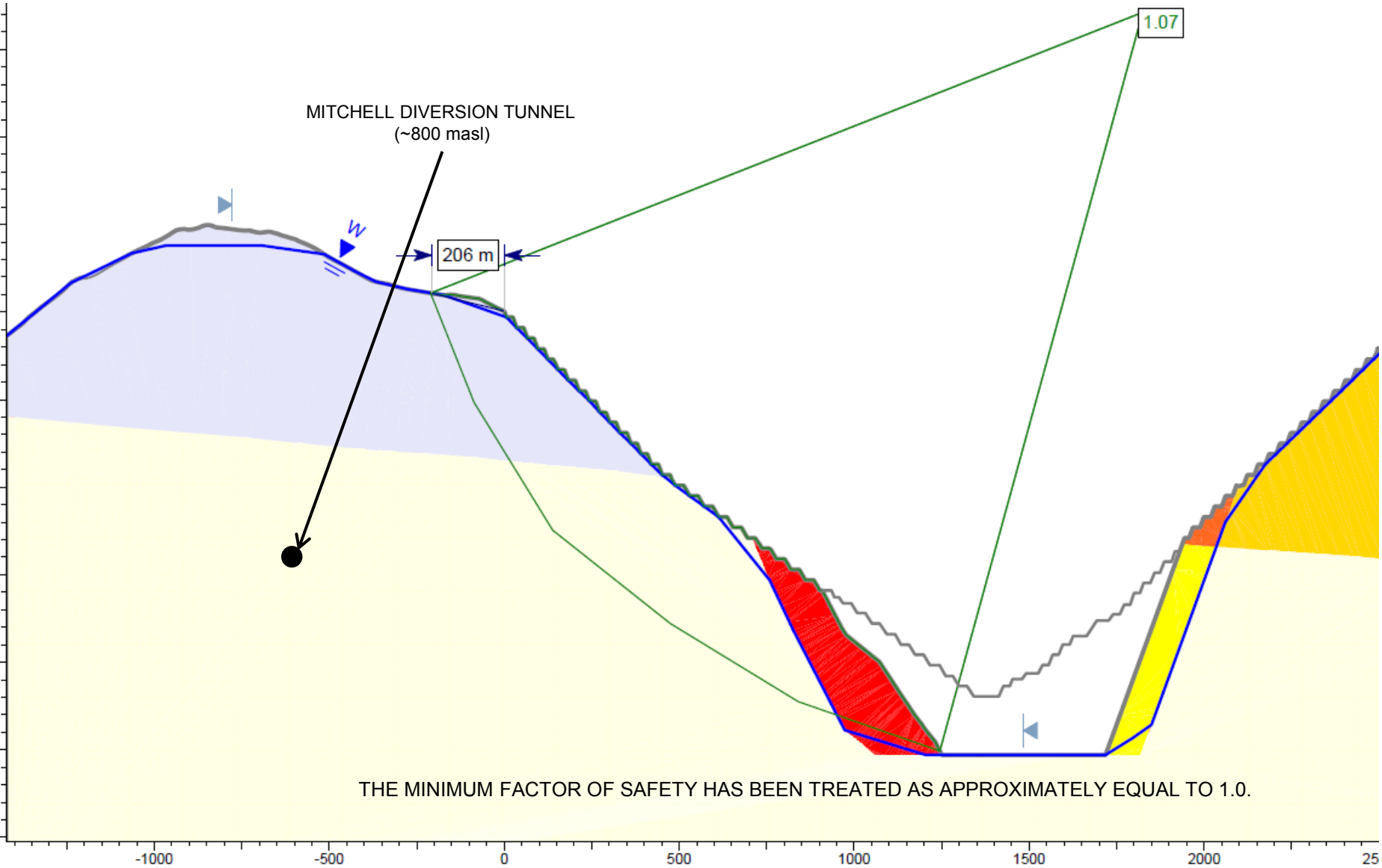
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B1

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A1 – FOS 1.0
BASE CASE WATER TABLE

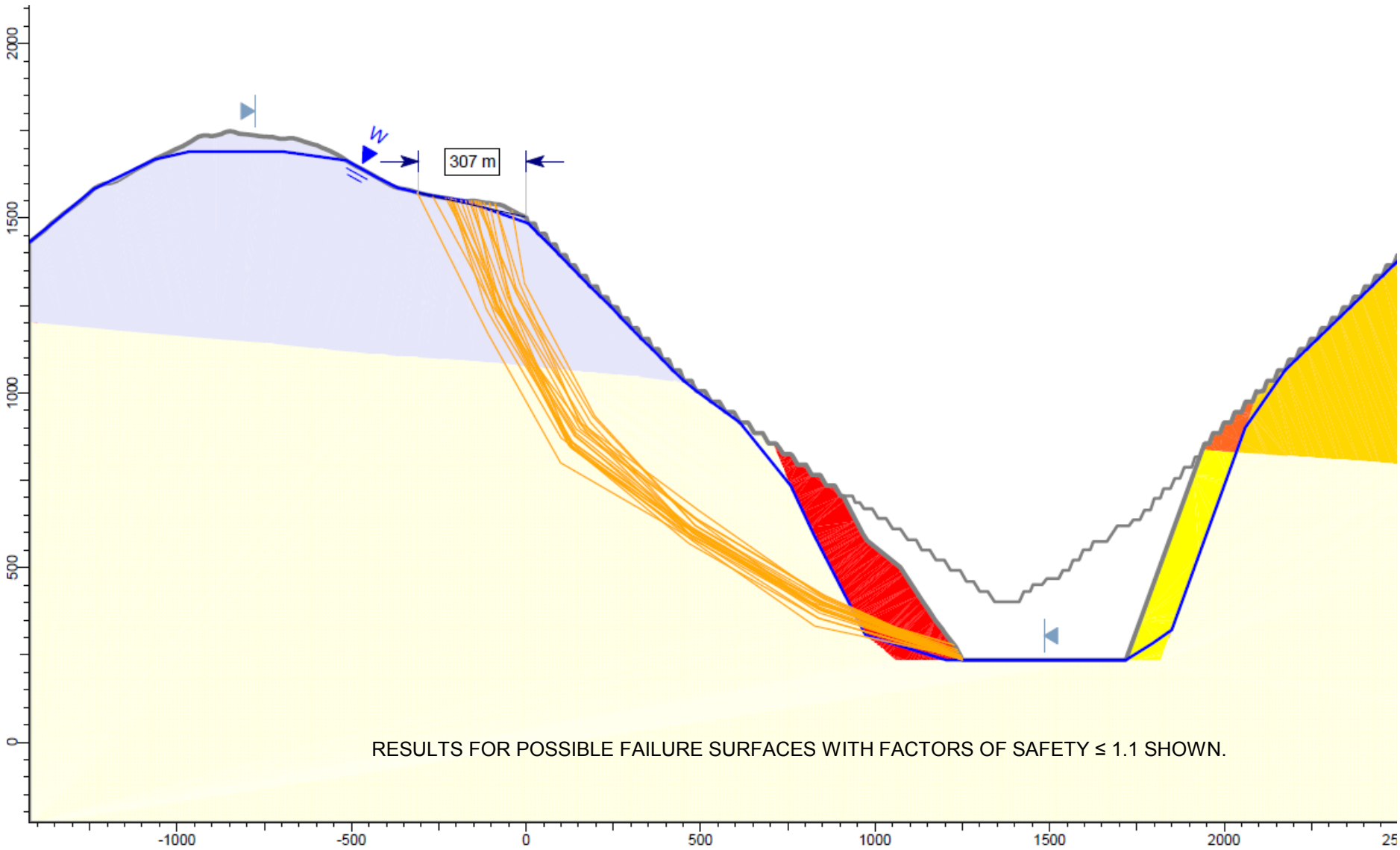
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B2

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

REPORT TITLE: PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE: SECTION A1 – FOS 1.1
BASE CASE WATER TABLE

PROJECT No.: 0638-013-31

FIGURE No.: B3

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

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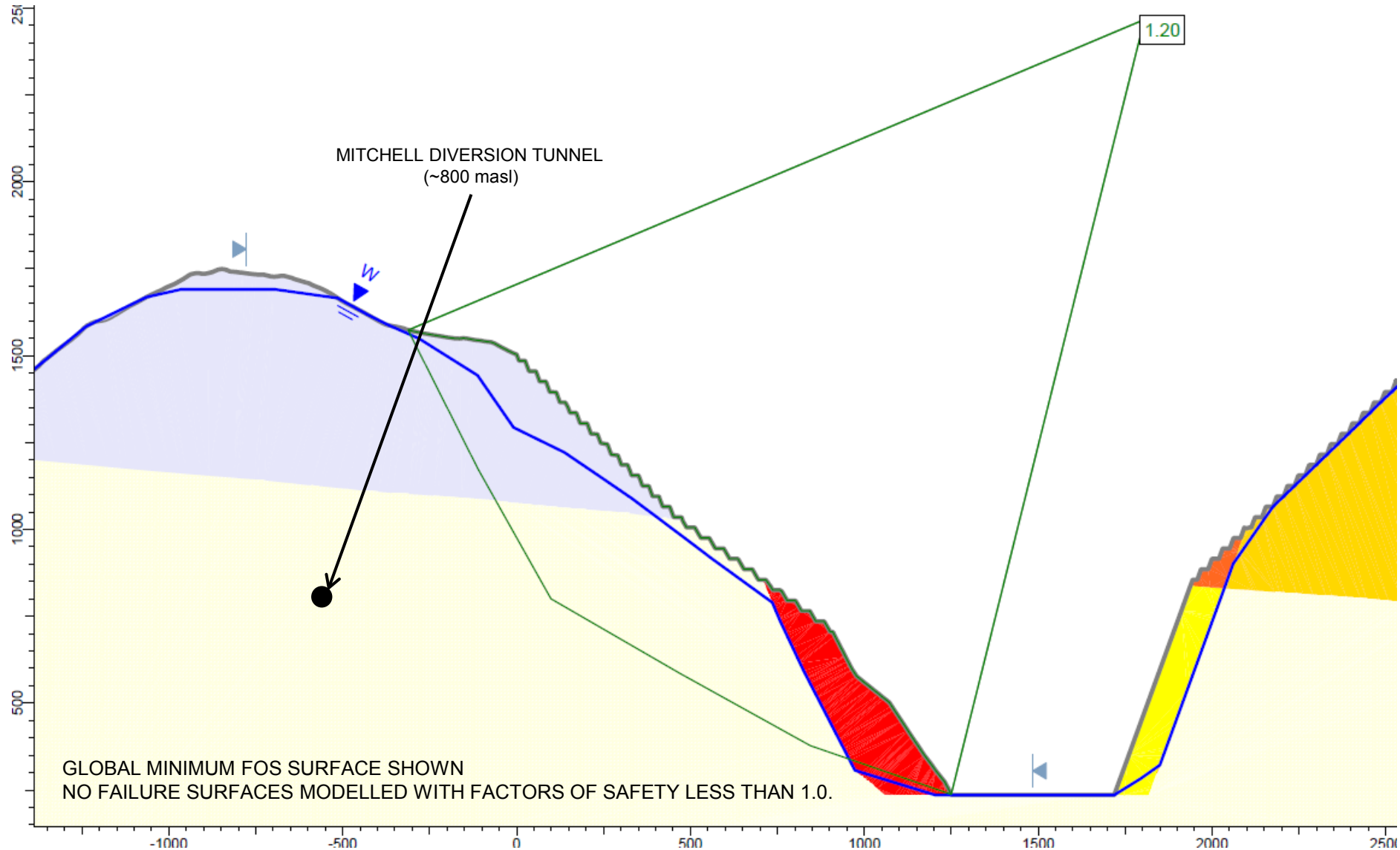


NOTES:

1. ASSUMES BOTH DRAINAGE ADITS AND VERTICAL PUMPING WELLS ARE MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A1
OPTIMISTIC WATER TABLE

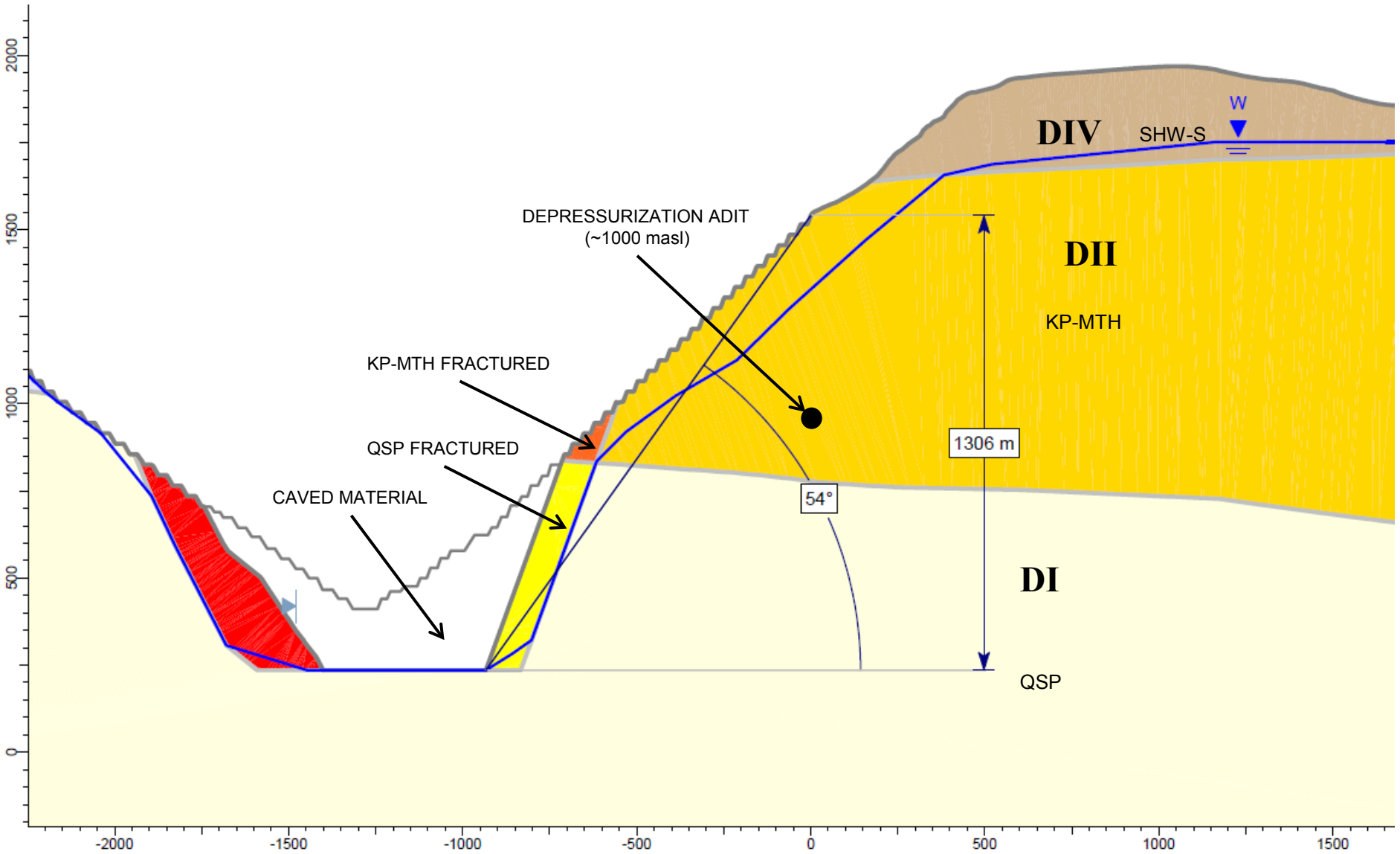
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B4

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES THE NORTH DEPRESSURIZATION ADIT IS MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A2 – MODEL GEOMETRY
BASE CASE WATER TABLE

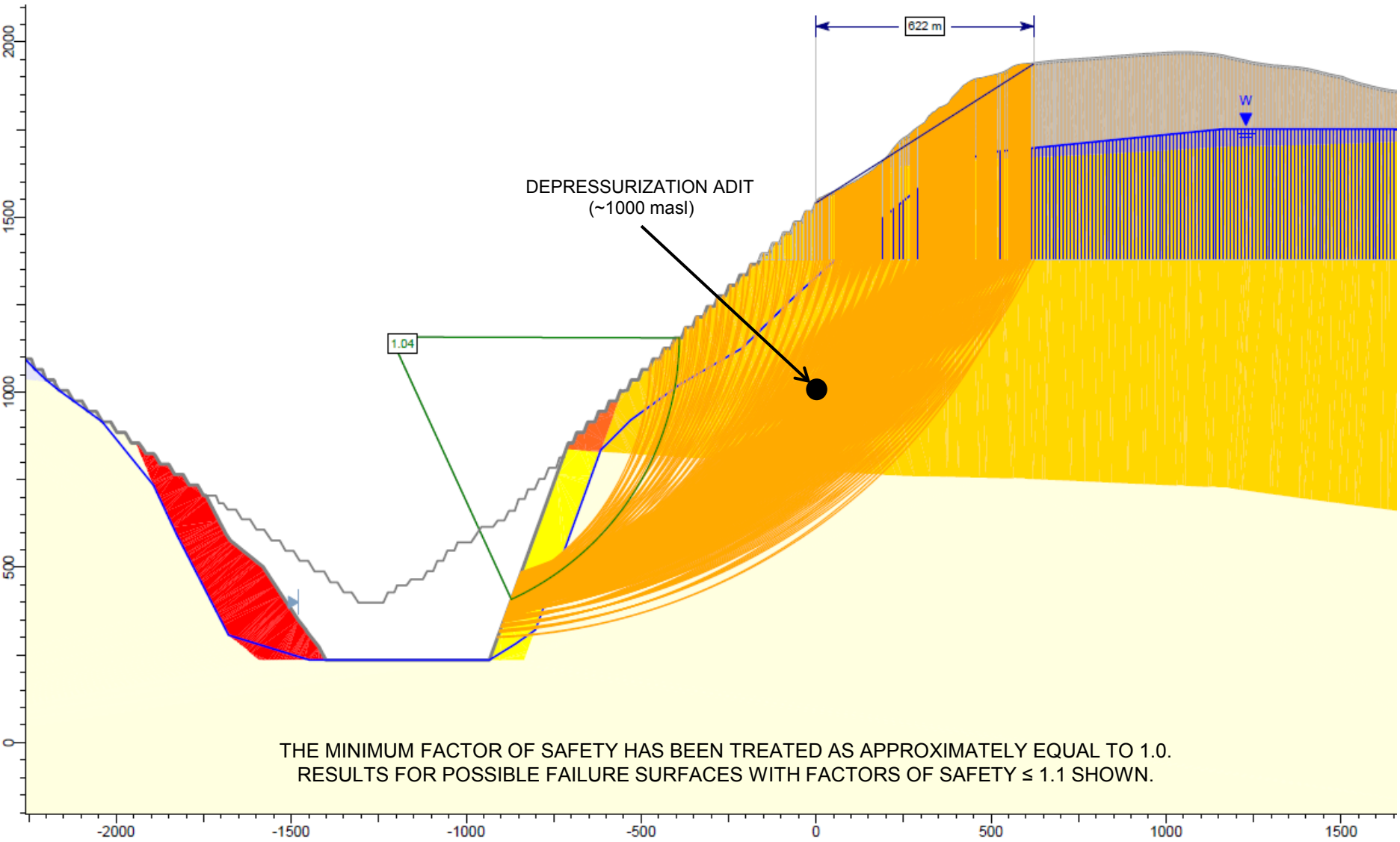
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B5

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES THE NORTH DEPRESSURIZATION ADIT IS MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A2 – FOS 1.1
BASE CASE WATER TABLE

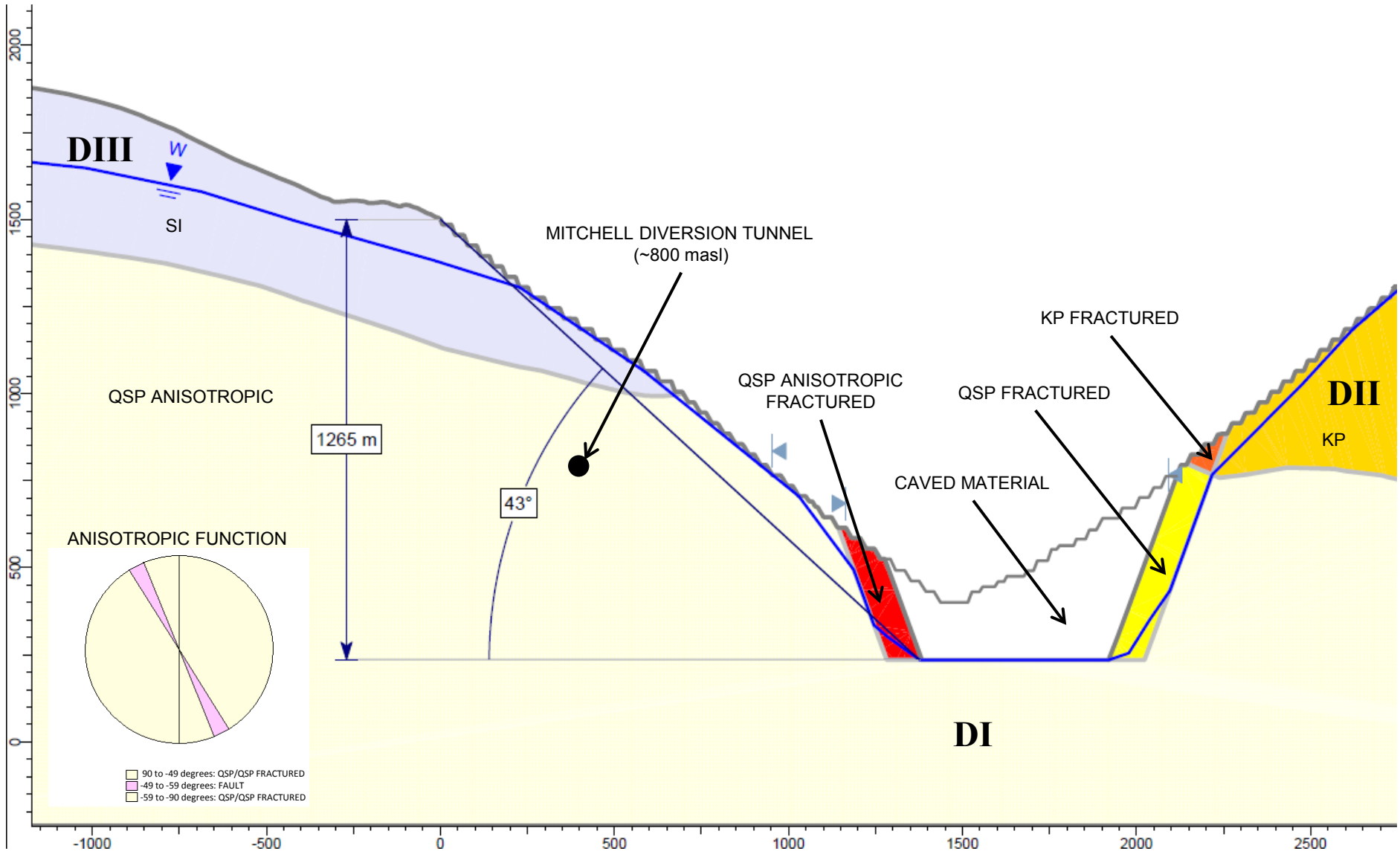
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B6

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION B – MODEL GEOMETRY
BASE CASE WATER TABLE

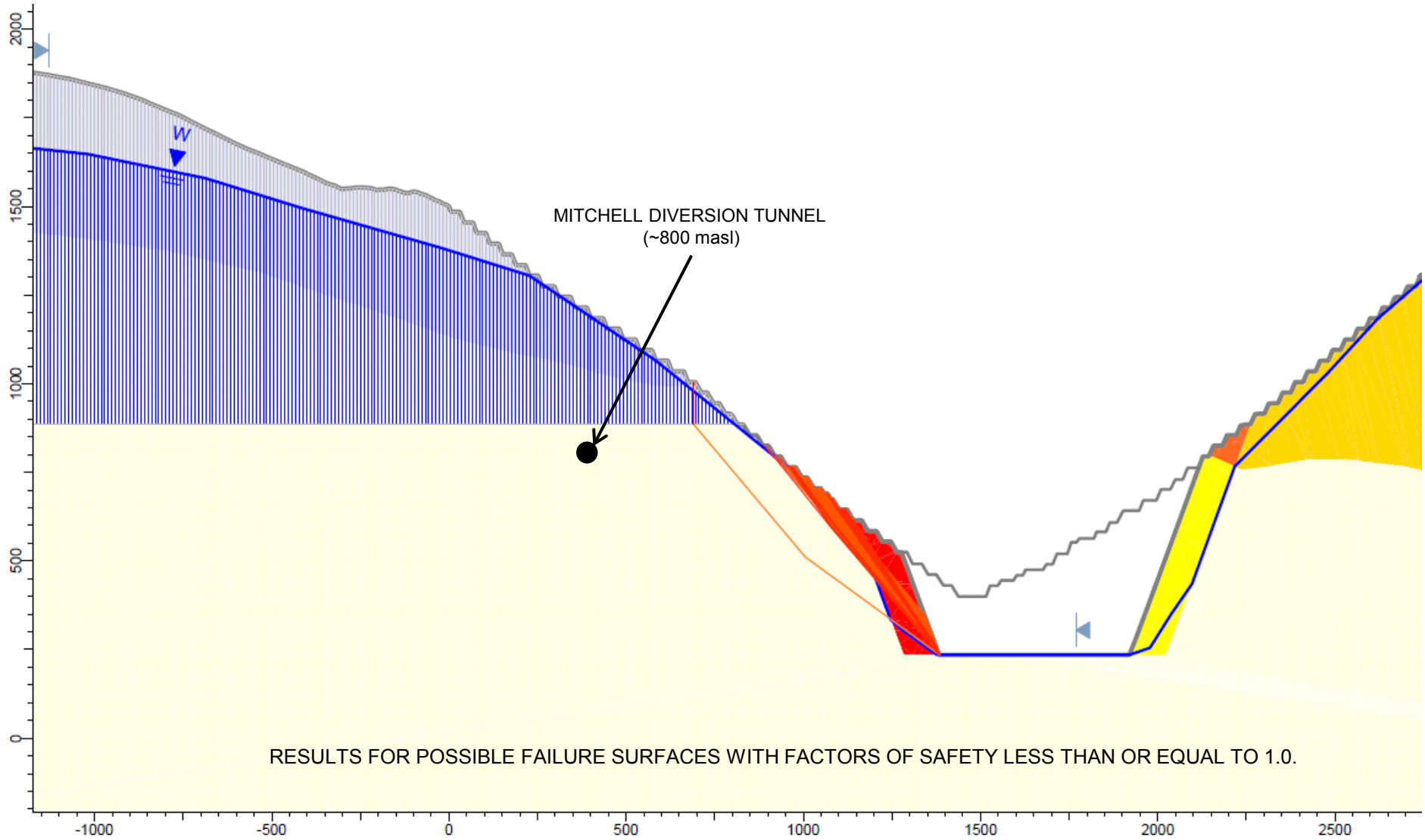
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B7

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

REPORT TITLE: PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

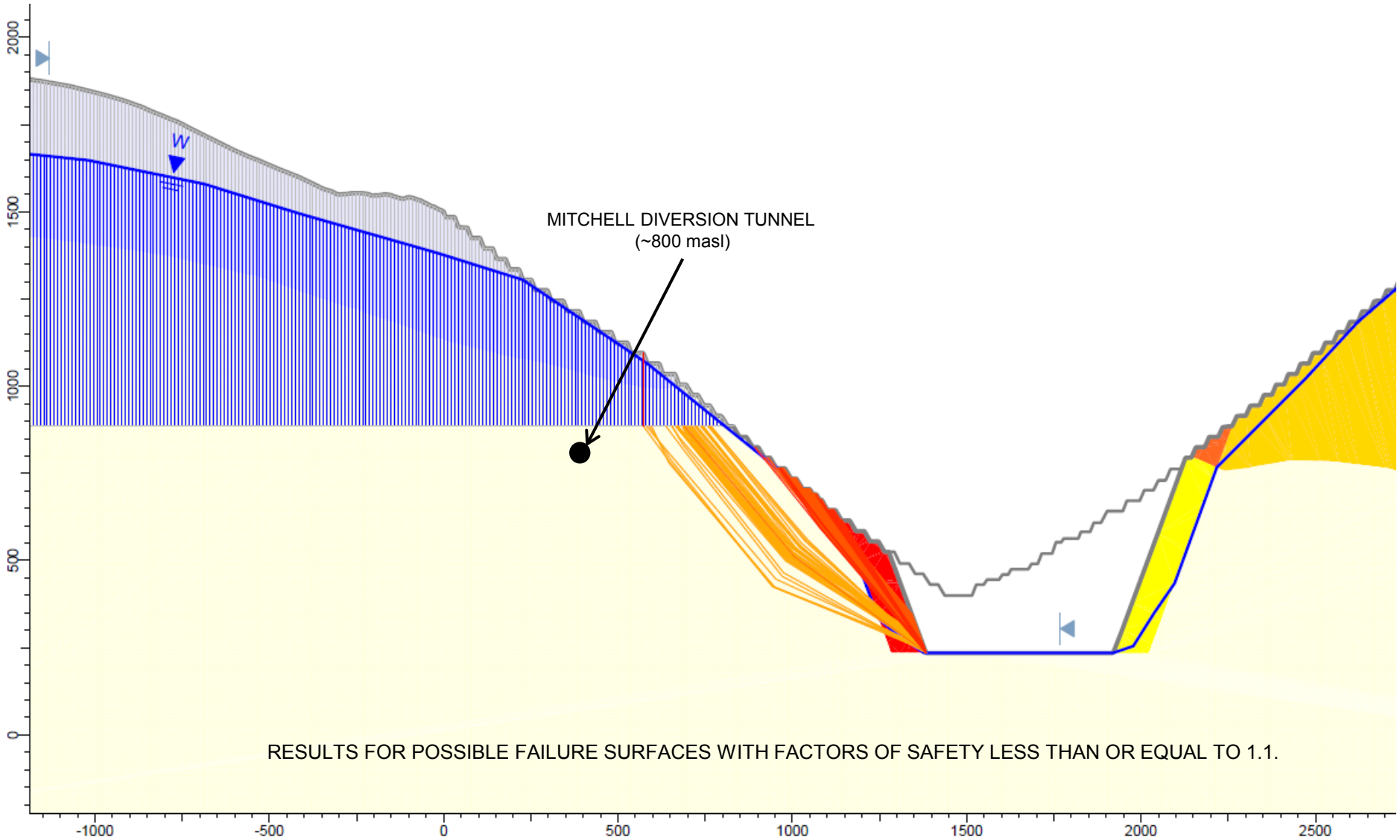
FIGURE TITLE: SECTION B – FOS 1.0
BASE CASE WATER TABLE

PROJECT No.: 0638-013-31

FIGURE No.: B8

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION B – FOS 1.1
BASE CASE WATER TABLE

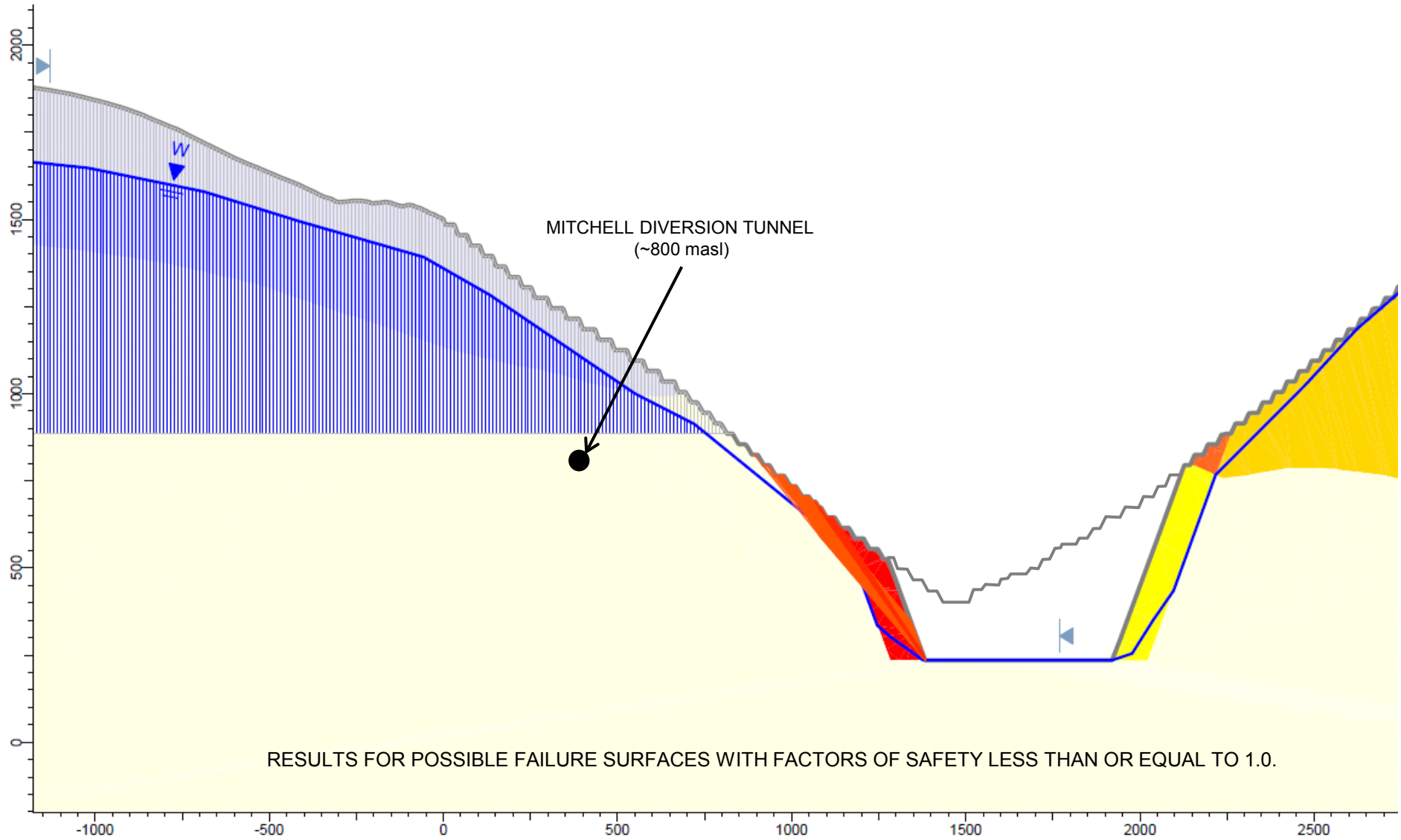
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B9

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES BOTH DRAINAGE ADITS AND VERTICAL PUMPING WELLS ARE MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION B – FOS 1.0
OPTIMISTIC WATER TABLE

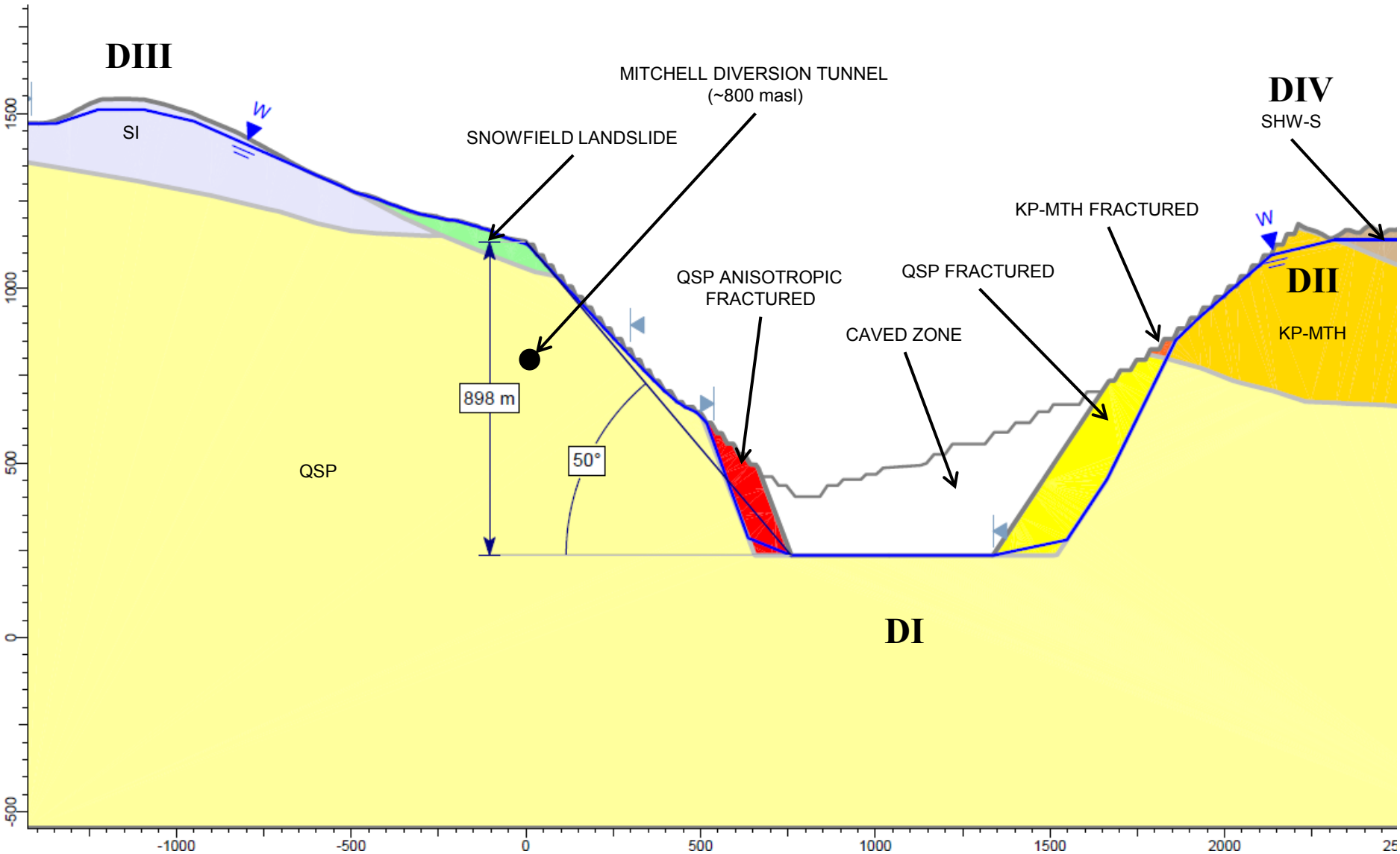
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B10

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



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AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION C – MODEL GEOMETRY

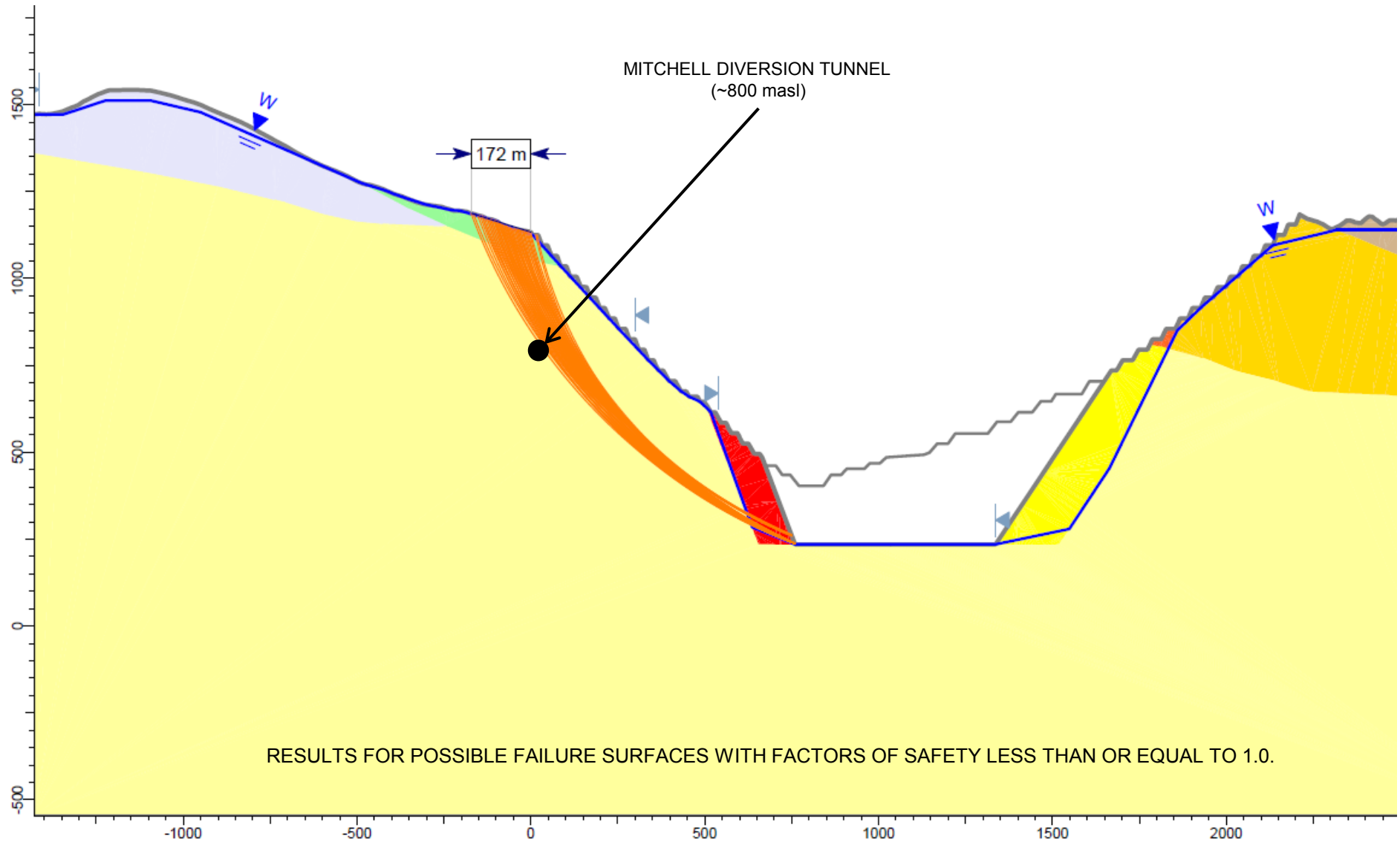
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B11

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION C – FOS 1.0

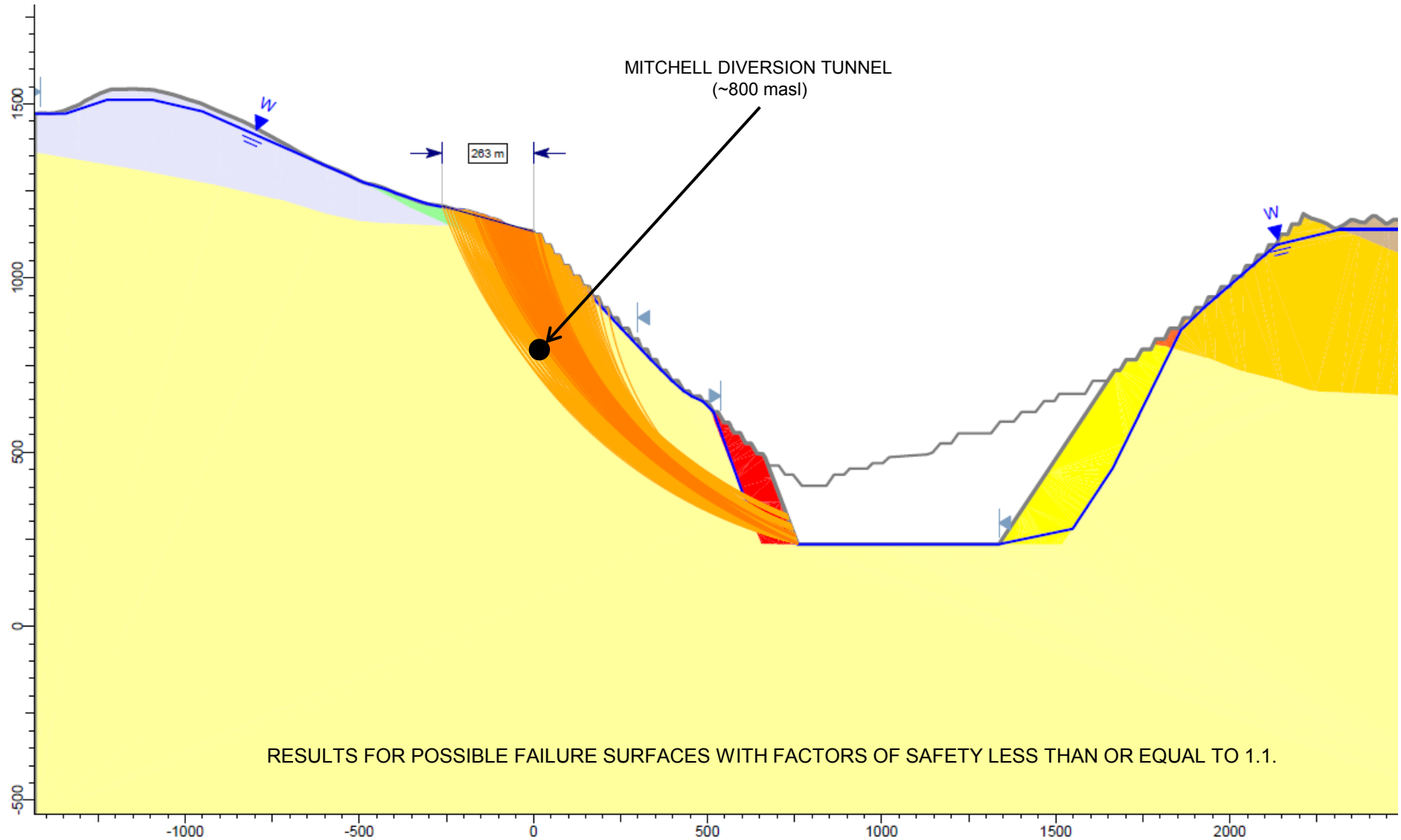
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B12

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION C – FOS 1.1

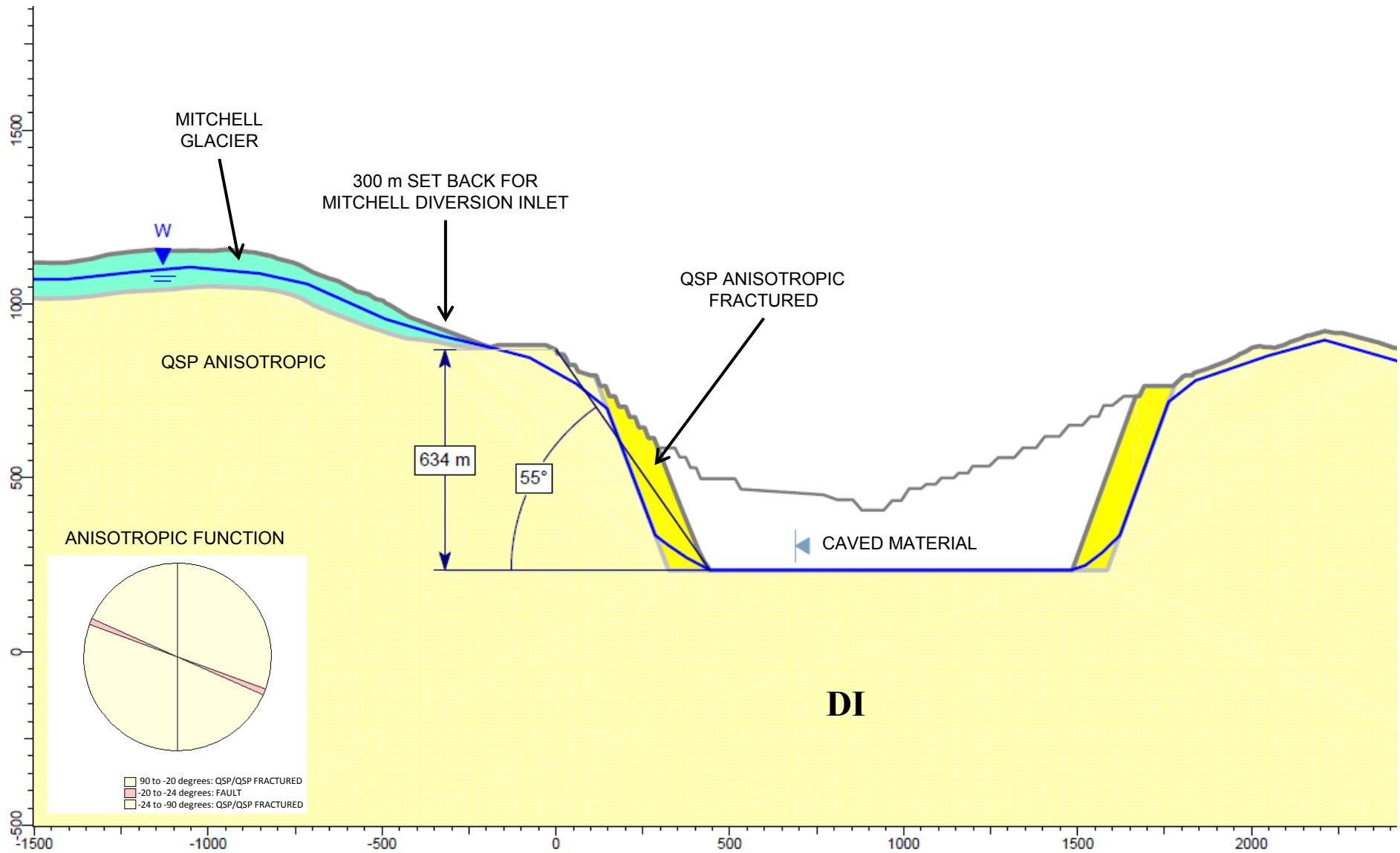
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B13

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



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AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – MODEL GEOMETRY

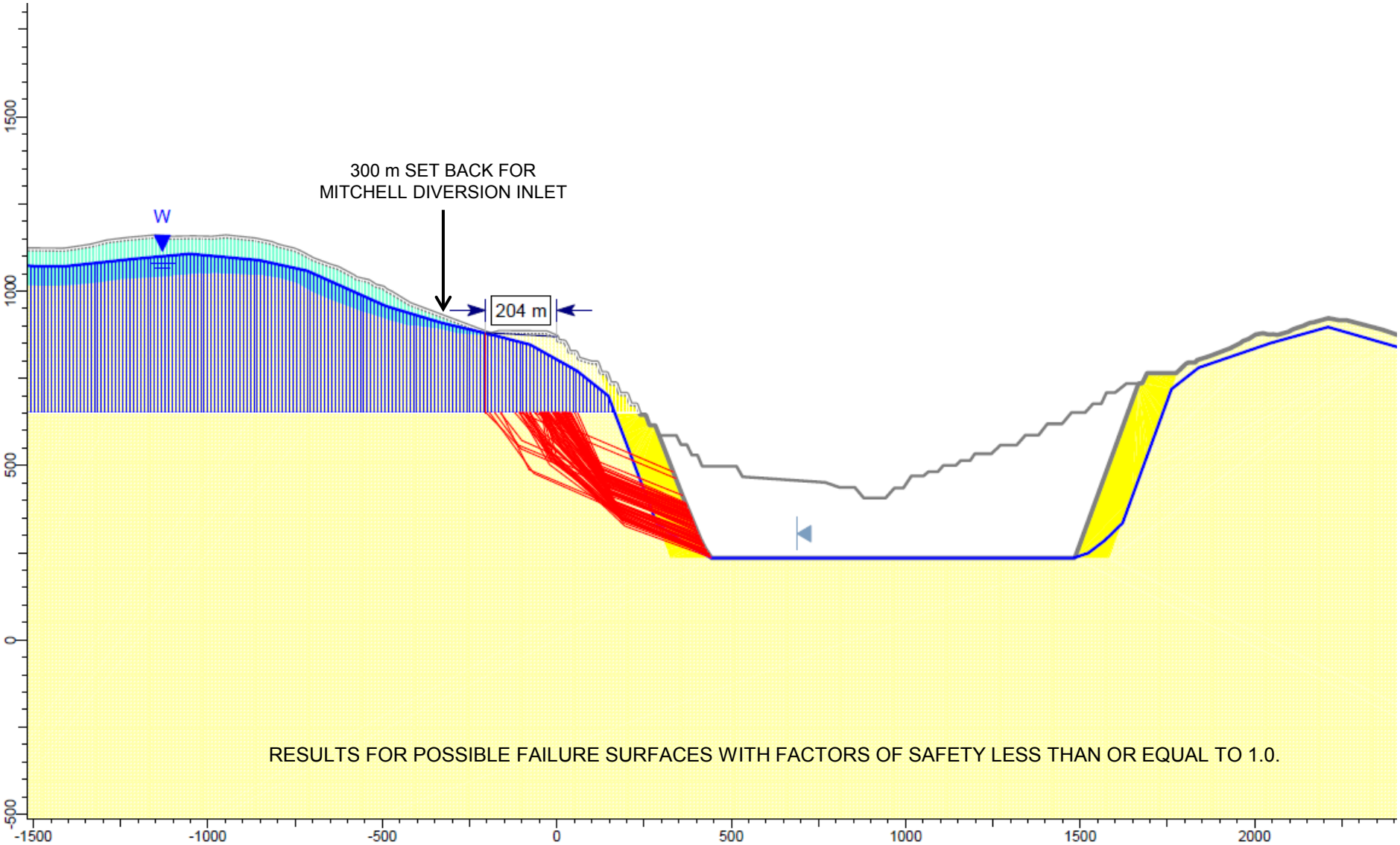
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B14

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – FOS 1.0

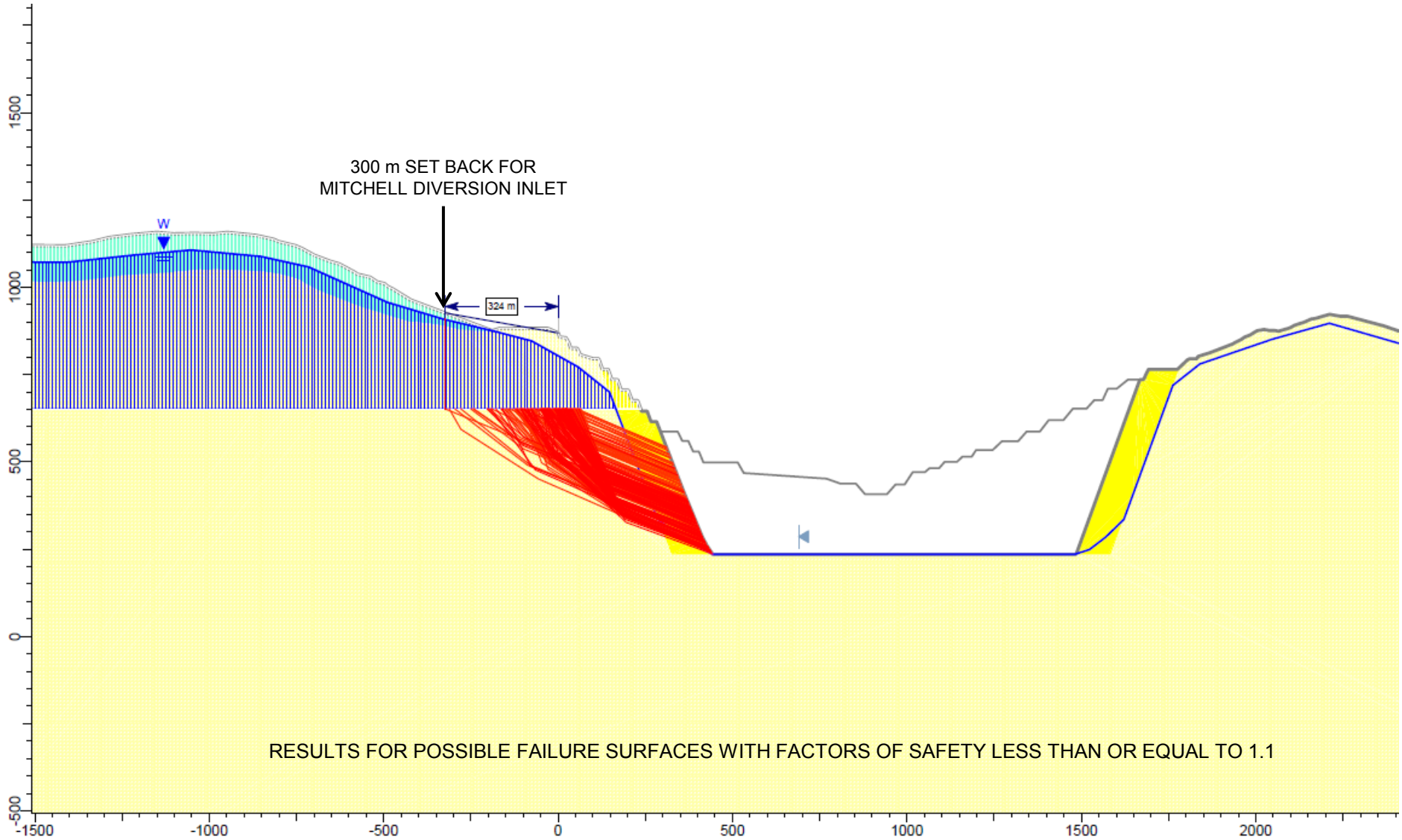
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B15

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – FOS 1.1

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B16

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

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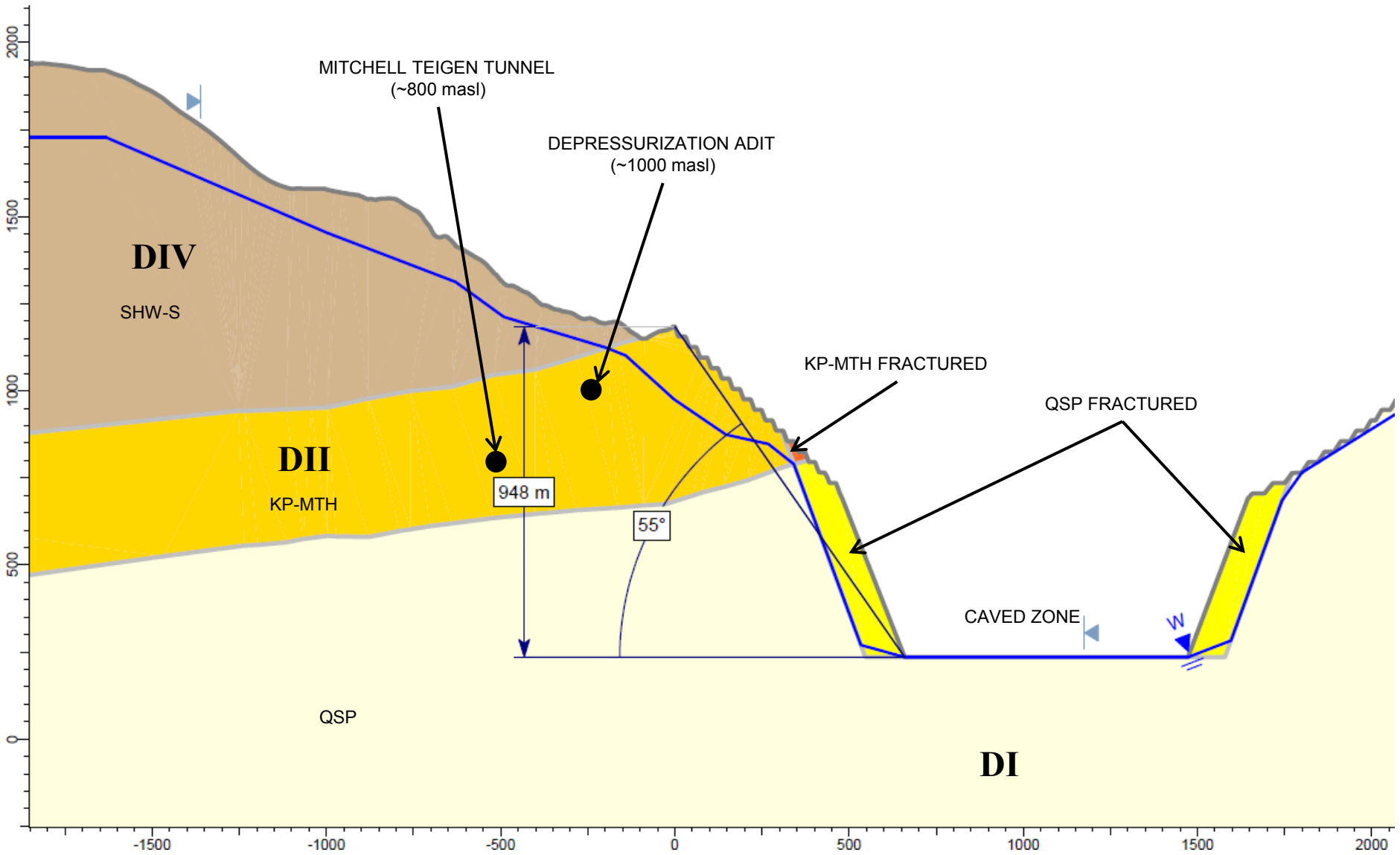


NOTES:
1. ASSUMES SOME DEPRESSURIZATION IS MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION E – MODEL GEOMETRY
BASE CASE WATER TABLE

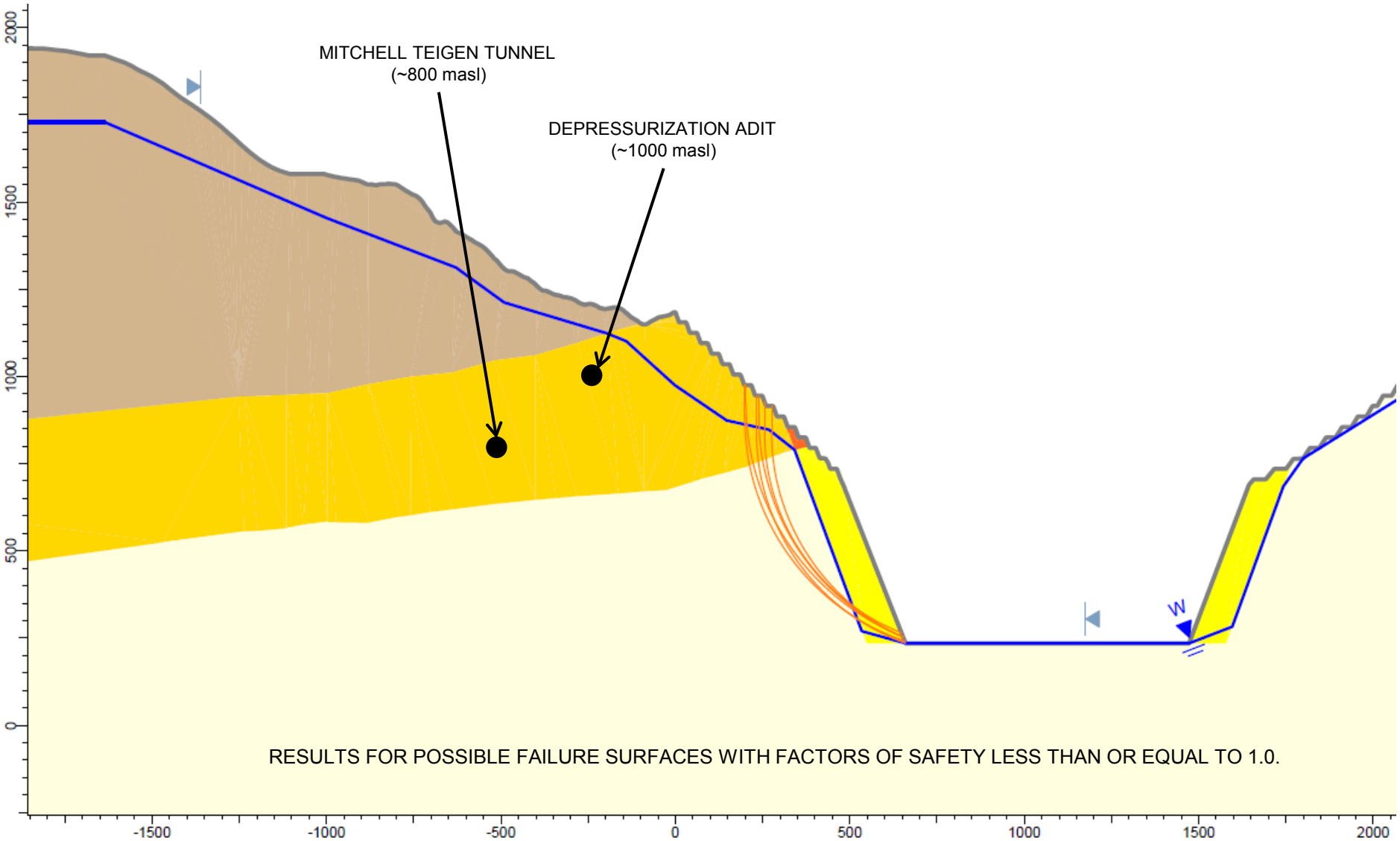
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B17

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



RESULTS FOR POSSIBLE FAILURE SURFACES WITH FACTORS OF SAFETY LESS THAN OR EQUAL TO 1.0.

NOTES:
1. ASSUMES SOME DEPRESSURIZATION IS MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION E – FOS 1.0
BASE CASE WATER TABLE

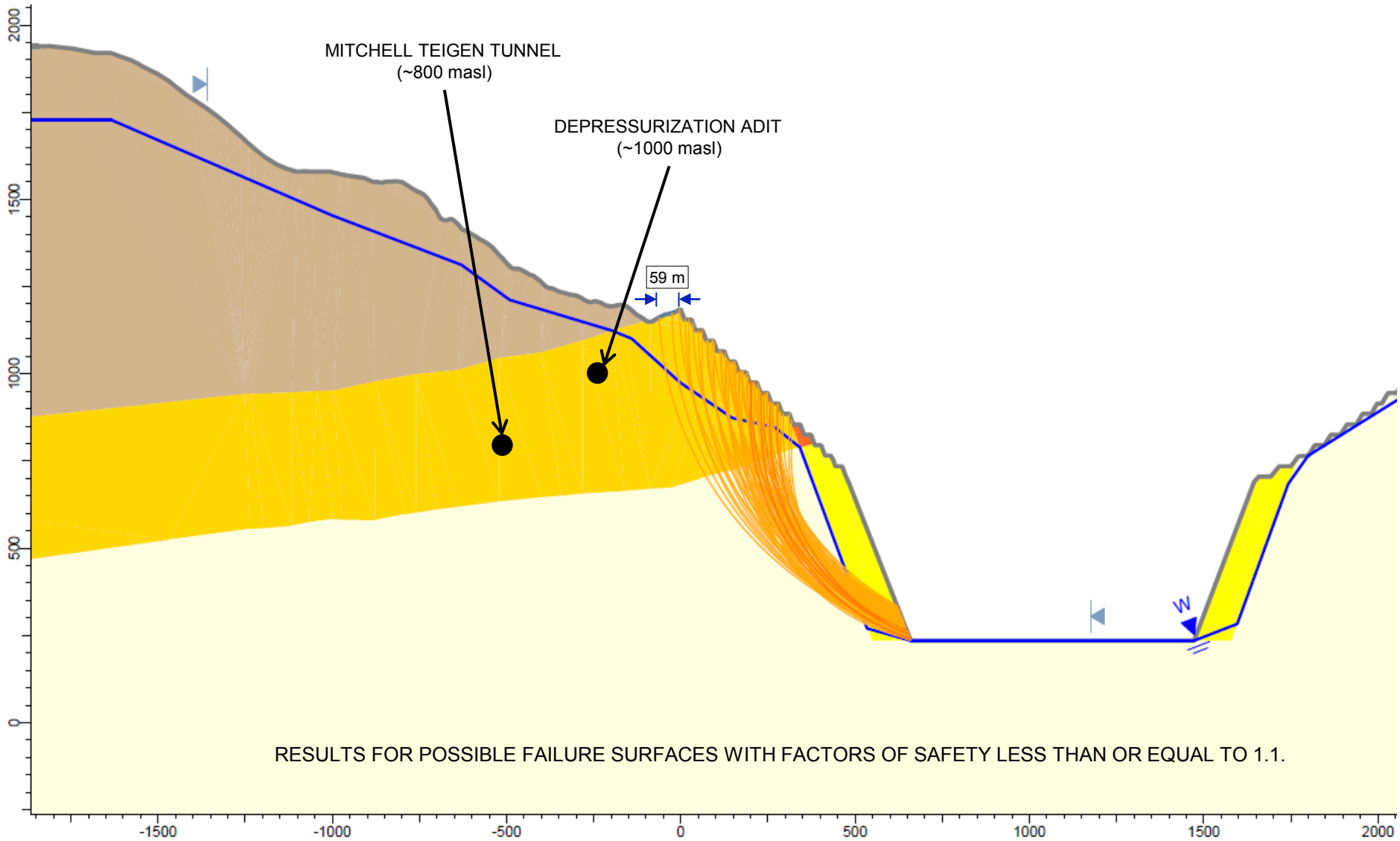
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B18

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:
1. ASSUMES SOME DEPRESSURIZATION IS MAINTAINED DURING BLOCK CAVING

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION E – FOS 1.1
BASE CASE WATER TABLE

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B19

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

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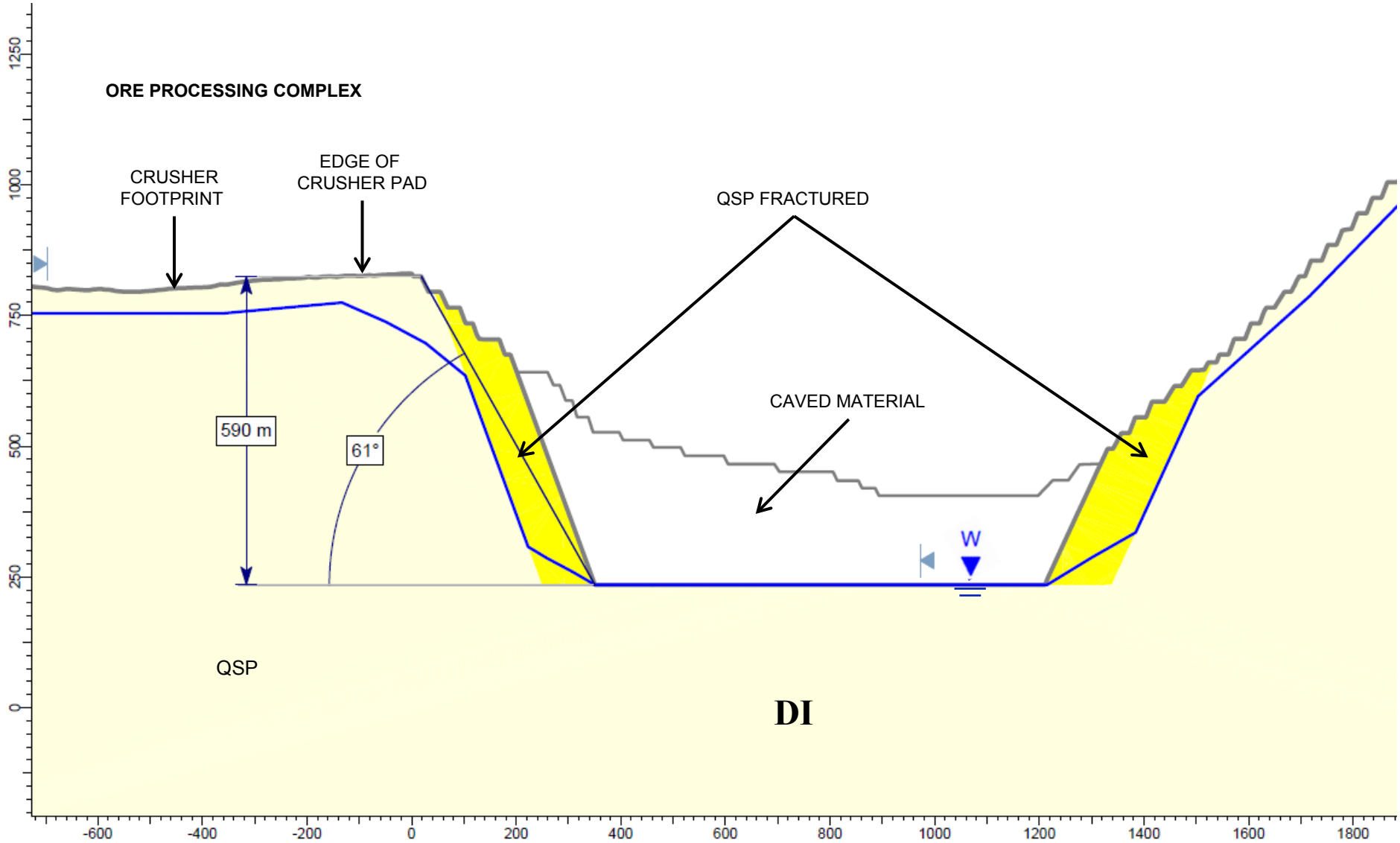

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION F – MODEL GEOMETRY

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B20

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

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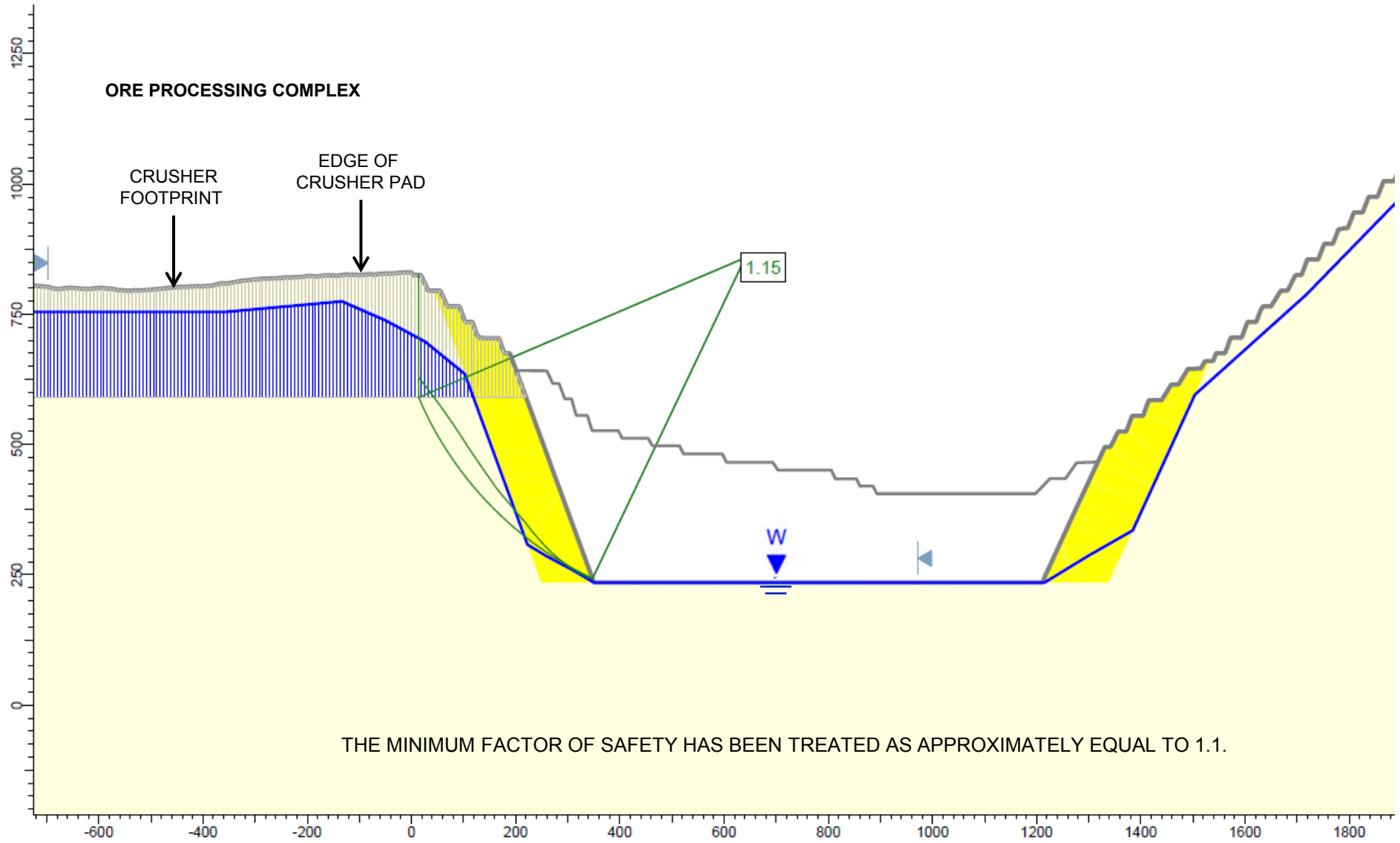

THE MINIMUM FACTOR OF SAFETY HAS BEEN TREATED AS APPROXIMATELY EQUAL TO 1.1.

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION F – ANALYSIS RESULTS

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B21

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

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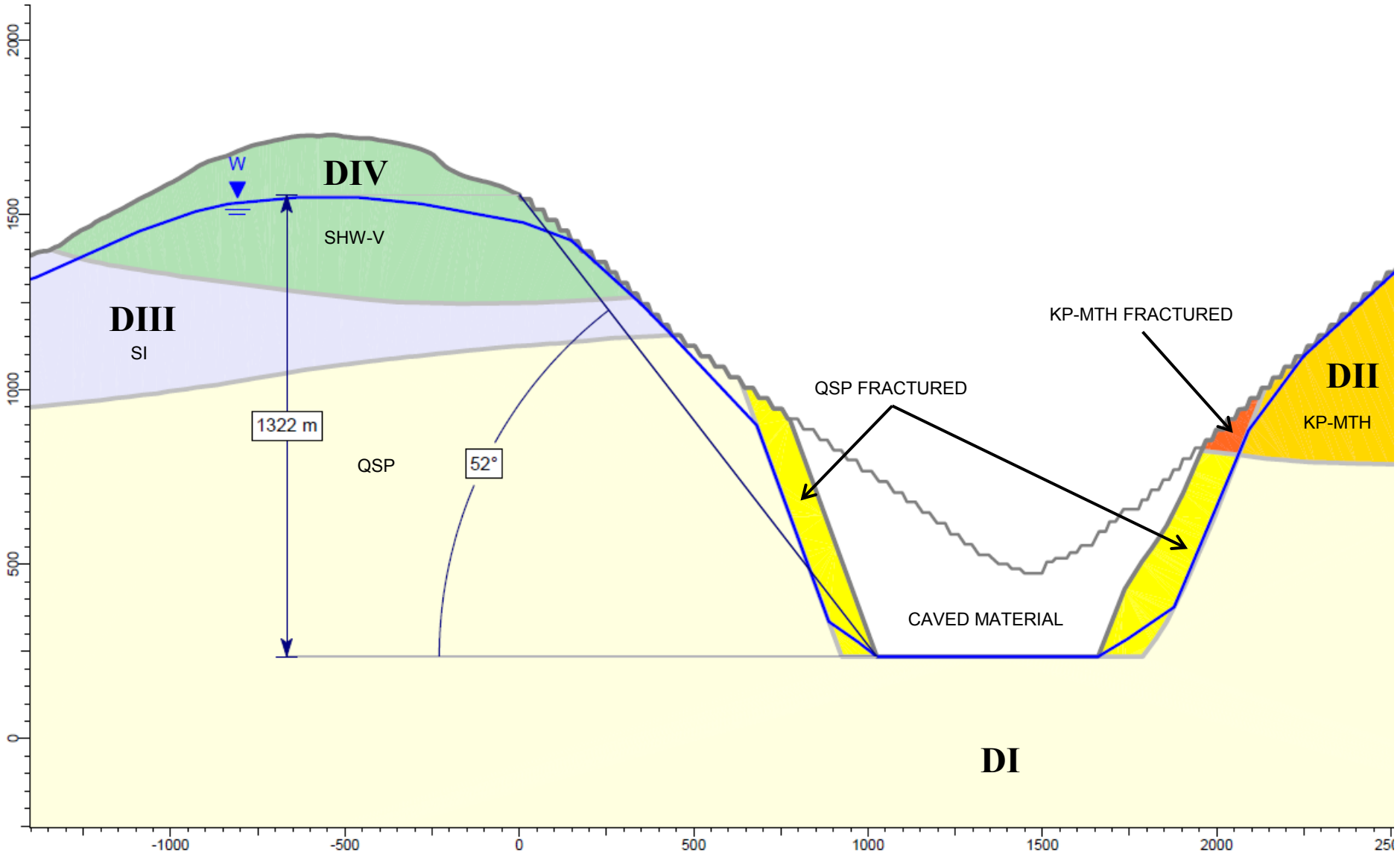

NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

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AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION G – MODEL GEOMETRY
BASE CASE WATER TABLE

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B22

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

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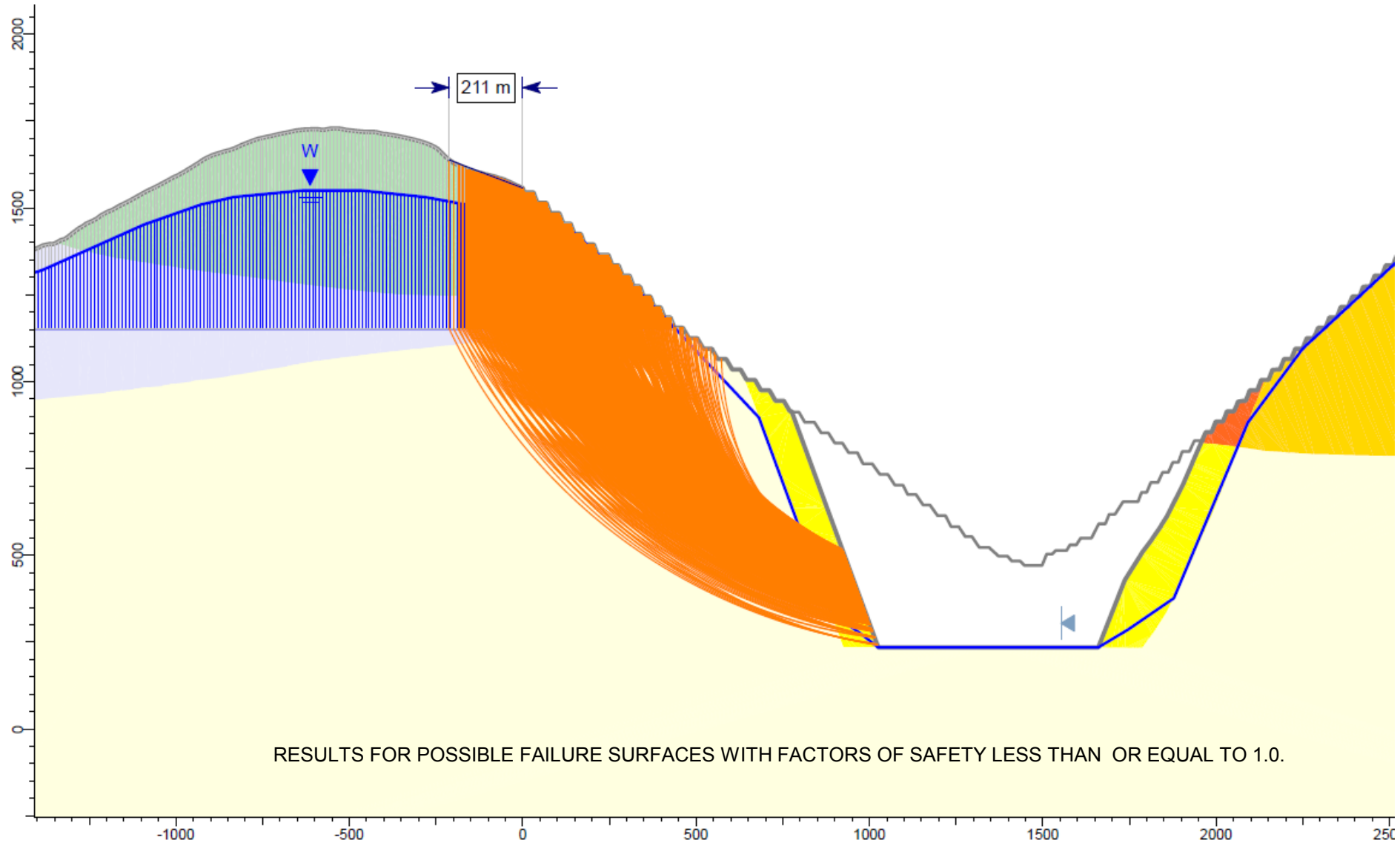

NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION G – FOS 1.0
BASE CASE WATER TABLE

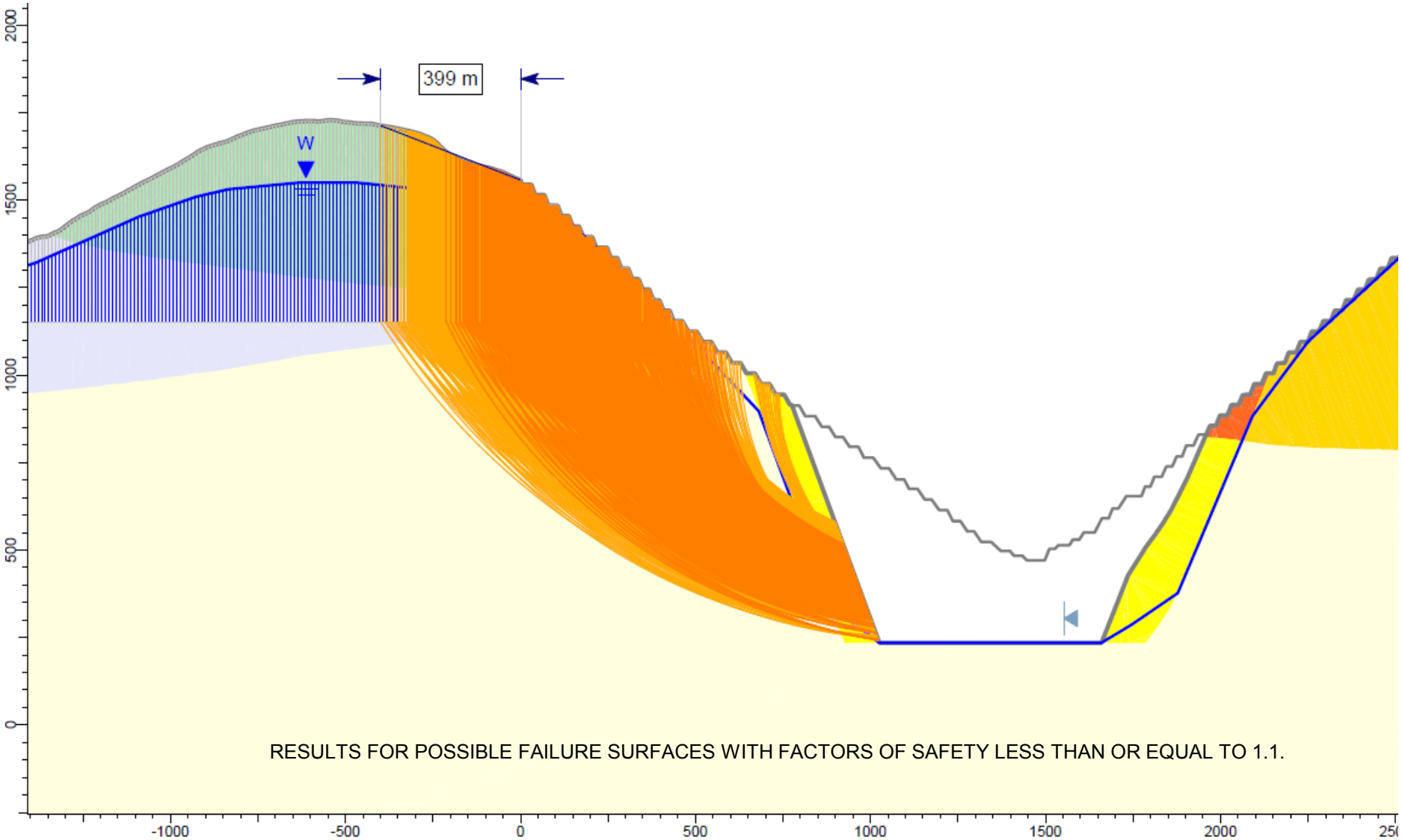
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B23

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

1. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION G – FOS 1.1
BASE CASE WATER TABLE

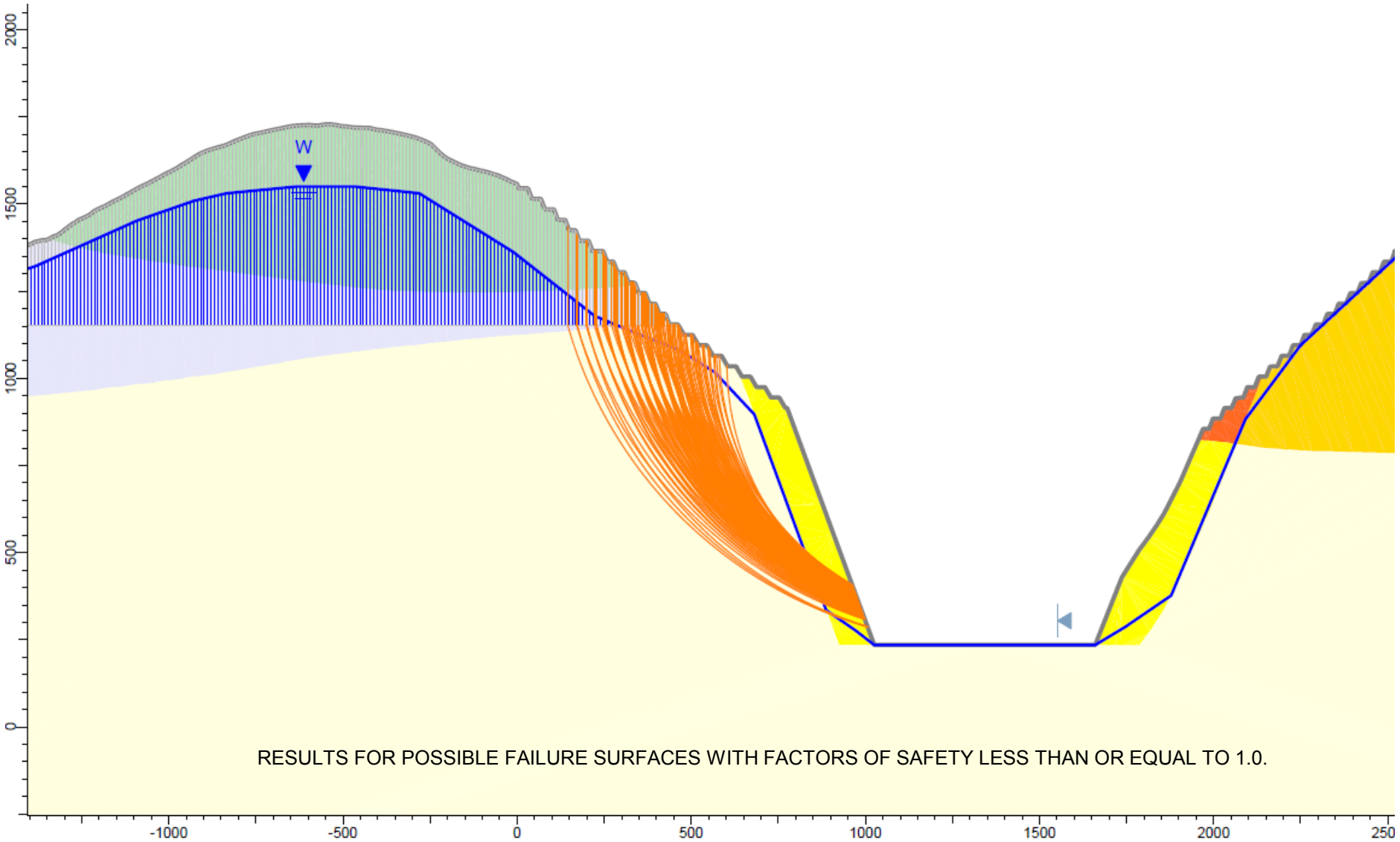
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
B24

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

DECEMBER 24, 2012



NOTES:

NOTES:

1. ASSUMES BOTH DRAINAGE ADITS AND VERTICAL PUMPING WELLS ARE MAINTAINED DURING BLOCK CAVING

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CLIENT: SEABRIDGE GOLD INC.

REPORT TITLE: PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE: SECTION G – FOS 1.0 OPTIMISTIC WATER TABLE

PROJECT No.: 0638-013-31

FIGURE No.: B25

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX B

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APPENDIX C
NORTH DEWATERING ADIT FINITE ELEMENT METHOD DEFORMATION ANALYSIS RESULTS

TABLE C1. SECTION A - ISOTROPIC AND DRY - FINITE ELEMENT METHOD ANALYSIS SUMMARY

Stage	End of Mining Period (years)	Roof			Right Wall			Left Wall			Floor			Description
		σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	
1		n/a												Pre-mining topography set up[Note 1]
2		n/a												Pre-mining topography set up[Note 1]
3		n/a												Pre-mining topography
4	1	32.06	9.07	0.04	28.86	6.58	0.04	21.93	7.35	0.04	24.90	4.38	0.04	Mining of south slope begins
5	5	31.91	9.01	0.10	28.88	6.54	0.10	21.96	7.27	0.10	24.69	4.34	0.10	Mining continues
6		30.05	8.10	0.33	29.71	6.03	0.32	22.81	6.10	0.33	21.24	3.84	0.33	Mining of north slope begins
7	10	30.08	8.09	0.34	29.74	6.02	0.33	22.84	6.09	0.34	21.25	3.83	0.34	Mining continues
8	20	27.42	6.38	0.60	29.61	5.82	0.60	21.52	4.97	0.60	16.30	3.01	0.60	Mining continues
9	23	26.73	6.28	0.69	29.41	5.79	0.69	21.43	4.88	0.69	15.50	2.98	0.69	Mining continues
10	26	23.33	5.34	1.02	29.08	5.51	1.02	21.72	4.26	1.02	11.00	2.40	1.01	Caving commences in centre of pit
11		23.23	5.27	1.02	29.13	5.51	1.02	21.75	4.23	1.02	10.82	2.37	1.02	The first level of caved rock is mined
12		22.05	4.88	1.14	29.24	5.49	1.14	22.20	4.06	1.14	9.20	2.27	1.14	The second level of caved rock is mined
13	55	21.10	4.57	1.23	28.74	5.26	1.23	22.55	3.95	1.22	8.07	2.15	1.22	The final level of caved rock is mined

Notes:

1. Stages 1, 2, and 3 are used to model the estimated stress history of the rockmass

2. Data taken from nodes in each wall of the proposed depressurization adit (illustrated below; see sections)

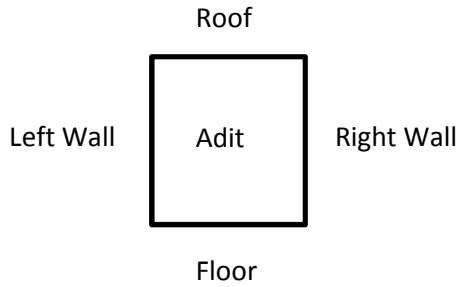

TABLE C2. SECTION A - ISOTROPIC WITH WATER TABLE - FINITE ELEMENT METHOD ANALYSIS SUMMARY

Stage	End of Mining Period (years)	Roof			Right Wall			Left Wall			Floor			Description
		σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	
1		n/a												Pre-mining topography set up[Note 1]
2		n/a												Pre-mining topography set up[Note 1]
3		n/a												Pre-mining topography, water table[Note 2]
4	1	30.15	8.82	0.04	22.29	7.38	0.04	21.51	5.92	0.04	31.25	8.62	0.04	Mining of south slope begins
5	5	30.02	8.79	0.09	22.33	7.36	0.10	21.56	5.92	0.10	31.08	8.59	0.10	Mining continues
6		27.44	7.92	0.33	23.26	6.89	0.33	22.84	6.11	0.32	28.62	8.15	0.32	Mining of north slope begins
7	10	27.38	7.89	0.34	23.28	6.88	0.34	22.87	6.11	0.34	28.56	8.14	0.34	Mining continues
8	20	21.56	7.59	0.62	24.40	6.68	0.62	21.87	5.67	0.62	24.94	7.33	0.62	Mining continues
9	23	20.16	7.46	0.71	24.05	6.54	0.71	22.64	5.87	0.70	23.63	7.38	0.70	Mining continues
10	26	14.43	5.96	1.21	21.35	5.82	1.20	20.16	5.46	1.20	15.68	6.20	1.19	Caving commences in centre of pit
11		15.96	6.36	1.30	22.63	6.07	1.29	21.37	5.80	1.29	17.30	6.56	1.28	The first level of caved rock is mined
12		17.46	6.53	5.06	22.98	6.30	4.95	21.46	6.03	4.99	17.60	5.95	4.88	The second level of caved rock is mined
13	55	17.70	6.43	14.80	23.03	6.24	14.44	21.99	6.17	14.65	16.56	5.58	14.28	The final level of caved rock is mined

Notes:

1. Stages 1, 2, and 3 are used to model the estimated stress history of the rockmass
2. Water table introduced in stage 3 and applied to all subsequent stages
3. Data taken from nodes in each wall of the proposed depressurization adit (illustrated below; see sections)

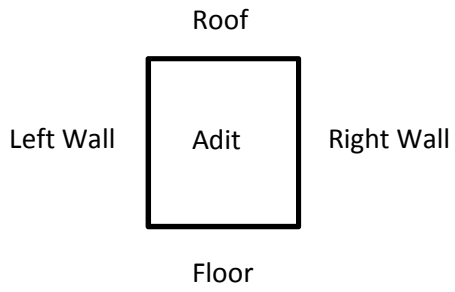

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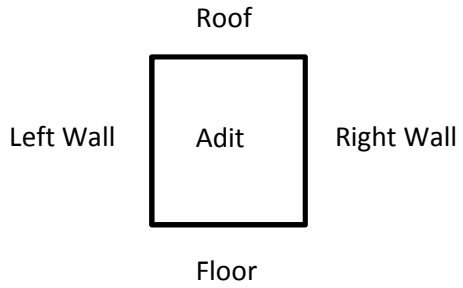
TABLE C3. SECTION A - ANISOTROPIC AND DRY - FINITE ELEMENT METHOD ANALYSIS SUMMARY

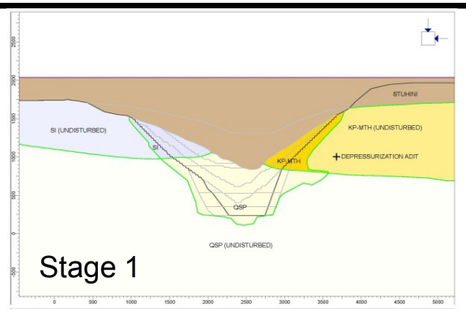
Stage	End of Mining Period (years)	Roof			Right Wall			Left Wall			Floor			Description
		σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	
1		n/a												Pre-mining topography set up[Note 1]
2		n/a												Pre-mining topography set up[Note 1]
3		n/a												Pre-mining topography
4	1	32.40	7.17	0.04	22.36	6.46	0.04	26.47	6.53	0.04	29.17	6.19	0.05	Mining of south slope begins
5	5	32.32	7.13	0.09	22.39	6.43	0.09	26.50	6.49	0.10	29.06	6.16	0.10	Mining continues
6		30.08	6.45	0.32	23.12	5.75	0.32	27.18	5.88	0.32	26.07	5.72	0.32	Mining of north slope begins
7	10	30.19	6.56	0.34	21.86	5.82	0.34	27.30	5.87	0.34	25.69	5.69	0.34	Mining continues
8	20	23.23	5.45	0.61	22.34	4.87	0.61	26.62	4.50	0.61	21.39	4.54	0.61	Mining continues
9	23	22.45	5.38	0.70	22.25	4.77	0.70	26.45	4.44	0.70	20.53	4.52	0.70	Mining continues
10	26	18.41	4.55	1.04	22.71	4.03	1.03	26.71	3.88	1.03	16.21	4.15	1.03	Caving commences in centre of pit
11		18.12	4.48	1.05	22.90	3.98	1.05	26.90	3.83	1.05	15.81	4.12	1.04	The first level of caved rock is mined
12		17.78	4.45	1.17	24.11	3.97	1.16	29.66	4.57	1.17	13.82	4.06	1.16	The second level of caved rock is mined
13	55	17.17	4.61	1.26	24.58	4.13	1.25	29.61	4.43	1.26	13.48	4.28	1.25	The final level of caved rock is mined

Notes:

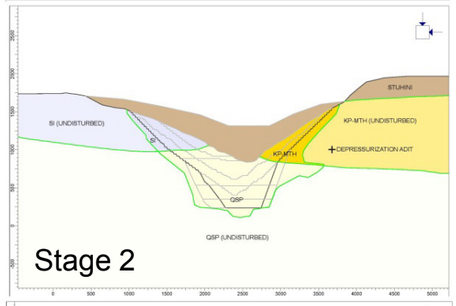
1. Stages 1, 2, and 3 are used to model the estimated stress history of the rockmass

2. Data taken from nodes in each wall of the proposed depressurization adit (illustrated below; see sections)

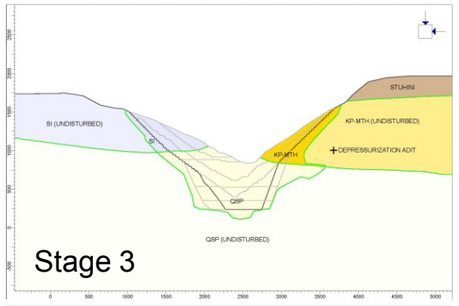




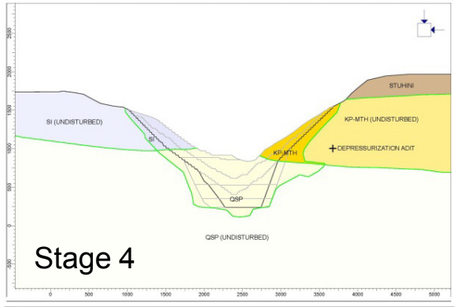
Stage 1



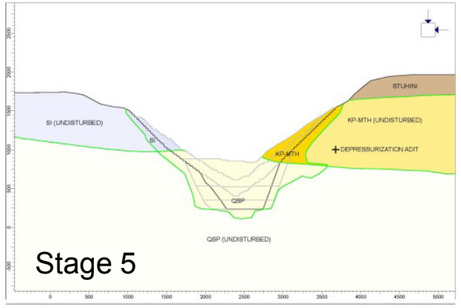
Stage 2



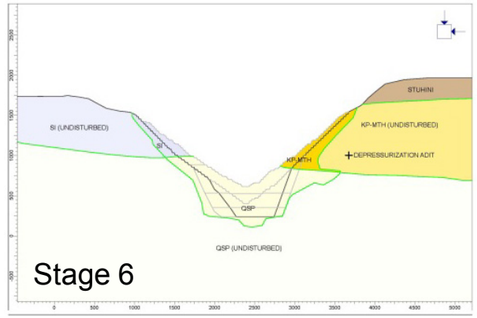
Stage 3



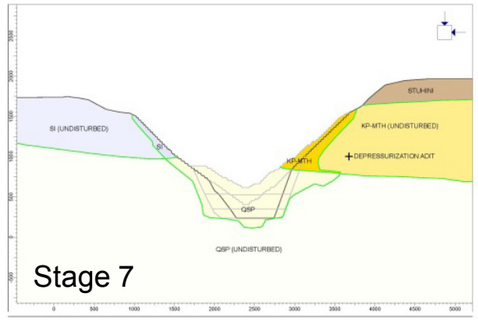
Stage 4



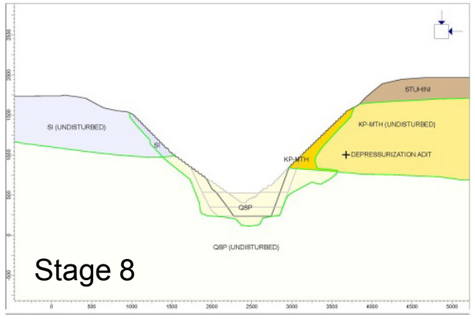
Stage 5



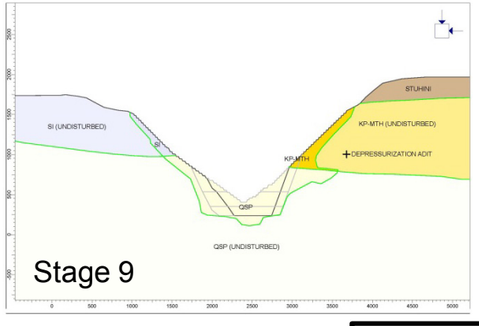
Stage 6



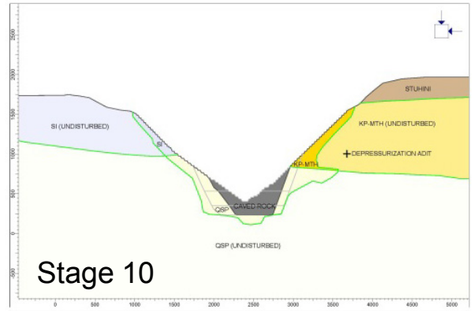
Stage 7



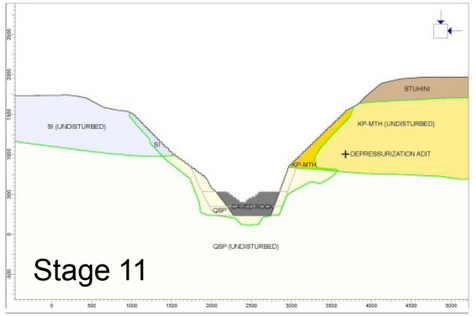
Stage 8



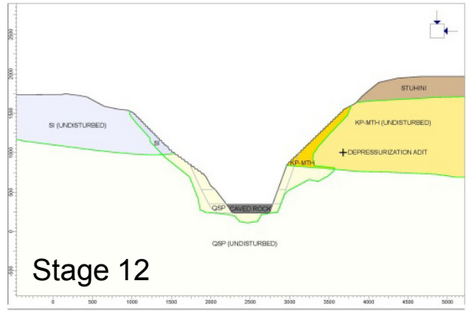
Stage 9



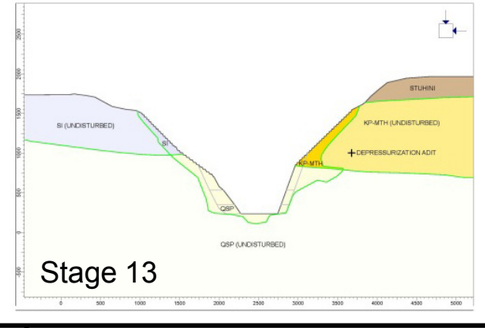
Stage 10



Stage 11



Stage 12



Stage 13

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CLIENT: SEABRIDGE GOLD INC.

REPORT TITLE: PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE: FINITE ELEMENT MODELLING STAGES FOR SECTION A

PROJECT NO.: 0638-013-31

FIGURE NO.: C1

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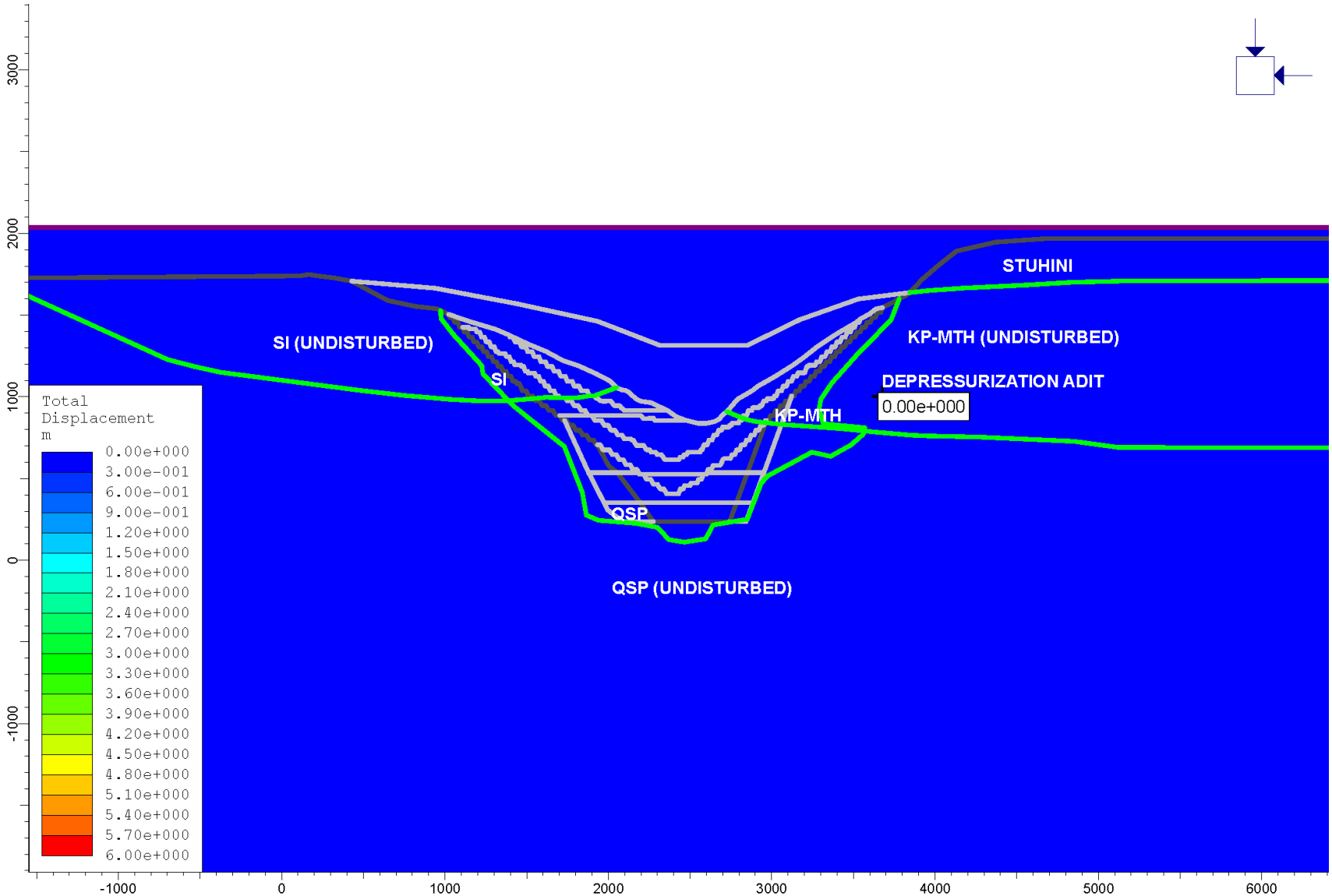
DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 1

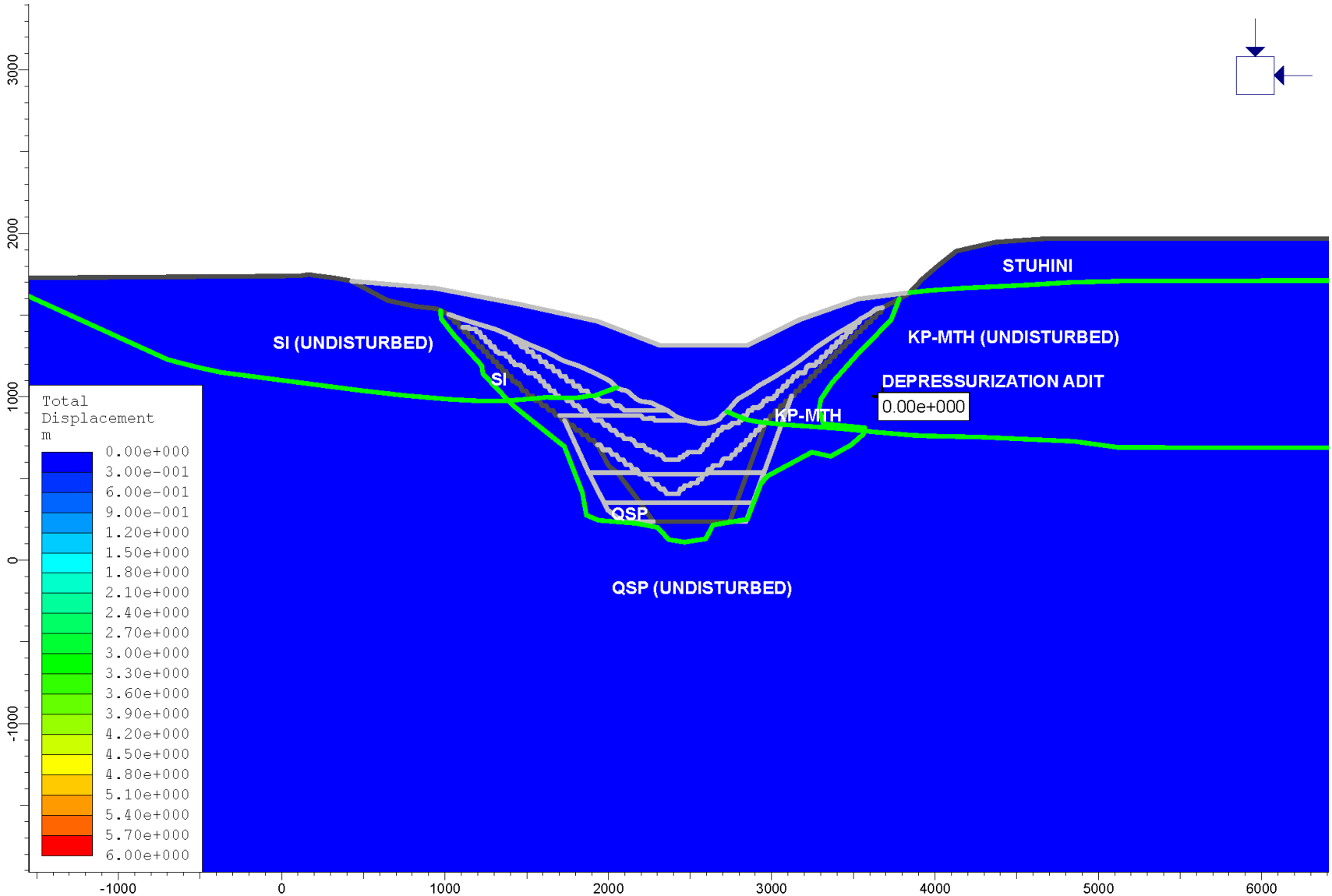
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C2

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 2

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C3

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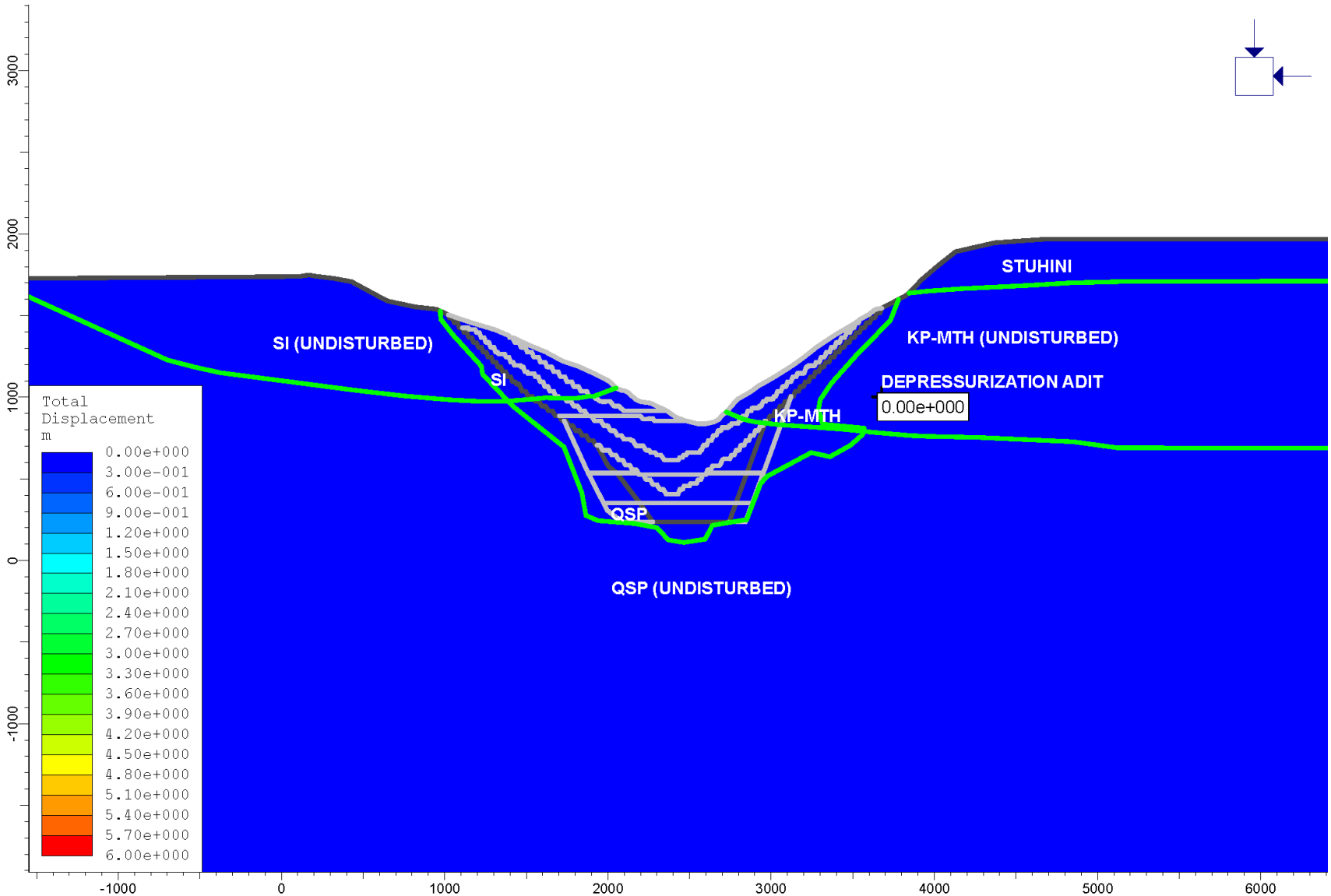
DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 3

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C4

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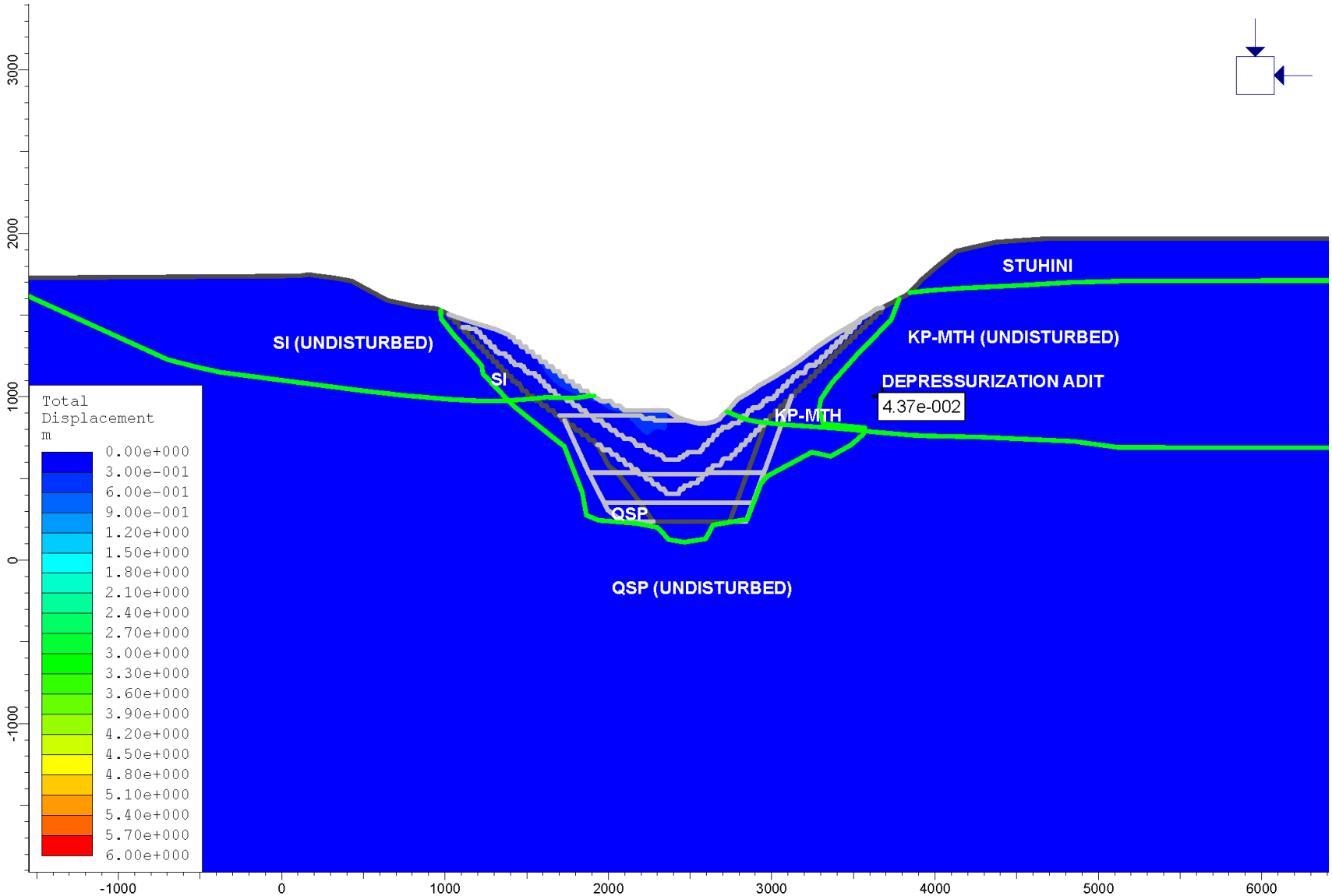

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 4

CLIENT:
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PROJECT No.:
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FIGURE No.:
C5

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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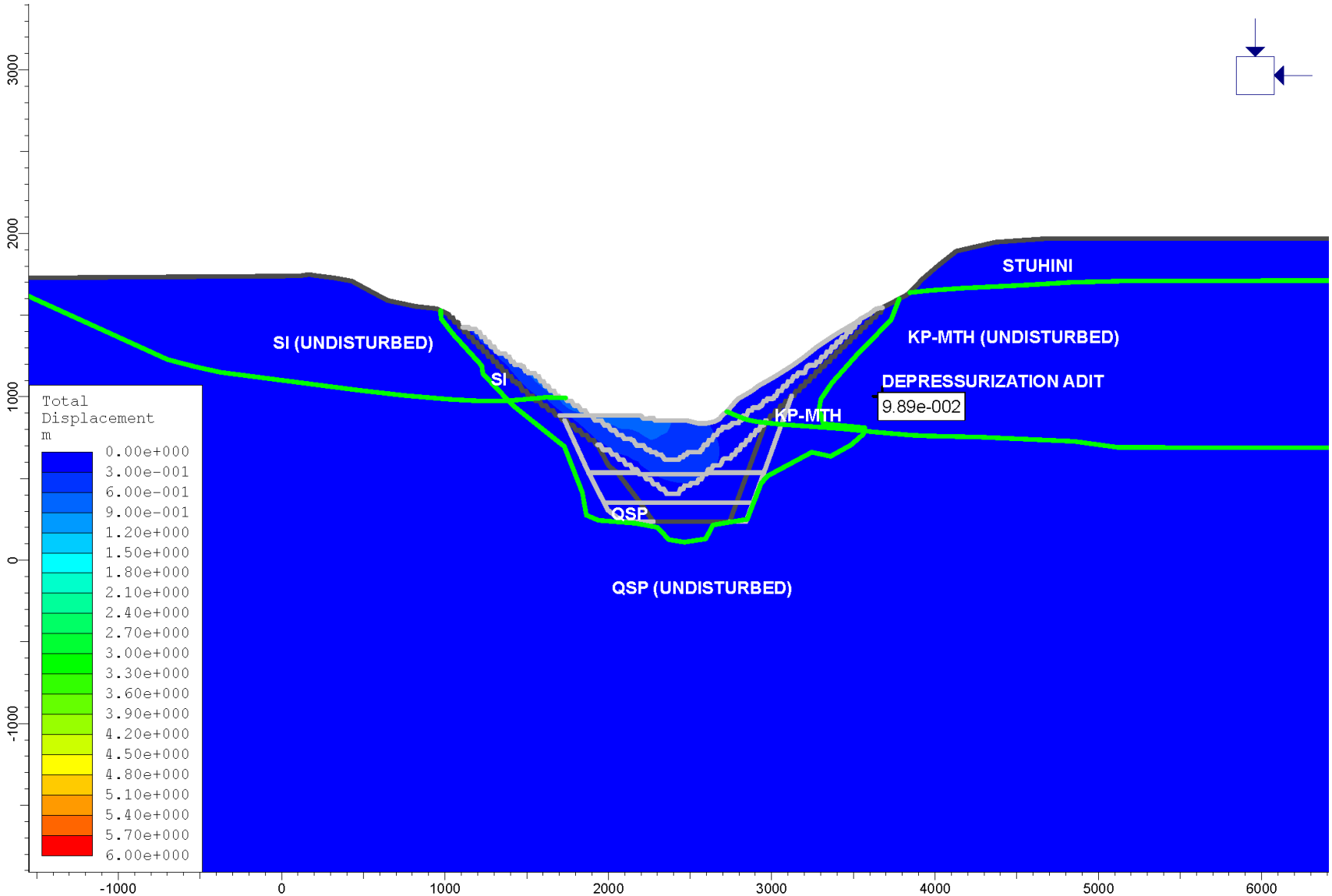

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 5

CLIENT:
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PROJECT No.:
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FIGURE No.:
C6

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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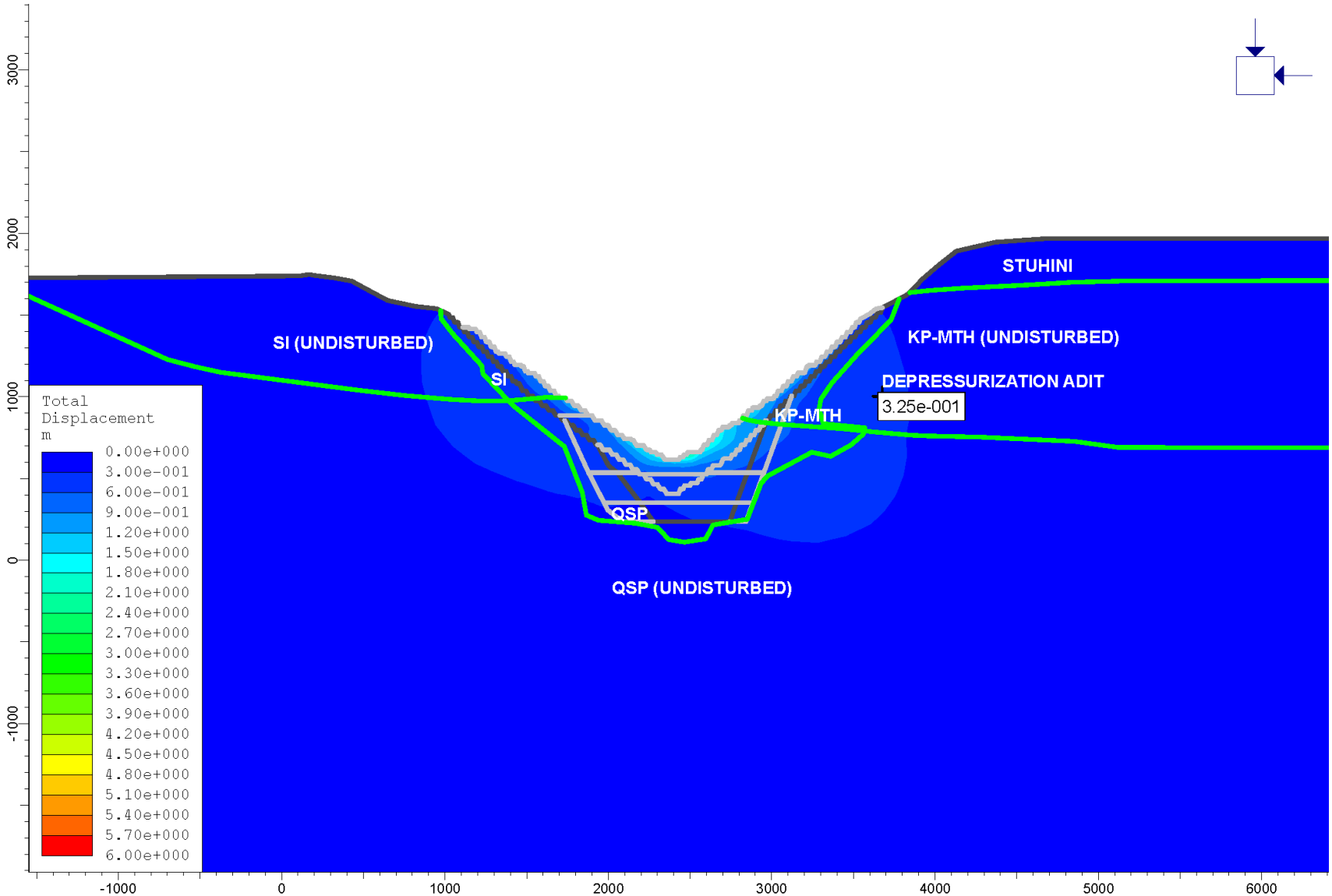

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 6

CLIENT:
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PROJECT No.:
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FIGURE No.:
C7

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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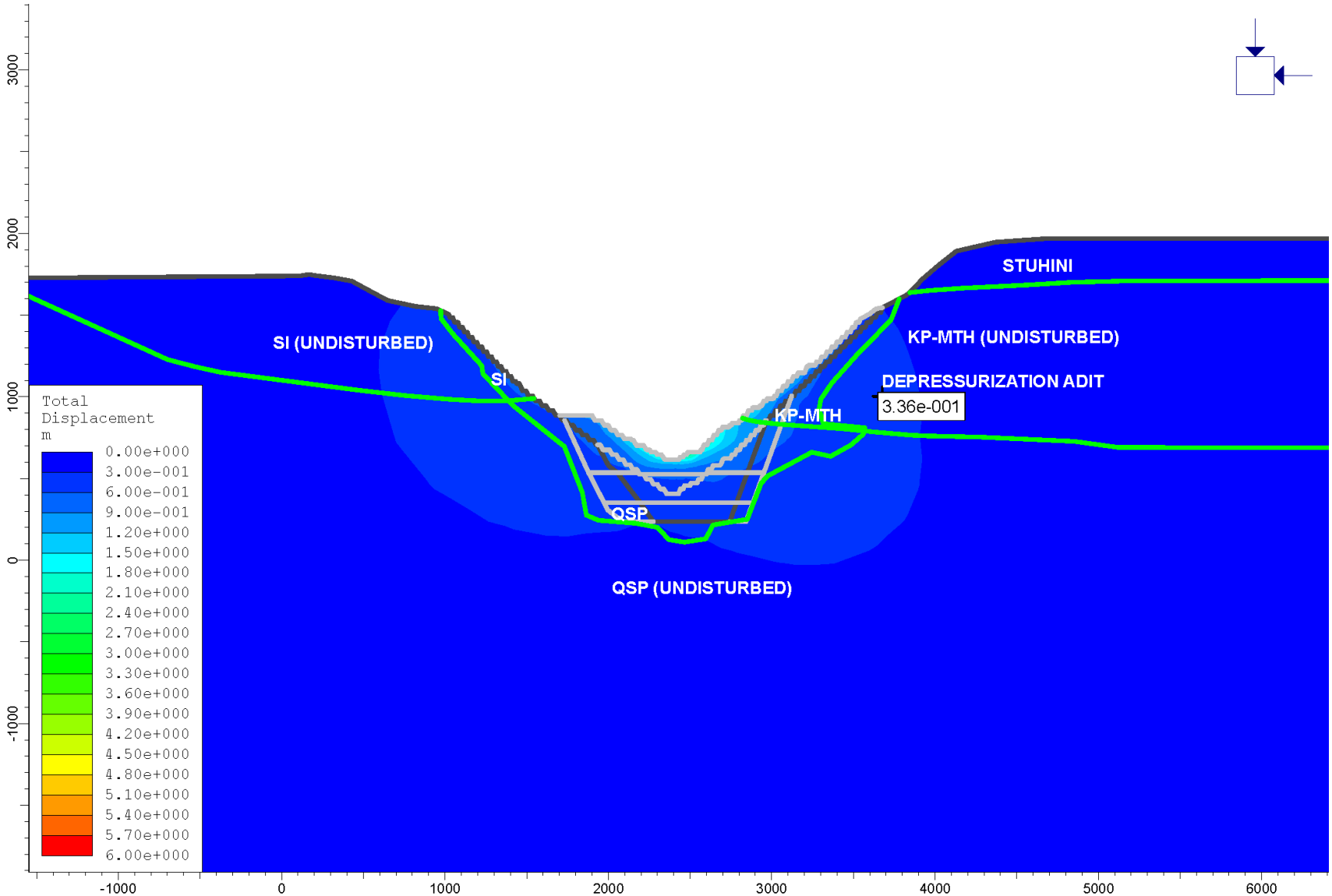

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 7

CLIENT:
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PROJECT No.:
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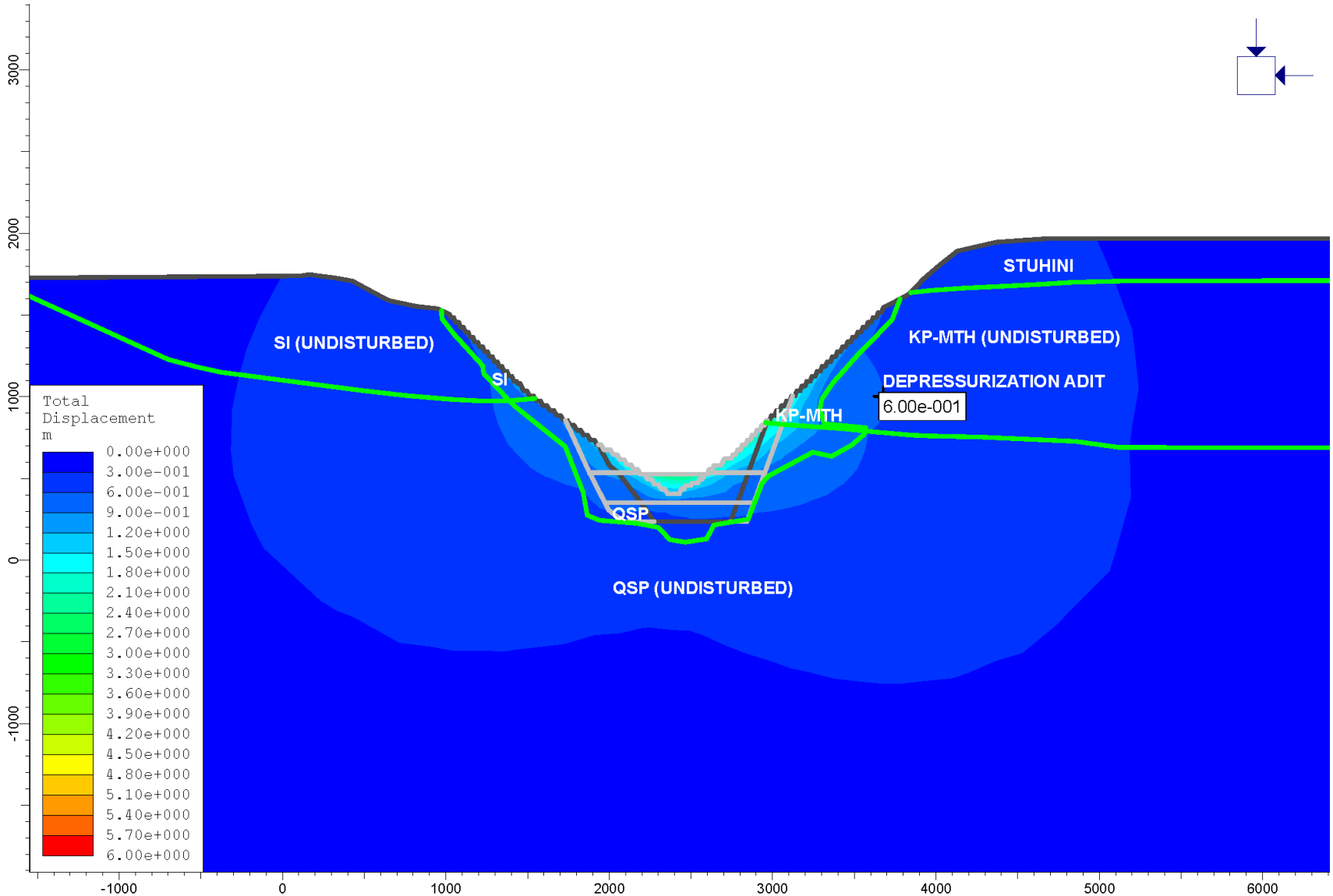
FIGURE No.:
C8



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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 8

CLIENT:
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FIGURE No.:
C9

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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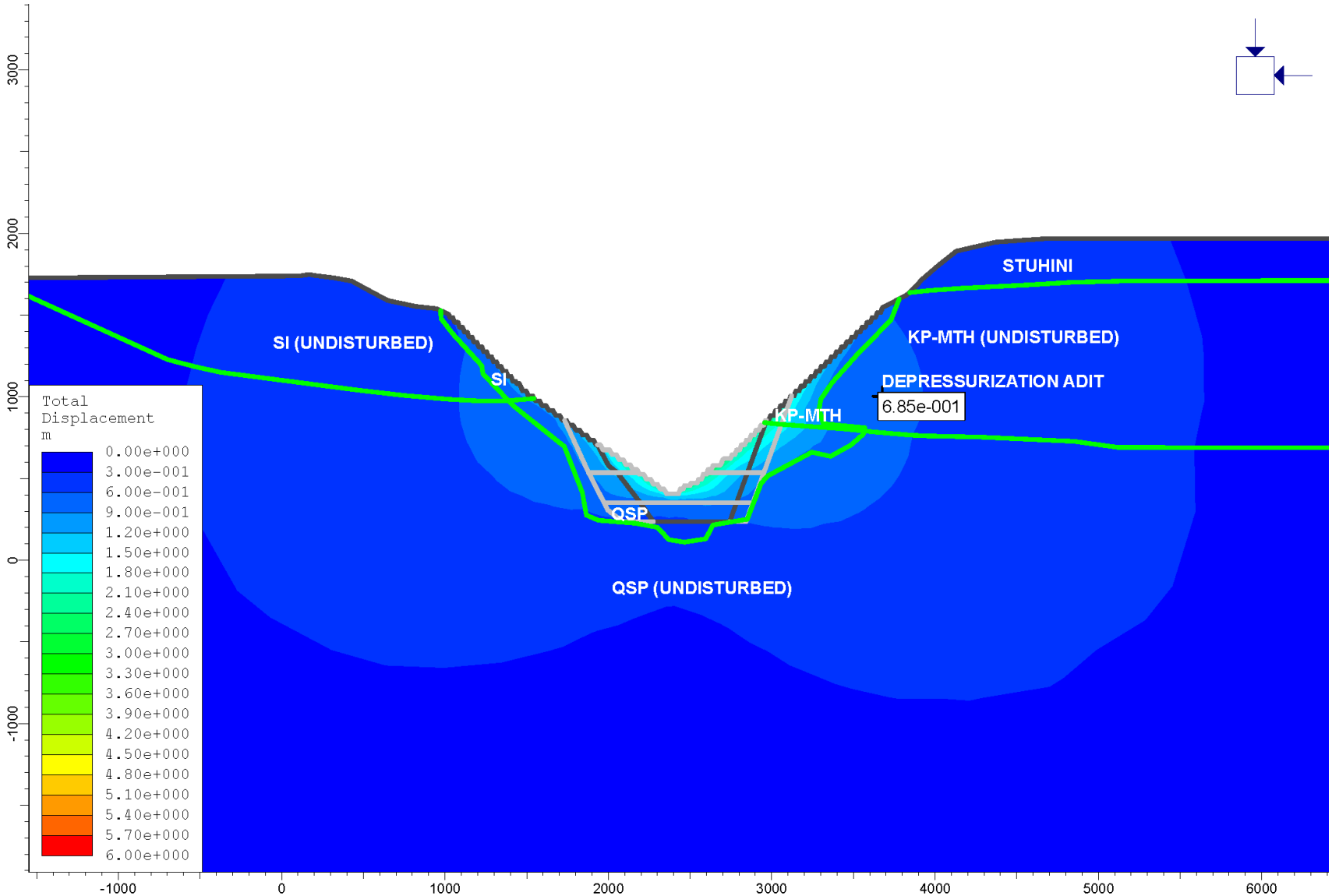

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT , DRY CASE – STAGE 9

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FIGURE No.:
C10

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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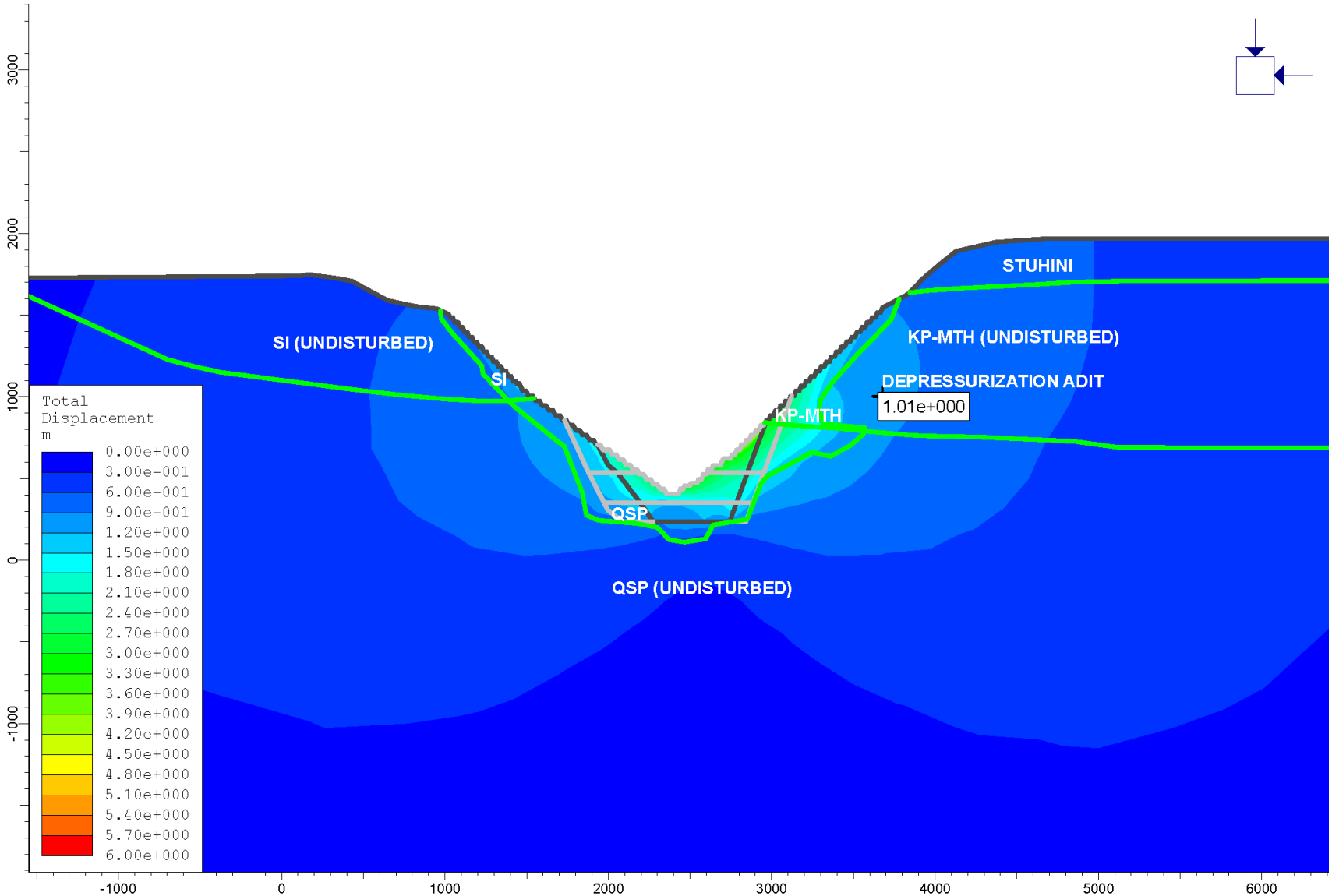

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 10

CLIENT:
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PROJECT No.:
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FIGURE No.:
C11

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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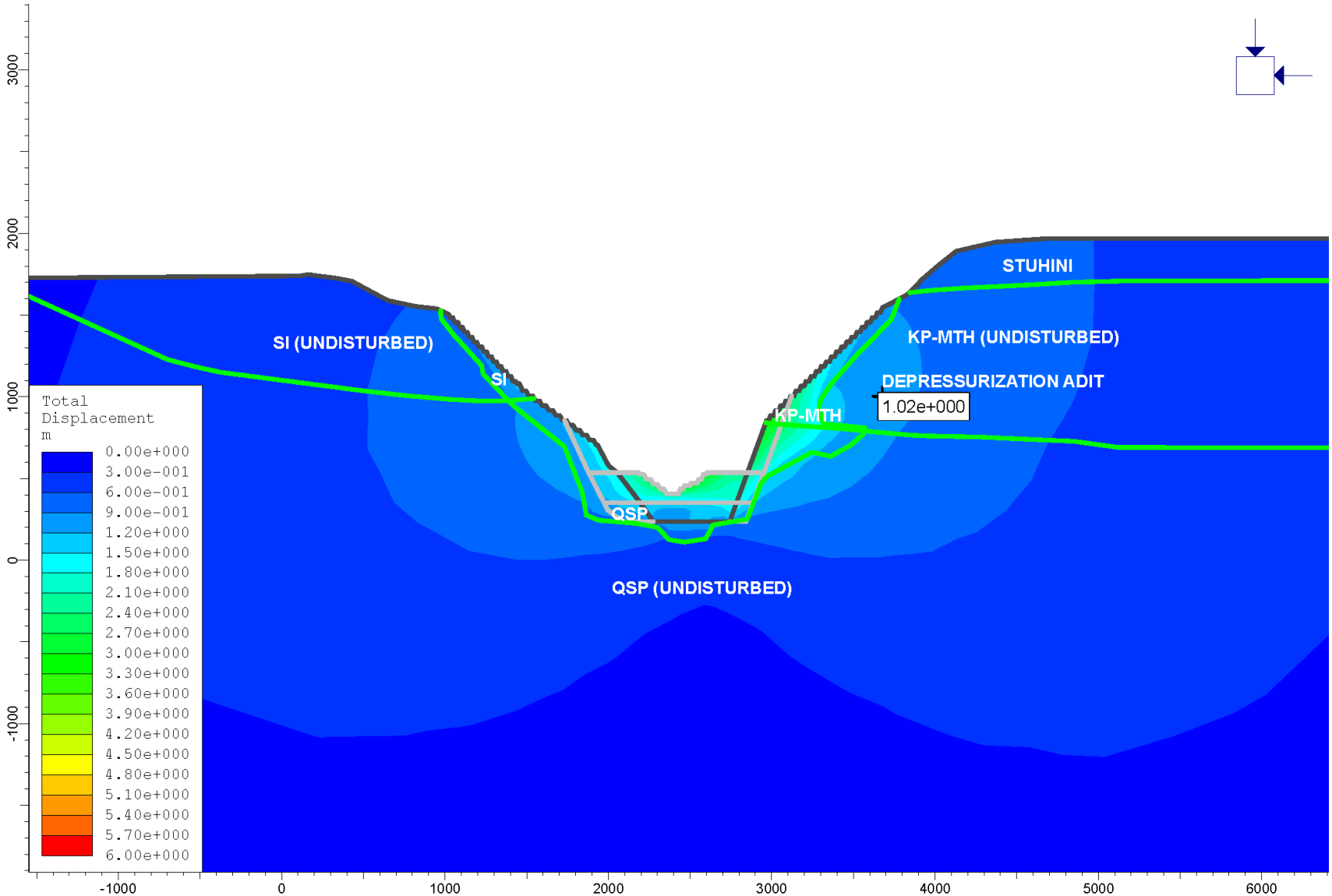

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 11

CLIENT:
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0638-013-31

FIGURE No.:
C12

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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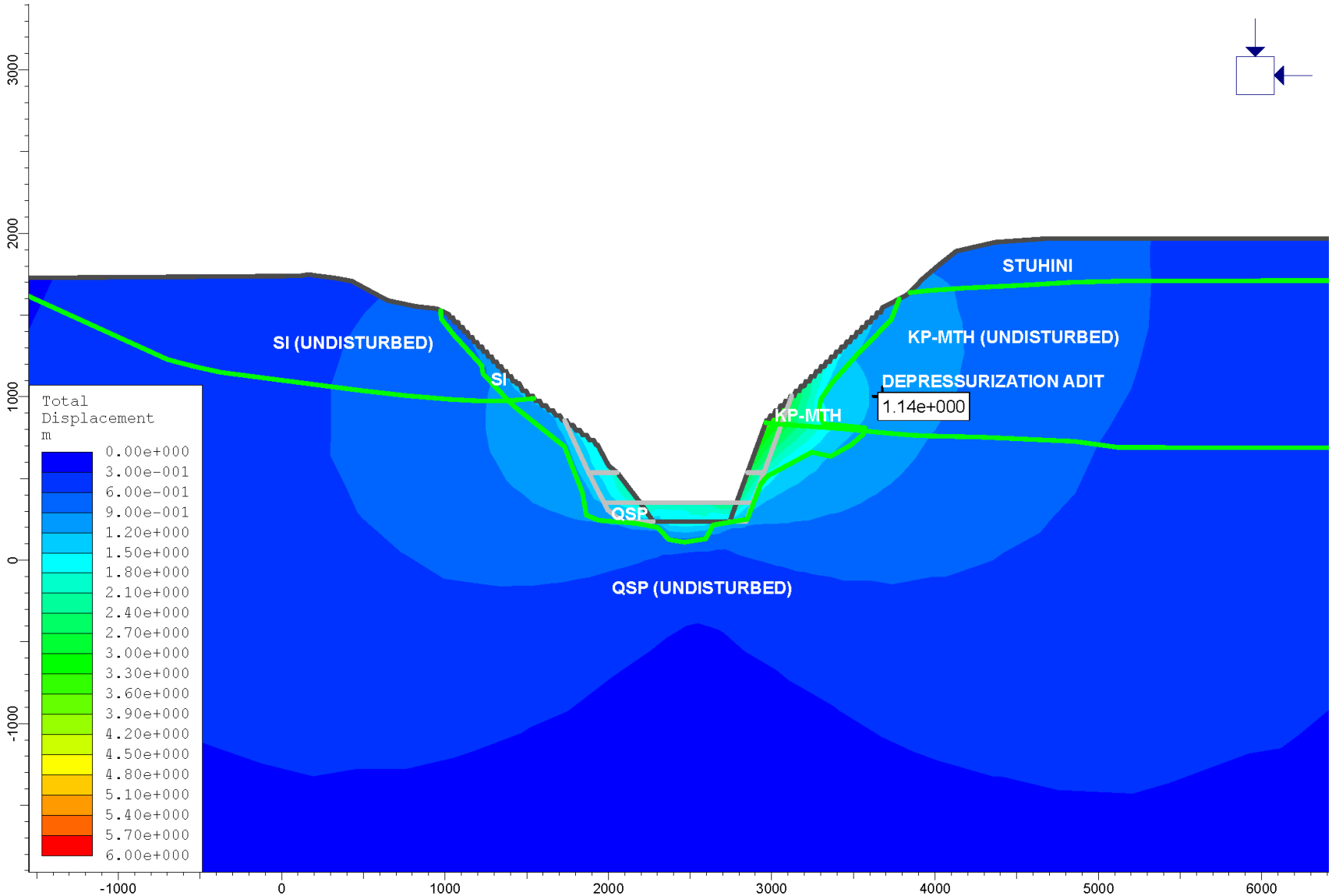

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 12

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
C13

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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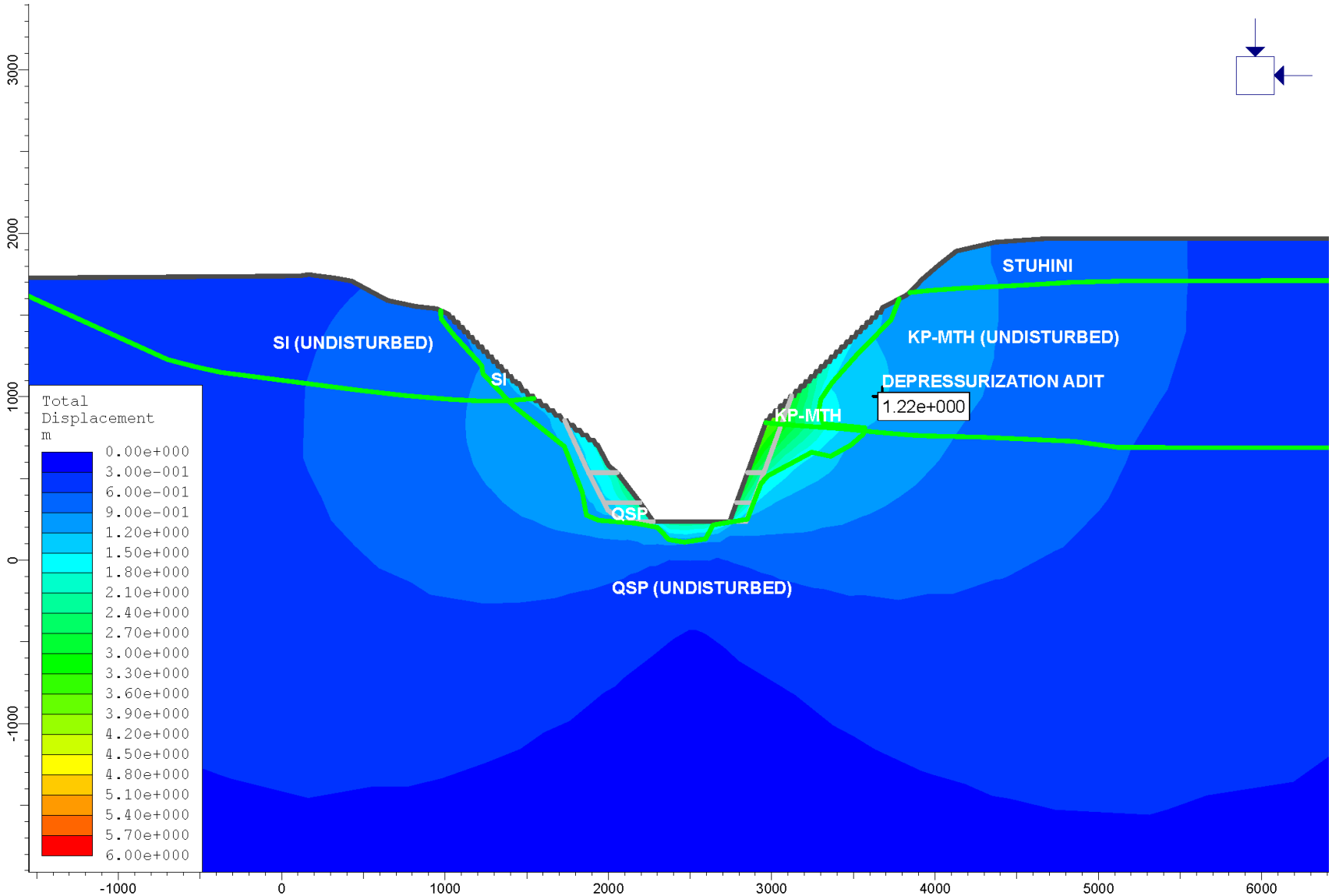

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, DRY CASE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C14

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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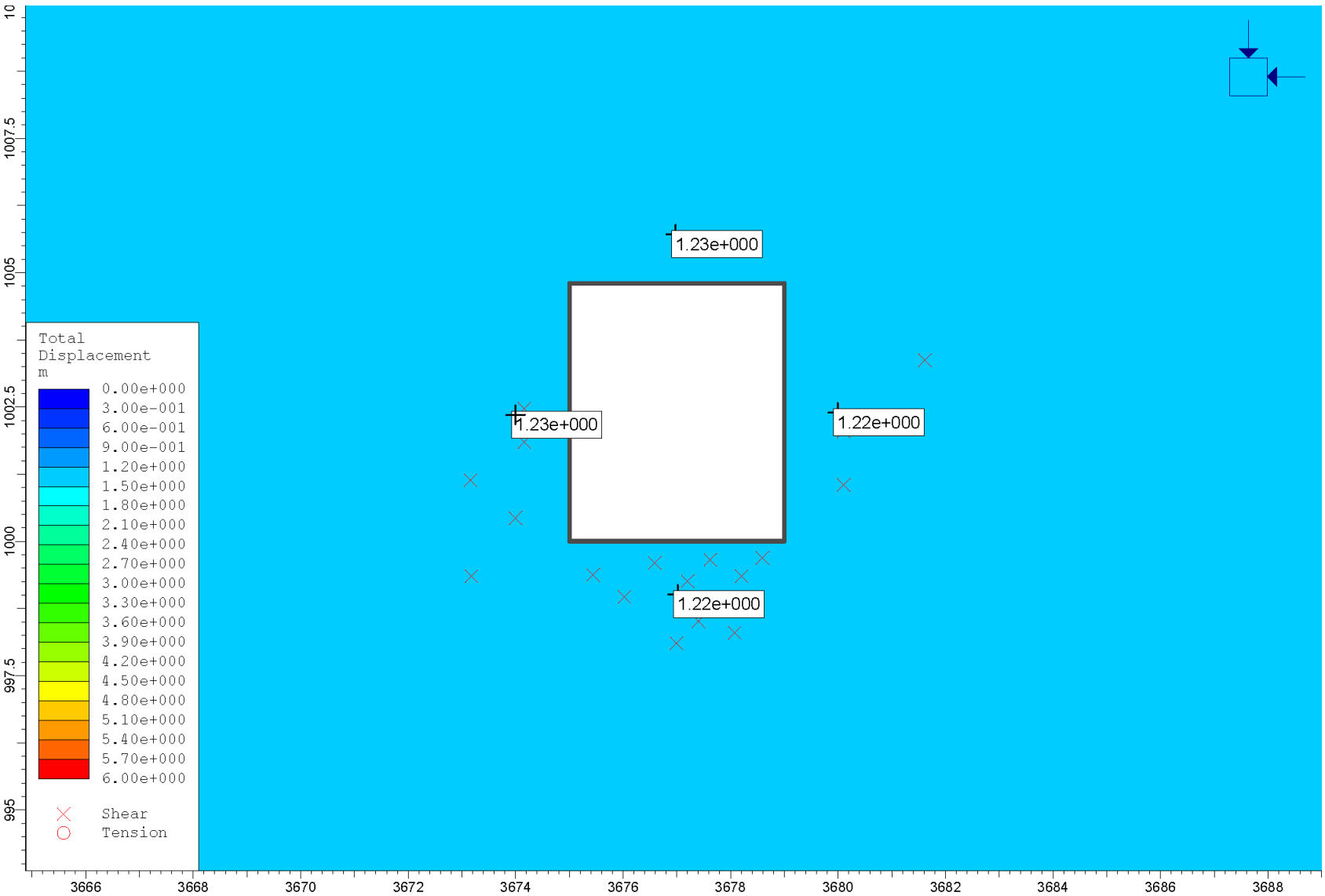

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT AROUND DEWATERING ADIT, DRY CASE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C15

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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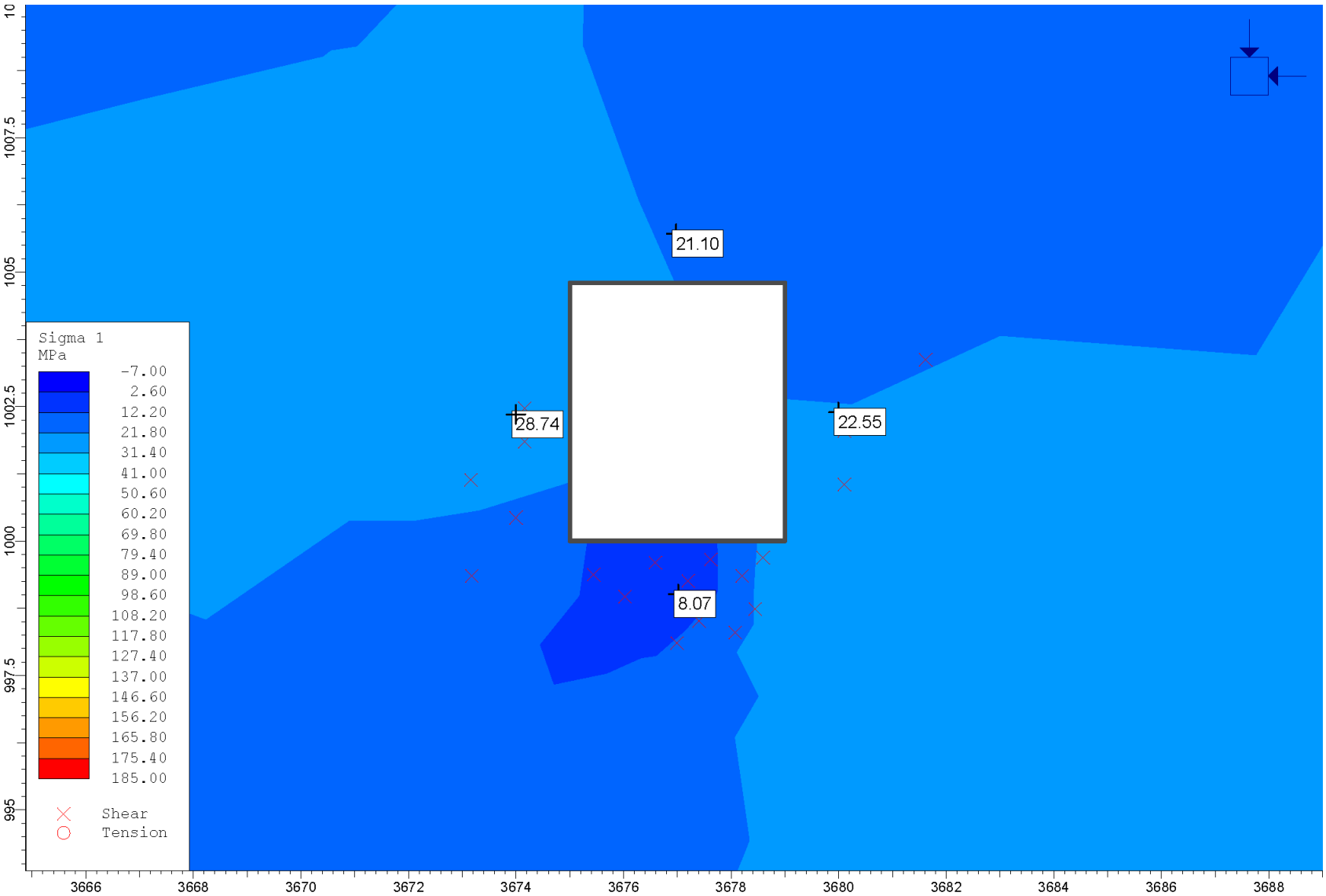

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A - MAJOR PRINCIPAL STRESS AROUND THE DEWATERING ADIT, DRY CASE - STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C16

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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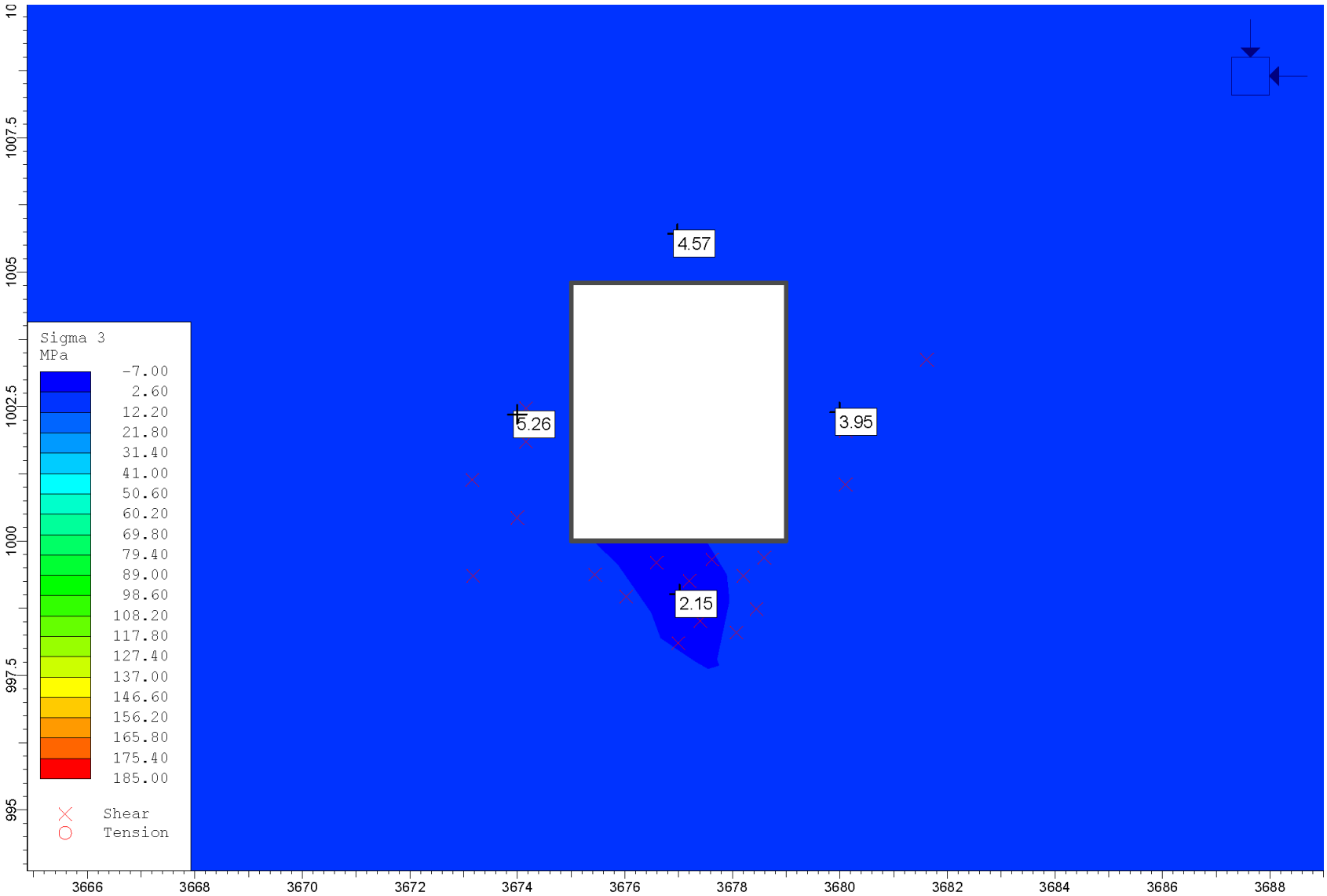

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A - MINOR PRINCIPAL STRESS AROUND THE DEWATERING ADIT, DRY CASE - STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
C17

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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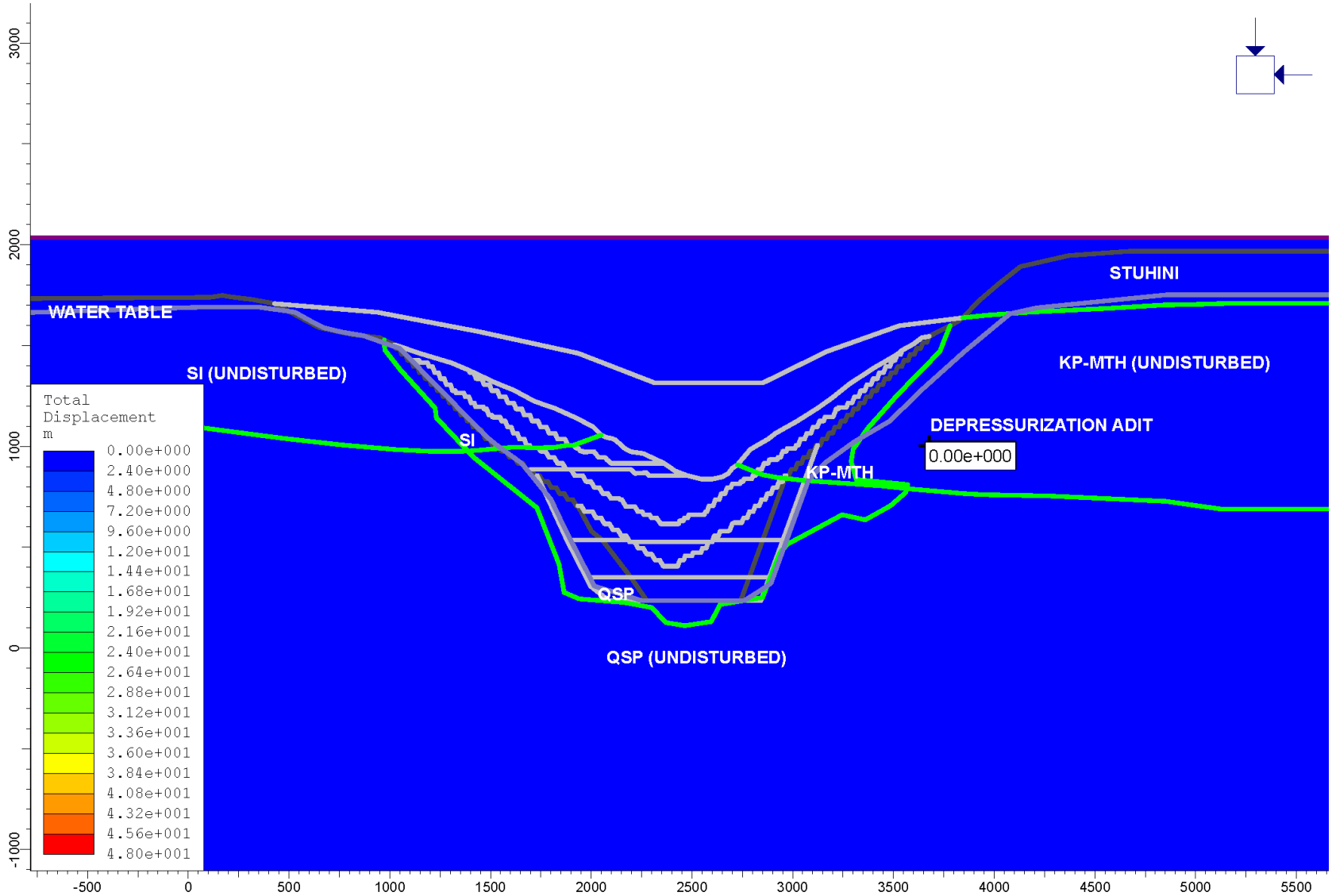

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 1

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
C18

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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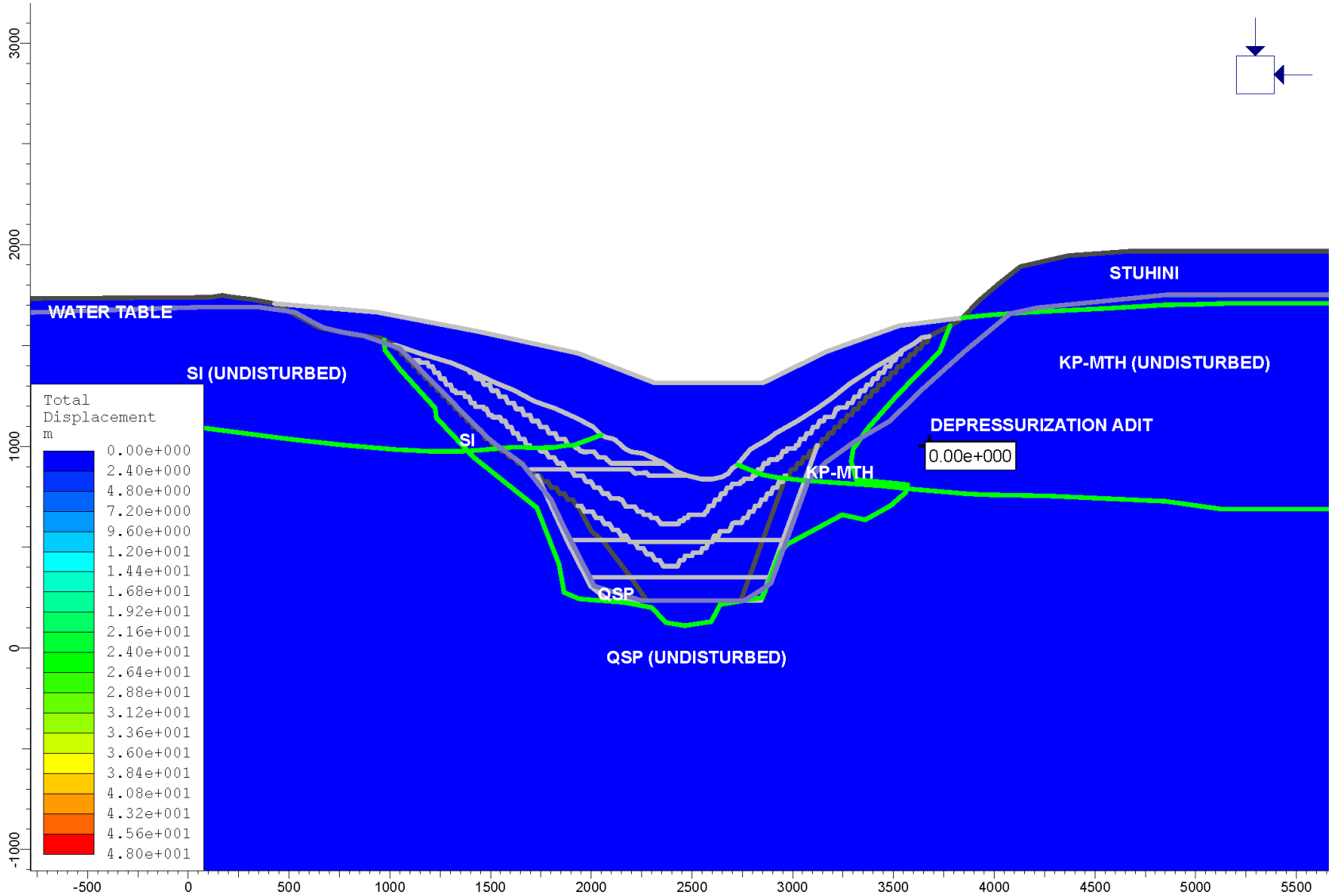

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 2

CLIENT:
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FIGURE No.:
C19

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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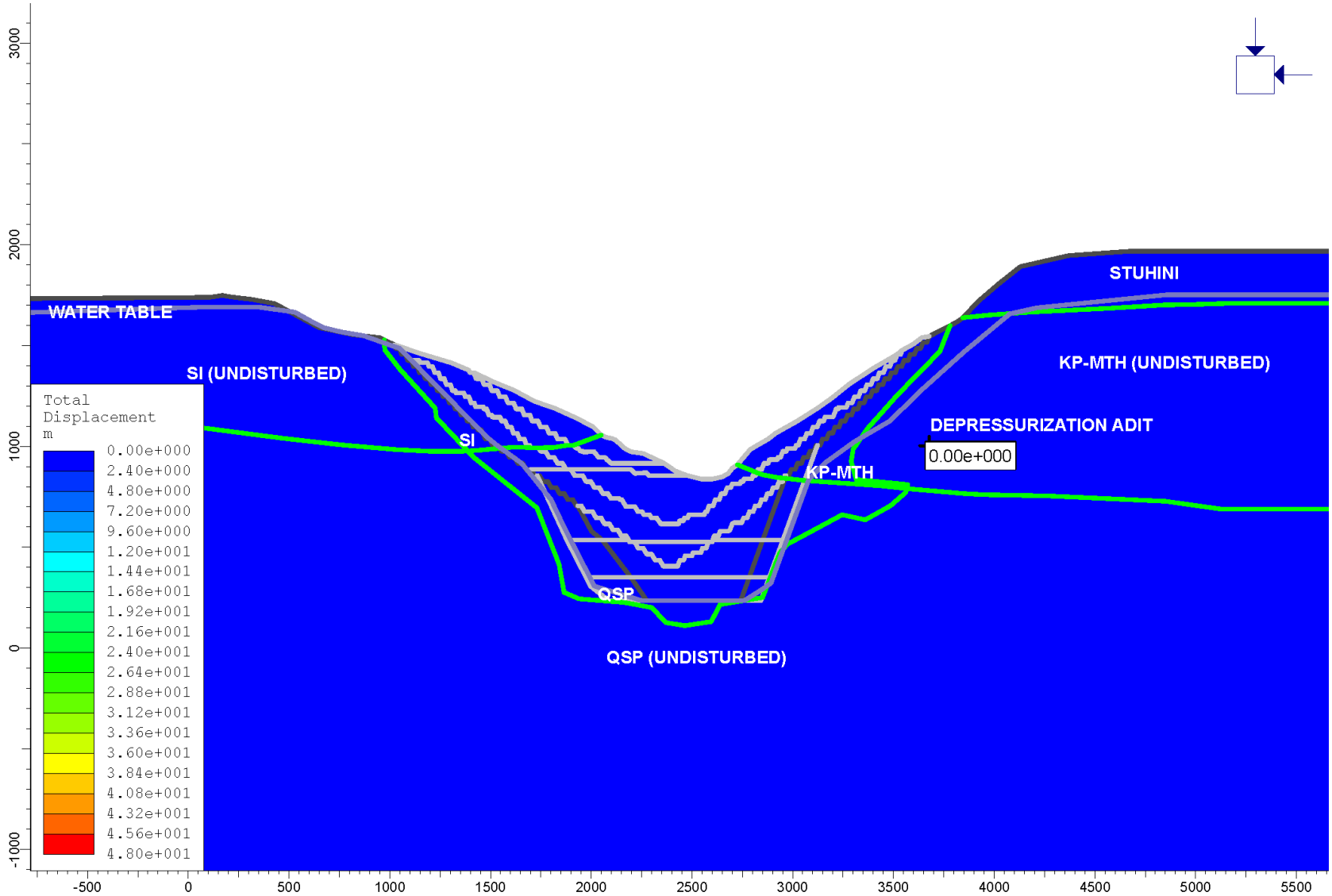

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 3

CLIENT:
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FIGURE No.:
C20

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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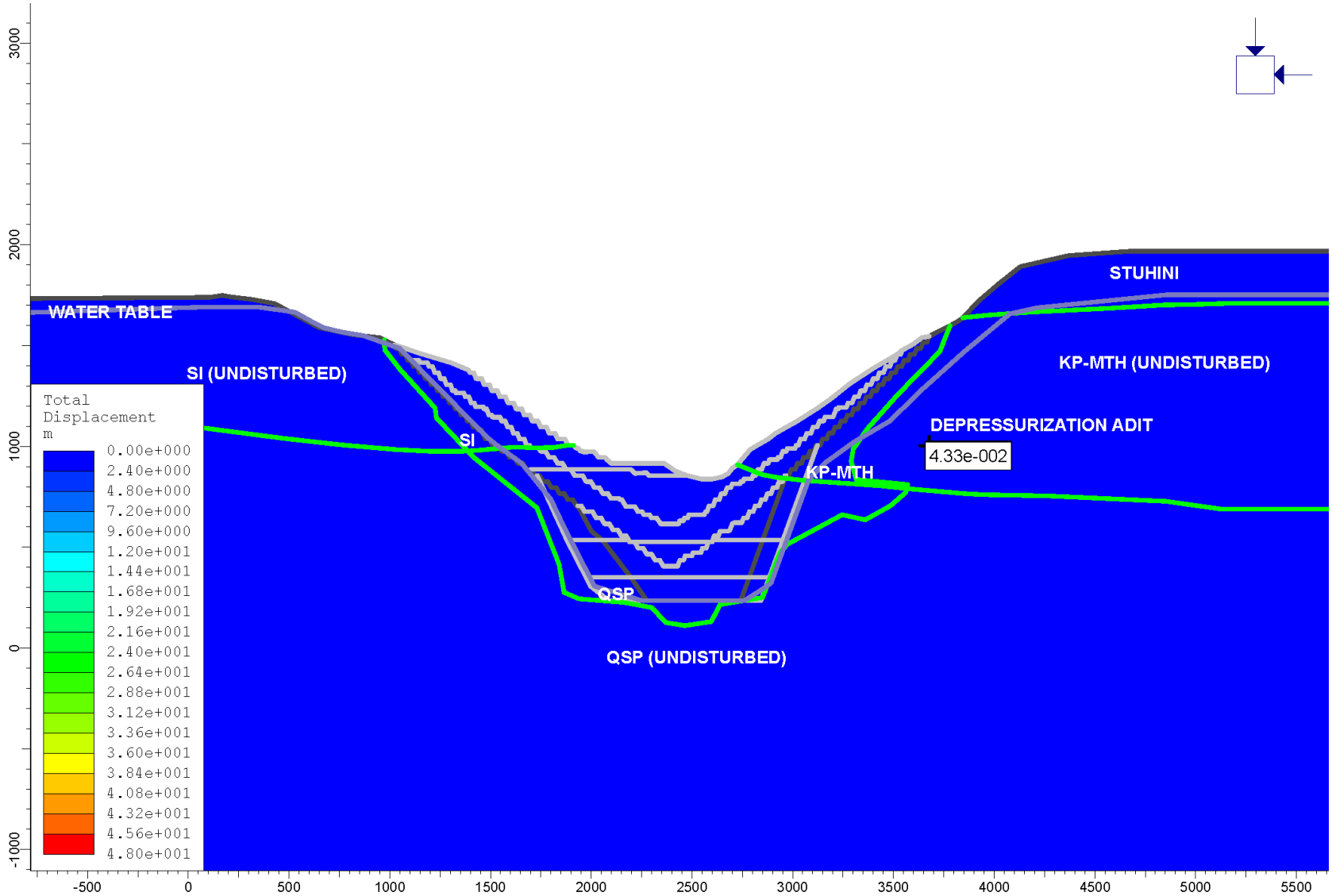

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 4

CLIENT:
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PROJECT No.:
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FIGURE No.:
C21

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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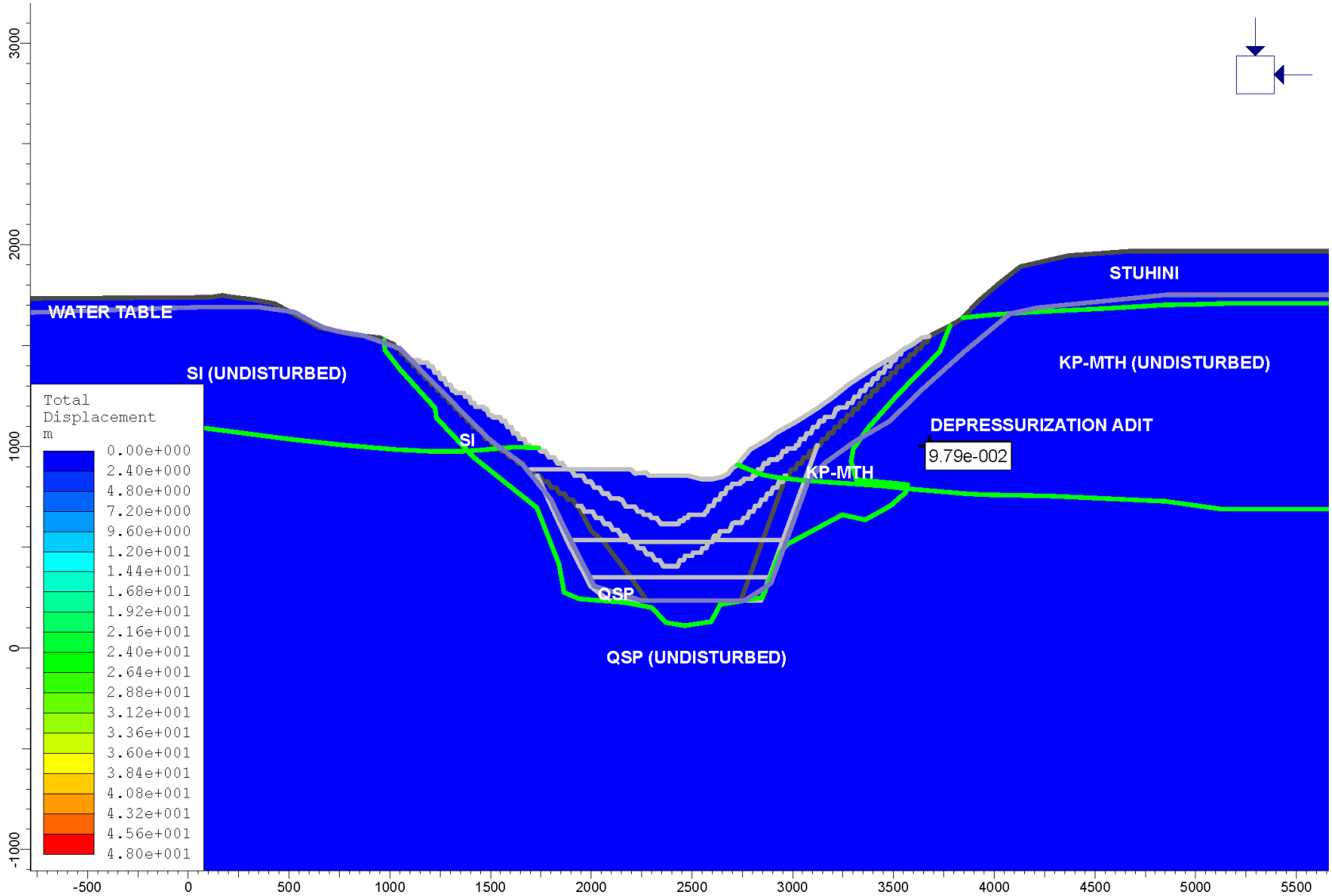

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 5

CLIENT:
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PROJECT No.:
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FIGURE No.:
C22

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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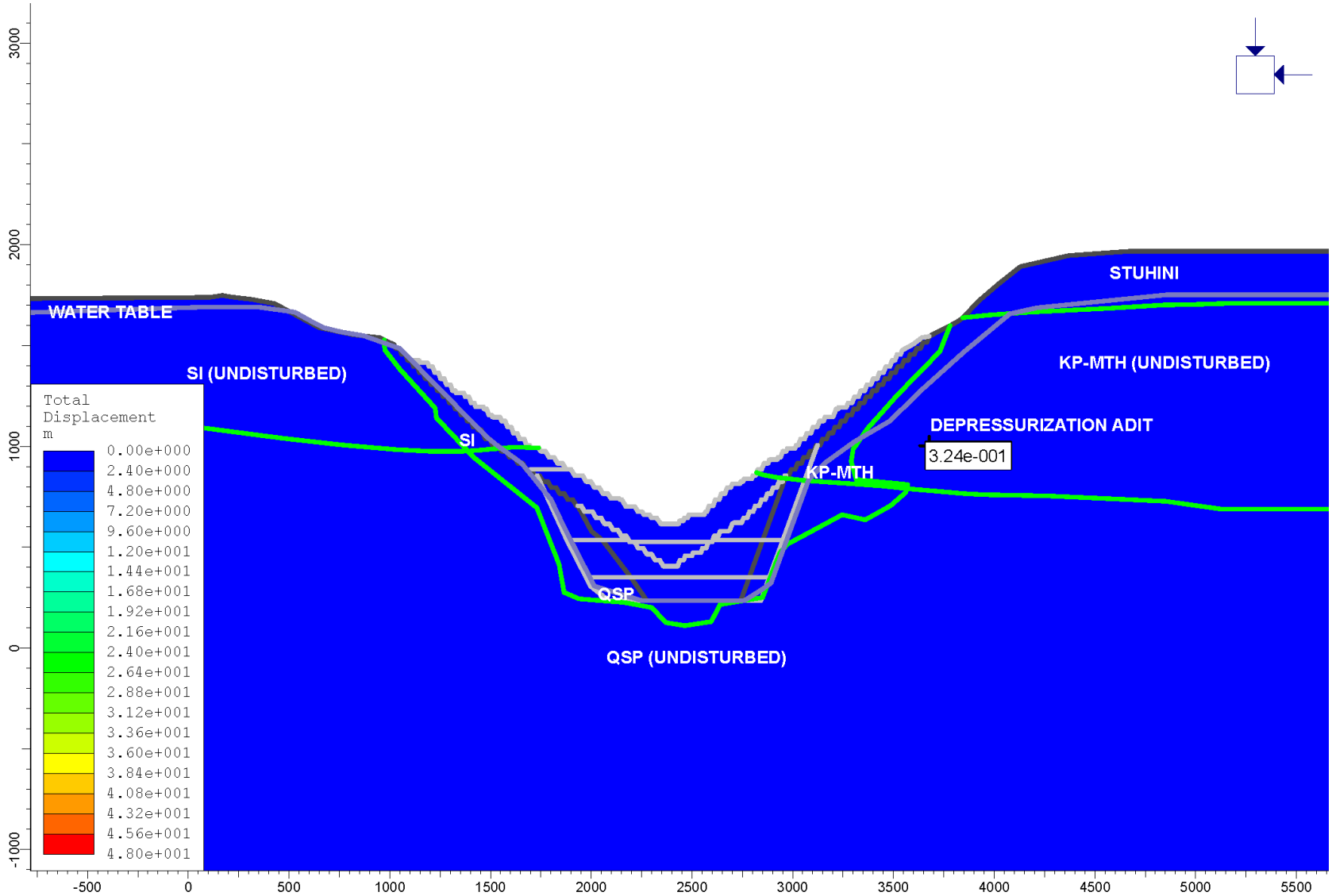

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 6

CLIENT:
SEABRIDGE GOLD INC.

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FIGURE No.:
C23

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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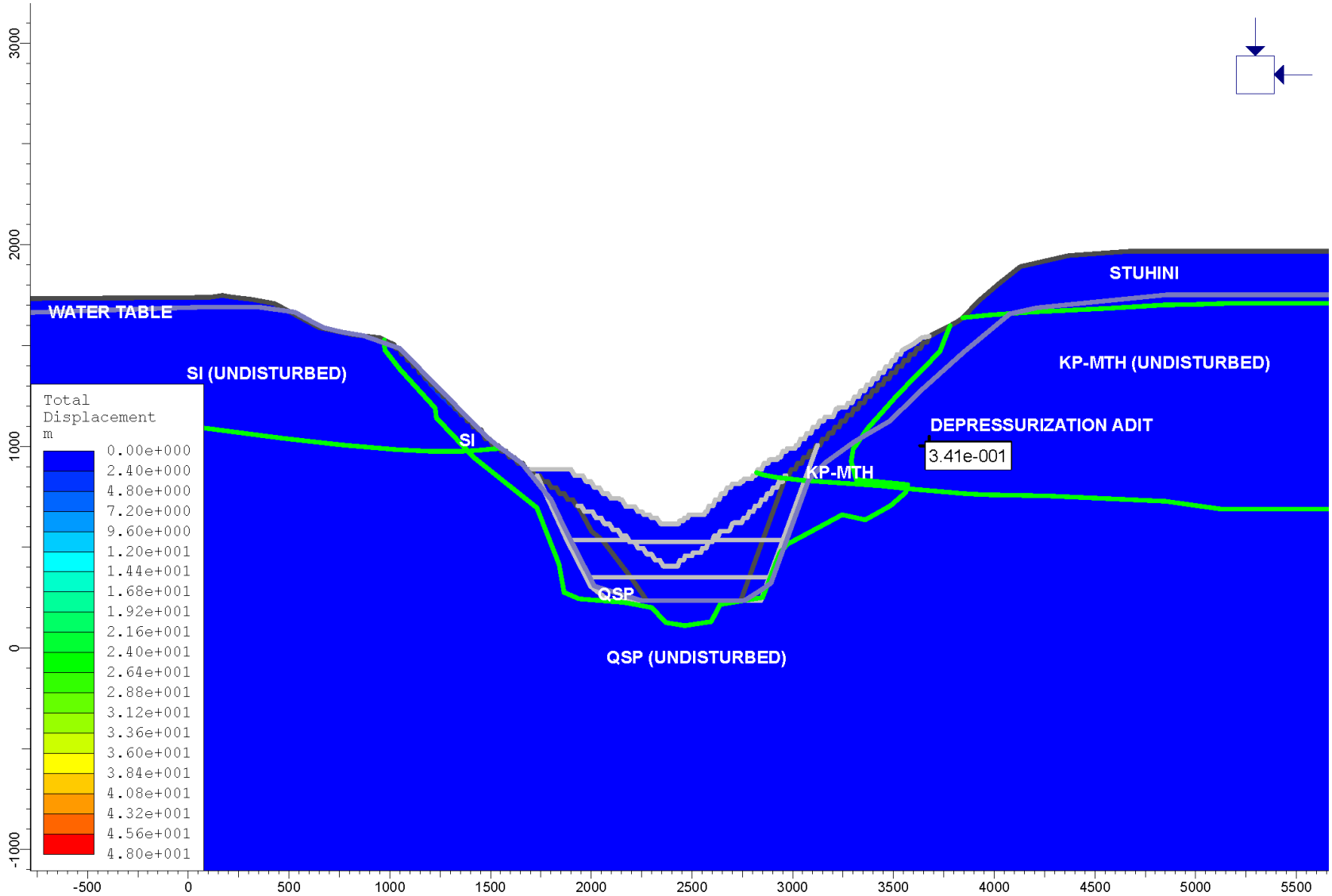

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 7

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
C24

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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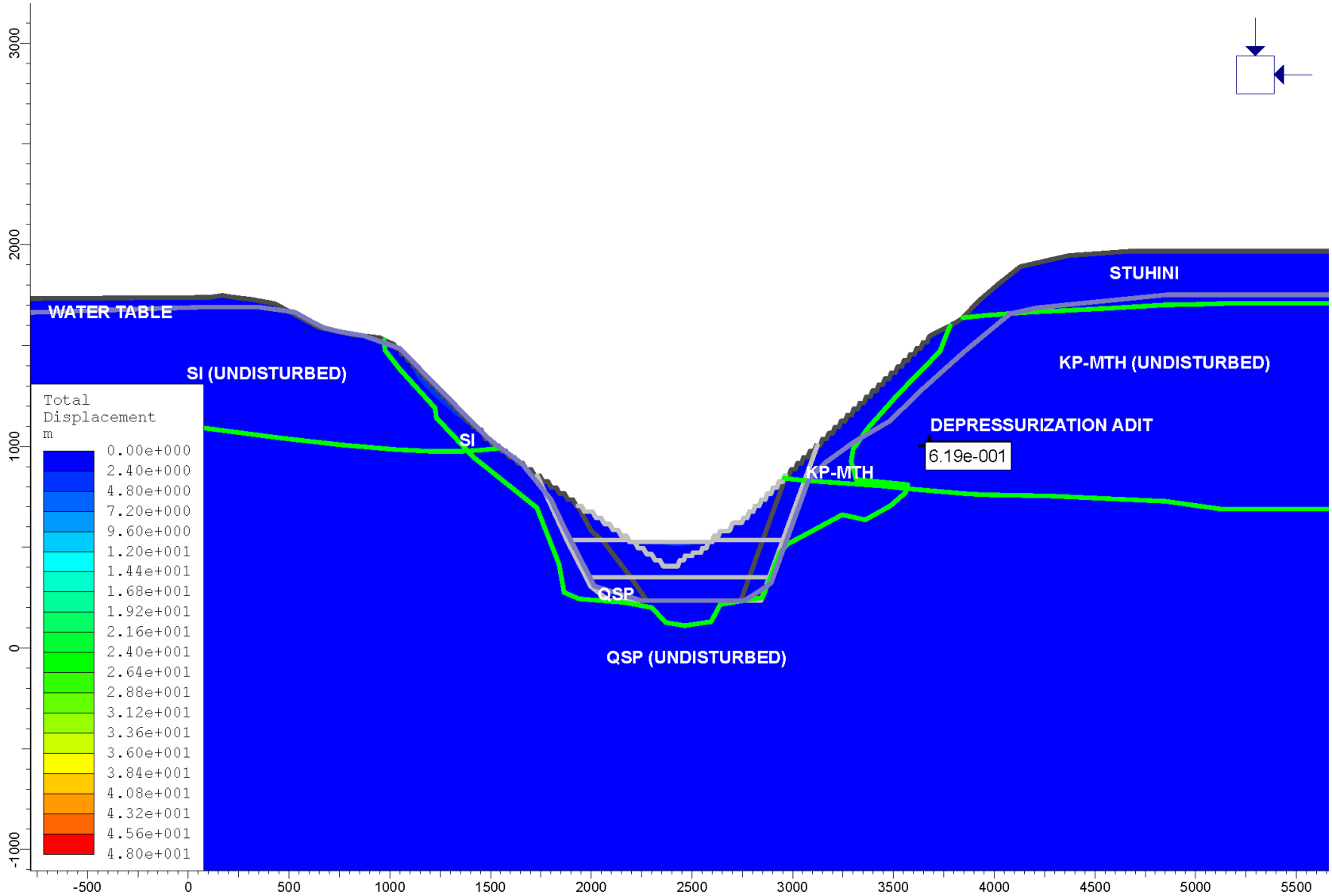

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 8

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
C25

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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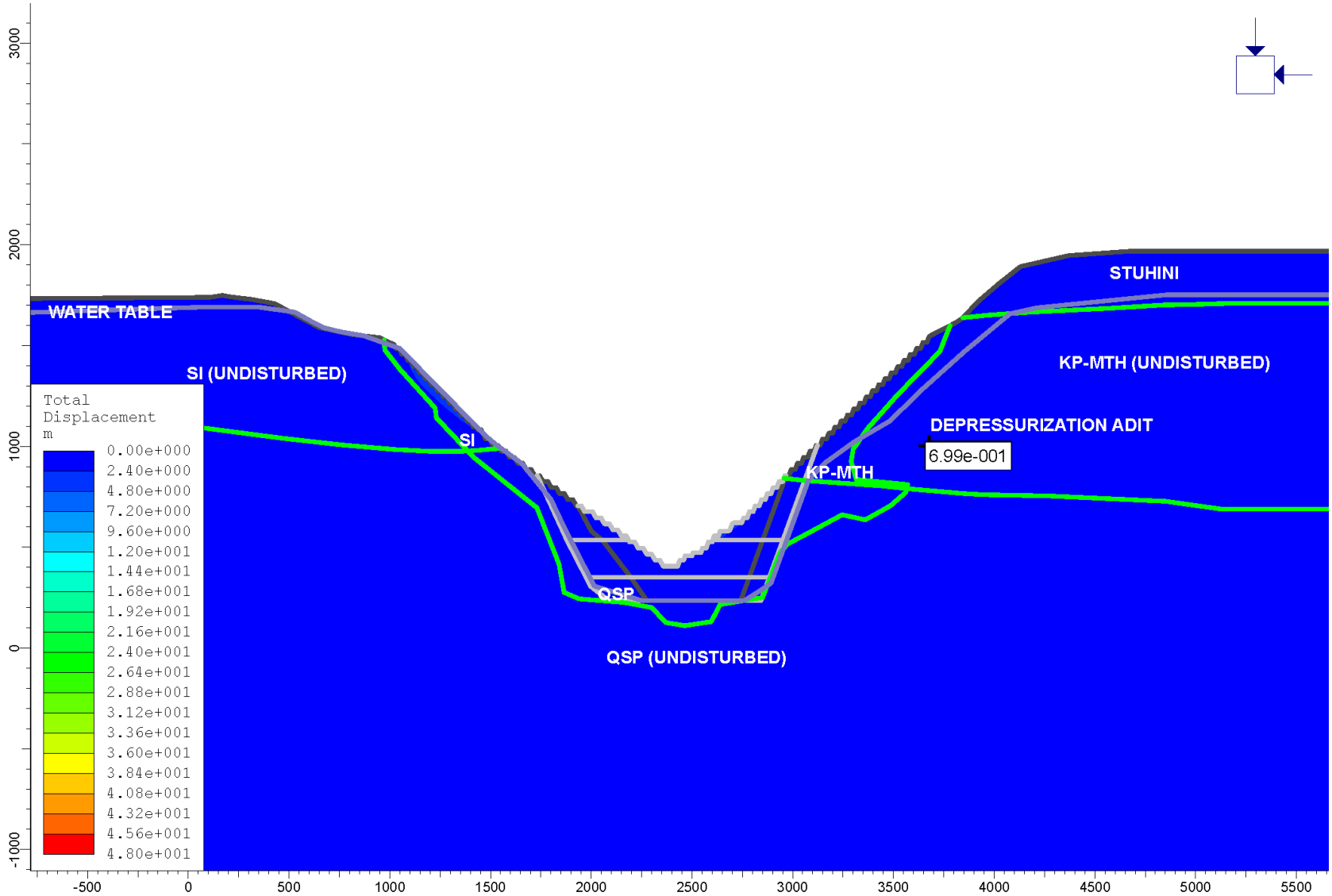

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 9

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C26

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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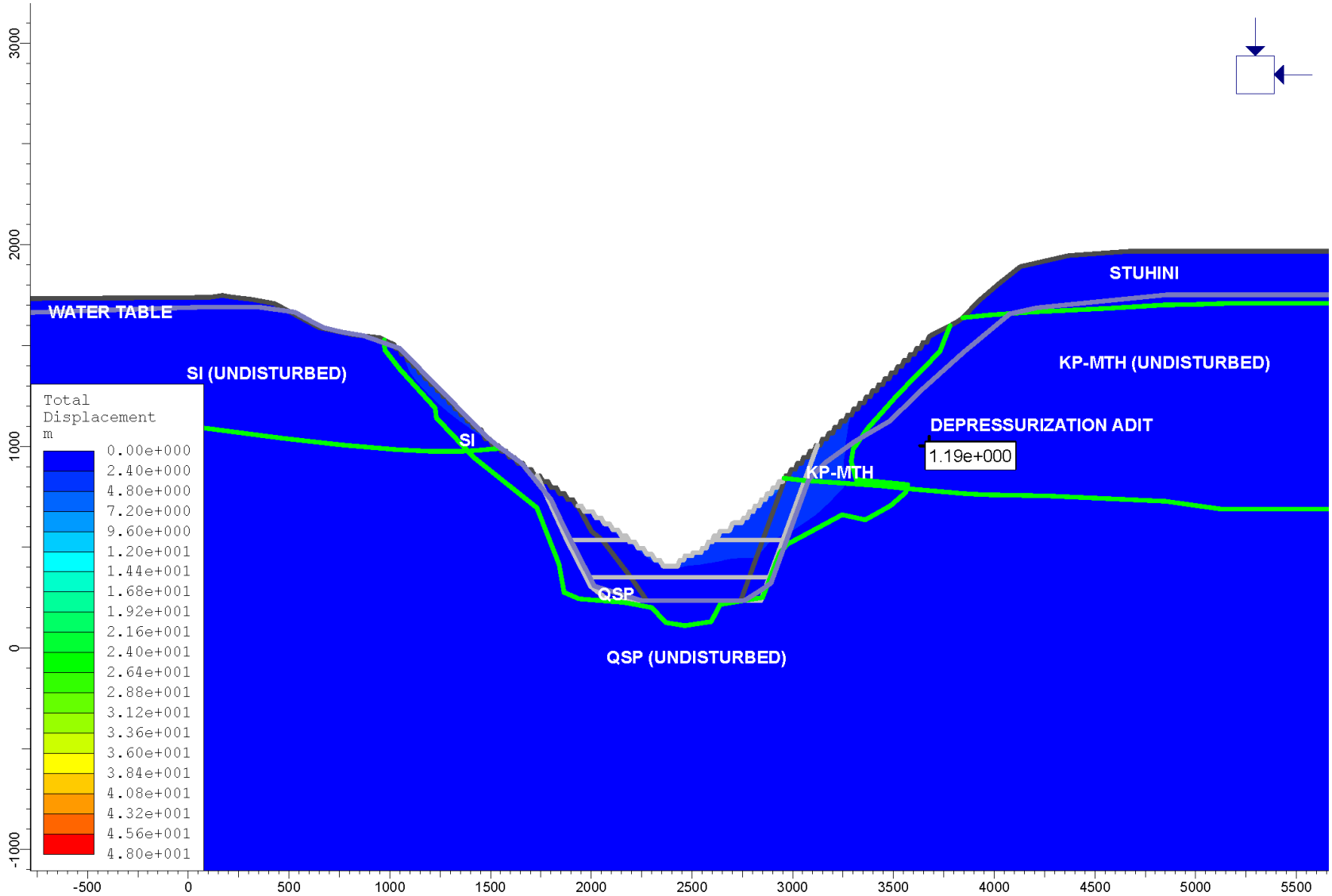

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 10

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
C27

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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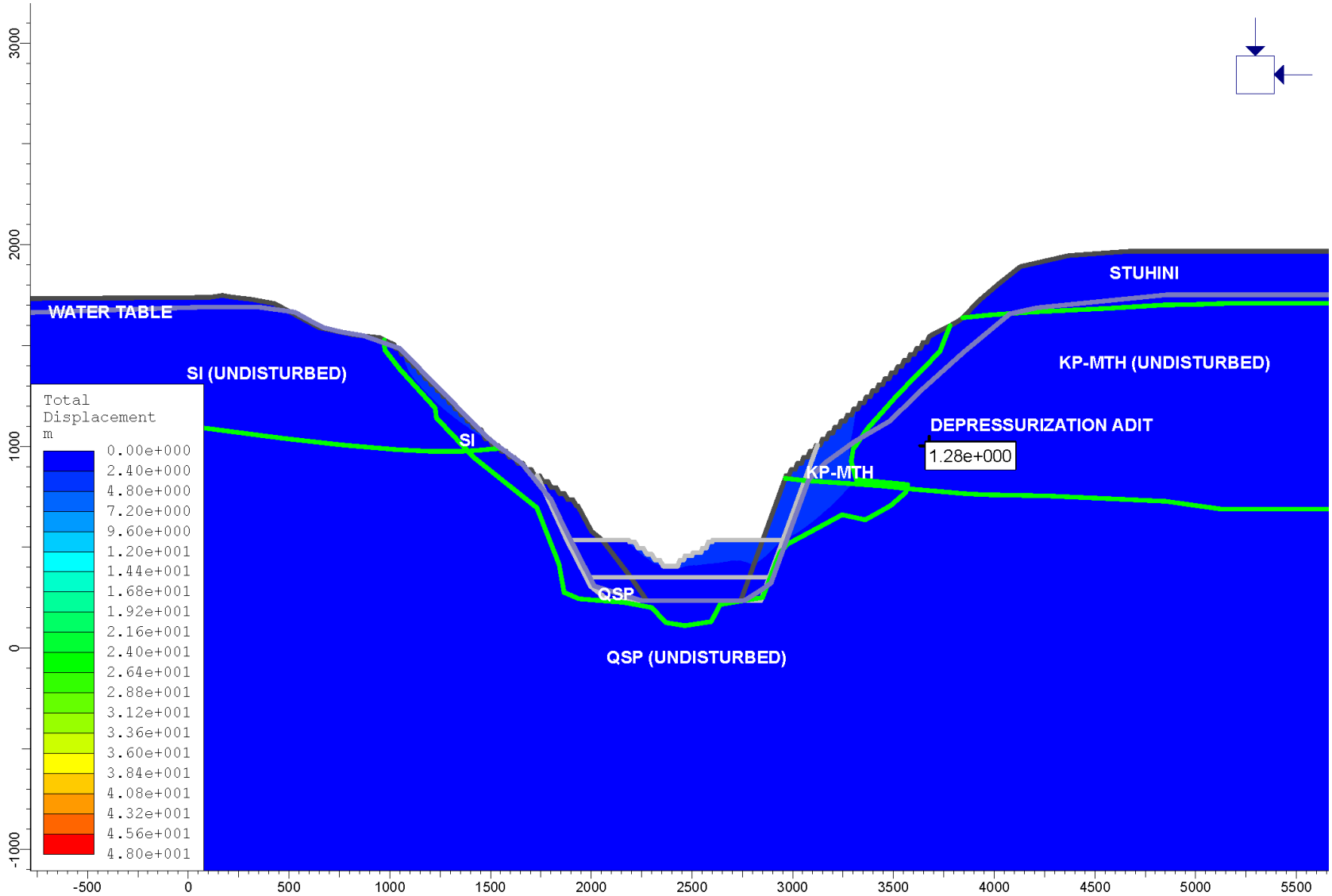

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 11

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C28

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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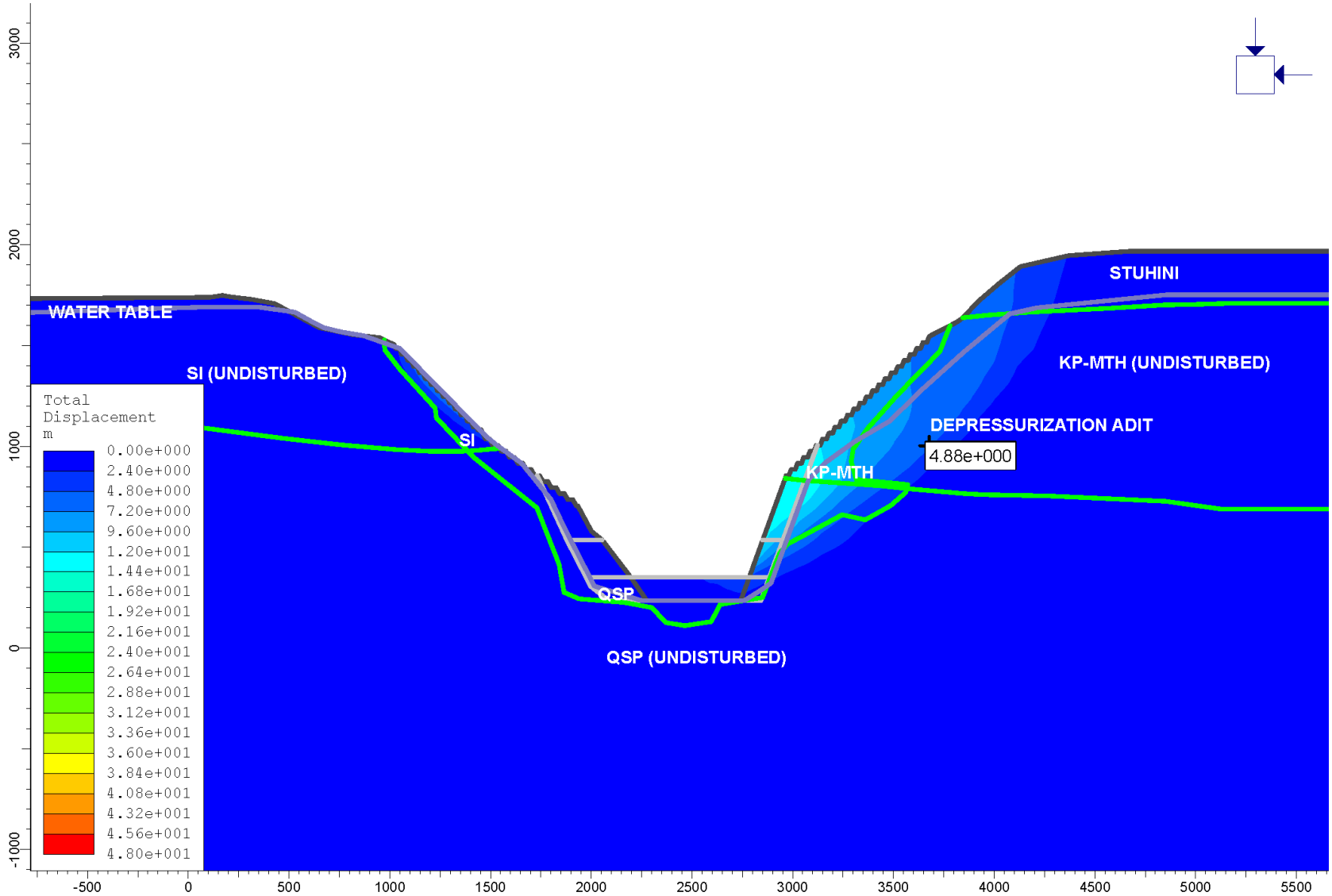

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 12

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C29

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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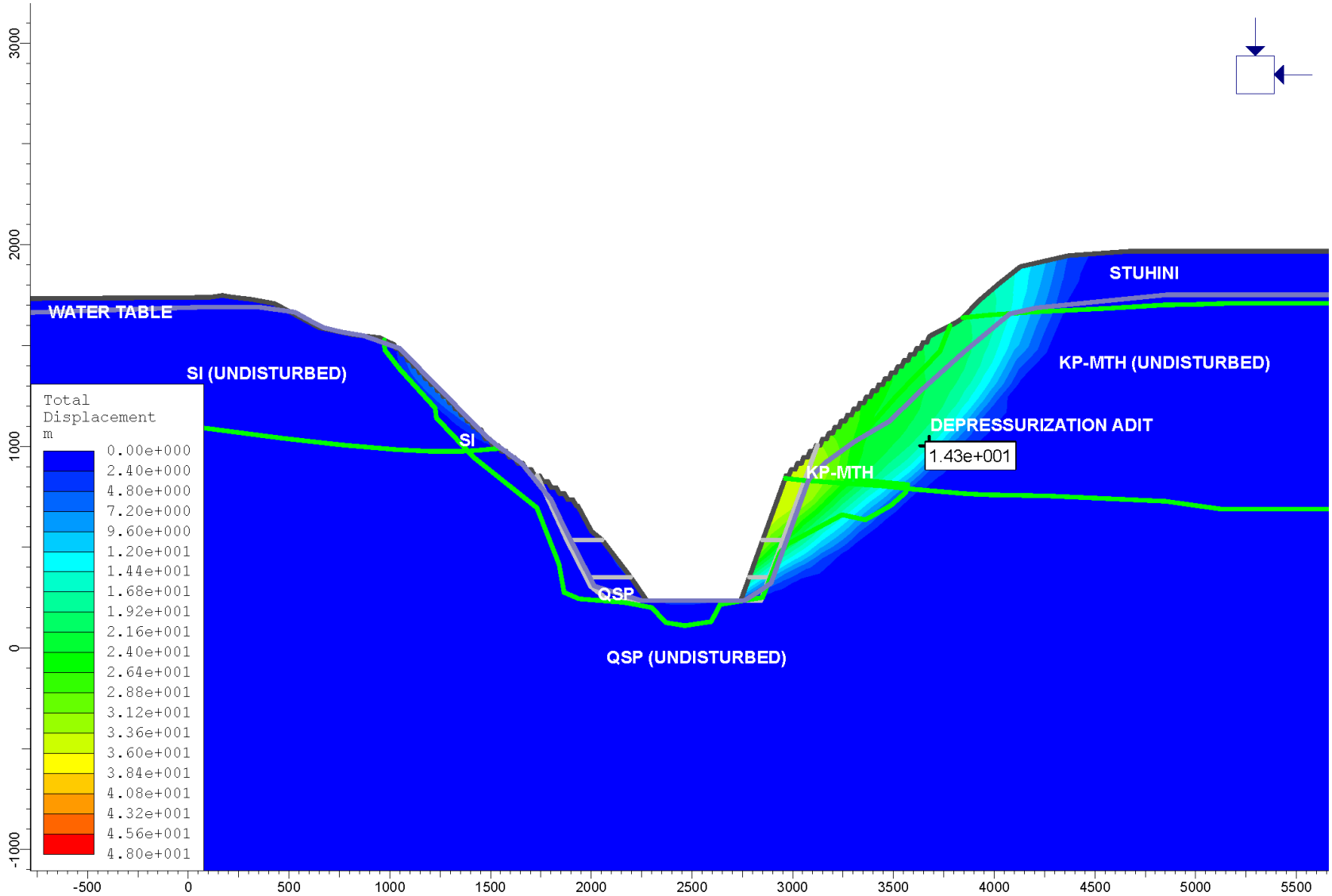

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, BASE CASE WATER TABLE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C30

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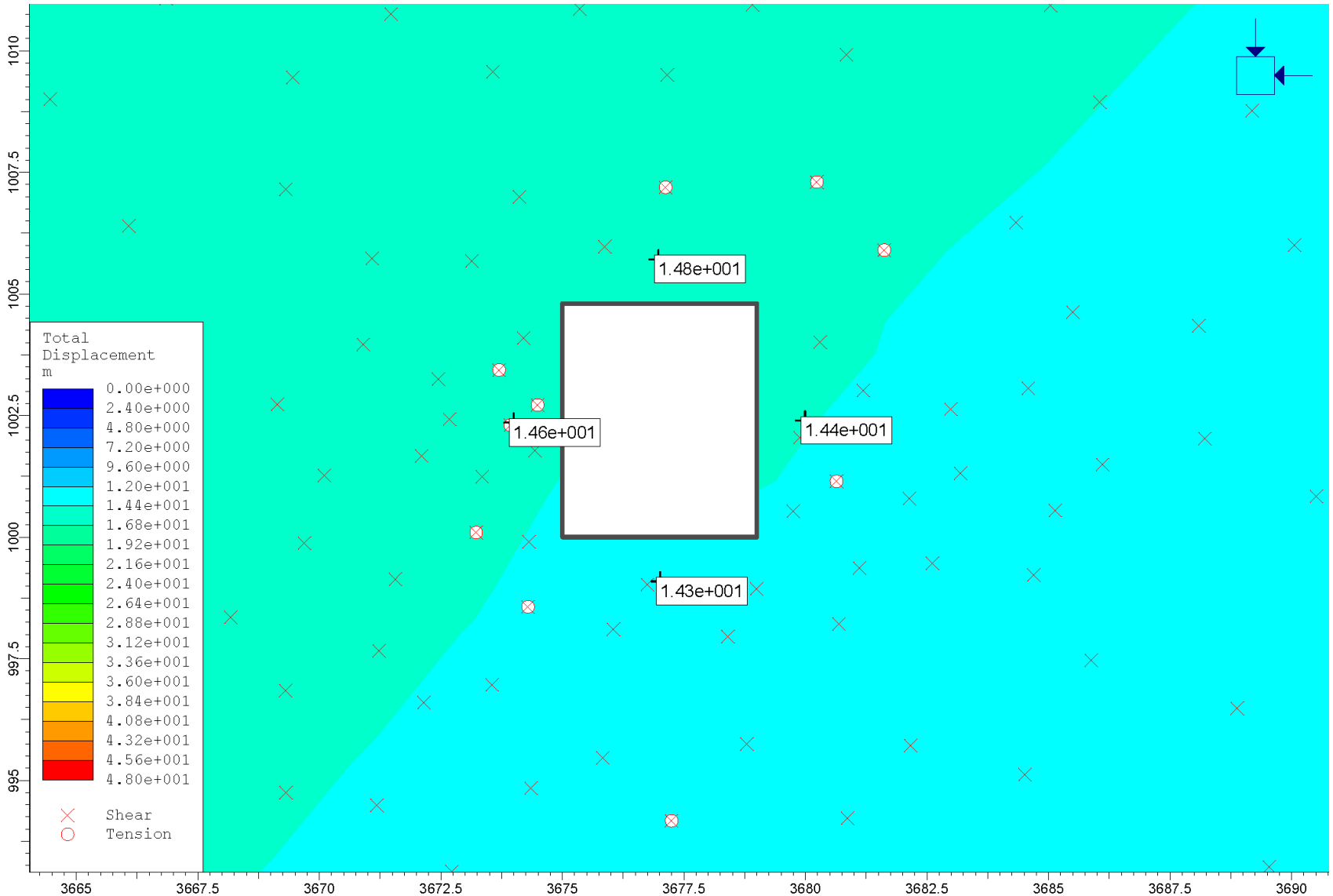

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT AROUND DEWATERING ADIT, BASE CASE WATER TABLE – STAGE 13

CLIENT:
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PROJECT No.:
0638-013-31

FIGURE No.:
C31

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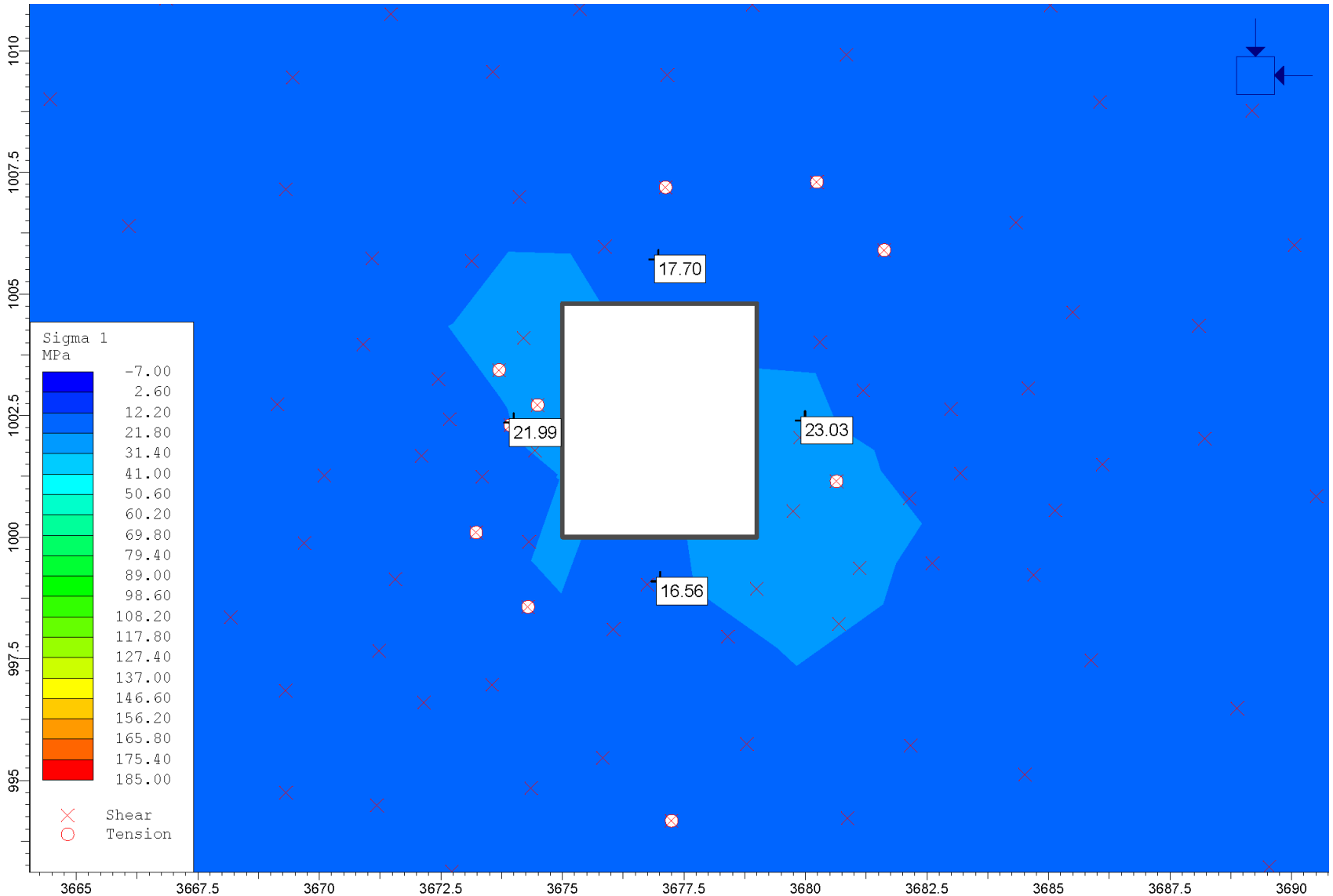

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – MAJOR PRINCIPAL STRESS AROUND DEWATERING ADIT, BASE CASE WATER TABLE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C32

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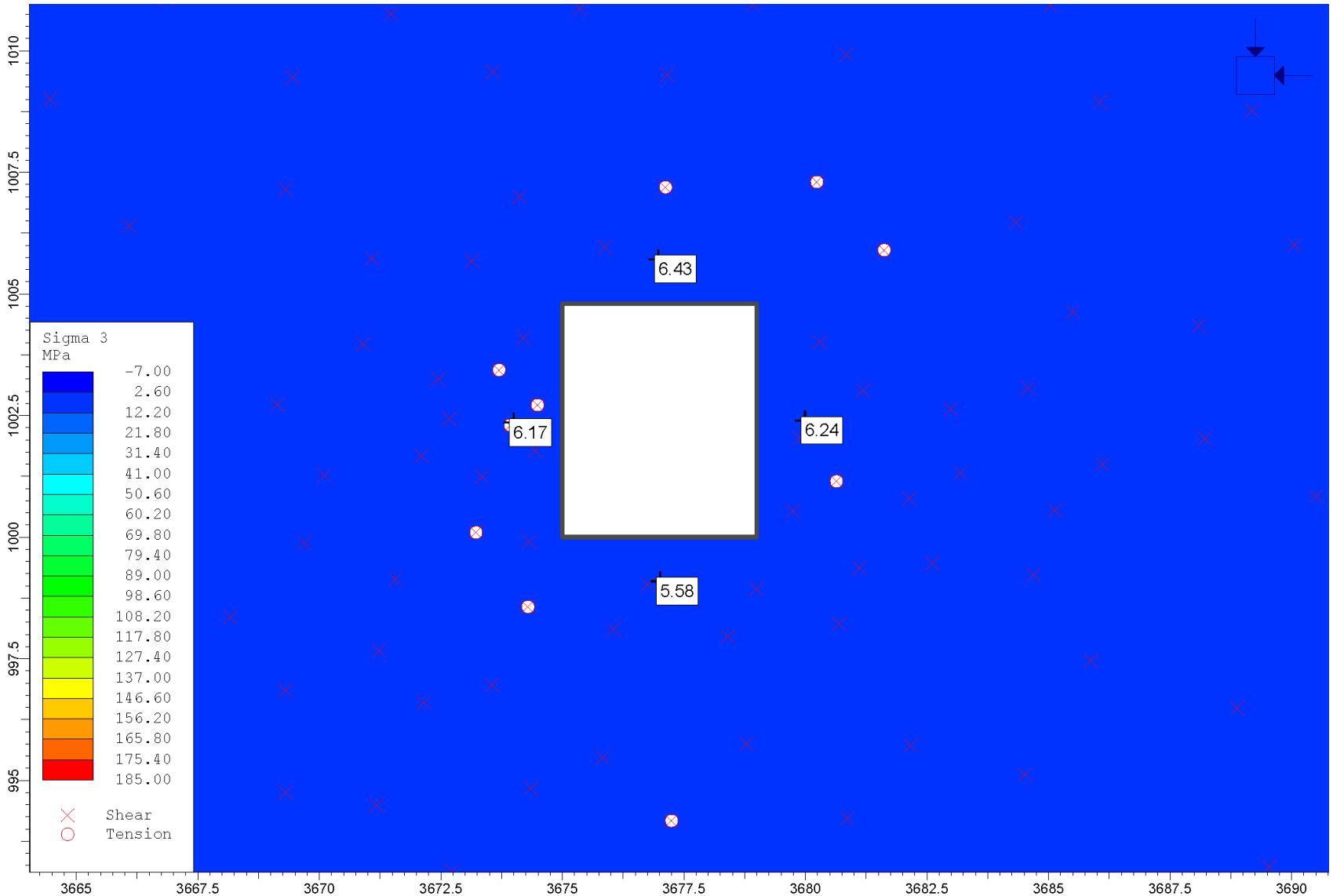

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – MINOR PRINCIPAL STRESS AROUND DEWATERING ADIT, BASE CASE WATER TABLE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C33

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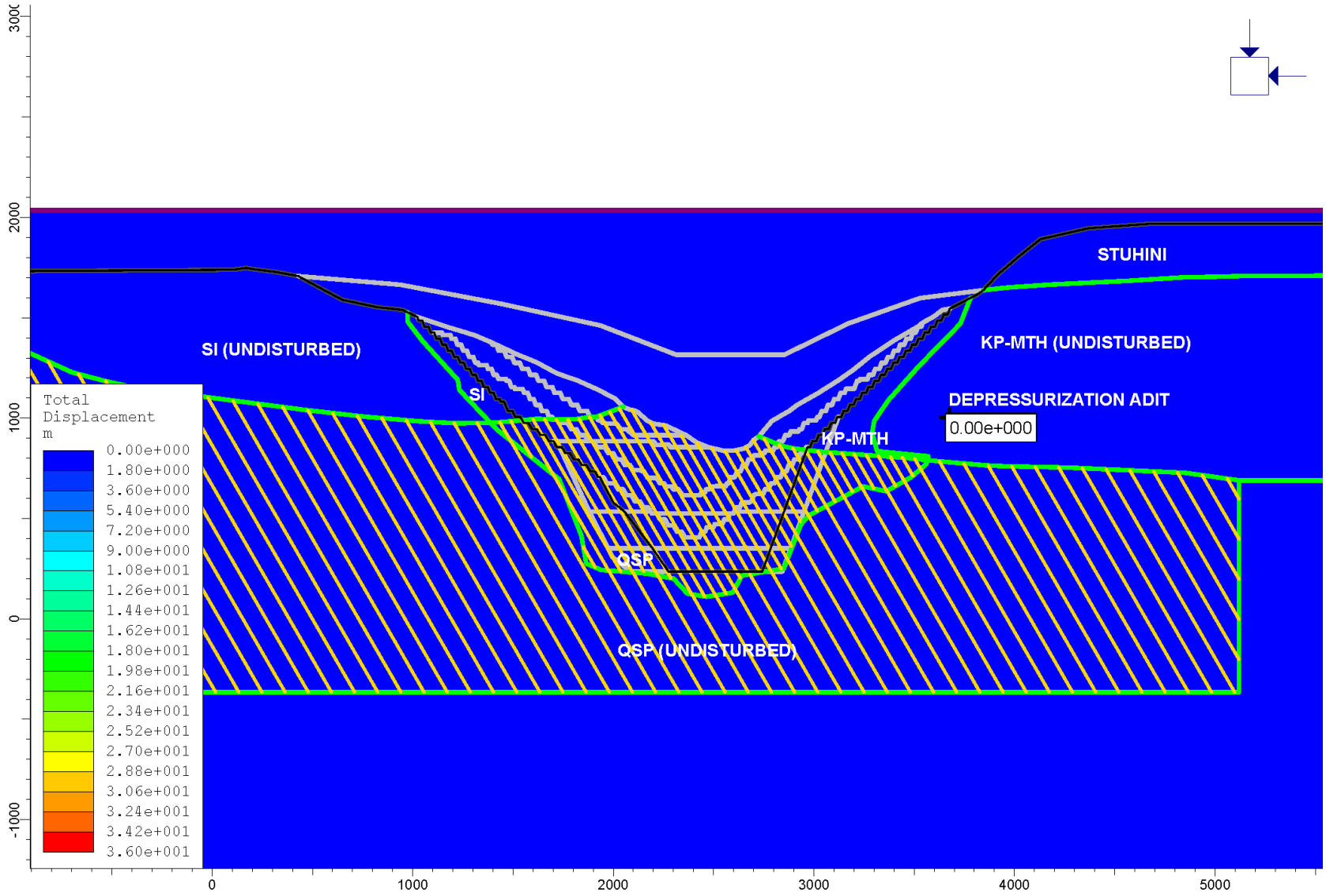

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 1

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
C34

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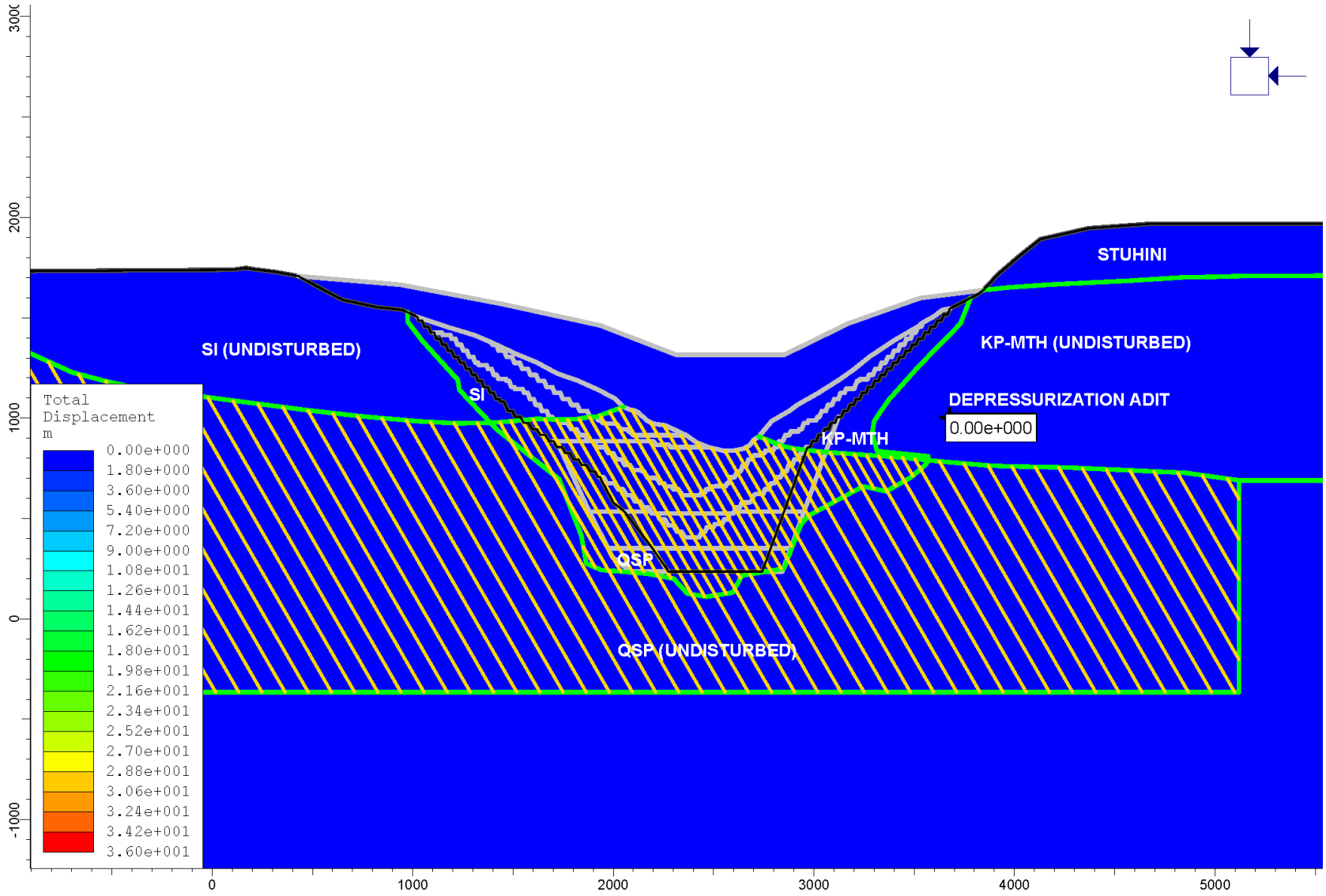

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 2

CLIENT:
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FIGURE No.:
C35

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX C

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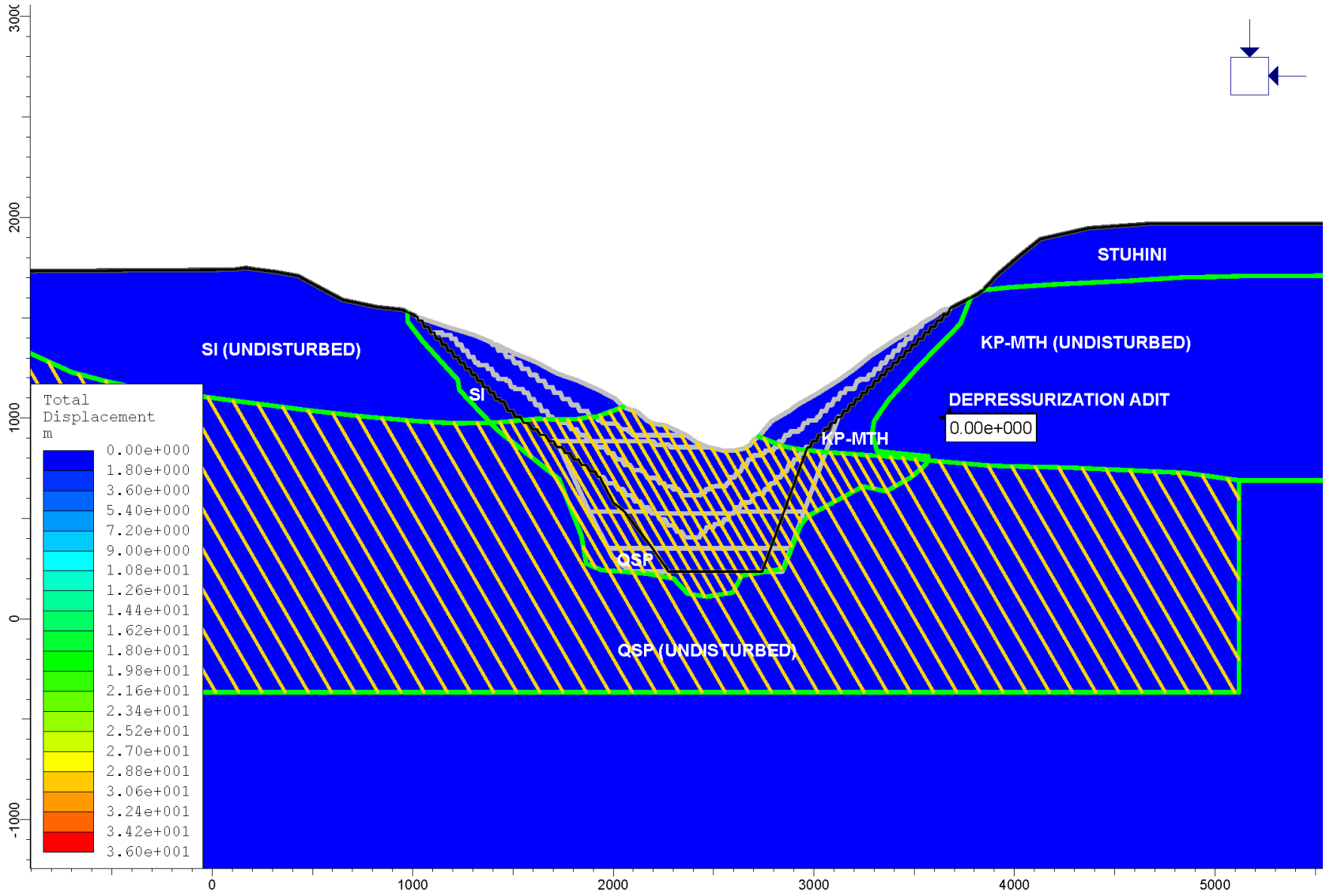

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 3

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0638-013-31

FIGURE No.:
C36

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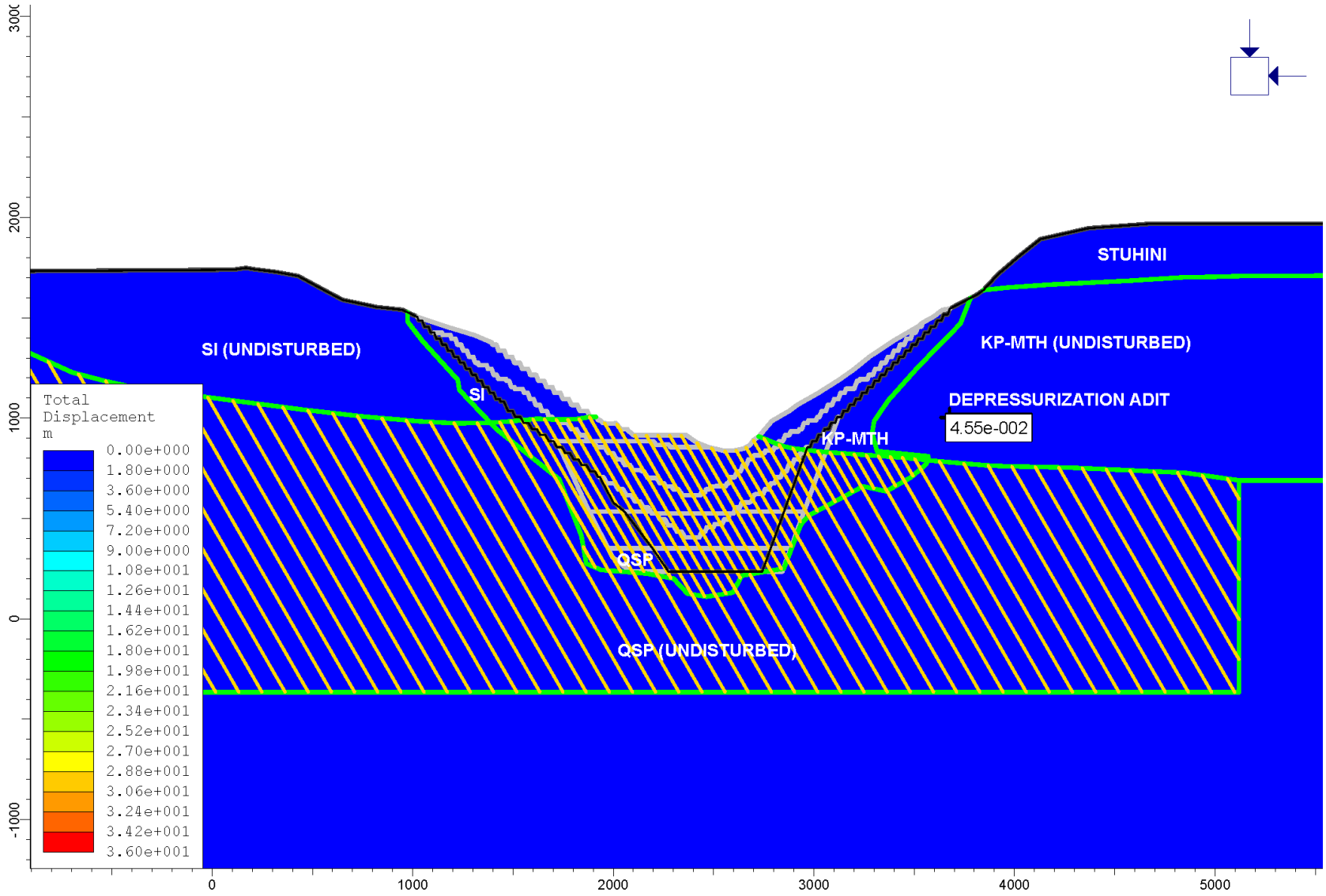

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 4

CLIENT:
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PROJECT No.:
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FIGURE No.:
C37

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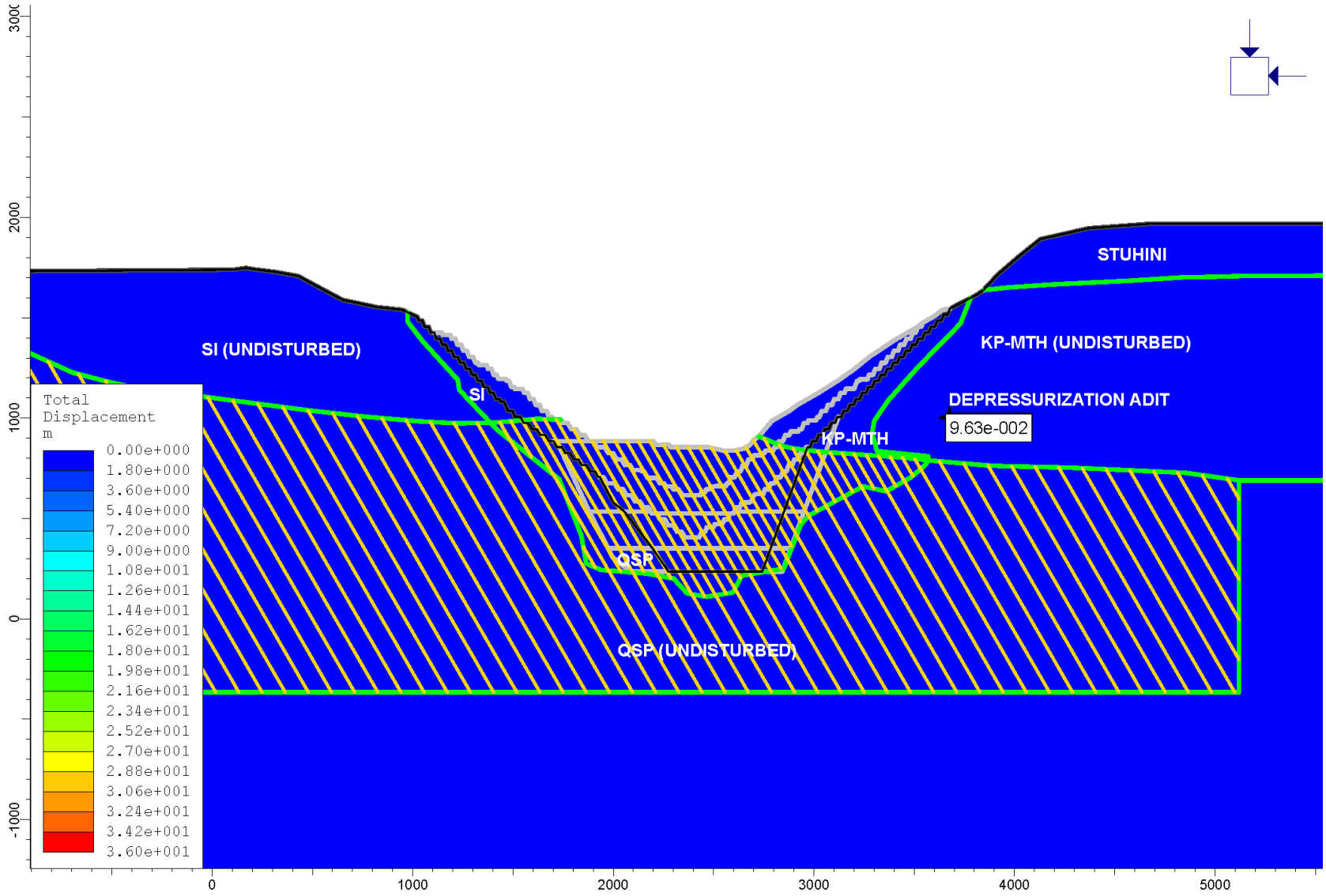

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 5

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C38

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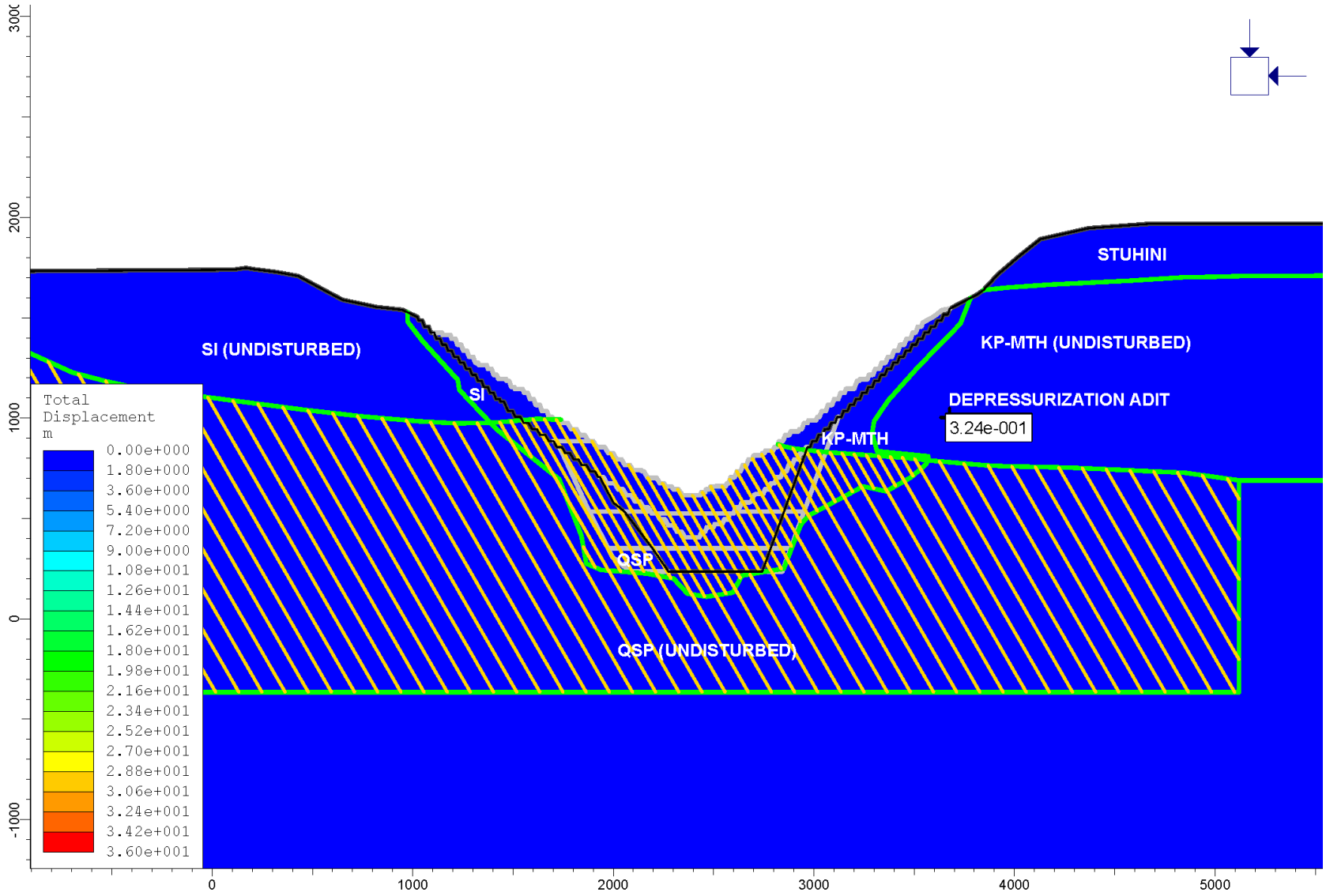

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 6

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PROJECT No.:
0638-013-31

FIGURE No.:
C39

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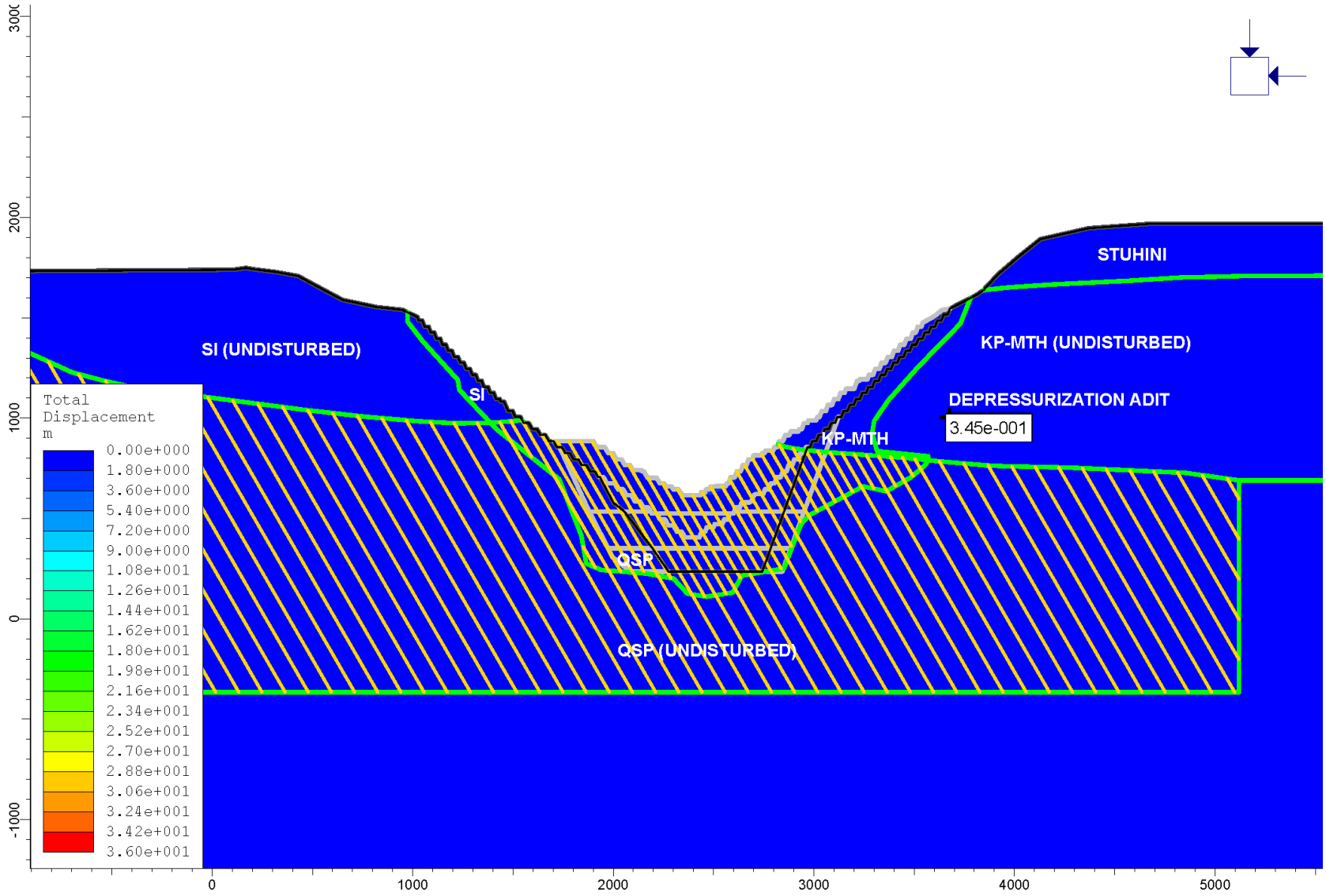

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 7

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FIGURE No.:
C40

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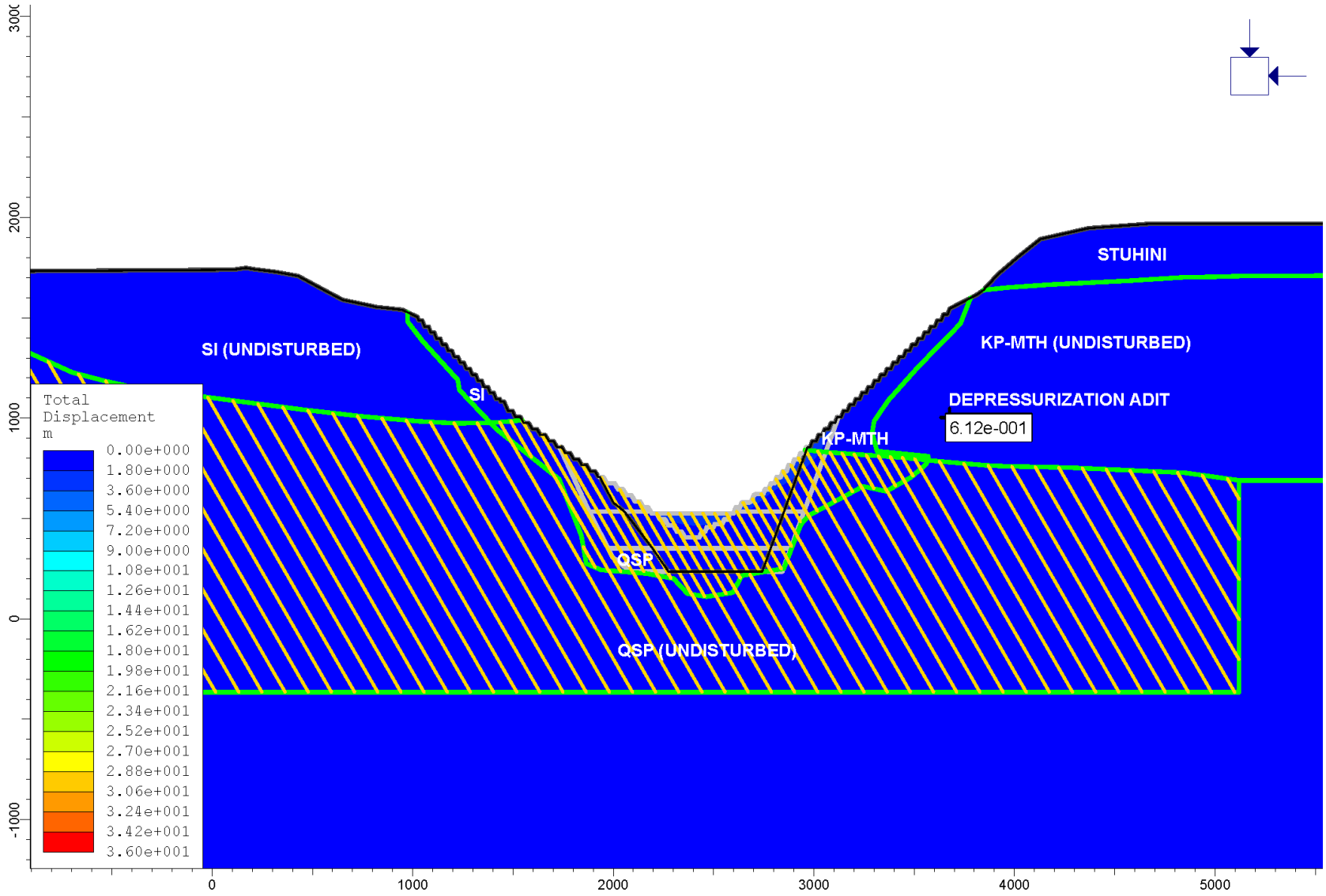

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 8

CLIENT:
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PROJECT No.:
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FIGURE No.:
C41

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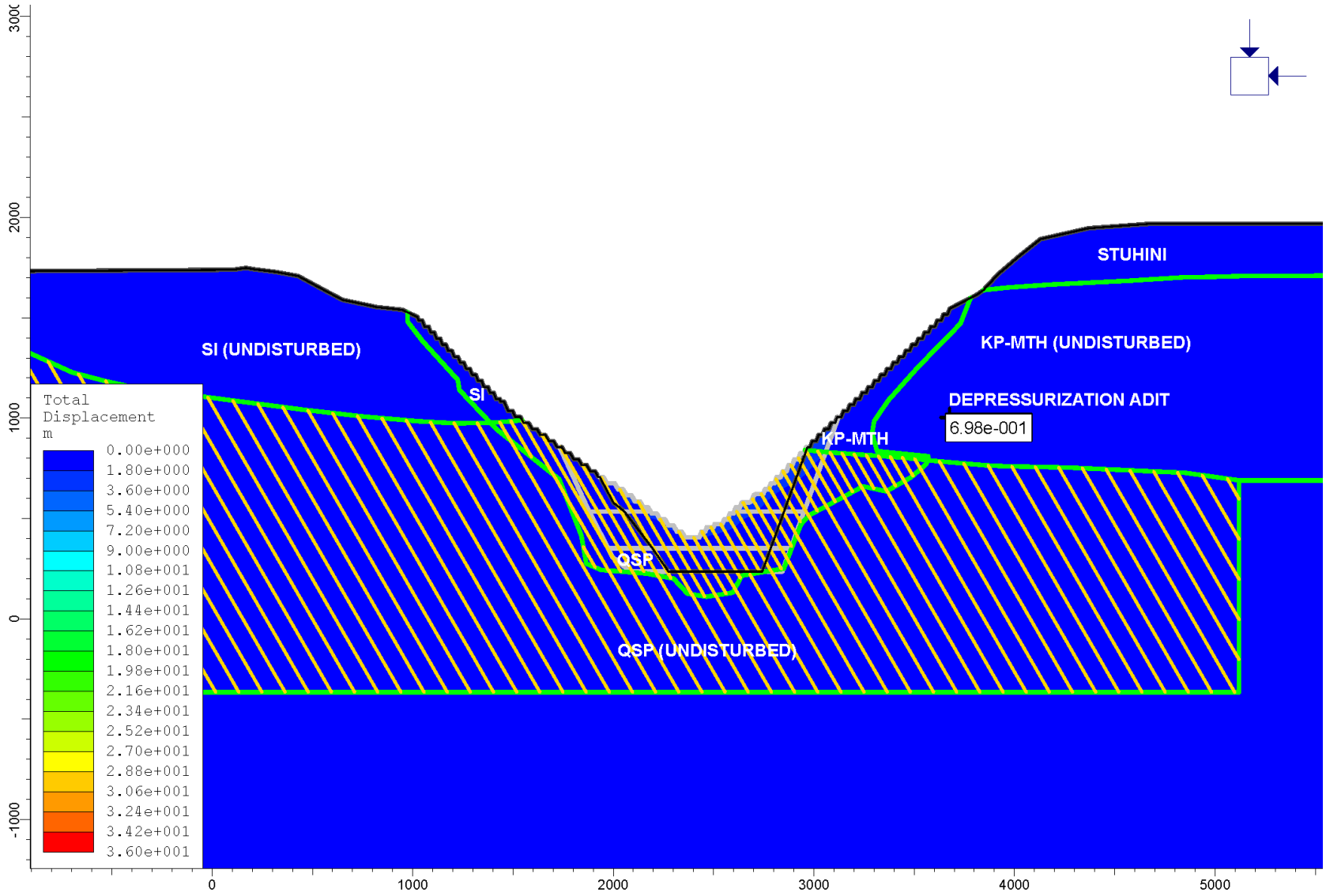

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 9

CLIENT:
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PROJECT No.:
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FIGURE No.:
C42

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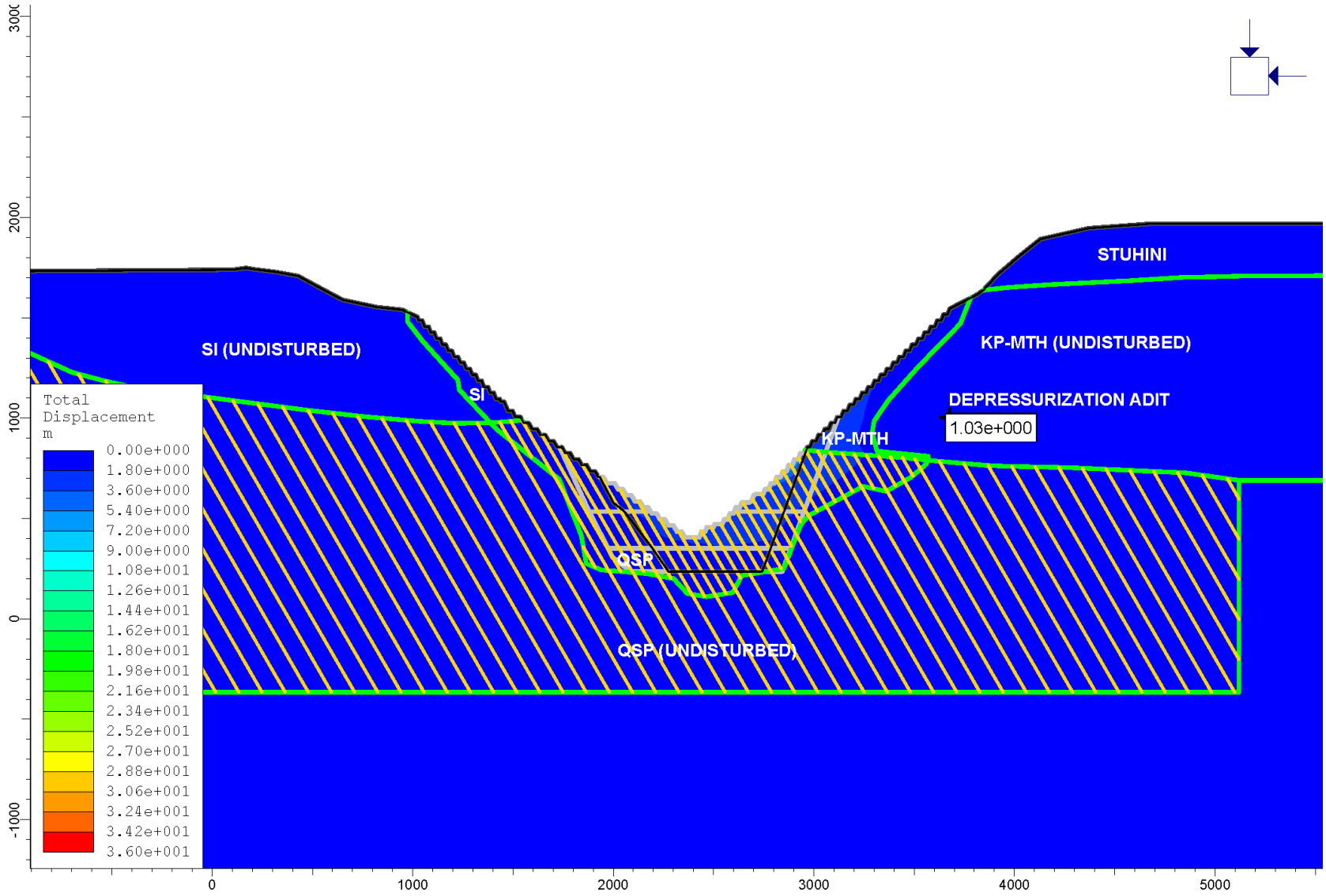

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FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 10

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PROJECT No.:
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FIGURE No.:
C43

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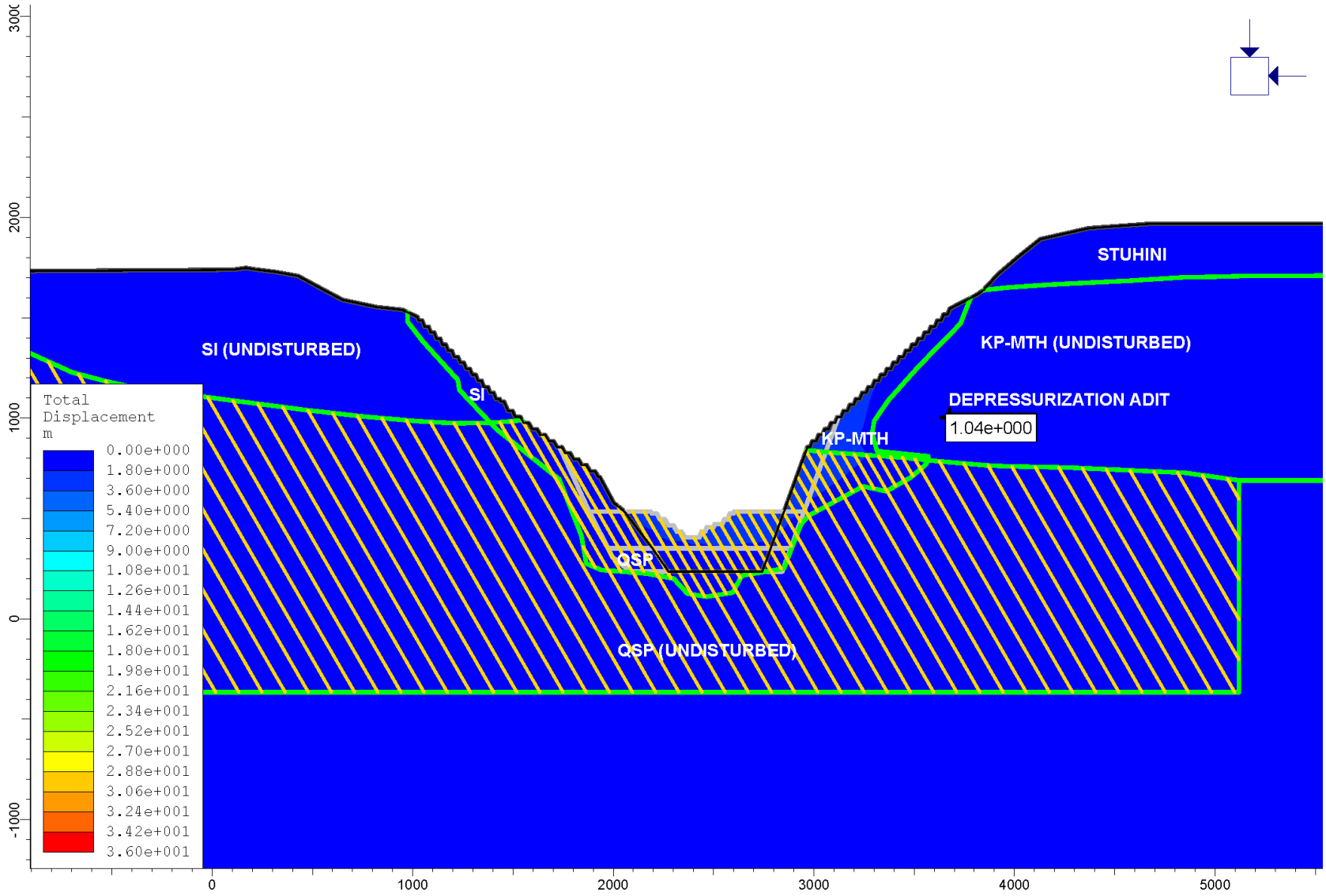

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 11

CLIENT:
SEABRIDGE GOLD INC.

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0638-013-31

FIGURE No.:
C44

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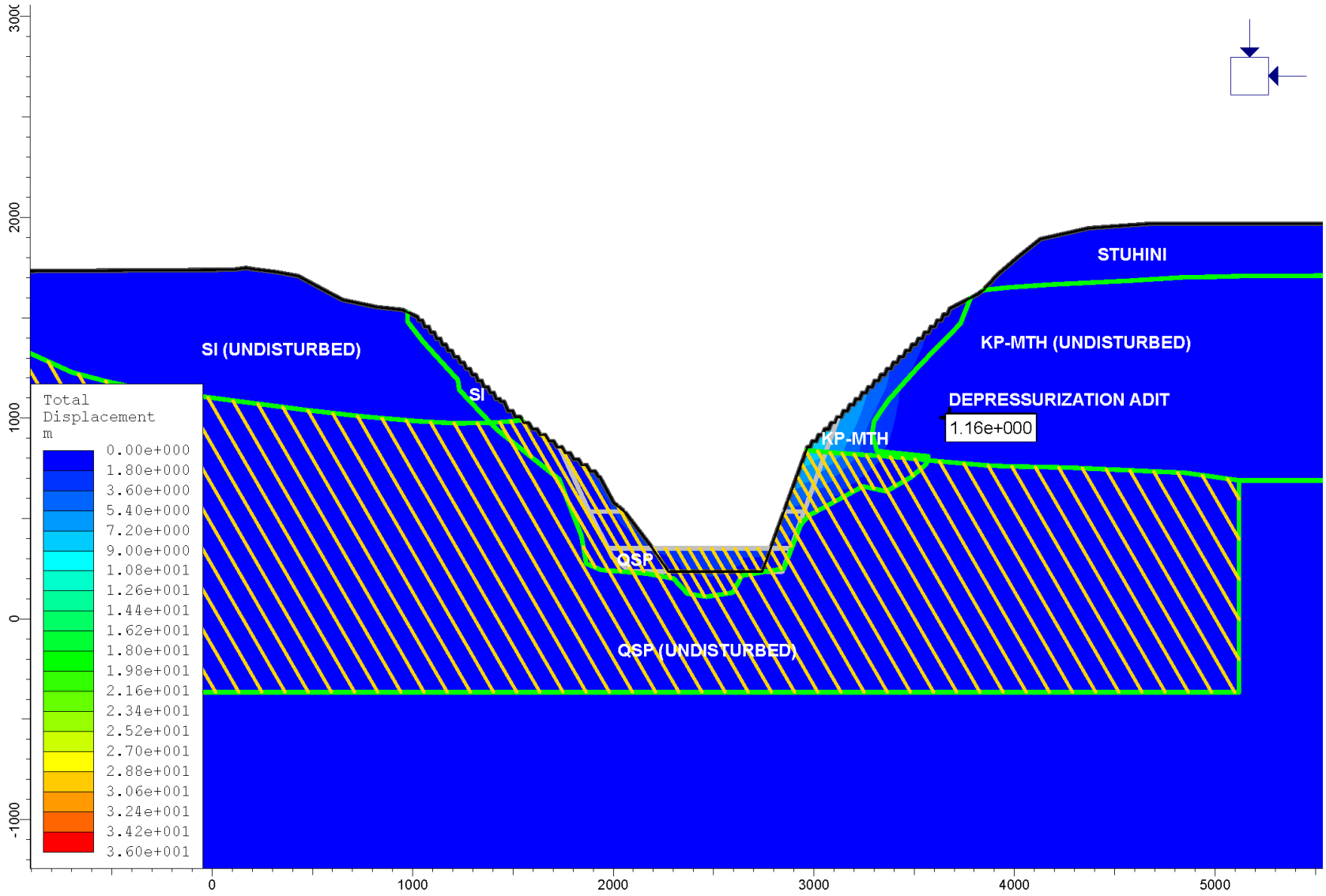

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 12

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FIGURE No.:
C45

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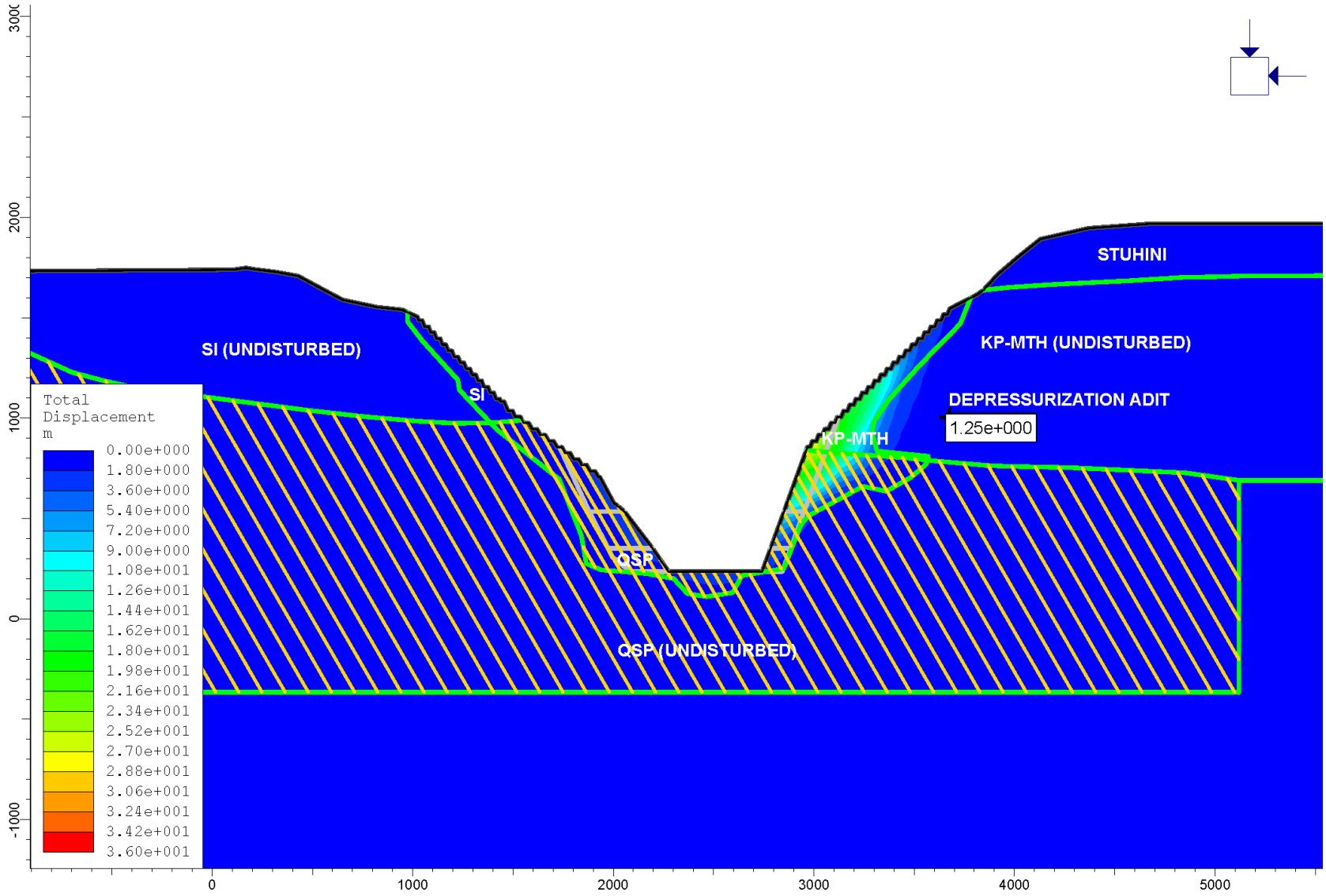

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C46

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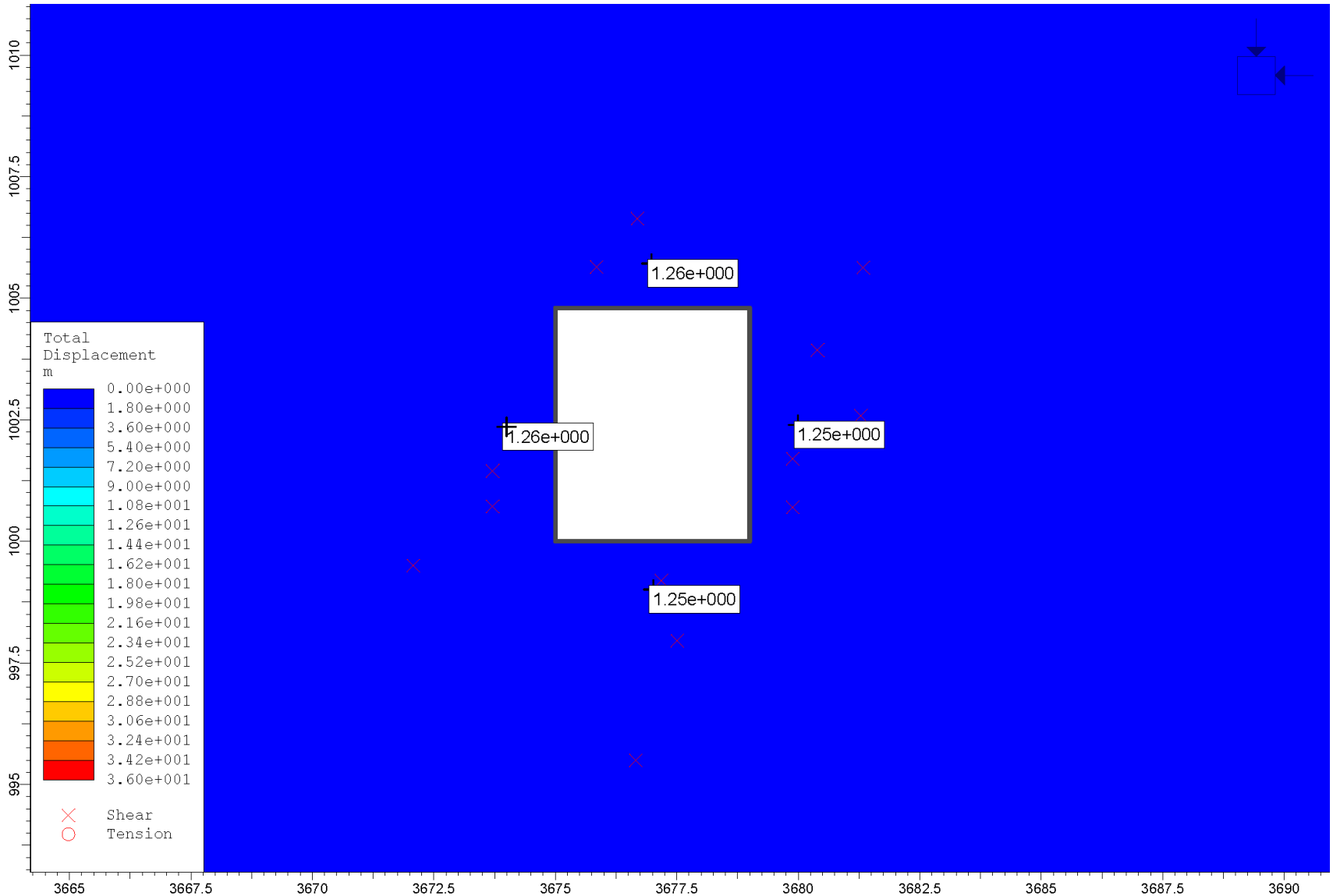

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – TOTAL DISPLACEMENT AROUND THE DEWATERING ADIT, ANISOTROPIC DRY CASE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
C47

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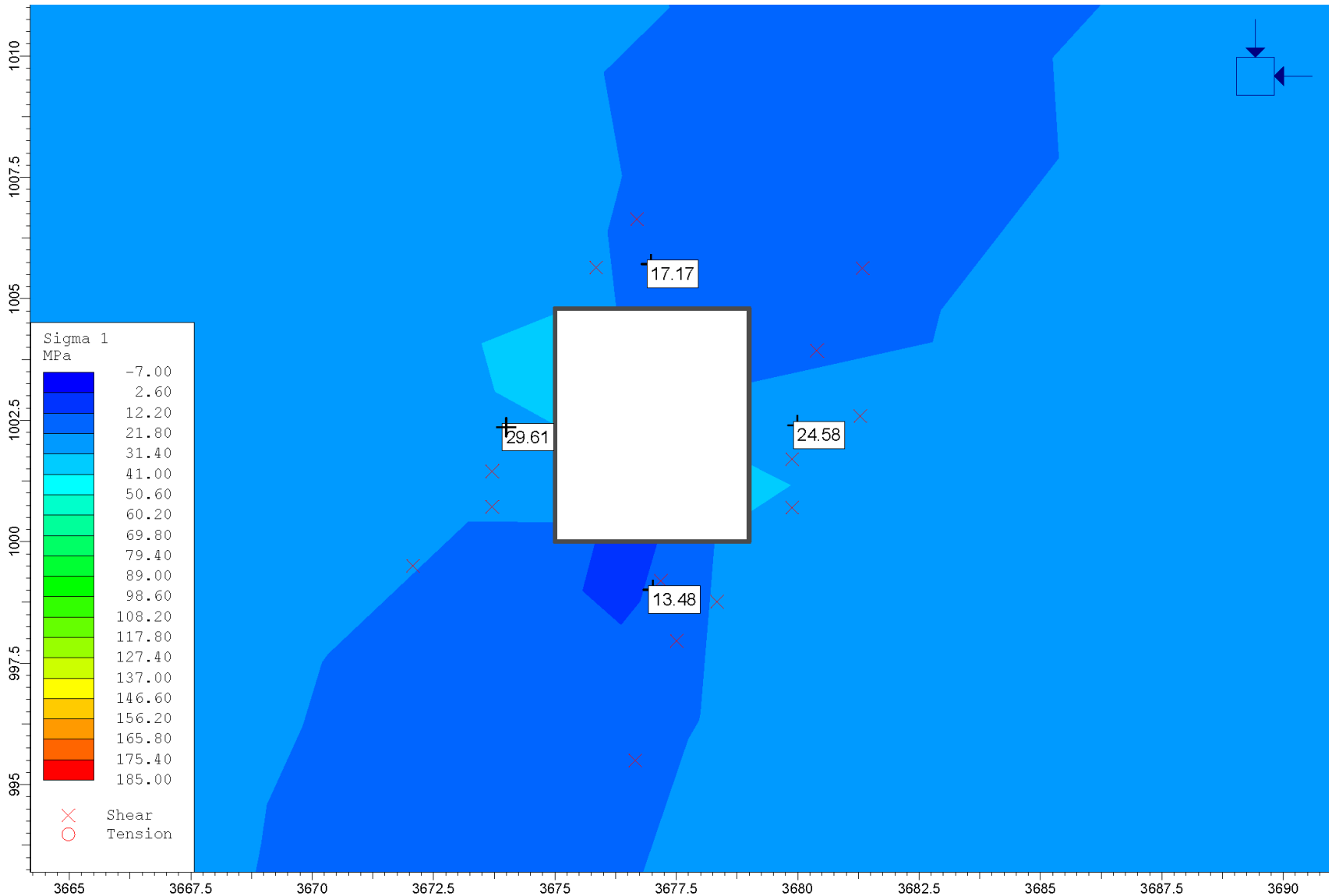

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – MAJOR PRINCIPAL STRESS AROUND THE DEWATERING ADIT, ANISOTROPIC DRY CASE – STAGE 13

CLIENT:
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PROJECT No.:
0638-013-31

FIGURE No.:
C48

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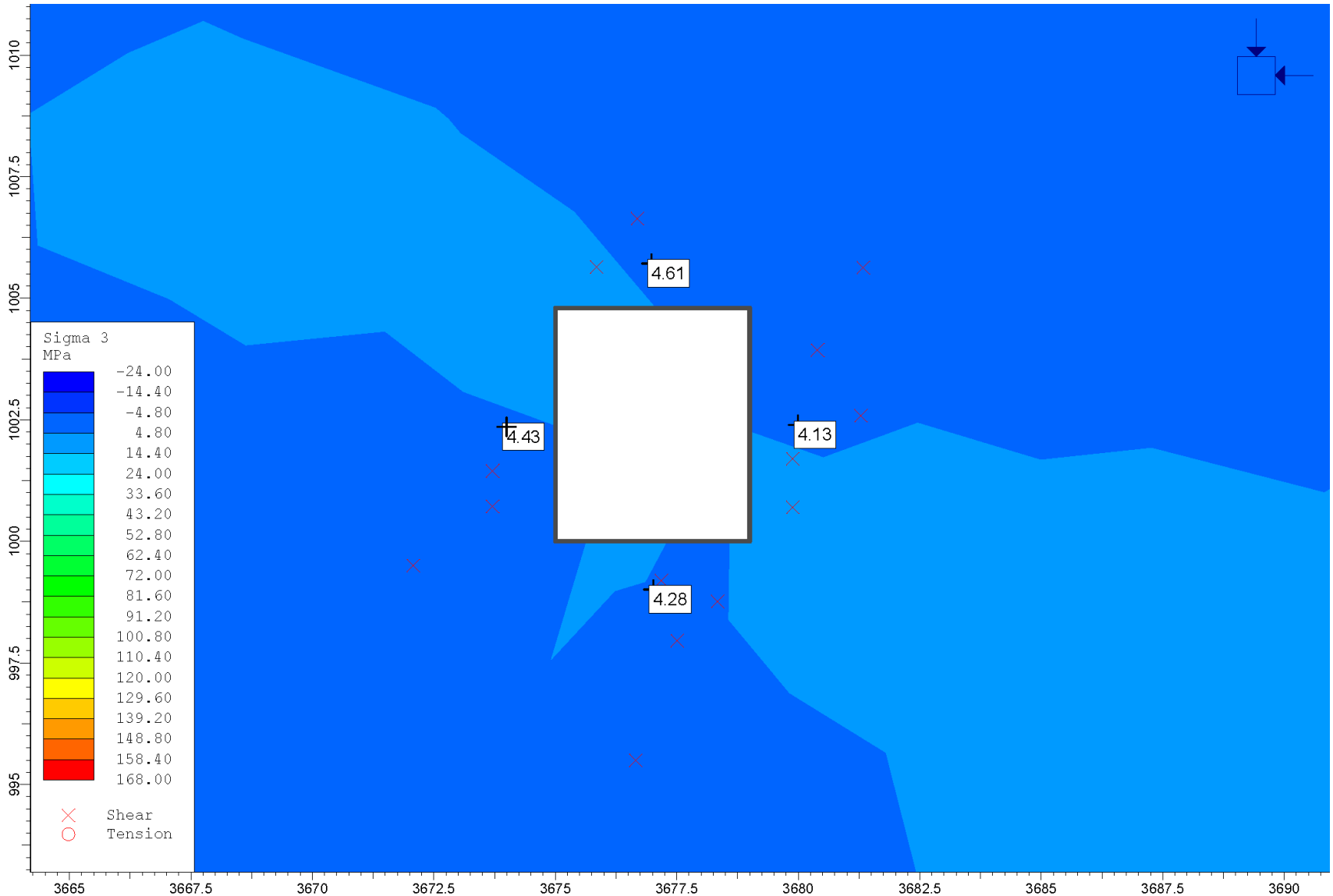

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION A – MINOR PRINCIPAL STRESS AROUND THE DEWATERING ADIT, ANISOTROPIC DRY CASE – STAGE 13

CLIENT:
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PROJECT No.:
0638-013-31

FIGURE No.:
C49

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APPENDIX D
MITCHELL DIVERSION INLET FINITE ELEMENT METHOD DEFORMATION ANALYSIS RESULTS

TABLE D1. SECTION D - ISOTROPIC AND DRY - FINITE ELEMENT METHOD ANALYSIS SUMMARY

Stage	End of Mining Period (years)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	Description
1		n/a			Pre-mining topography set up[Note 1]
2		n/a			Pre-mining topography set up[Note 1]
3		n/a			Pre-mining topography and glacier set up[Note 1]
4	3	1.45	0.91	0.01	Start of mining and glacial retreat
5	5	1.38	0.91	0.02	Mining and glacial retreat continue
6	10	0.92	0.69	0.07	Mining and glacial retreat continue
7	20	0.27	-0.78	0.17	Mining and glacial retreat continue
8	23	0.08	-1.19	0.20	Mining and glacial retreat continue
9	26	3.39	0.94	0.31	Caving commences in center of pit; glacial retreat continues
10		3.49	0.94	0.31	The first level of caved rock is mined
11		3.62	0.94	0.31	The second level of caved rock is mined
12	55	3.49	0.94	0.33	The final level of caved rock is mined

Notes:

1. Stages 1, 2, and 3 are used to model the estimated stress history of the rockmass
2. Data taken from node closest to the proposed location of the Mitchell Diversion Inlet (node 531.8, 879.9; see sections)

TABLE D2. SECTION D - ISTROPIC WITH WATER TABLE - FINITE ELEMENT METHOD ANALYSIS SUMMARY

Stage	End of Mining Period (years)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	Description
1		n/a			Pre-mining topography set up[Note 1]
2		n/a			Pre-mining topography set up[Note 1]
3		n/a			Pre-mining topography and glacier set up[Notes 1 and 2]
4	3	1.45	0.91	0.01	Start of mining and glacial retreat, water table applied
5	5	1.38	0.91	0.02	Mining and glacial retreat continue
6	10	0.92	0.69	0.07	Mining and glacial retreat continue
7	20	0.27	-0.82	0.17	Mining and glacial retreat continue
8	23	0.08	-1.24	0.20	Mining and glacial retreat continue
9	26	3.27	0.93	0.31	Caving commences in center of pit; glacial retreat continues
10		3.34	0.93	0.31	The first level of caved rock is mined
11		3.29	0.92	0.32	The second level of caved rock is mined
12	55	3.08	0.92	0.34	The final level of caved rock is mined

Notes:

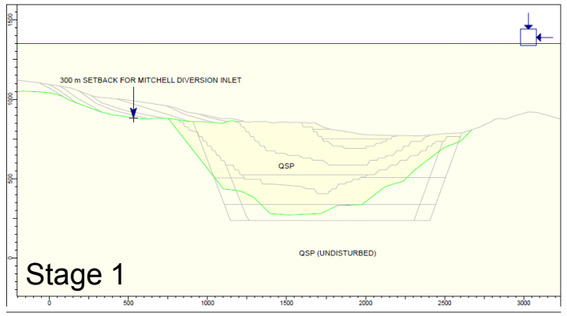
1. Stages 1, 2, and 3 are used to model the estimated stress history of the rockmass
2. Water table introduced in stage 3 and applied to all subsequent stages
3. Data taken from node closest to the proposed location of the Mitchell Diversion Inlet (node 531.8, 879.9; see sections)

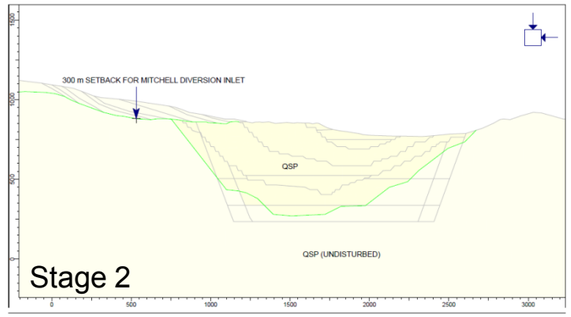
TABLE D3. SECTION D - ANISOTROPY AND DRY - FINITE ELEMENT METHOD ANALYSIS SUMMARY

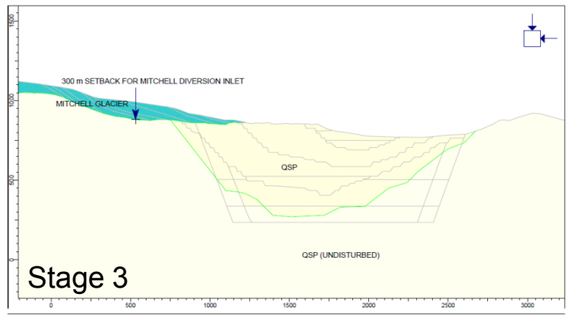
Stage	End of Mining Period (years)	σ_1 (MPa)	σ_3 (MPa)	Displ. (m)	Description
1		n/a			Pre-mining topography set up[Note 1]
2		n/a			Pre-mining topography set up[Note 1]
3		n/a			Pre-mining topography and glacier set up[Note 1]
4	3	11.78	1.77	0.01	Start of mining and glacial retreat
5	5	11.55	1.76	0.02	Mining and glacial retreat continue
6	10	10.54	1.59	0.07	Mining and glacial retreat continue
7	20	6.09	0.99	0.17	Mining and glacial retreat continue
8	23	4.99	0.71	0.20	Mining and glacial retreat continue
9	26	1.07	0.44	0.31	Caving commences in center of pit; glacial retreat continues
10		1.03	0.43	0.31	The first level of caved rock is mined
11		0.61	0.28	0.33	The second level of caved rock is mined
12	55	0.56	0.08	0.35	The final level of caved rock is mined

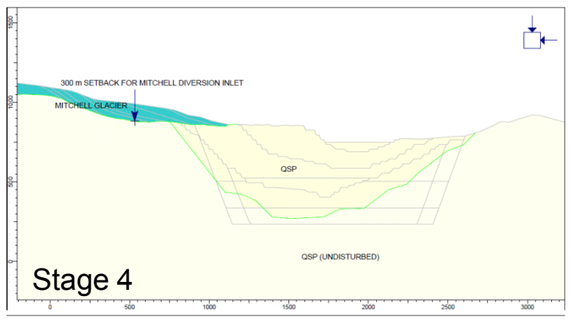
Notes:

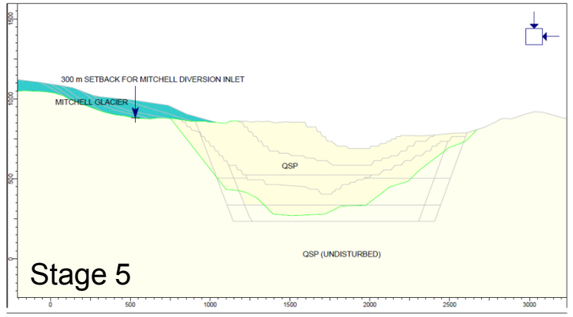
1. Stages 1, 2, and 3 allow the model to account for the estimated stress history of the area
2. Data taken from node closest to the proposed location of the Mitchell Diversion Inlet (node 531.8, 879.9; see sections)

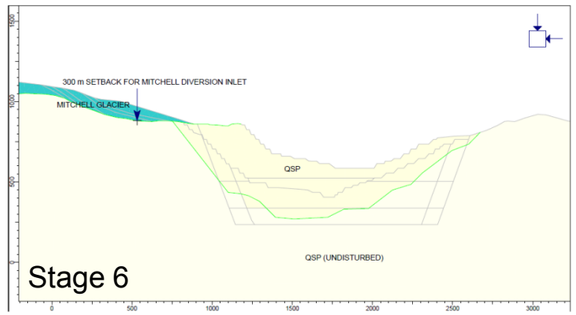


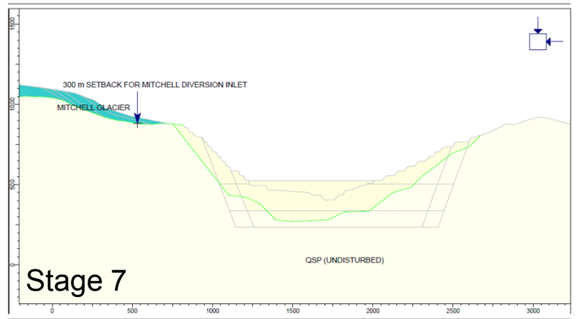


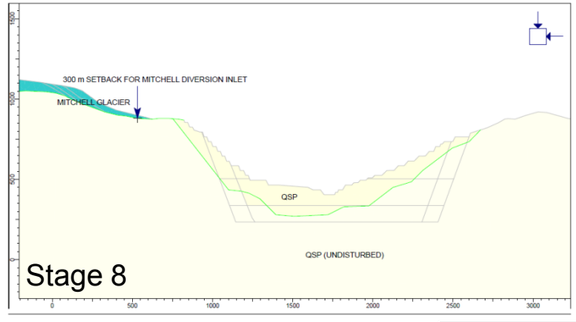


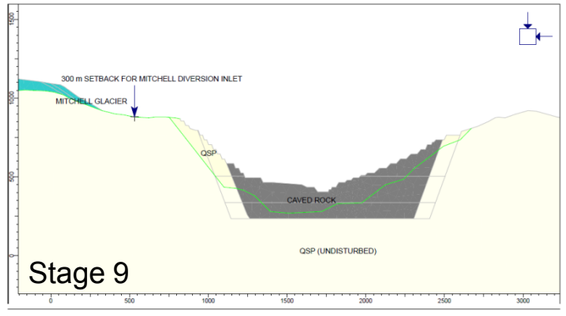


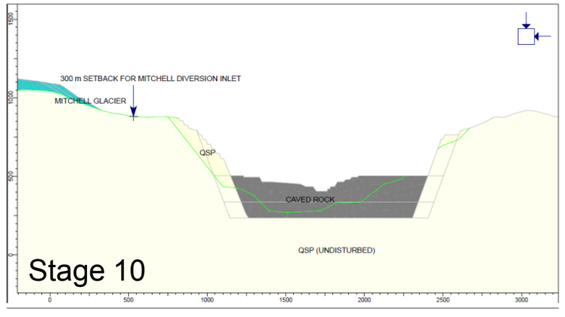


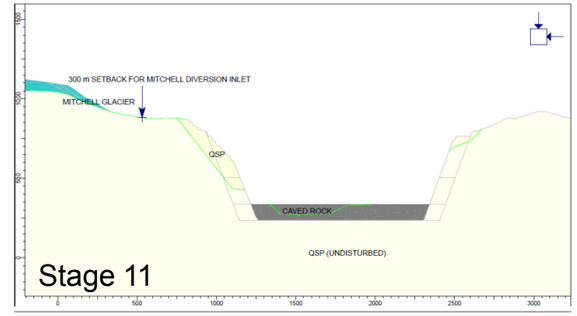


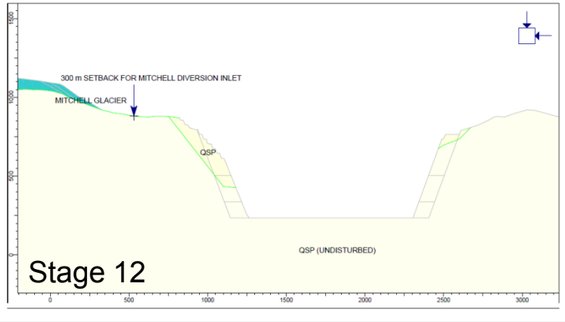












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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
FINITE ELEMENT MODELLING STAGES FOR SECTION D

CLIENT:
SEABRIDGE GOLD INC.

PROJECT NO.:
0638-013-31

FIGURE NO.:
D1

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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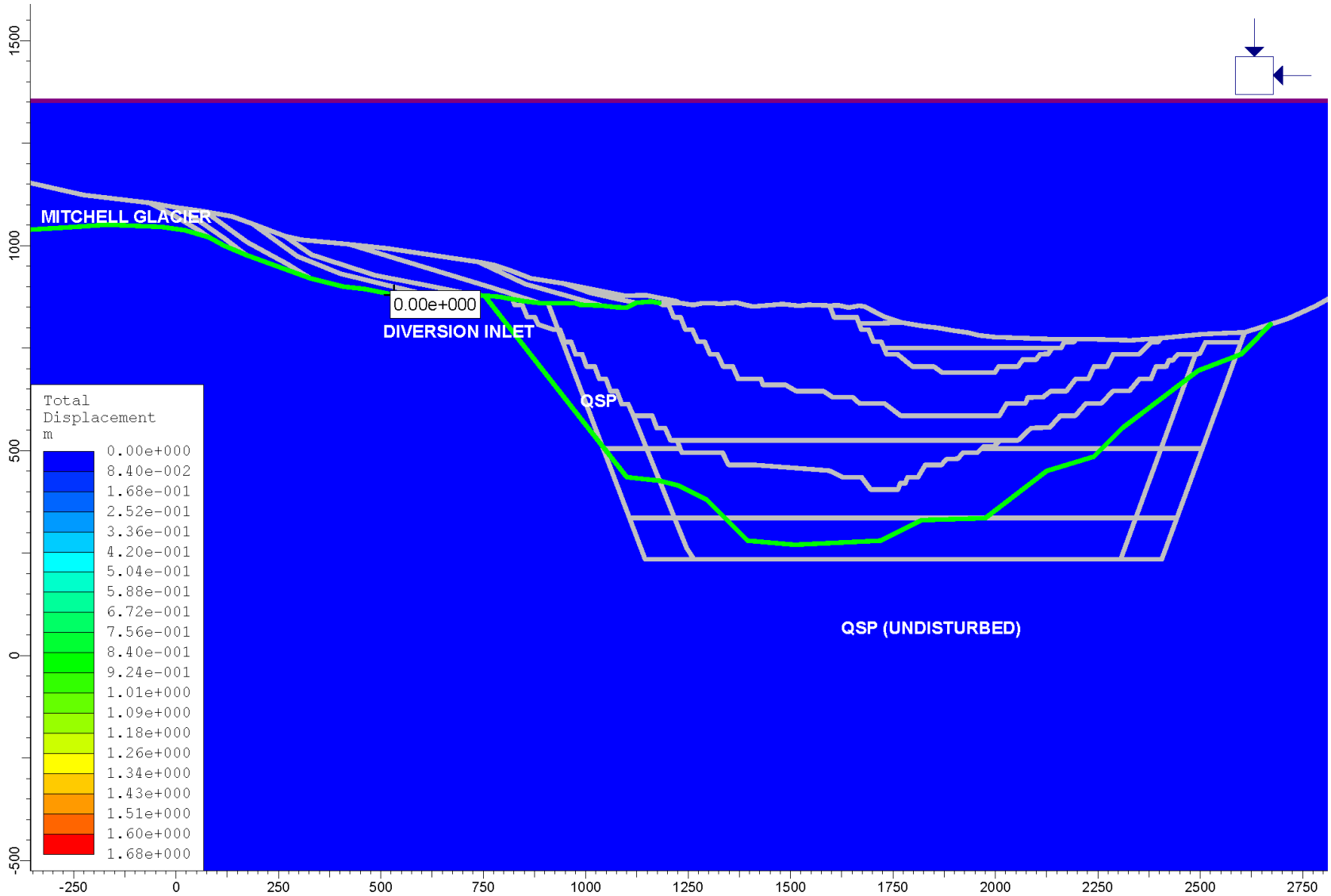

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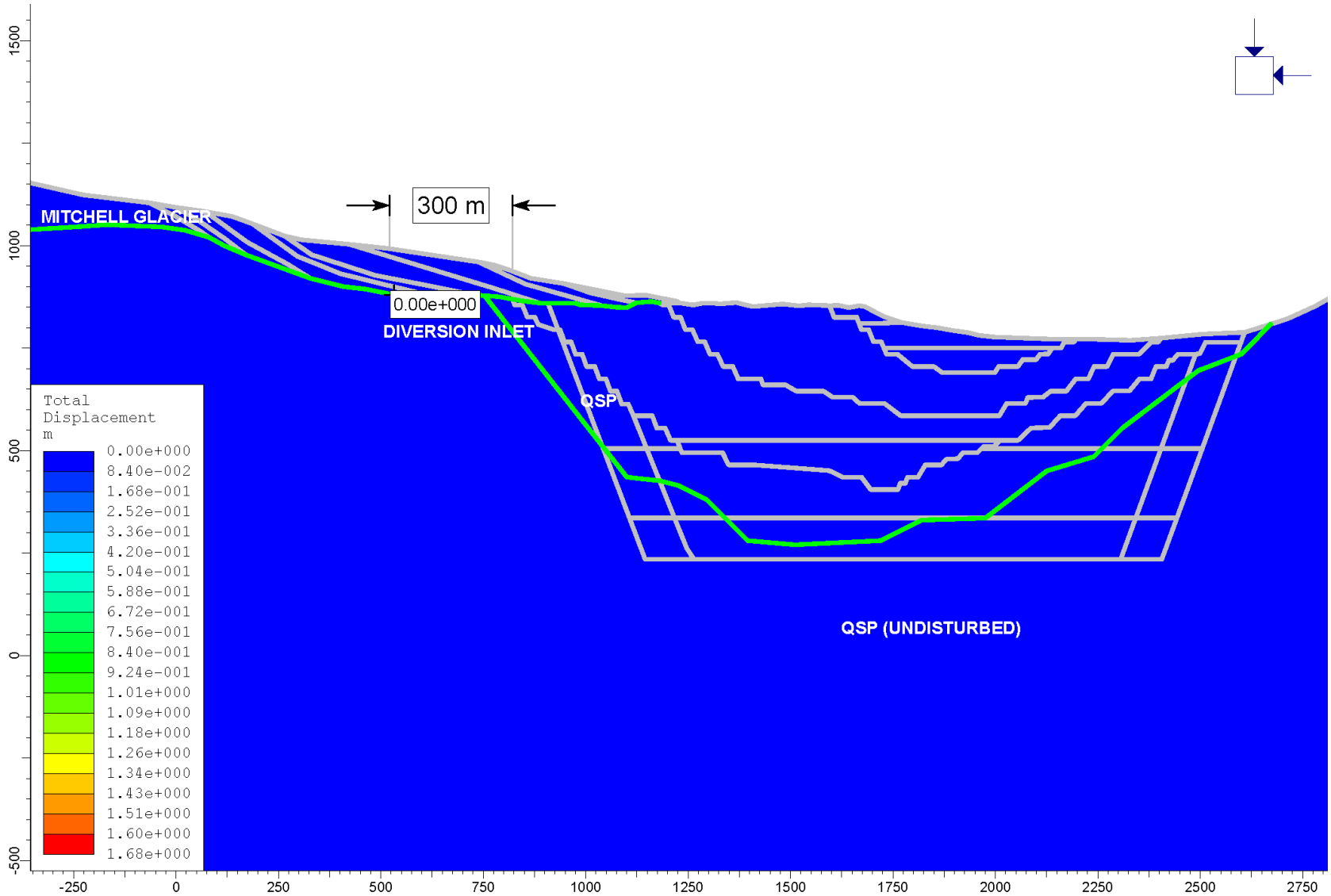
REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 1

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D2



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 2

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D3

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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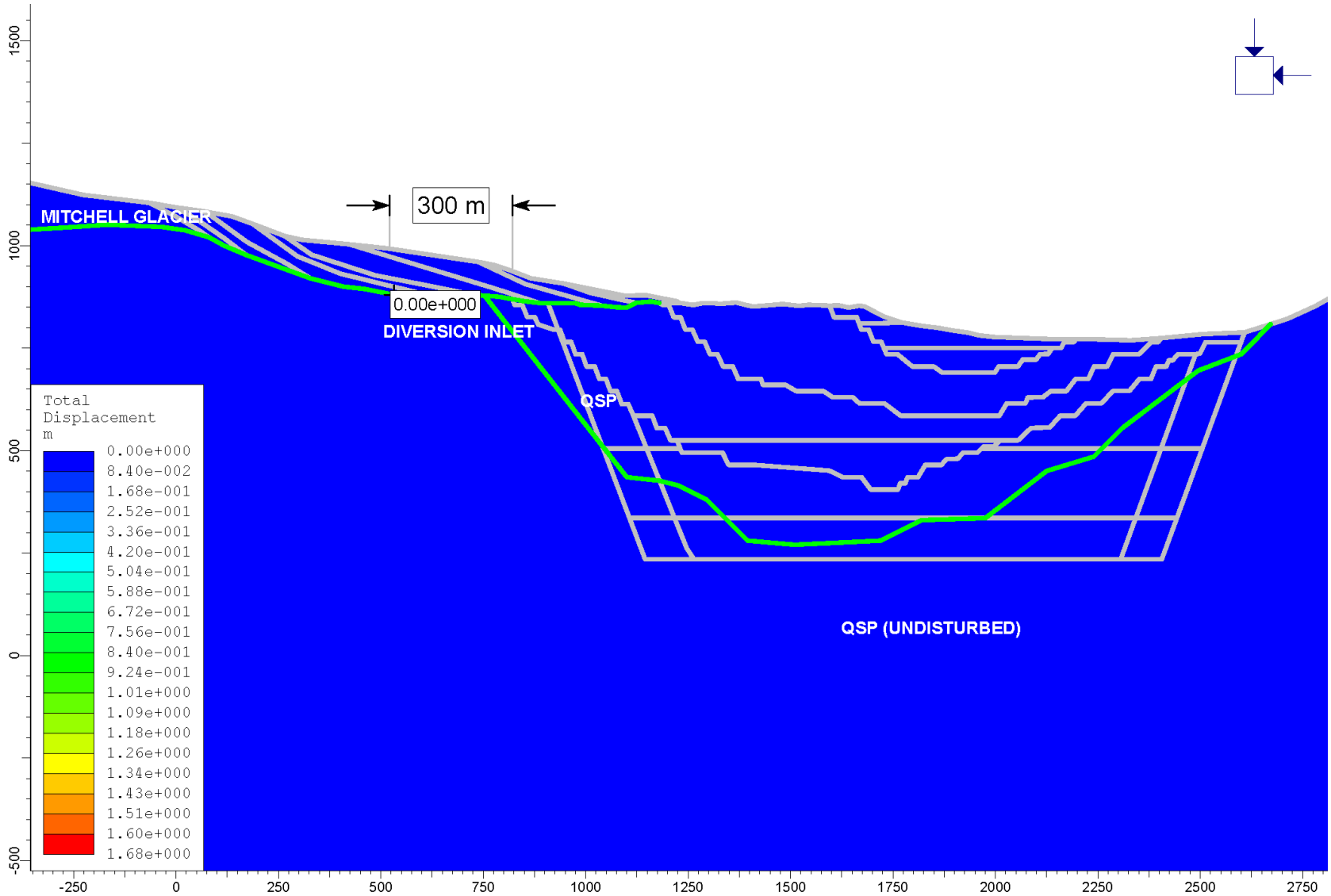

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 3

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D4

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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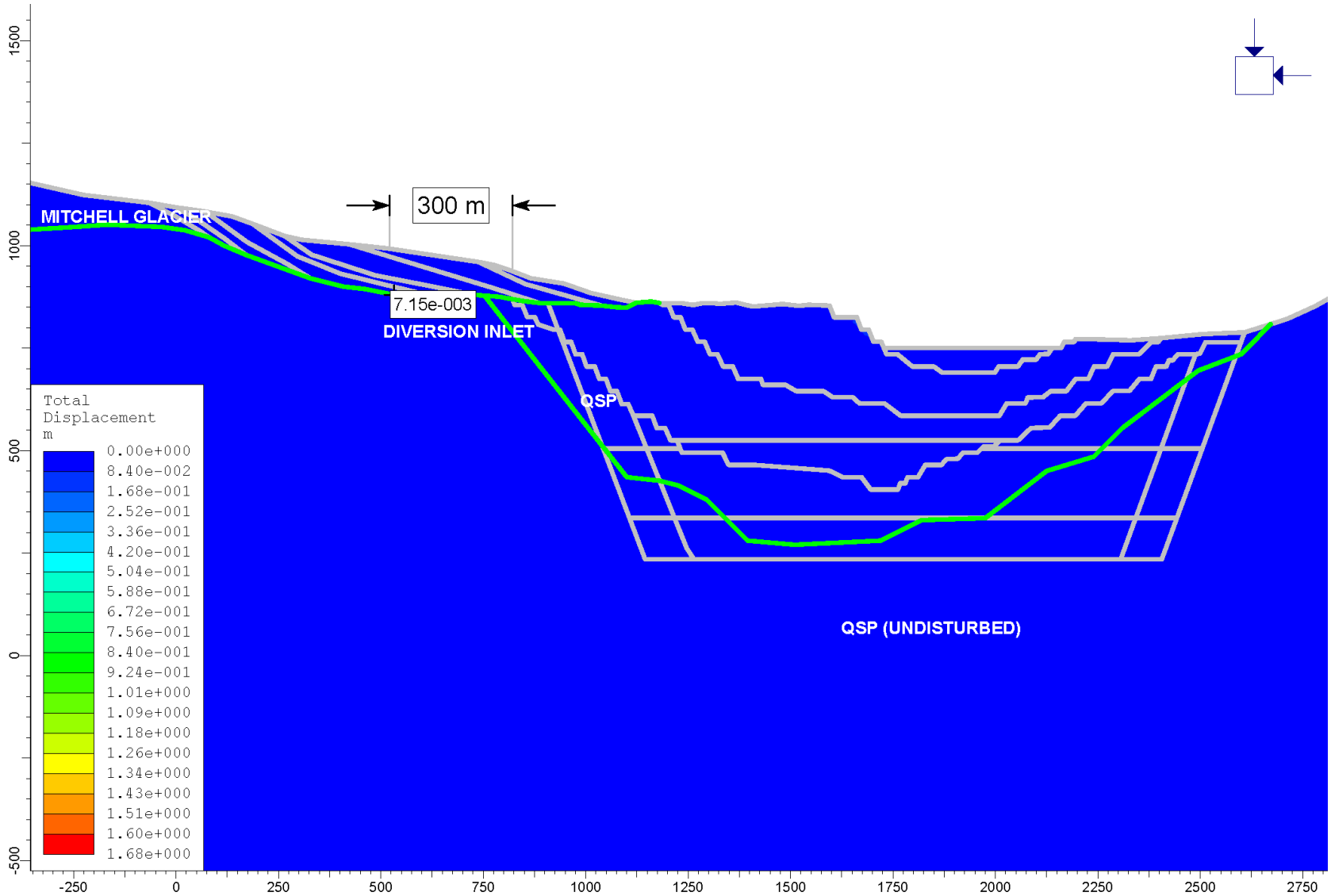

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 4

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
D5

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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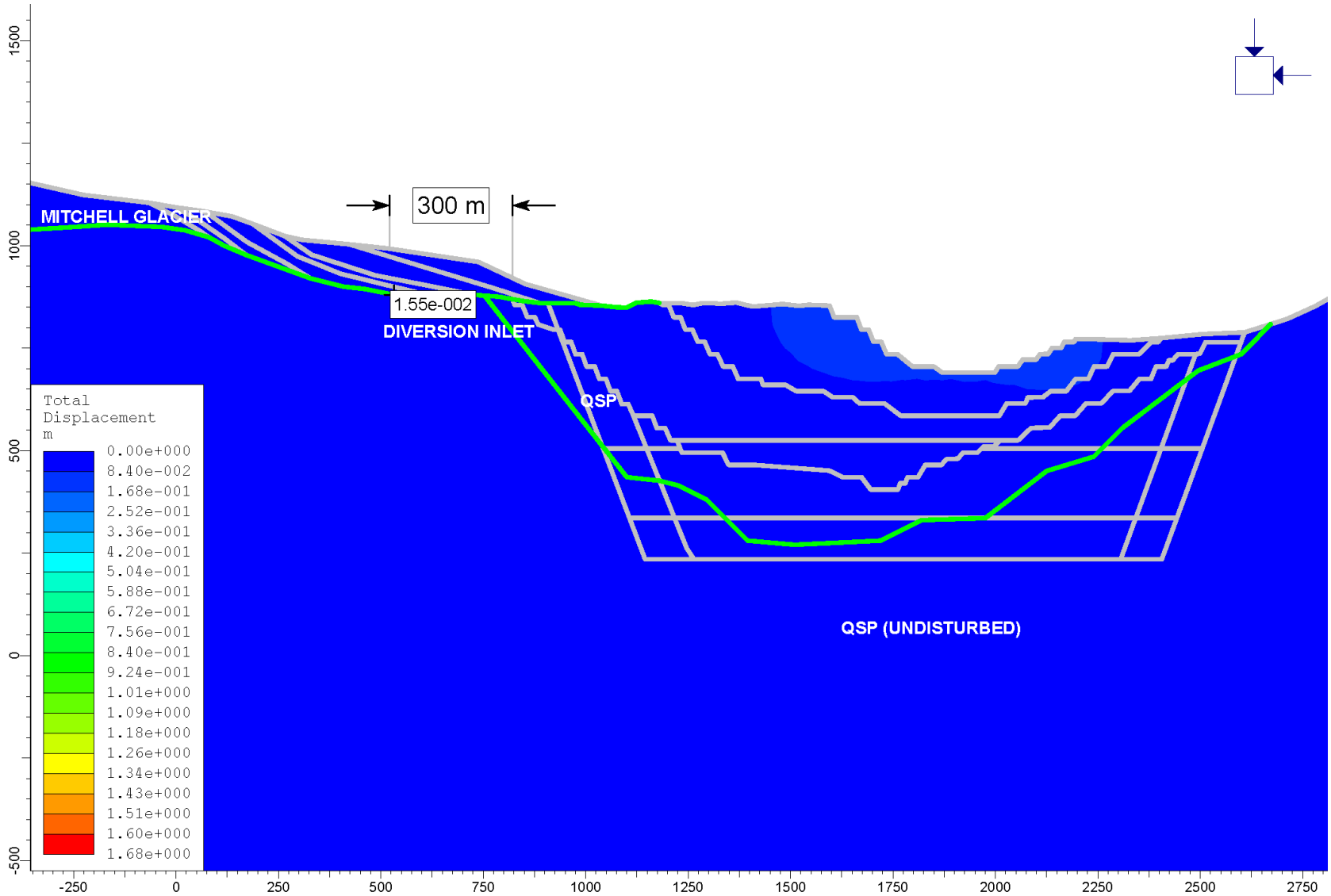

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 5

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D6

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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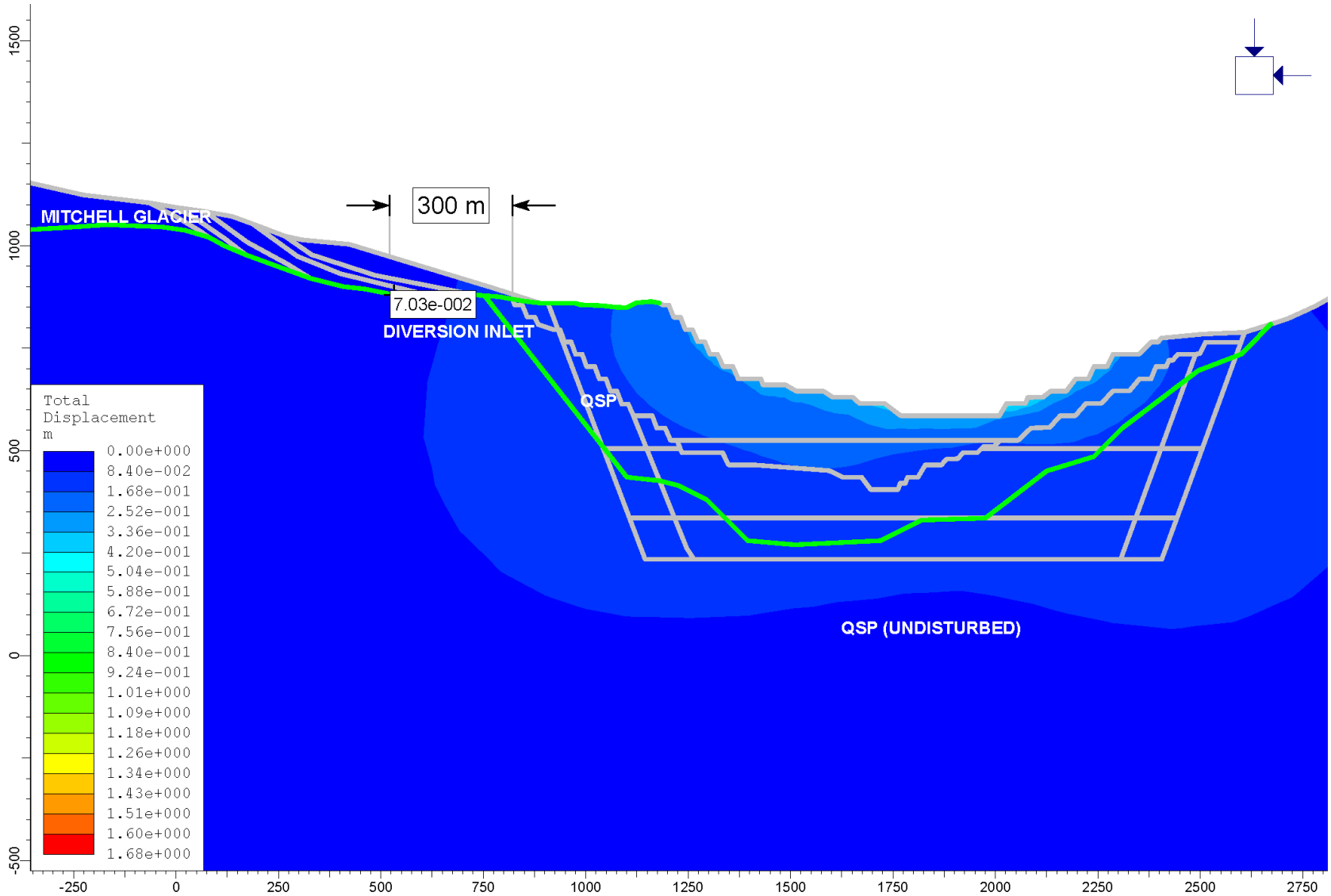

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 6

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D7

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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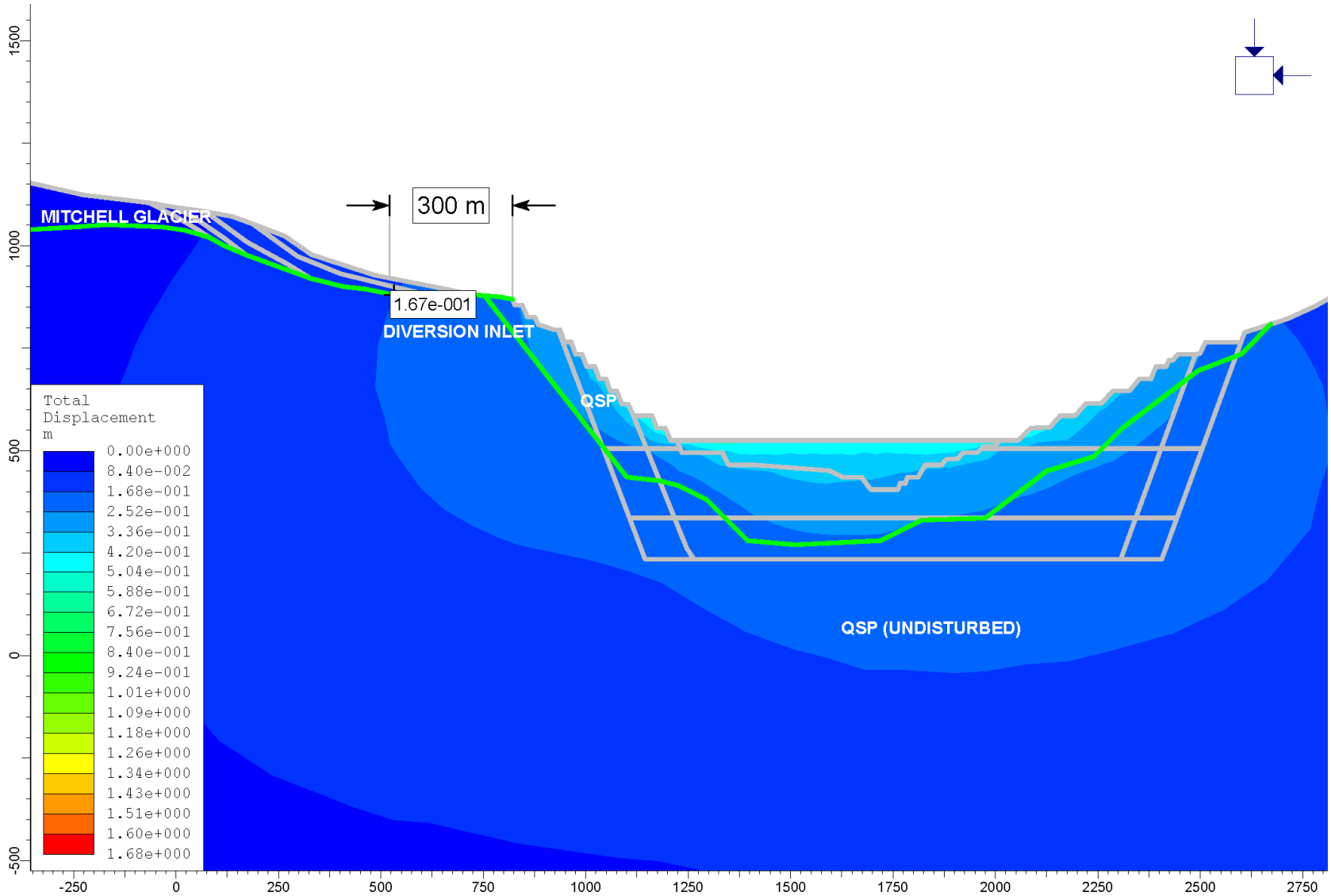

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 7

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D8

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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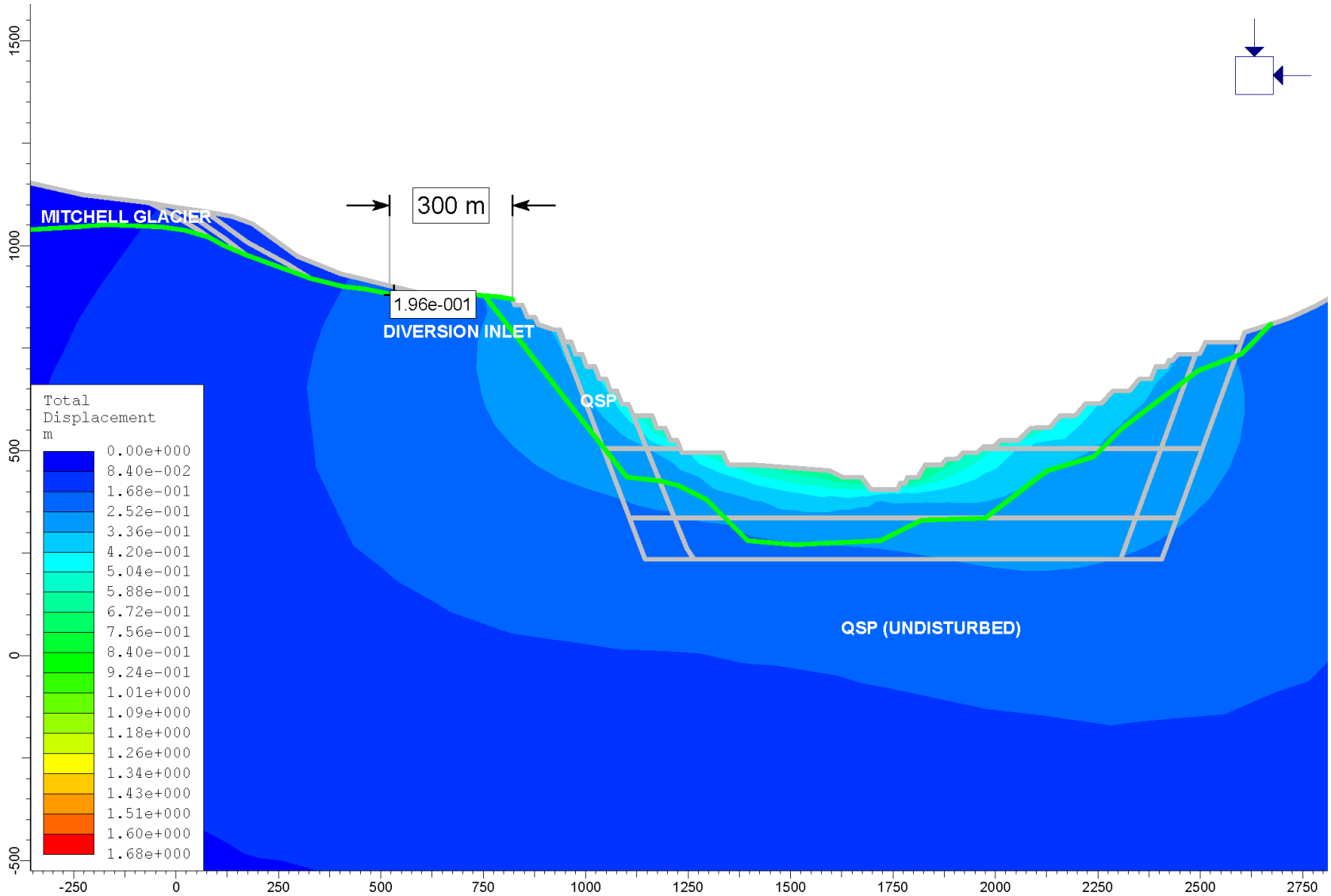

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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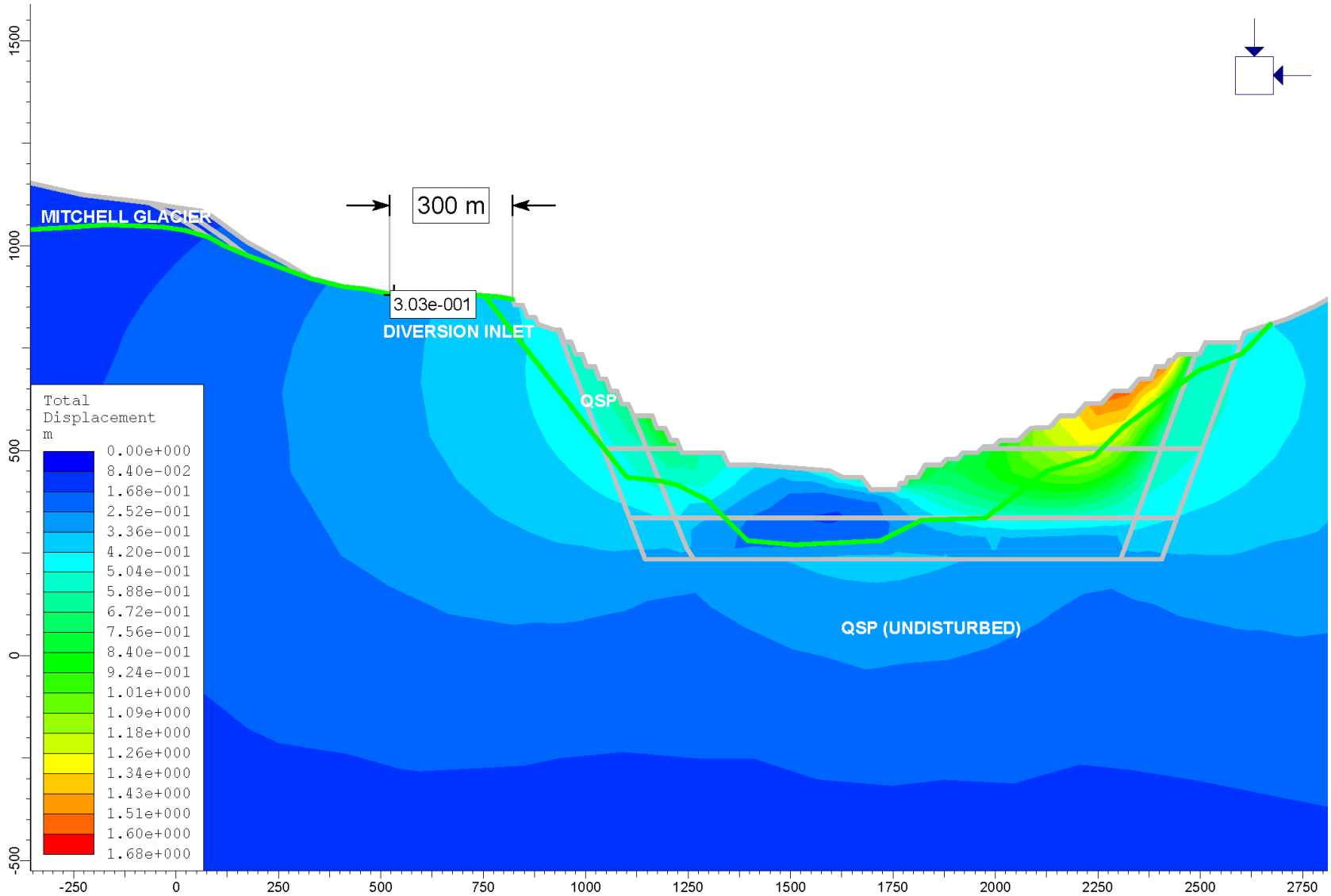
REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 8

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D9



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 9

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D10

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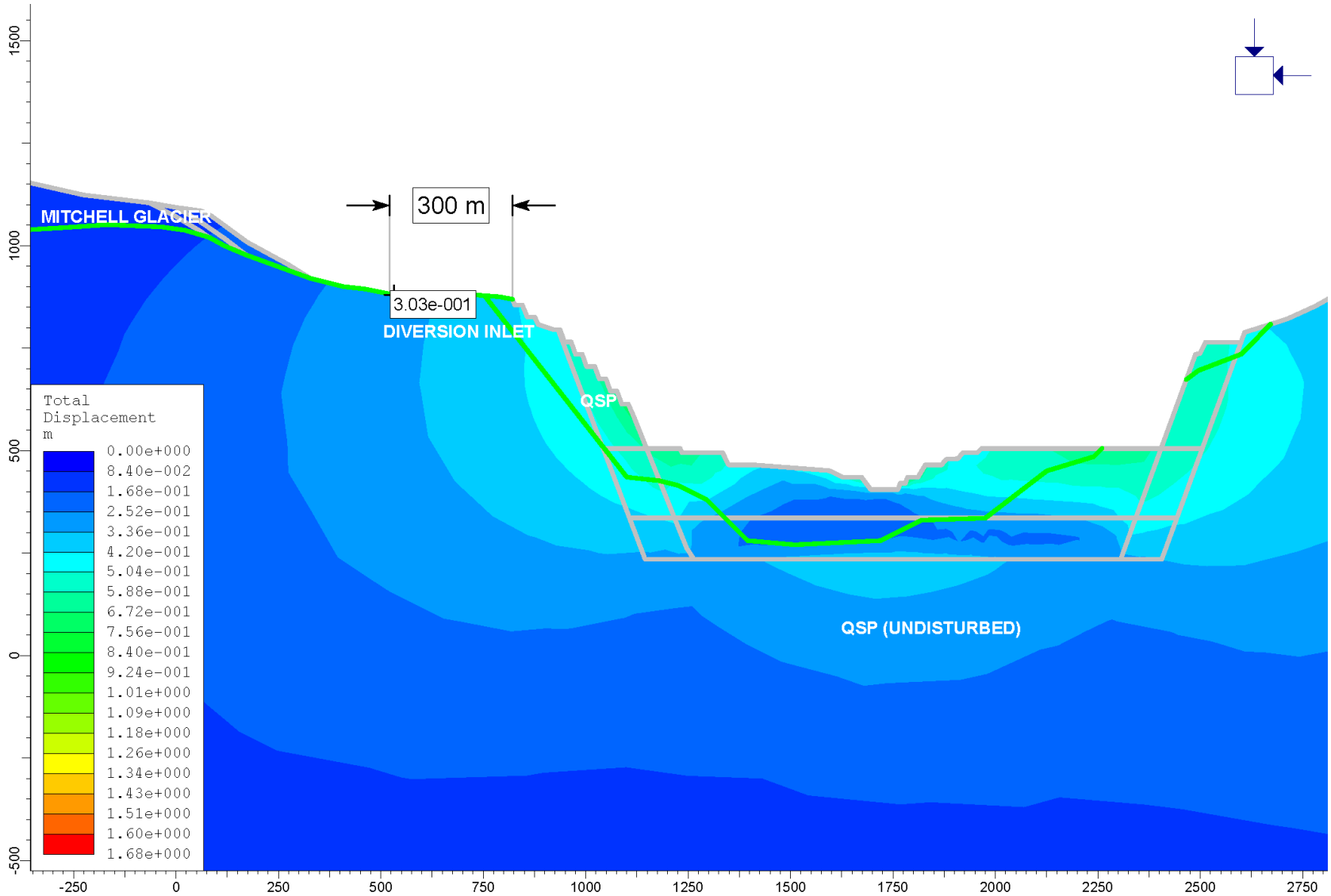

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 10

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
D11

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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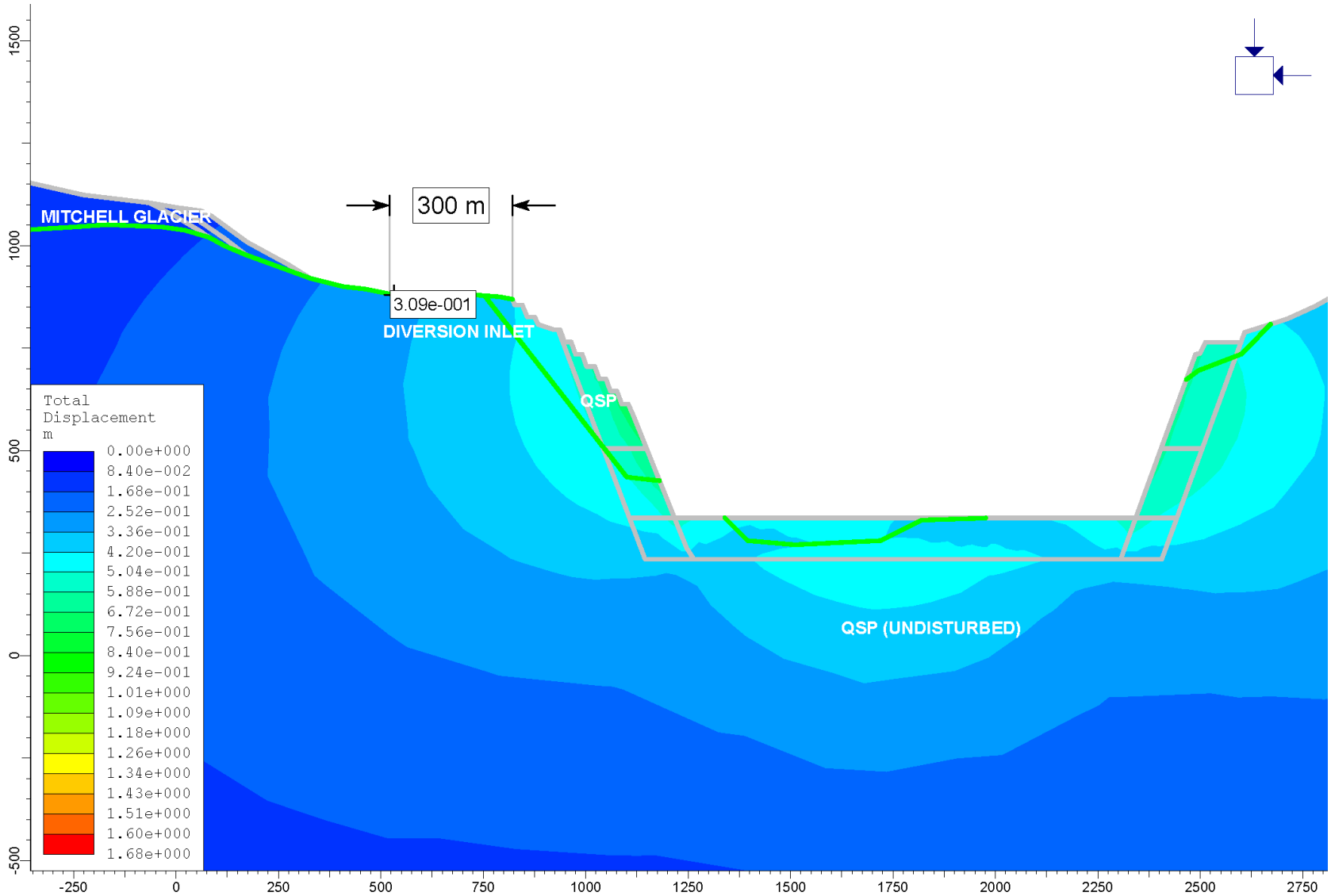

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 11

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D12

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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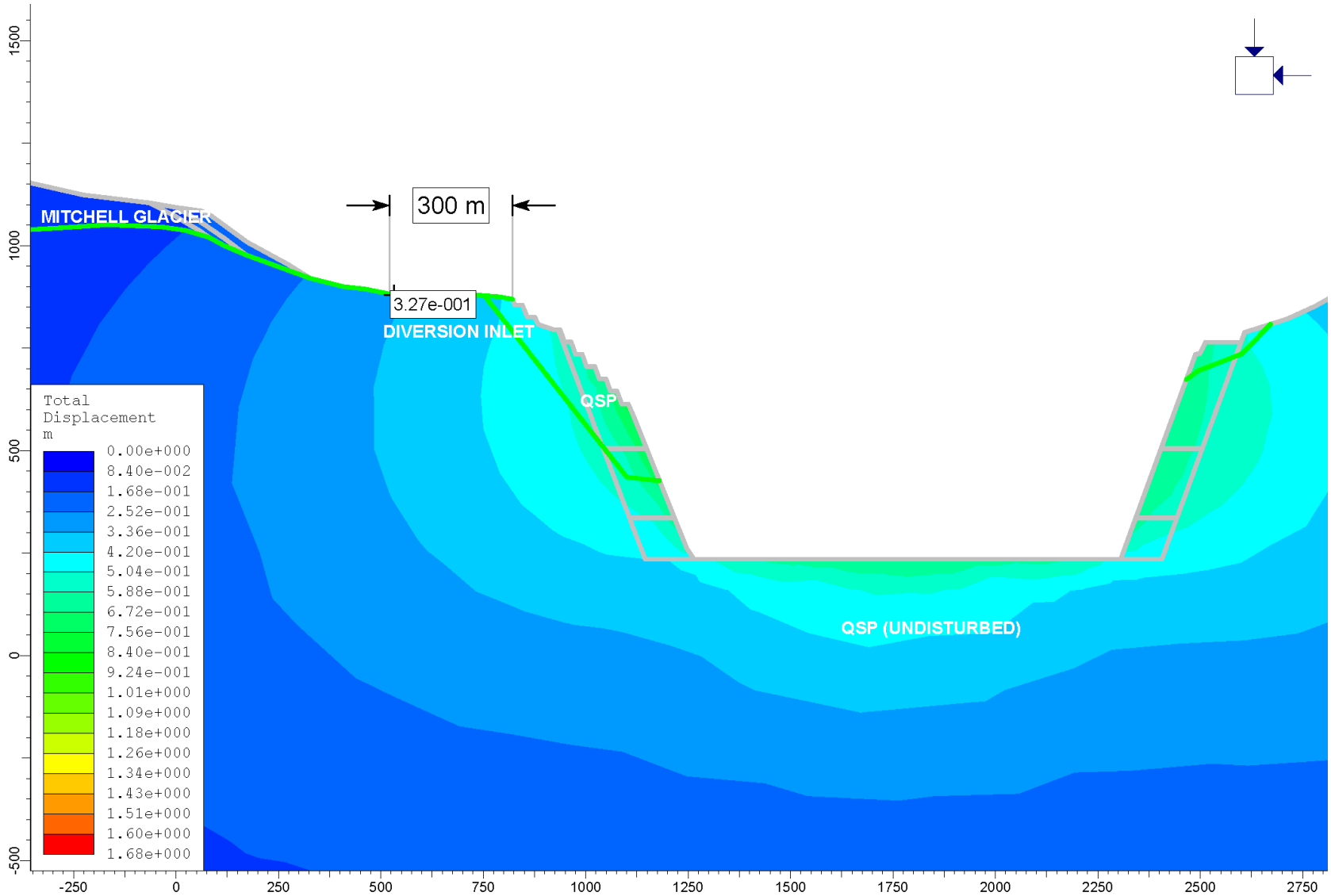

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ISOTROPIC DRY CASE – STAGE 12

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
D13

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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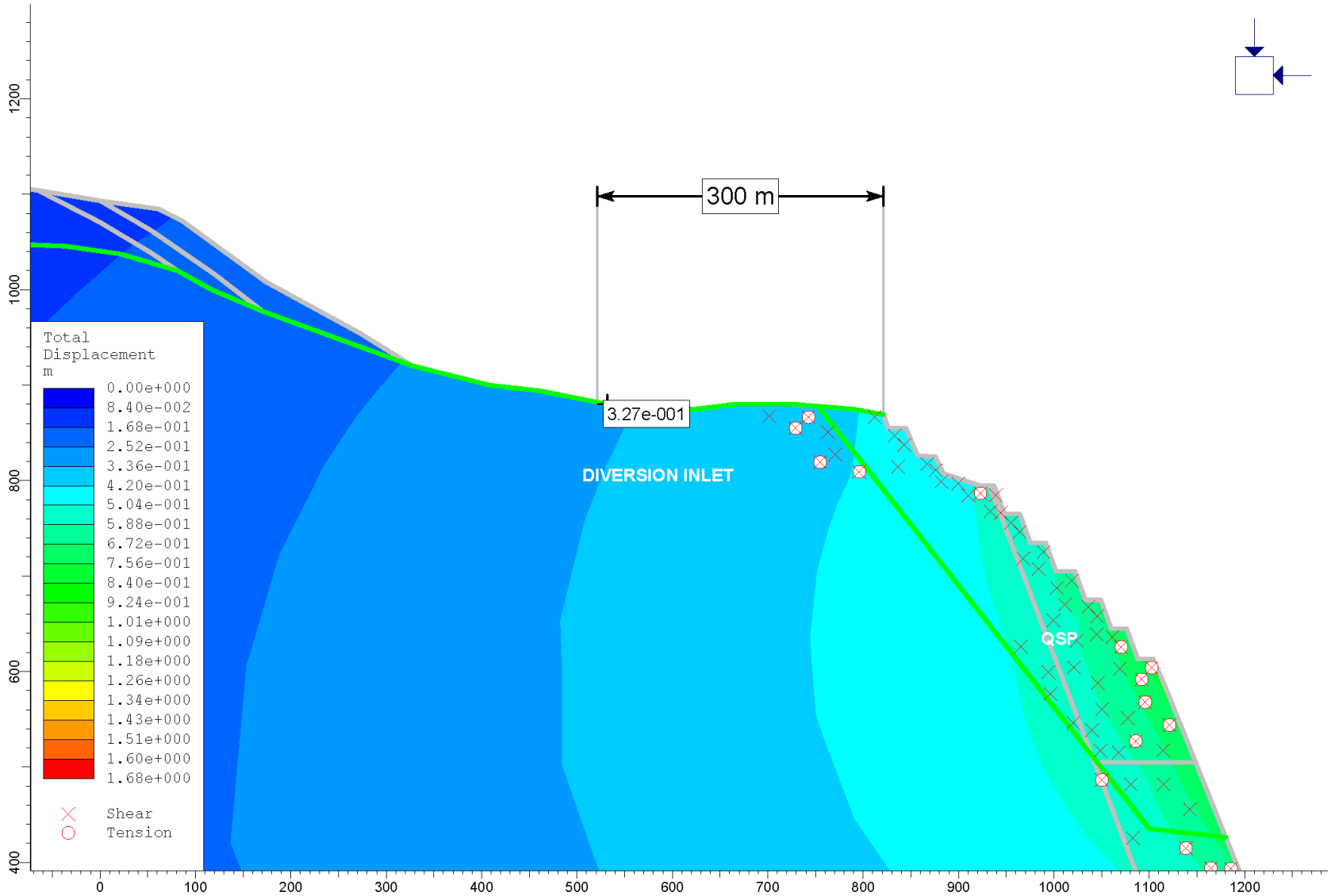

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT NEAR THE MITCHELL GLACIER DIVERSION INLET, ISOTROPIC DRY CASE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
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FIGURE No.:
D14

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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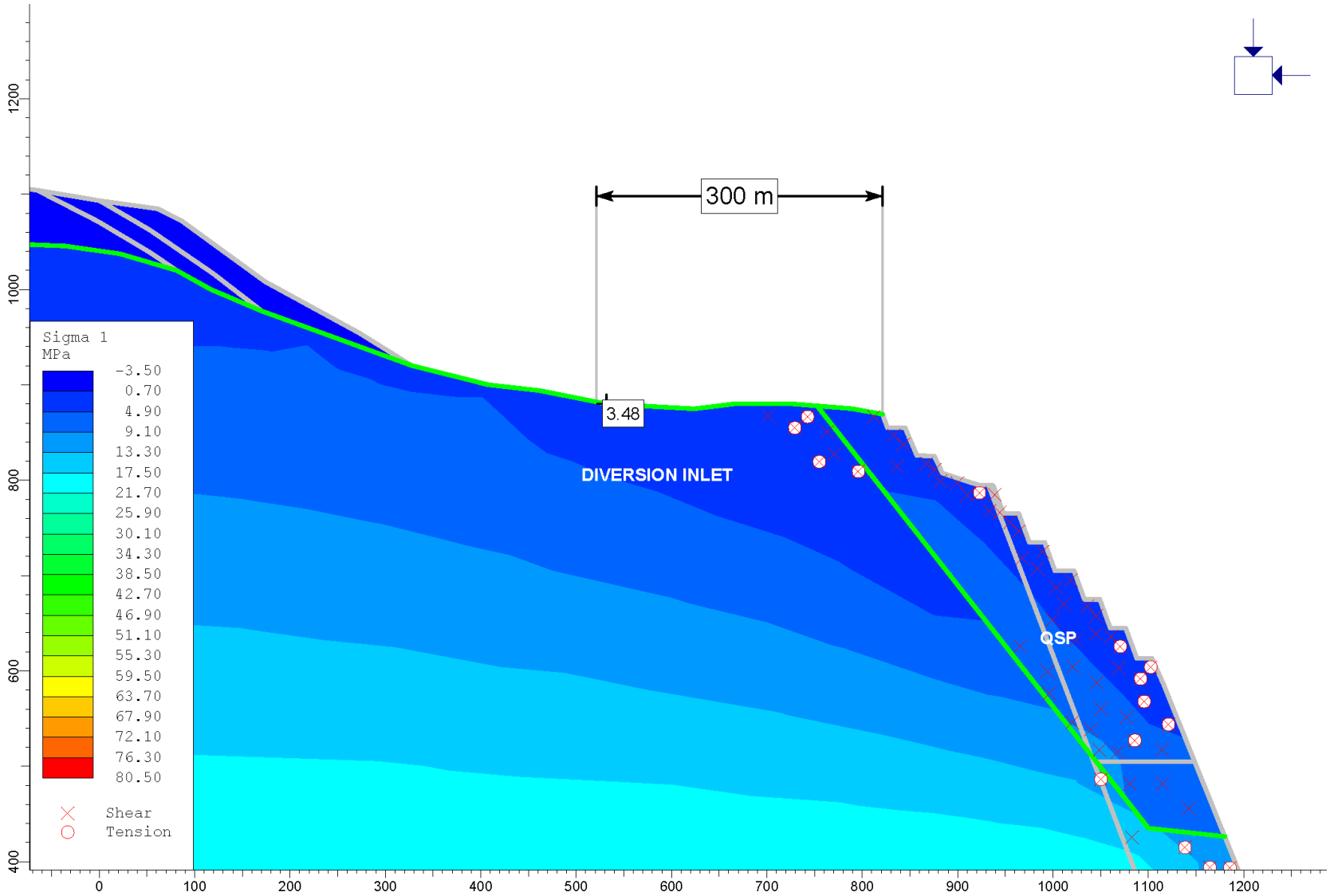

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D - MAJOR PRINCIPAL STRESS NEAR THE MITCHELL DIVERSION INLET- ISOTROPIC DRY CASE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D15

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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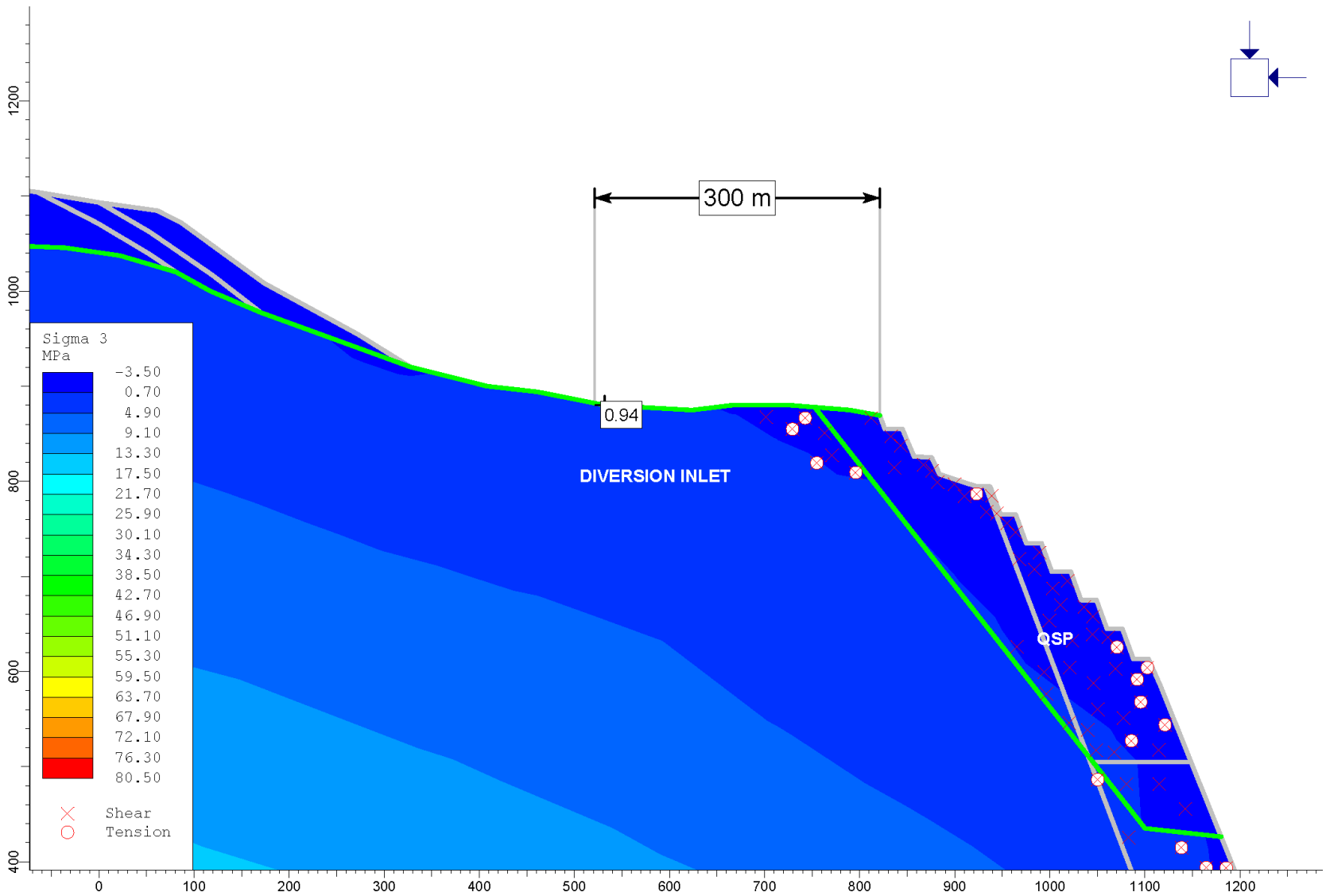

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D - MINOR PRINCIPAL STRESS NEAR THE MITCHELL DIVERSION INLET – ISOTROPIC DRY CASE- STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D16

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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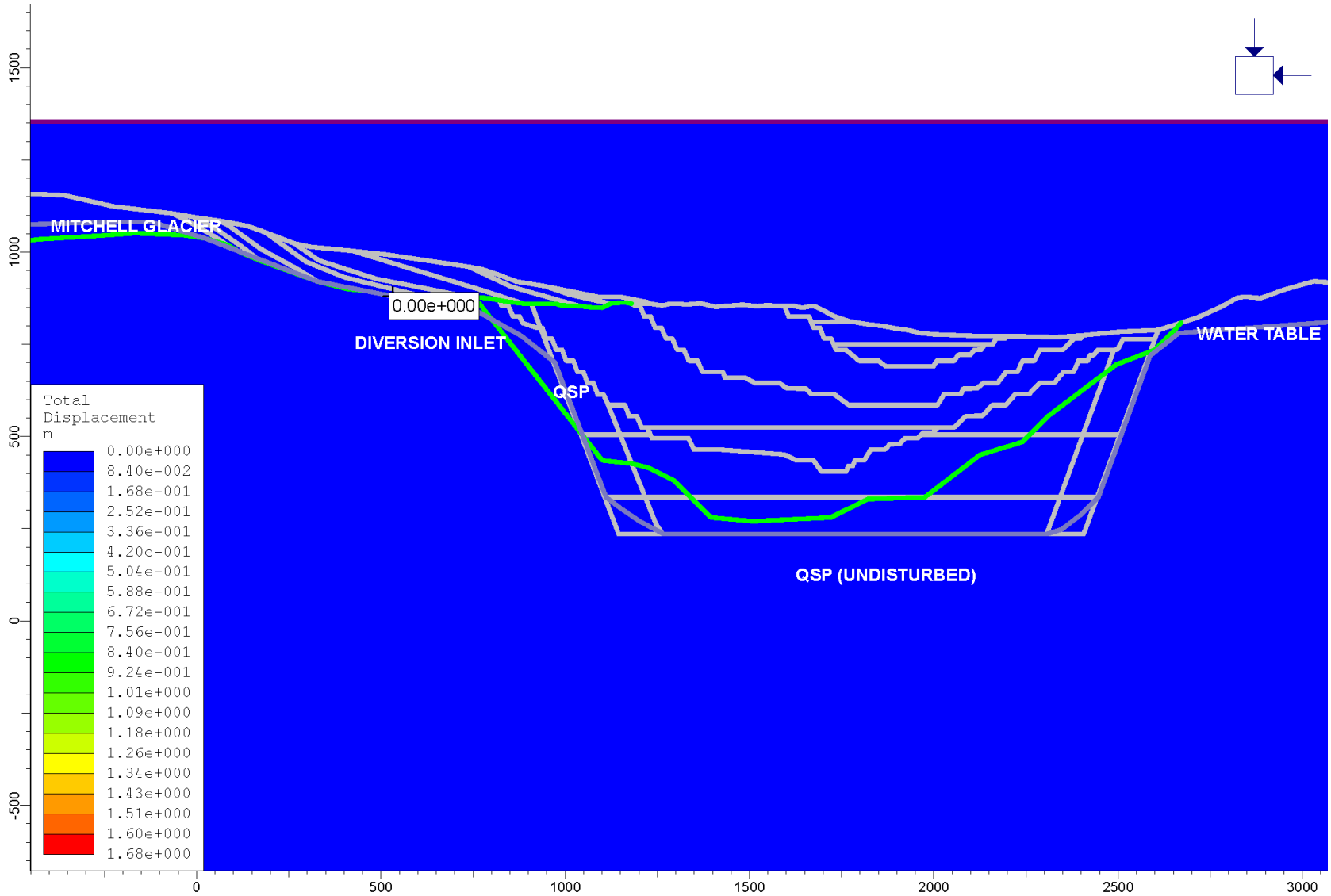

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 1

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D17

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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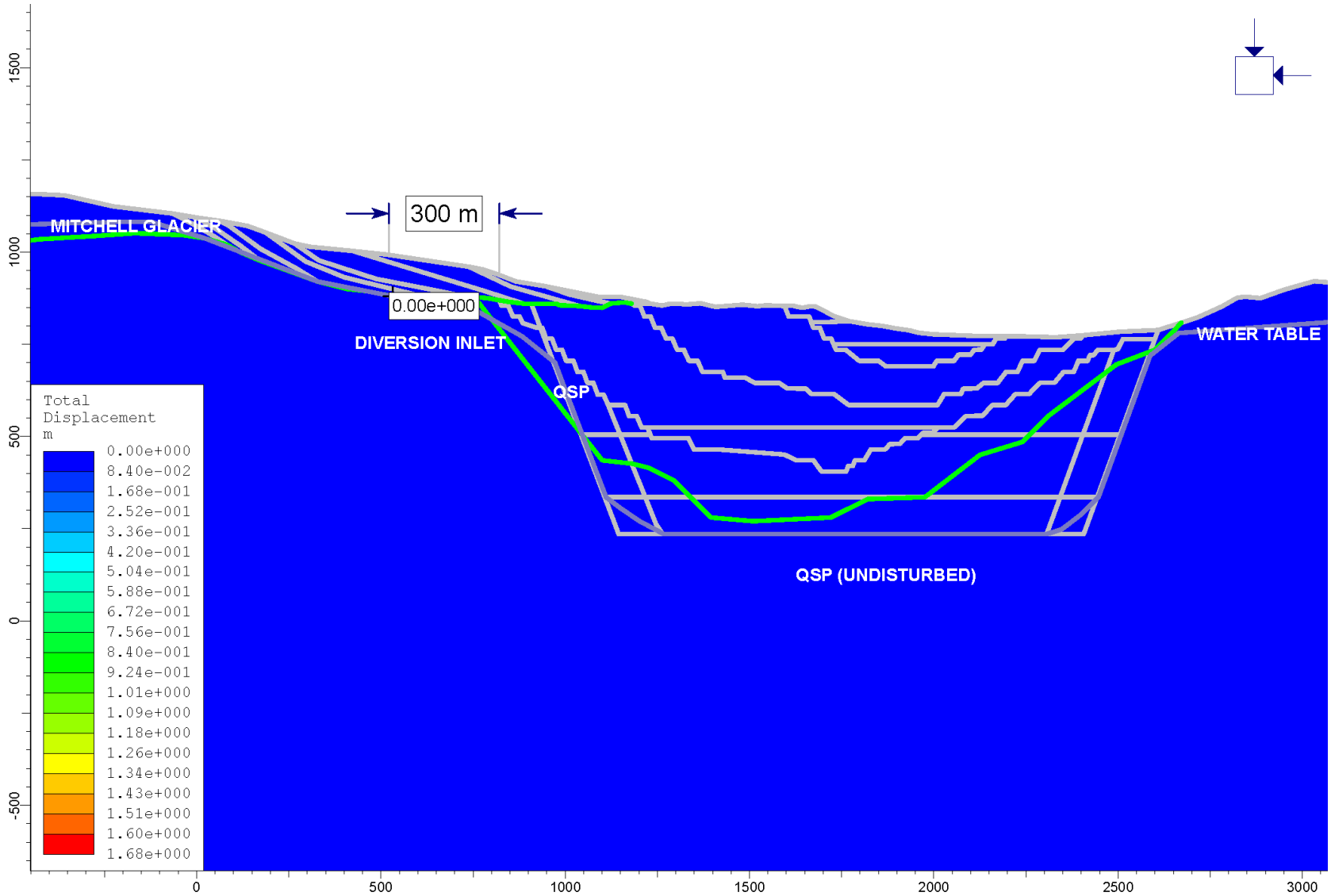

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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 2

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D18

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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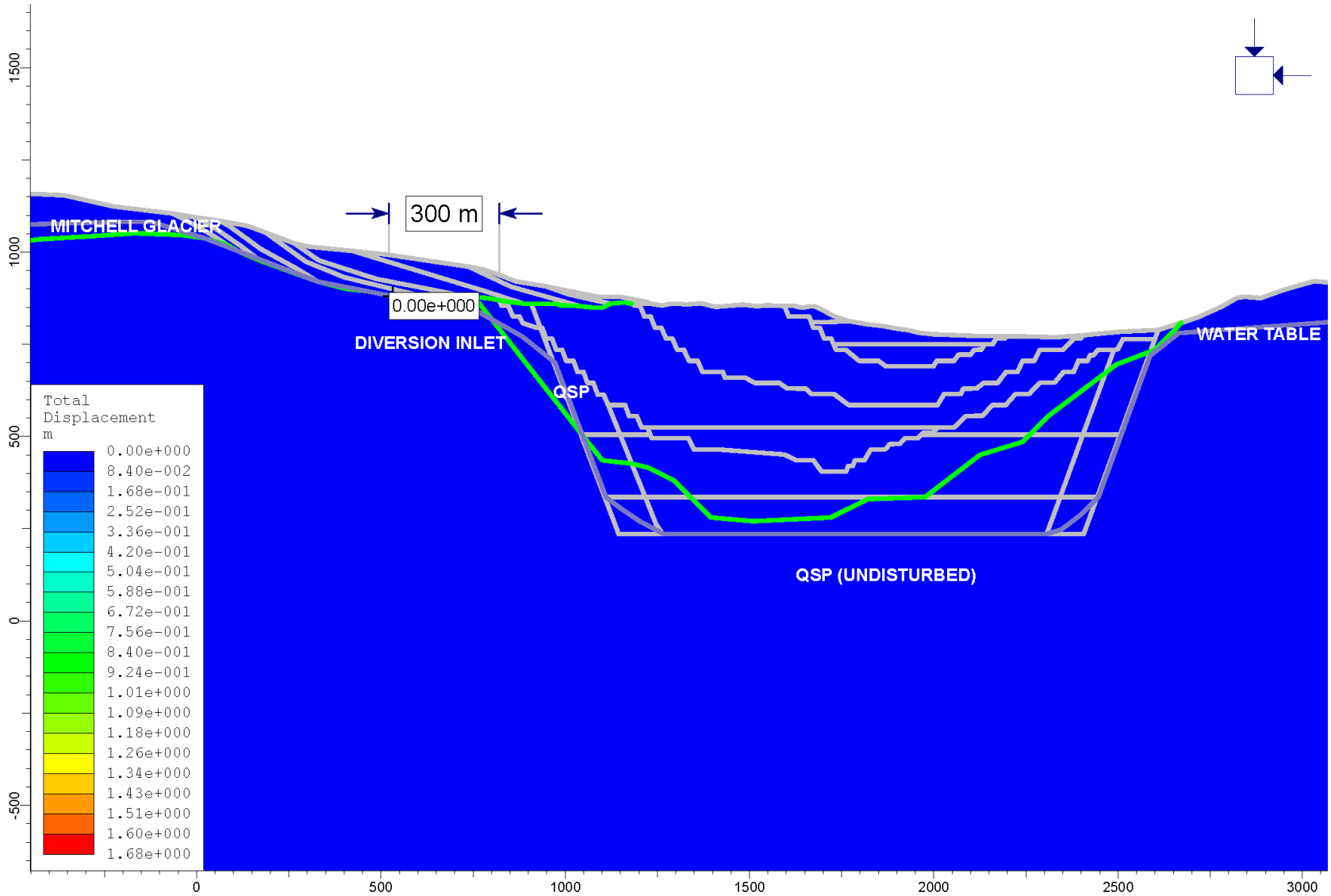

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 3

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D19

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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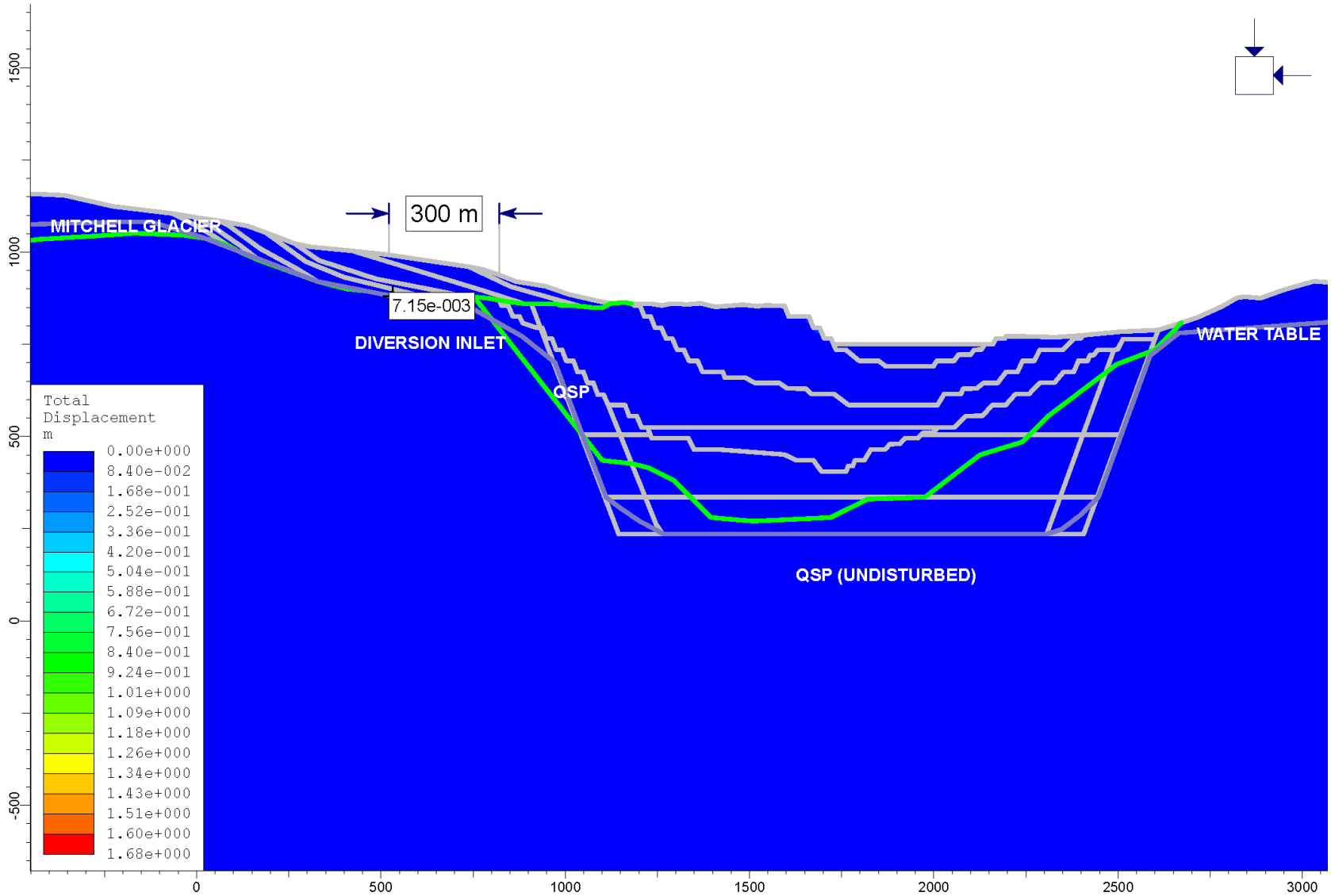

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 4

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D20

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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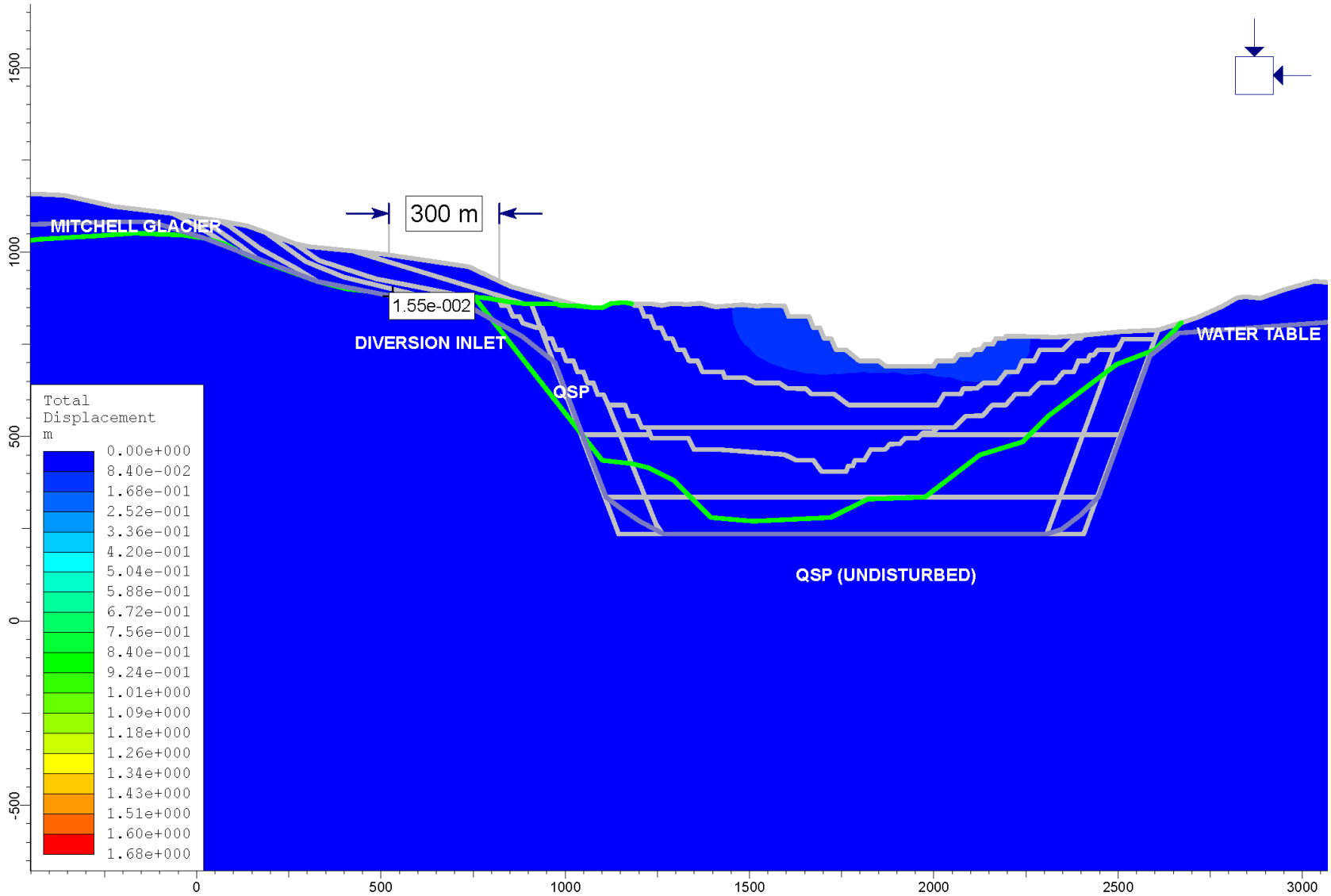

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 5

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D21

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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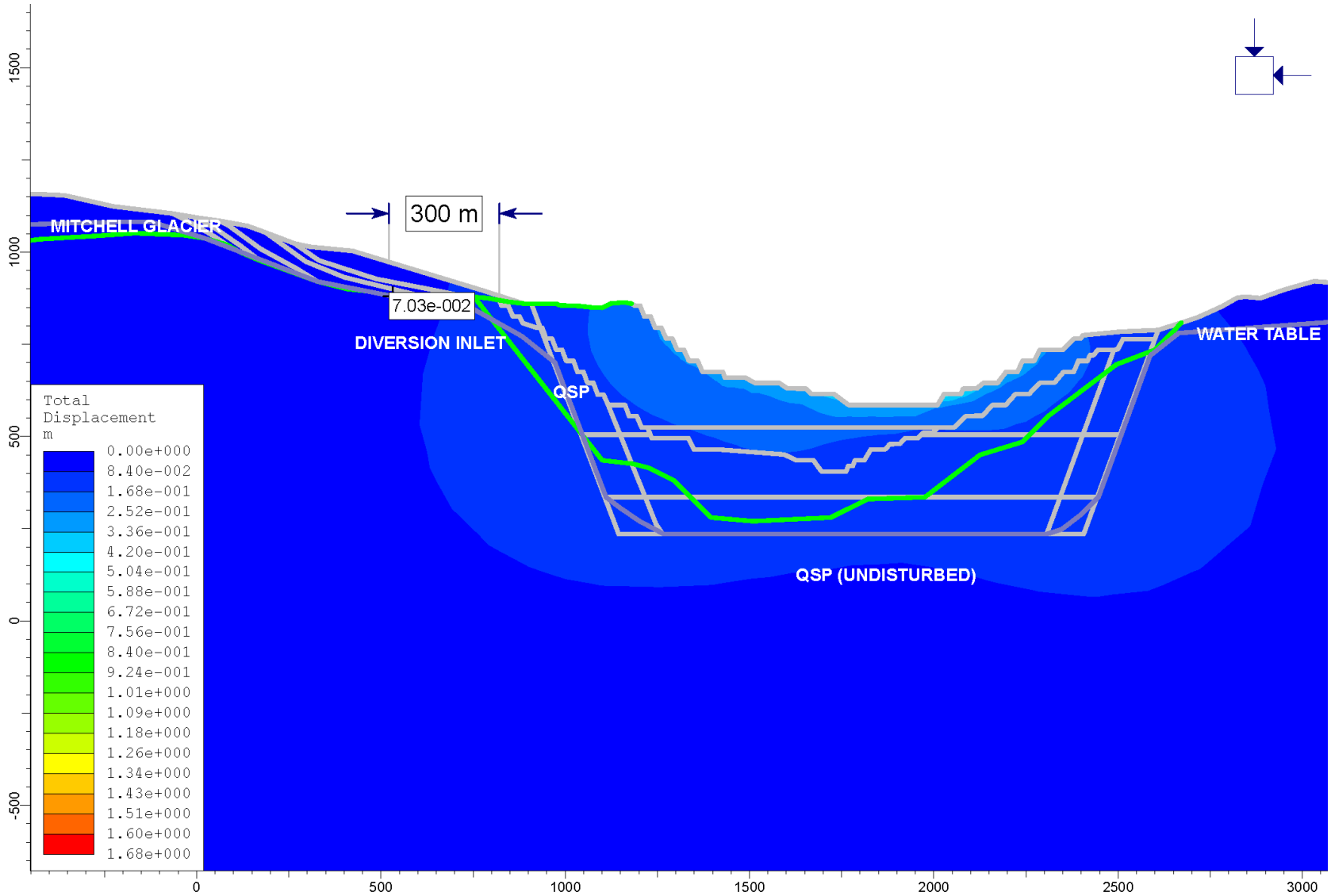

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 6

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D22

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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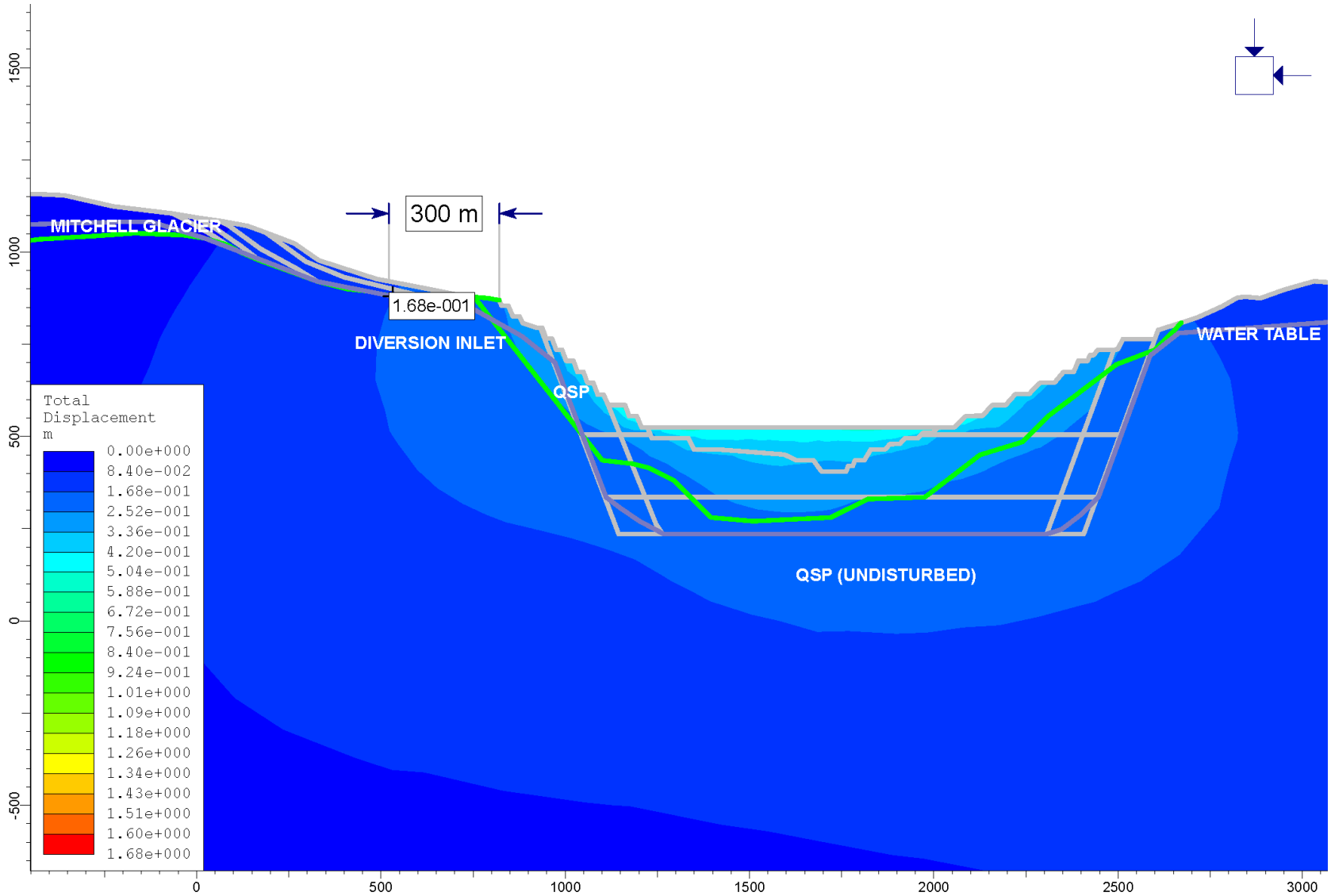

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 7

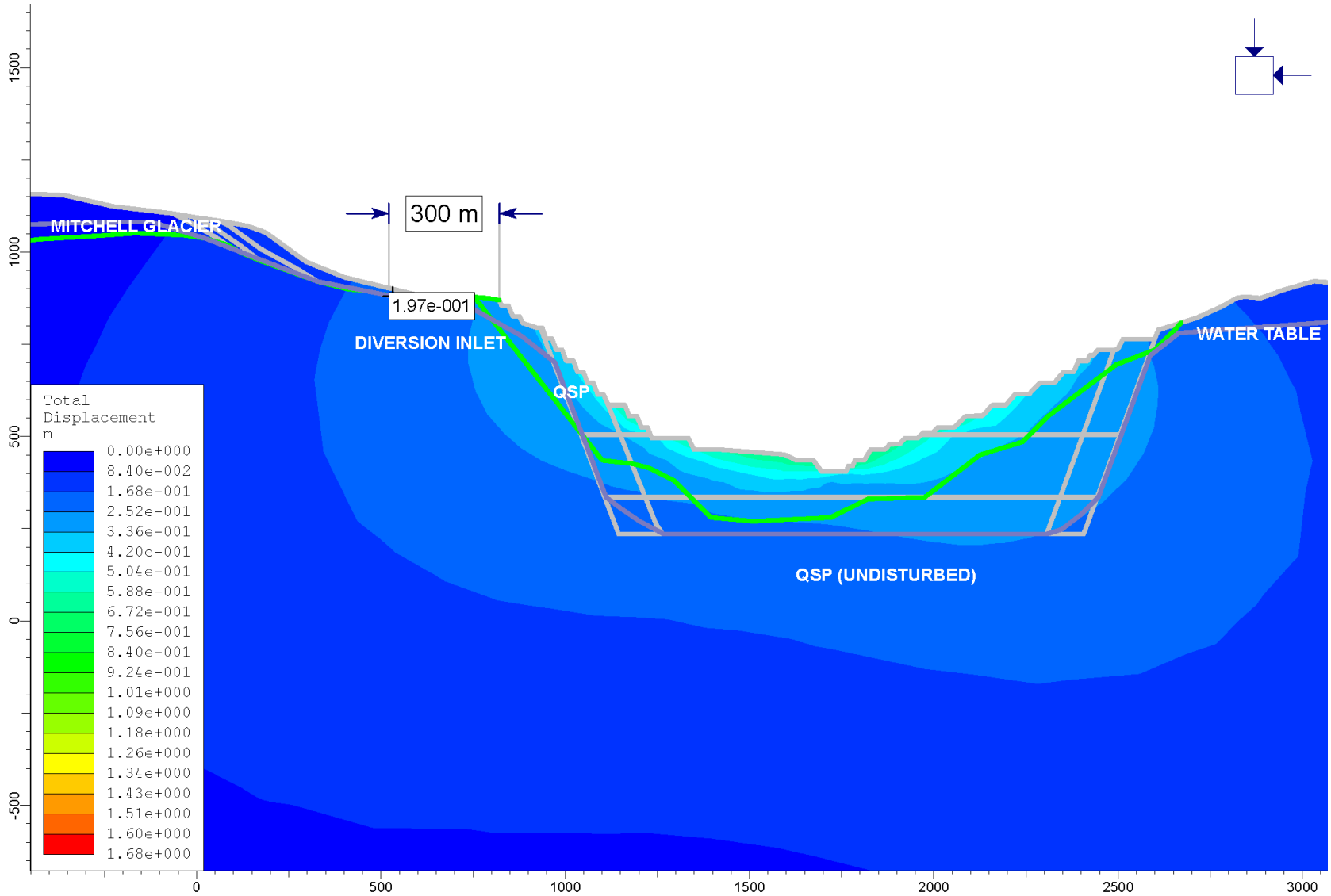
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D23

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 8

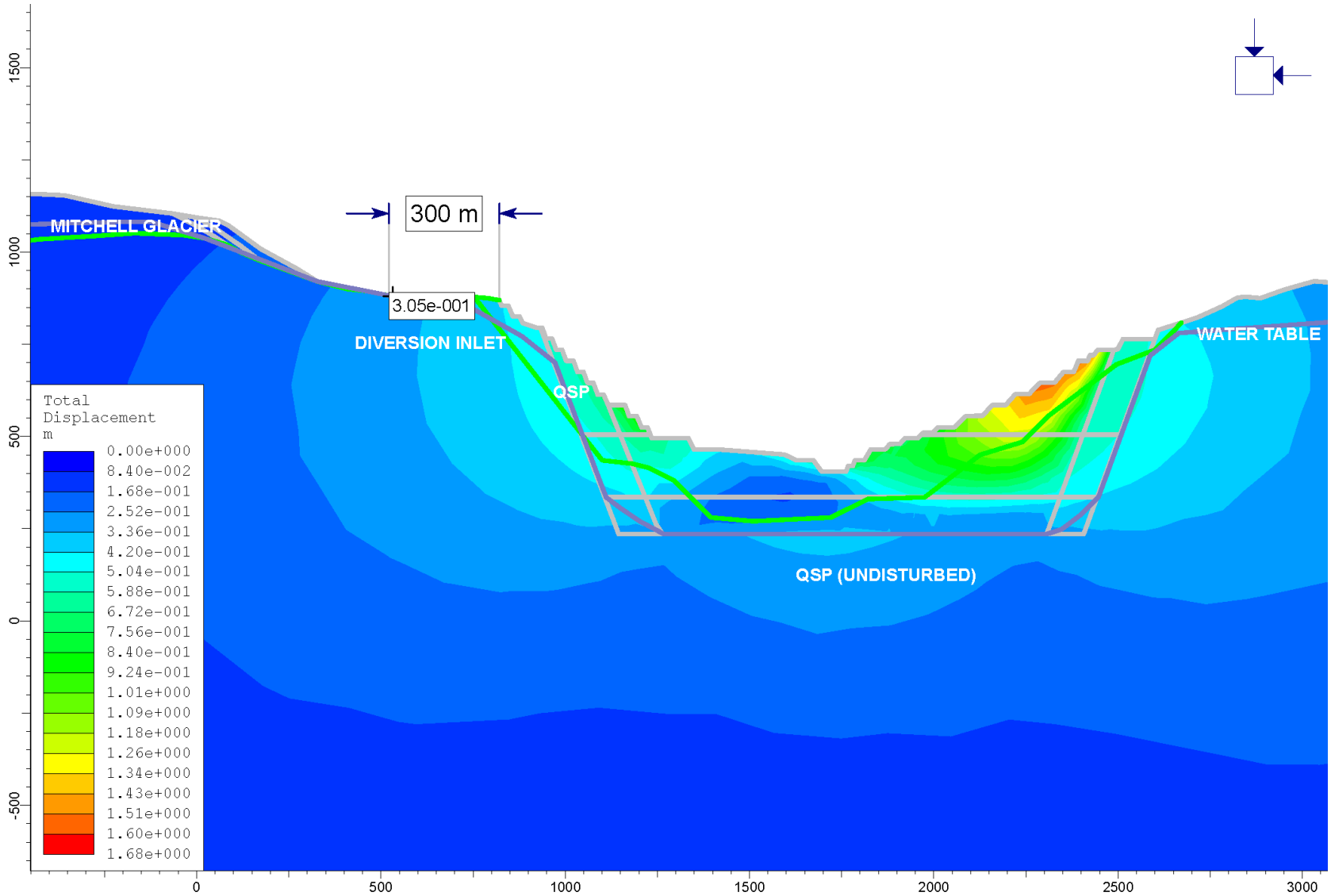
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D24

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 9

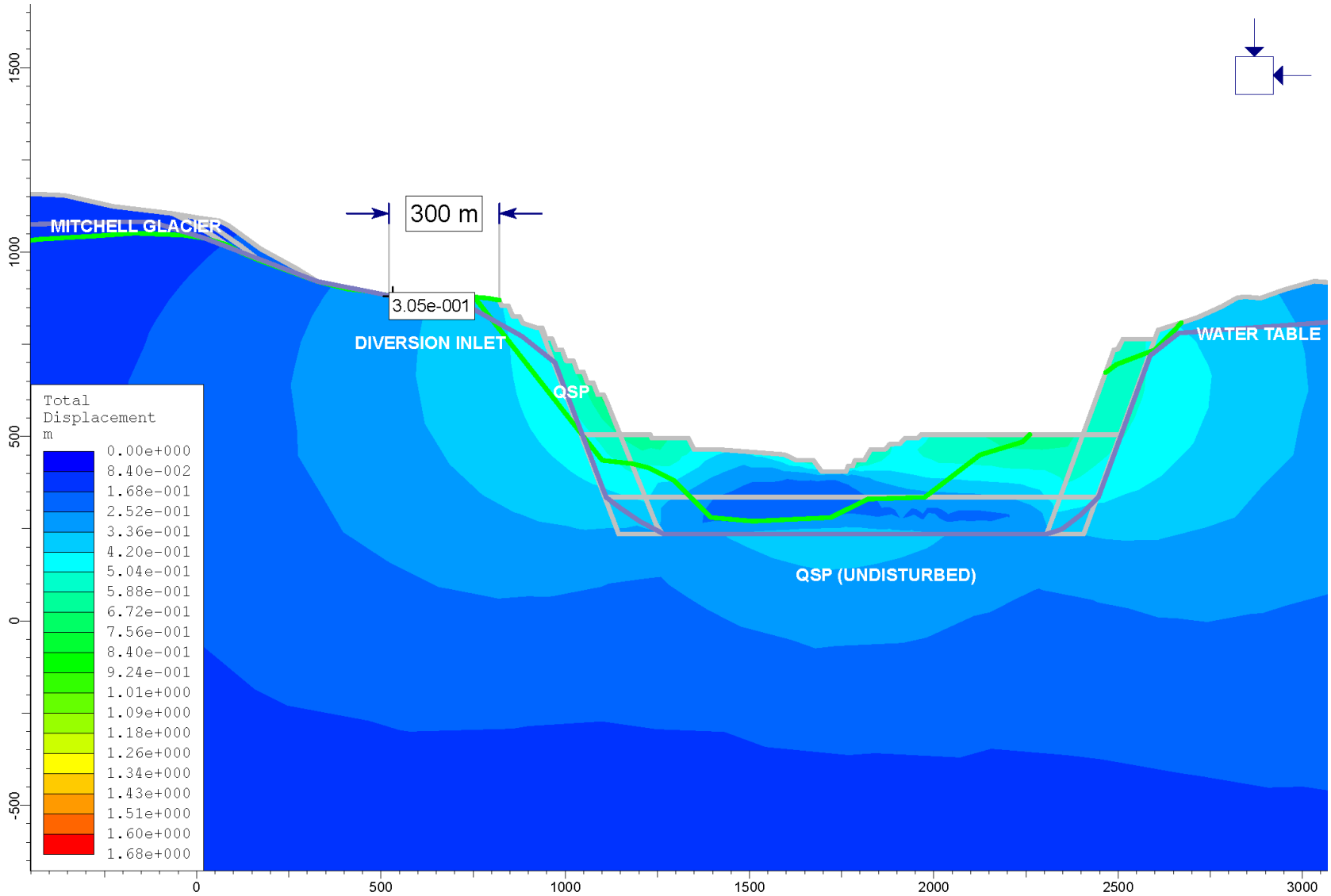
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D25

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 10

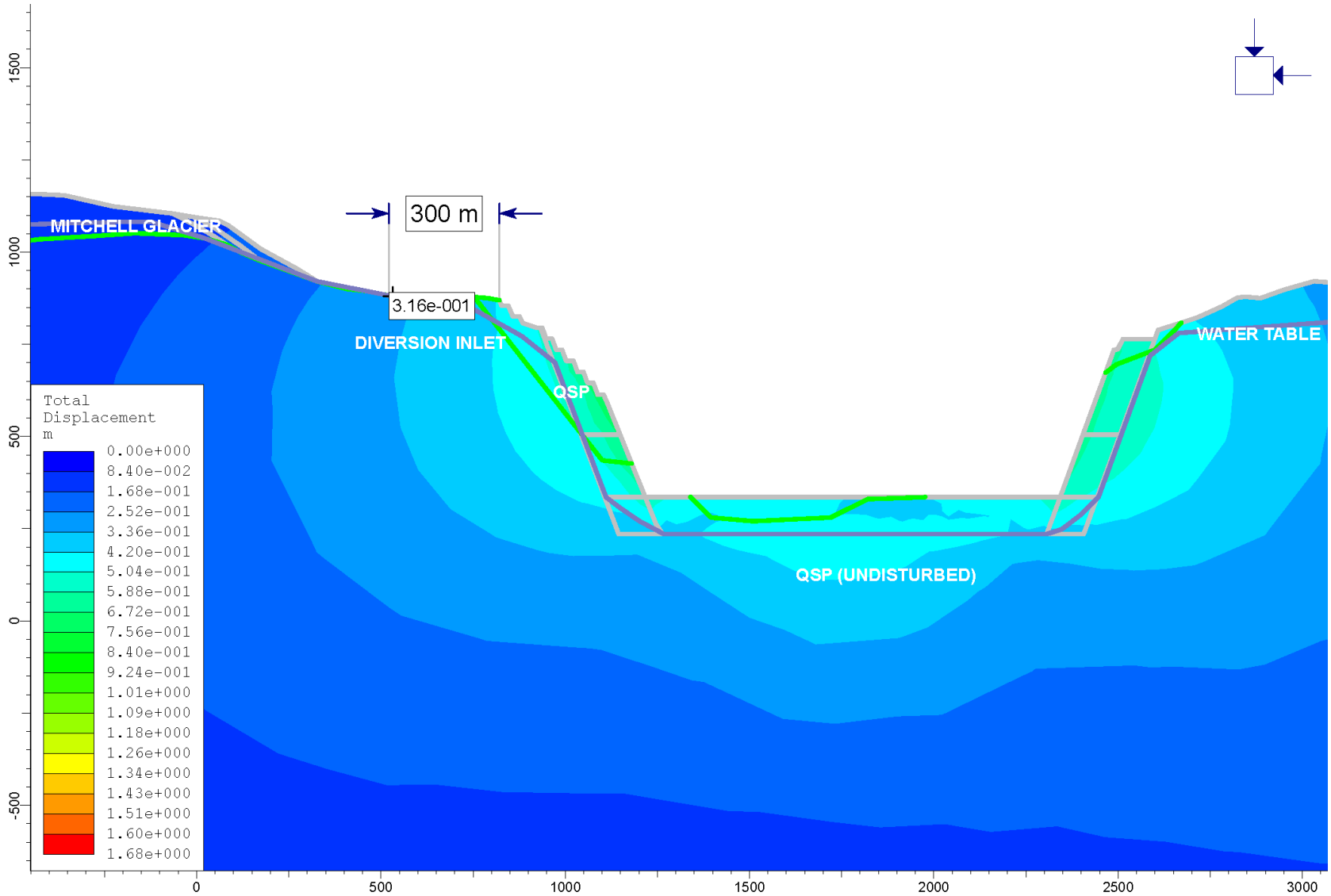
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D26

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 11

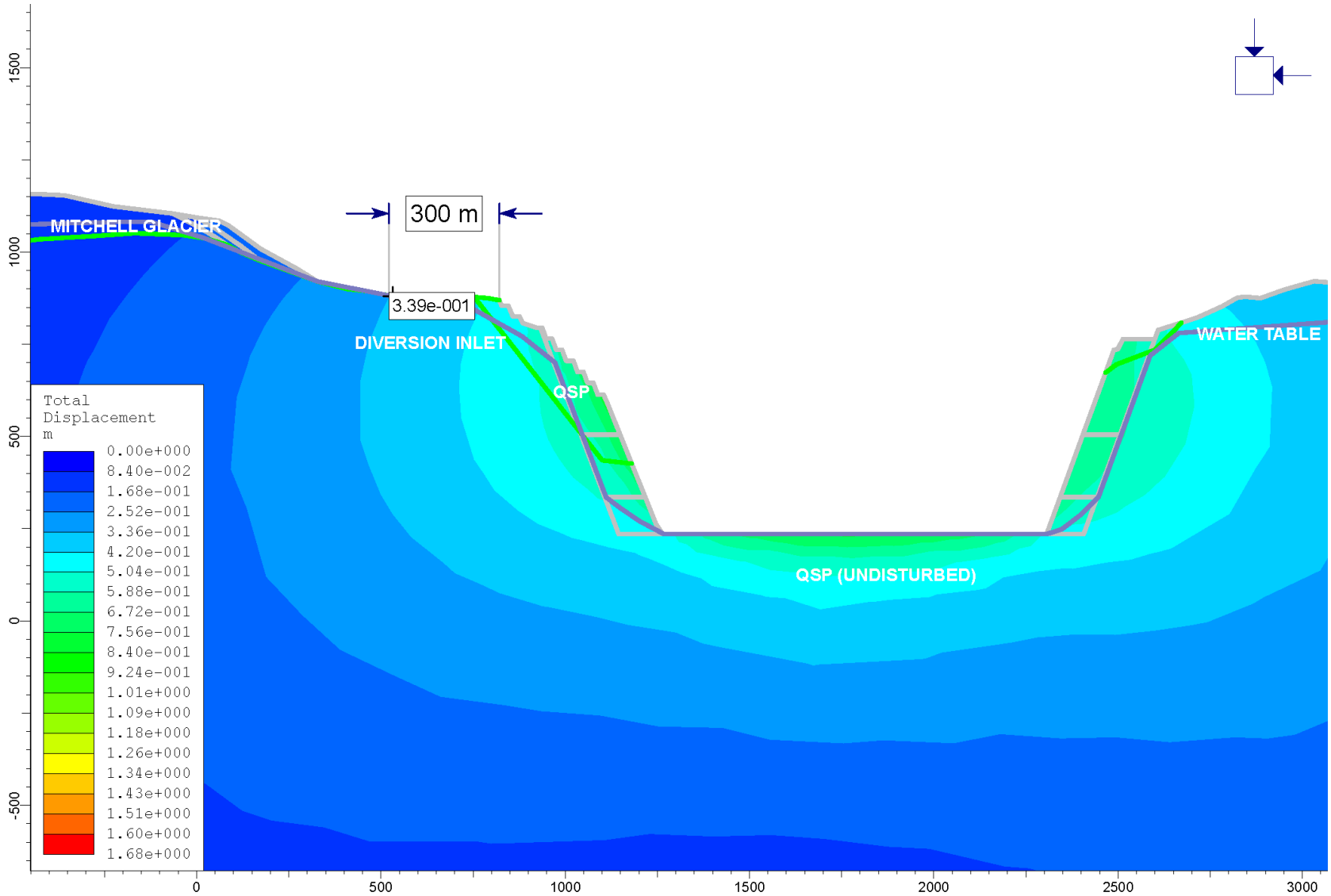
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D27

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, BASE CASE WATER TABLE– STAGE 12

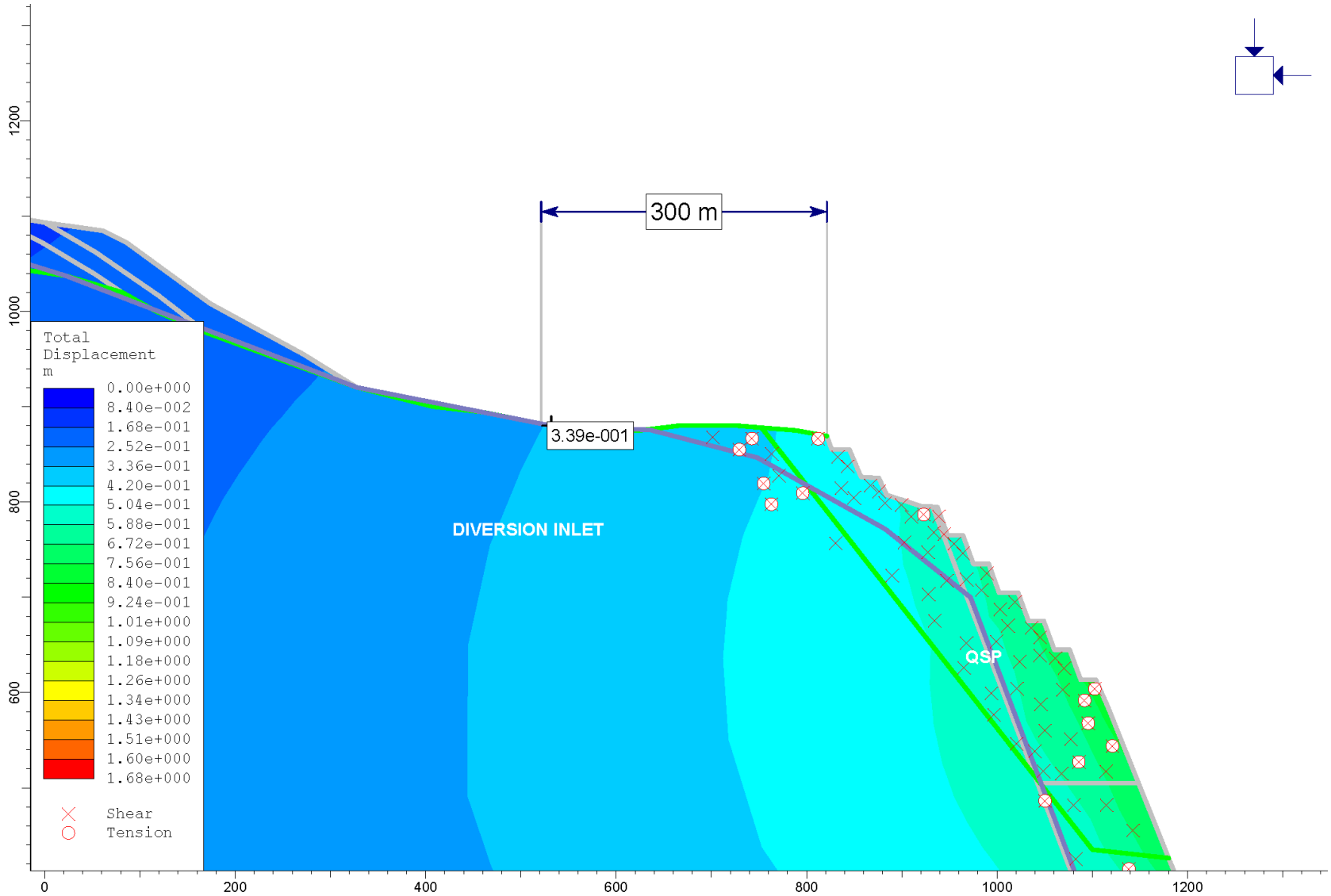
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D28

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT NEAR THE MITCHELL GLACIER DIVERSION INLET, ISOTROPIC BASE WT – STAGE 13

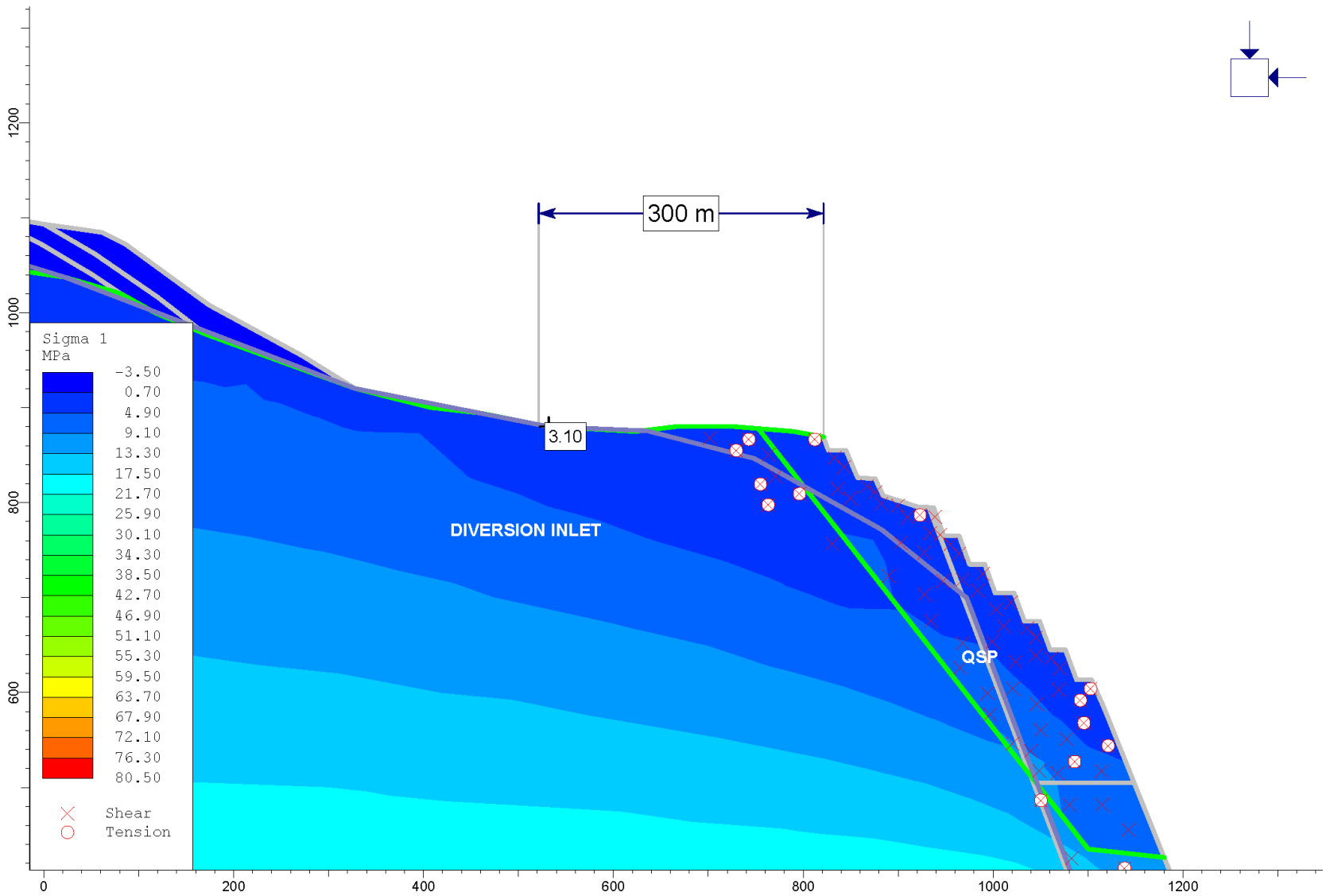
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D29

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D - MAJOR PRINCIPAL STRESS NEAR THE MITCHELL DIVERSION INLET- ISOTROPIC BASE CASE WT – STAGE 13

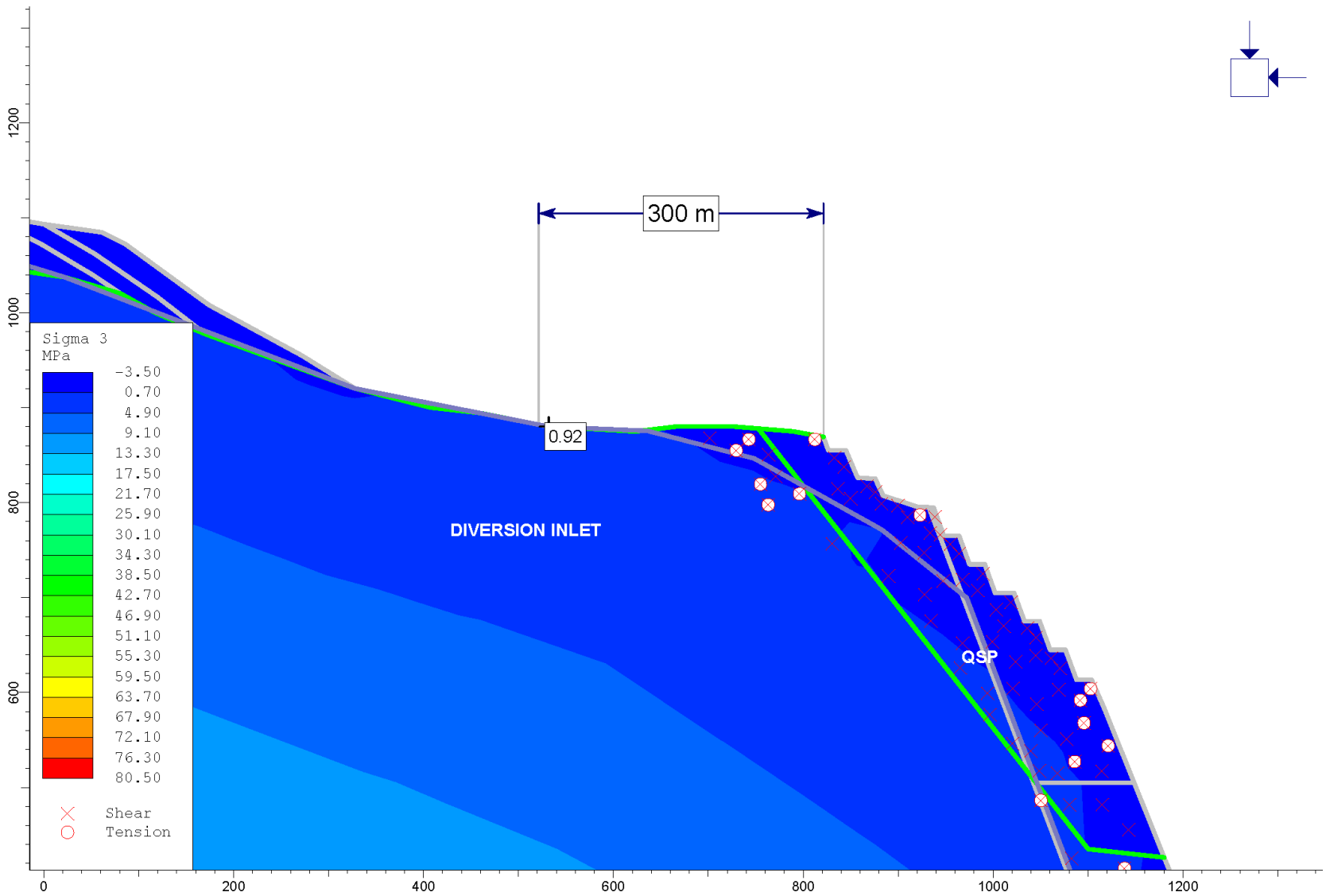
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D30

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D - MAJOR PRINCIPAL STRESS NEAR THE MITCHELL DIVERSION INLET- ISOTROPIC BASE CASE WT – STAGE 13

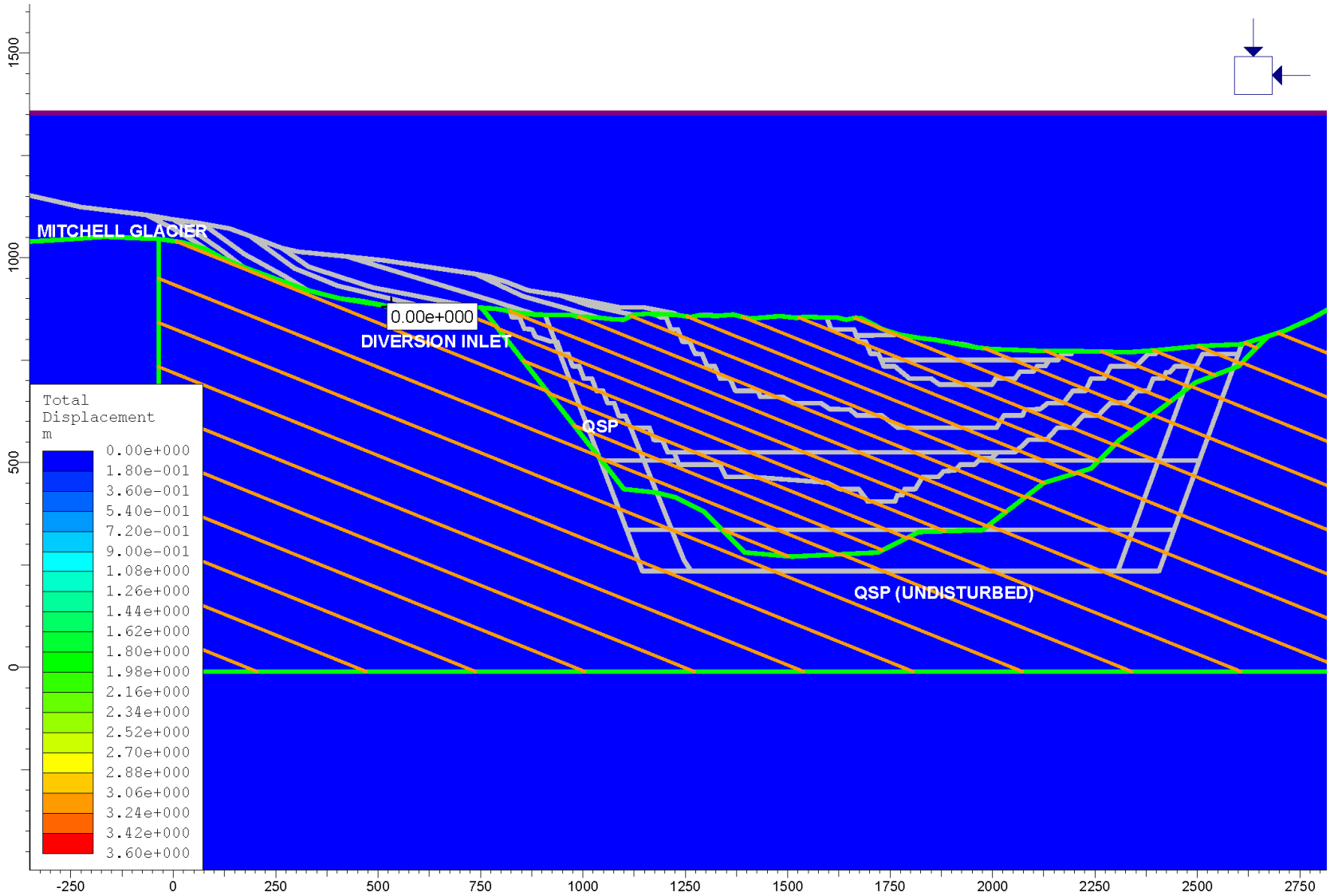
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D31

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 1

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D32

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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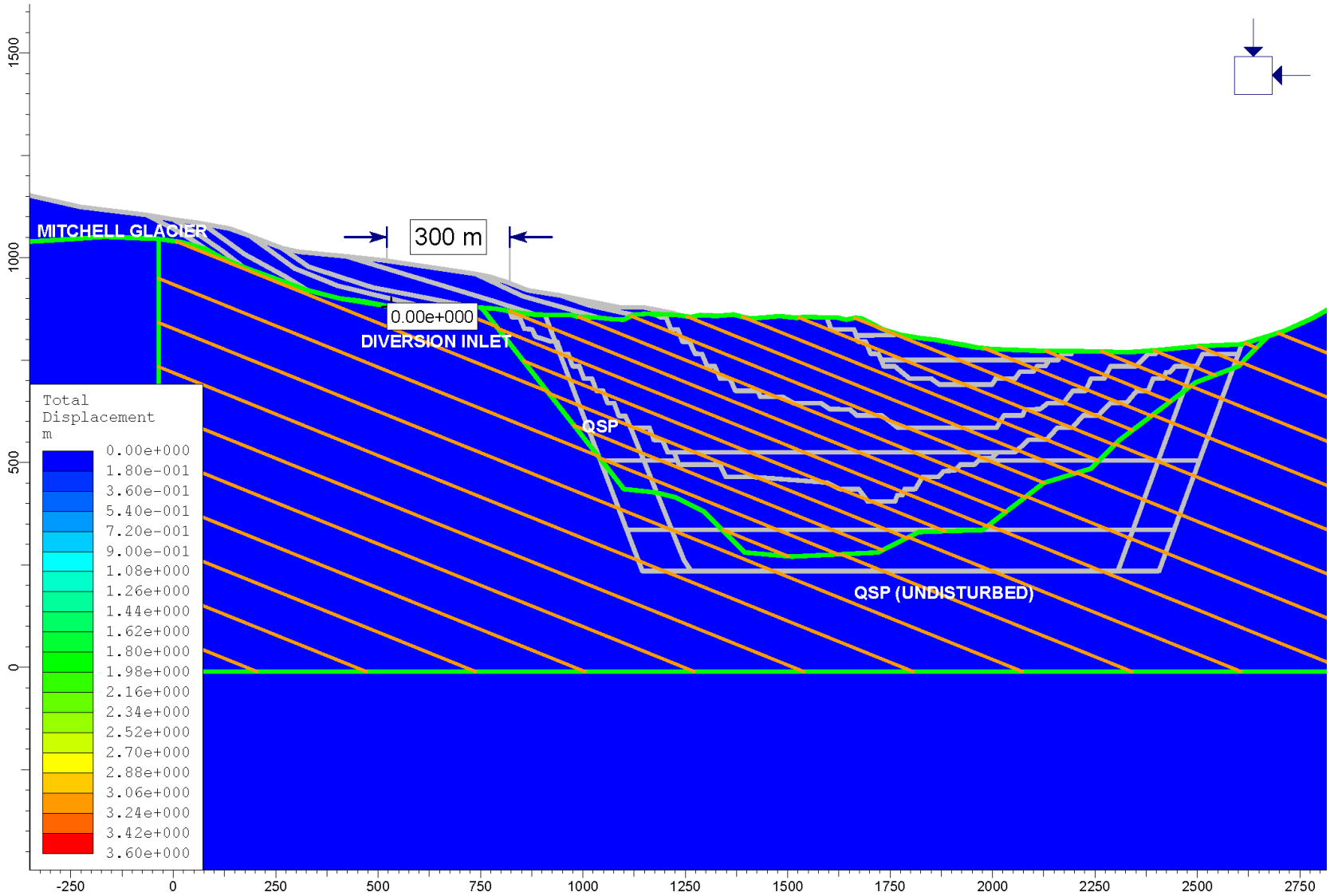

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 2

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D33

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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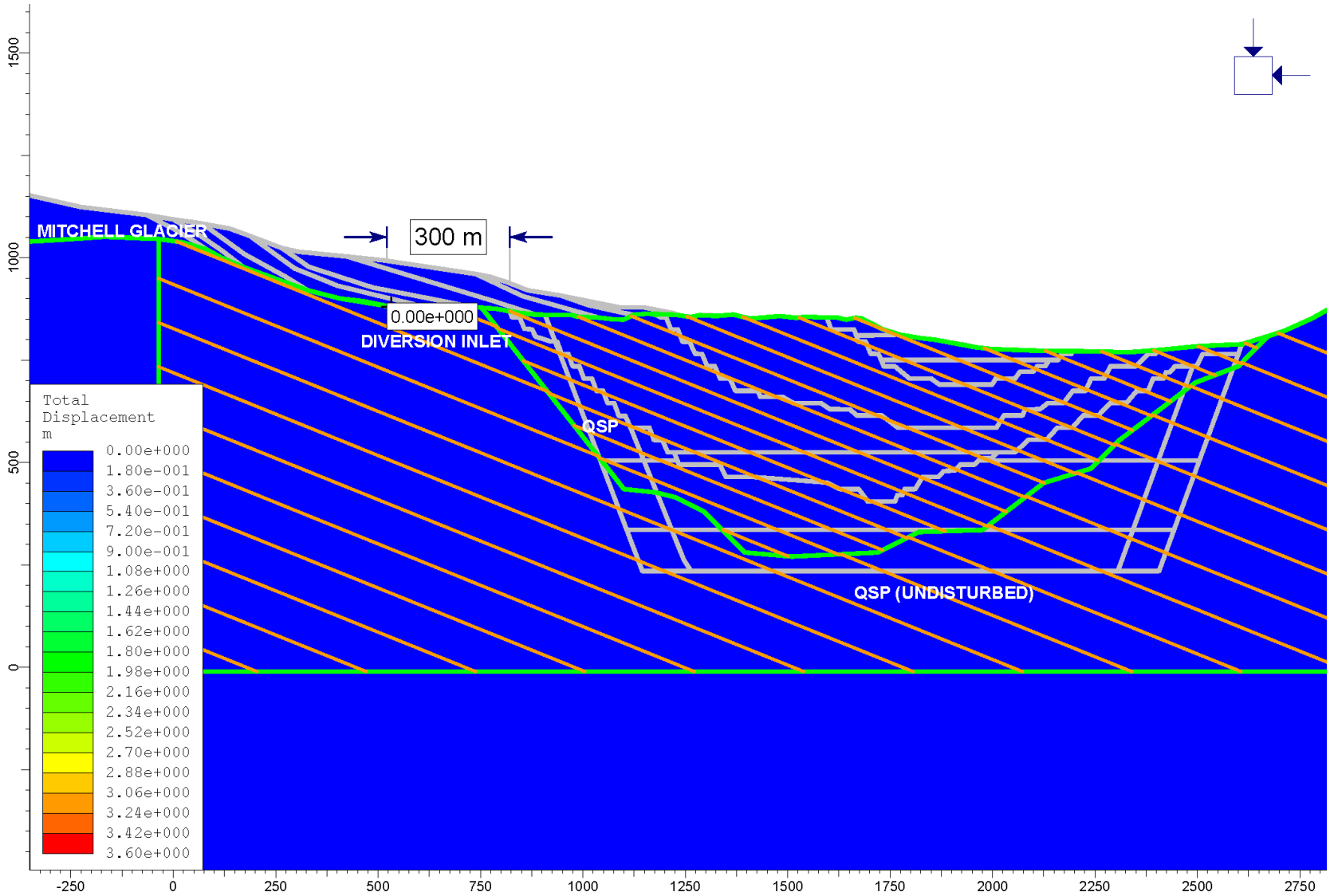

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 3

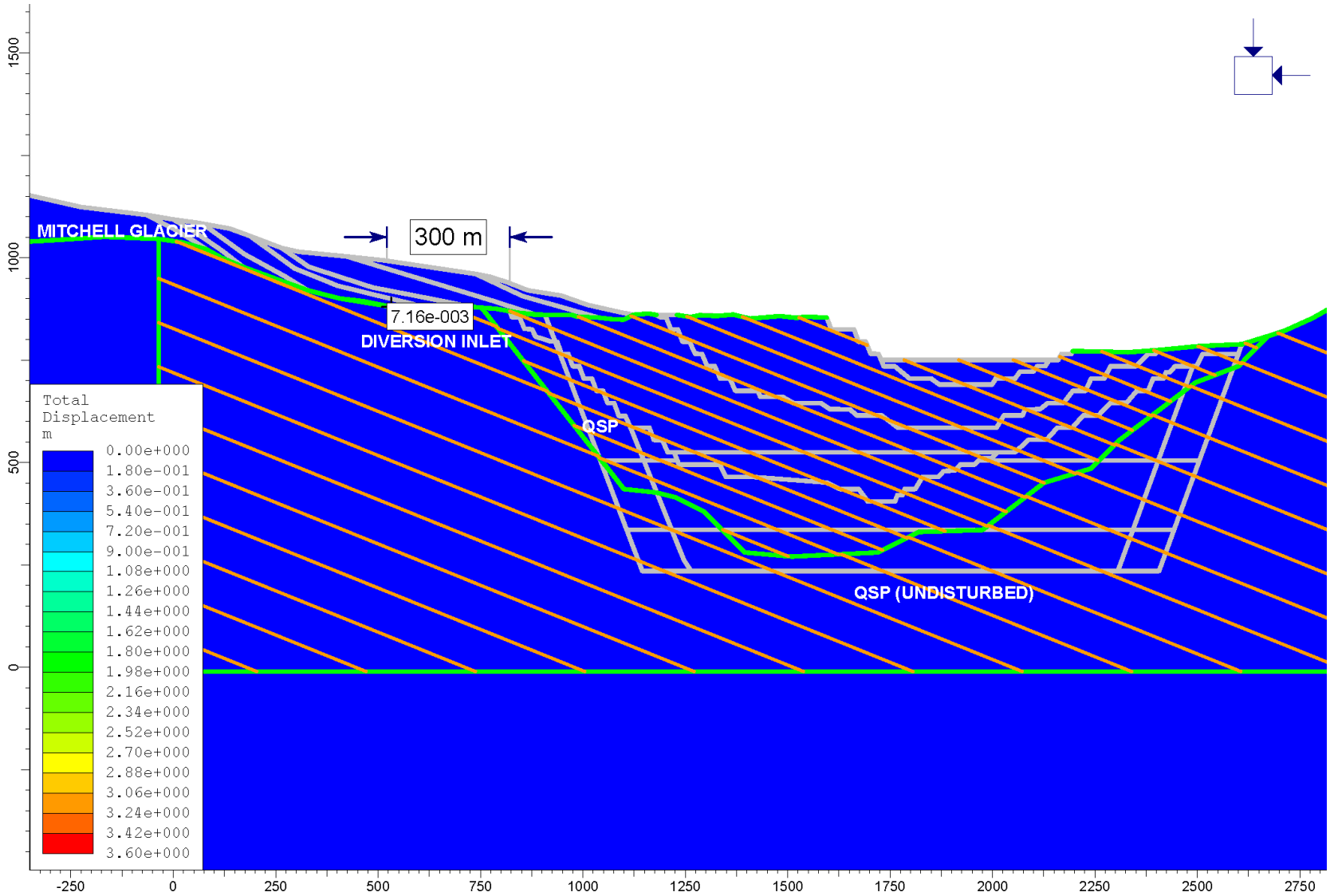
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D34

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 4

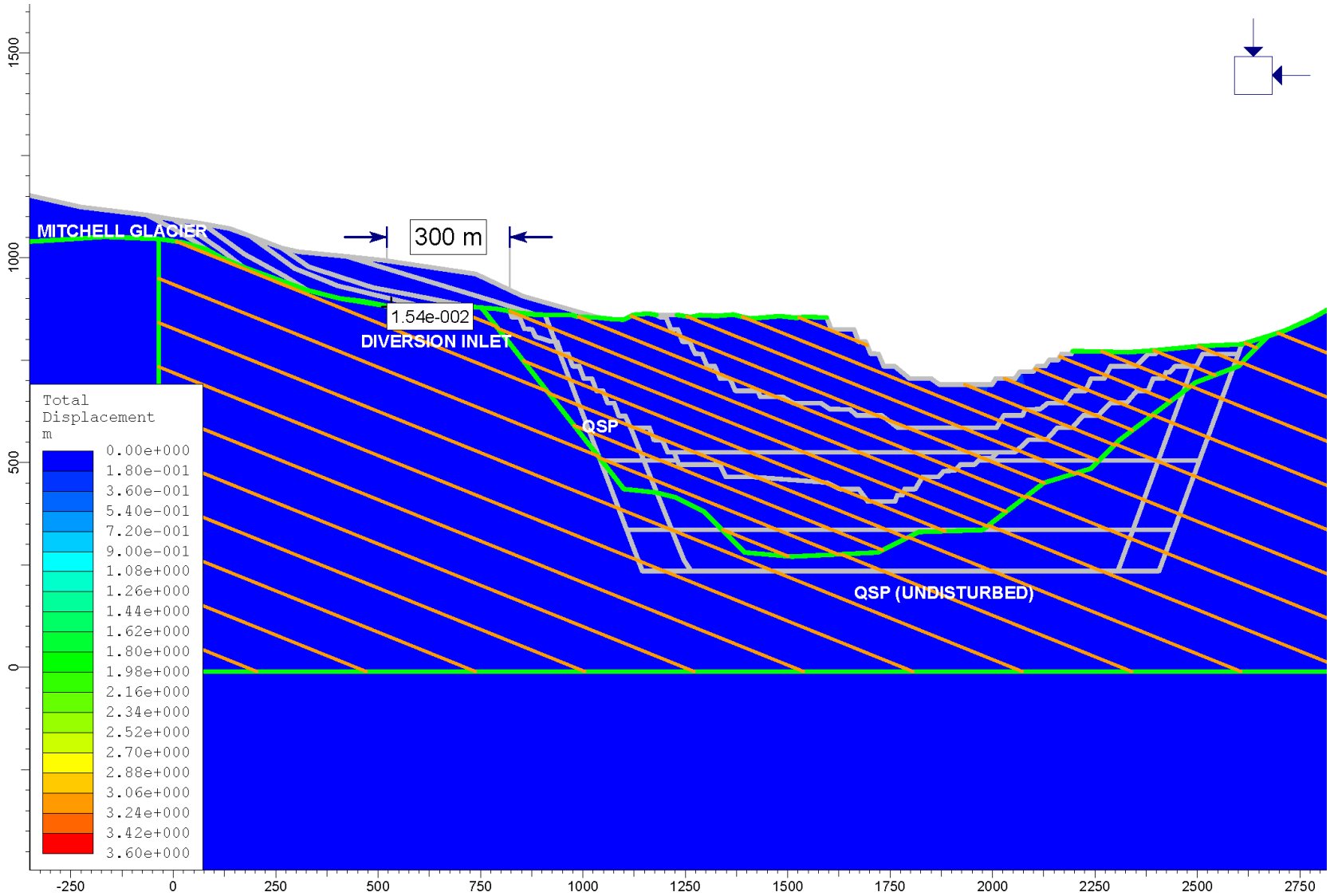
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D35

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 5

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D36

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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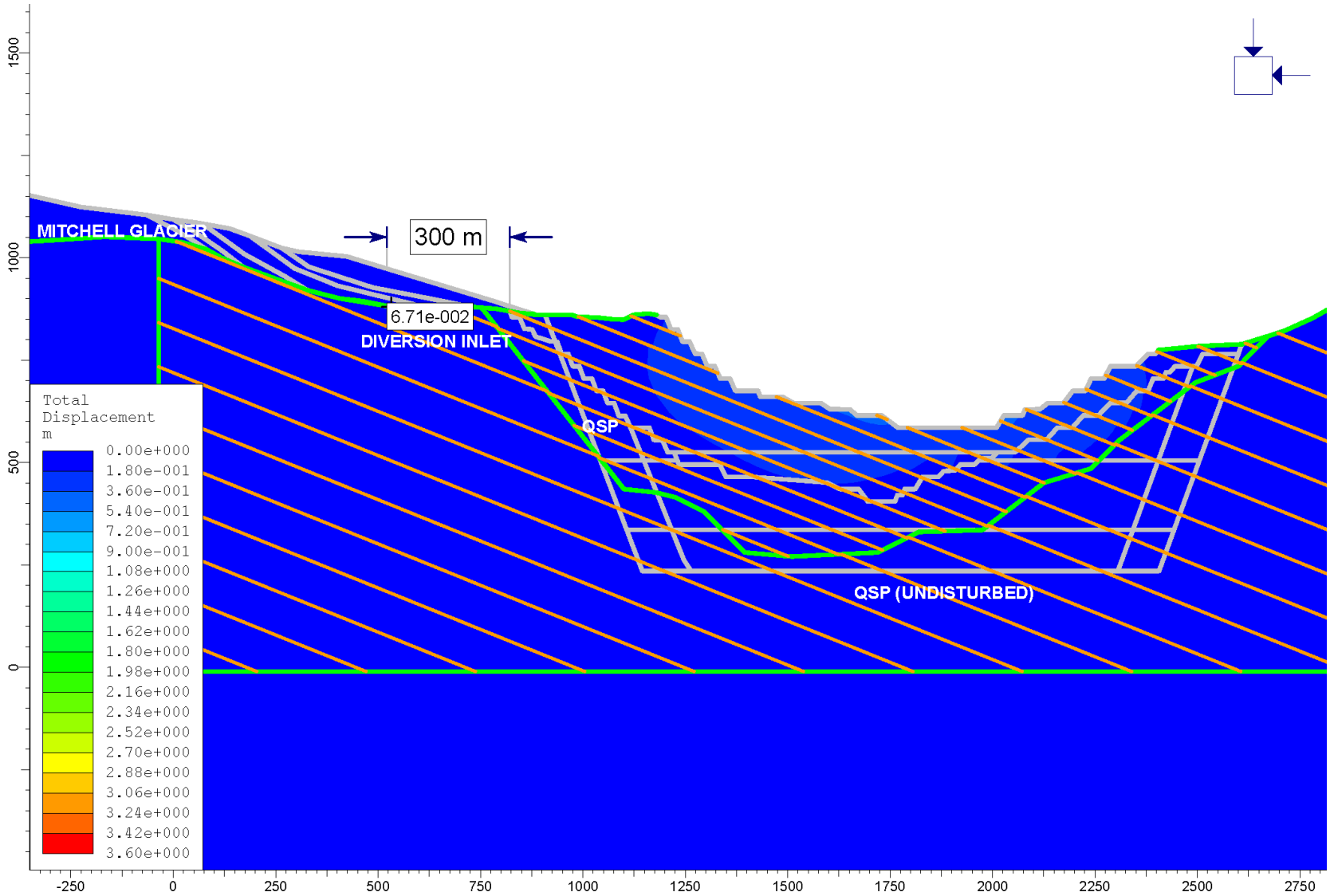

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 6

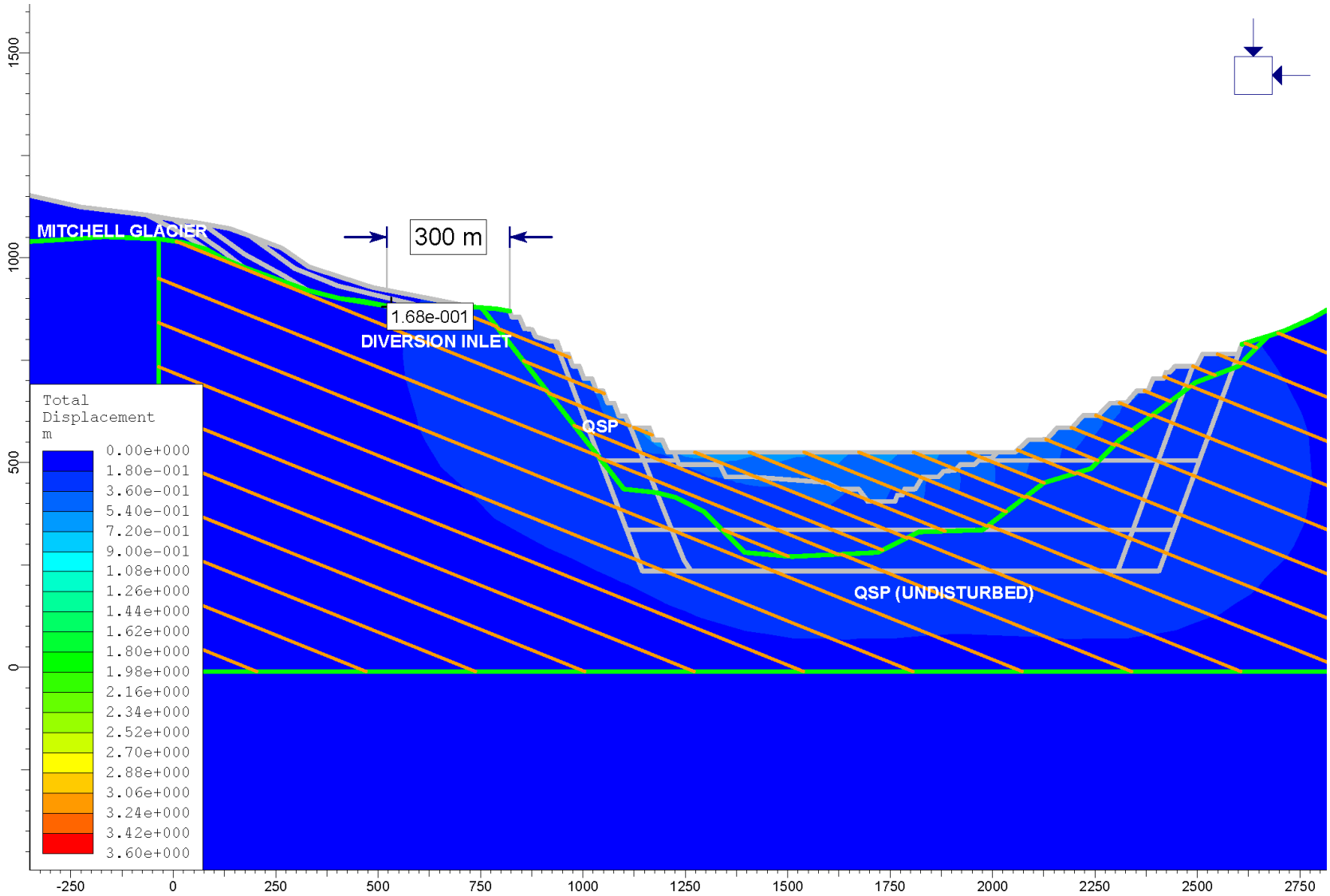
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D37

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 7

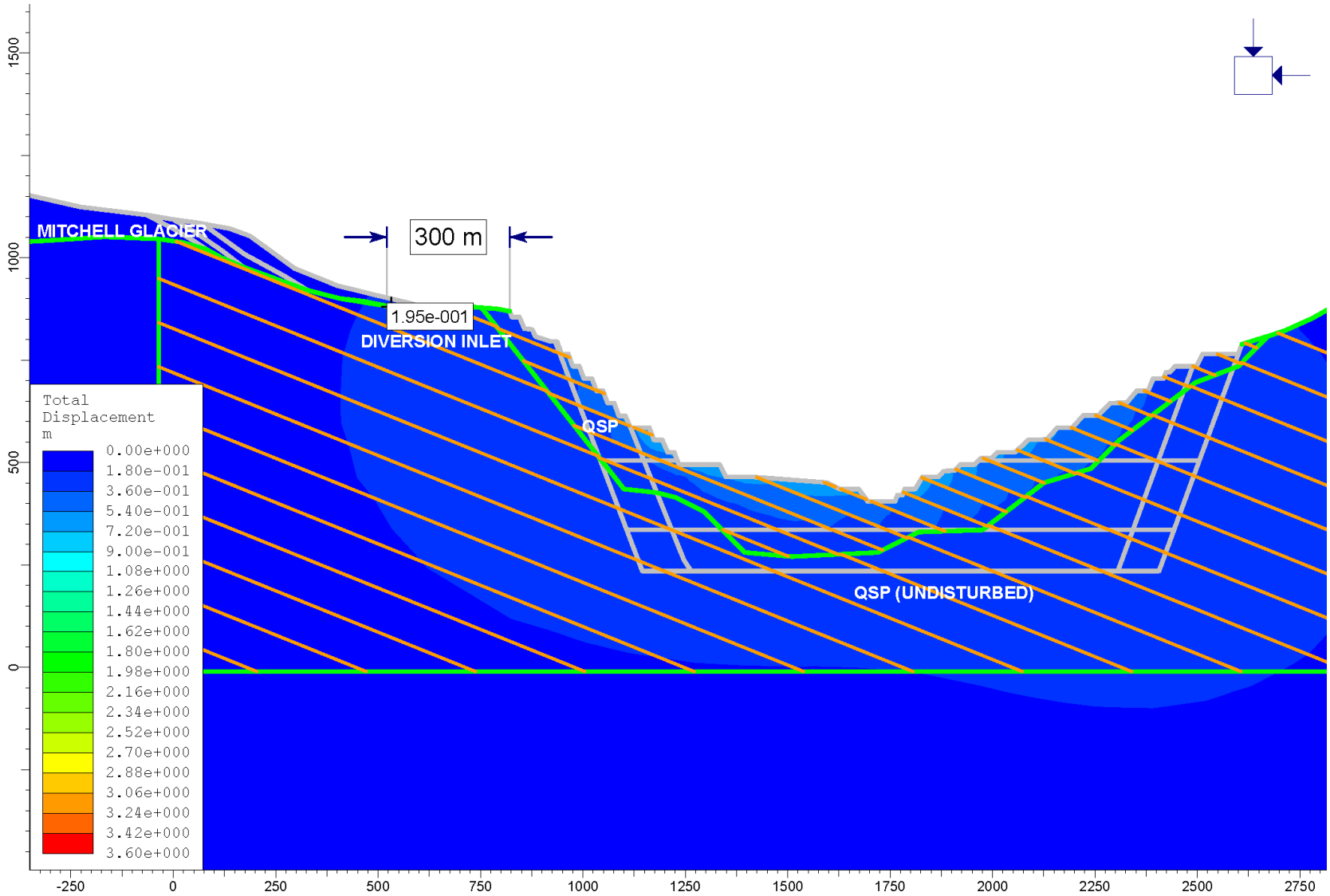
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D38

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 8

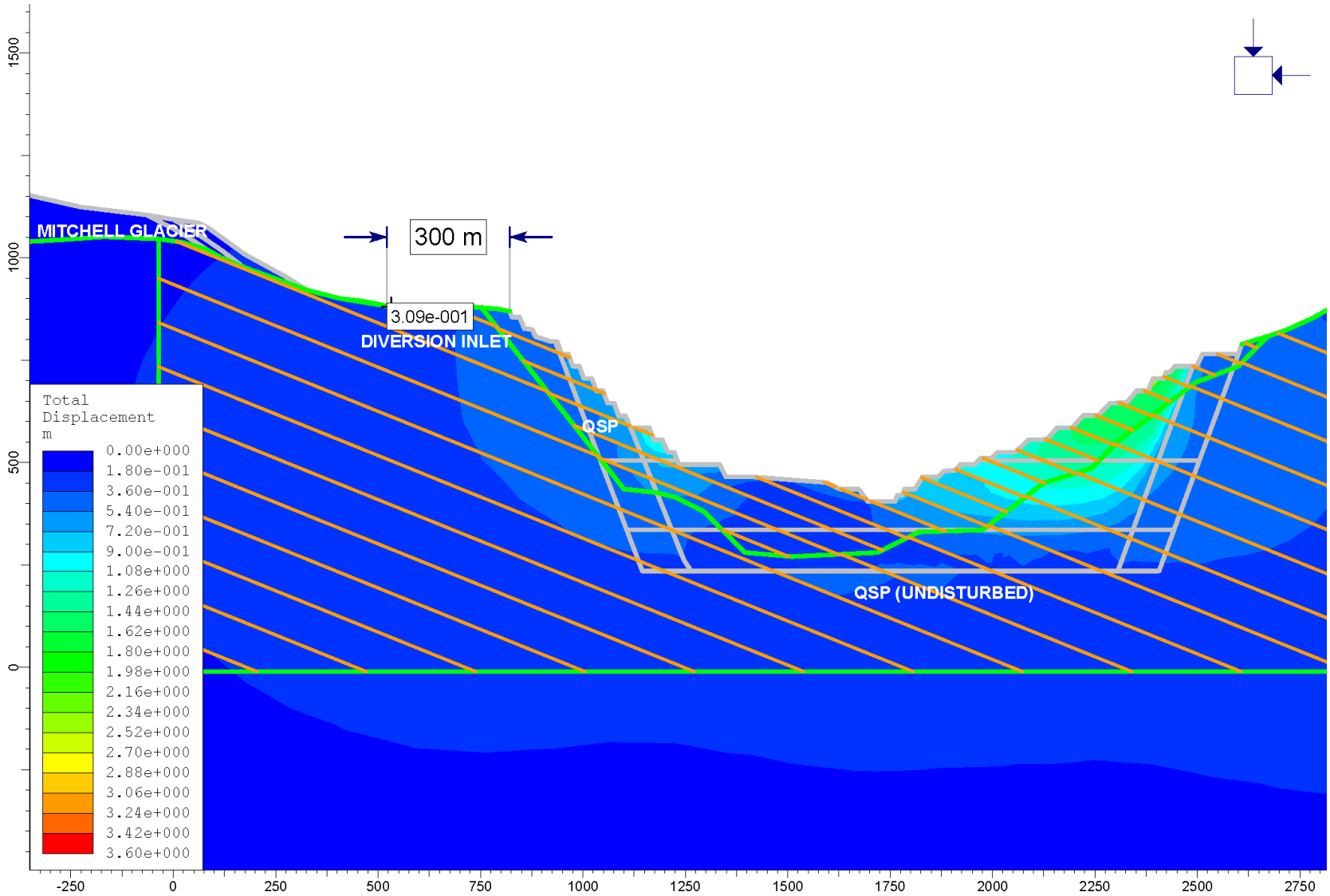
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D39

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 9

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D40

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

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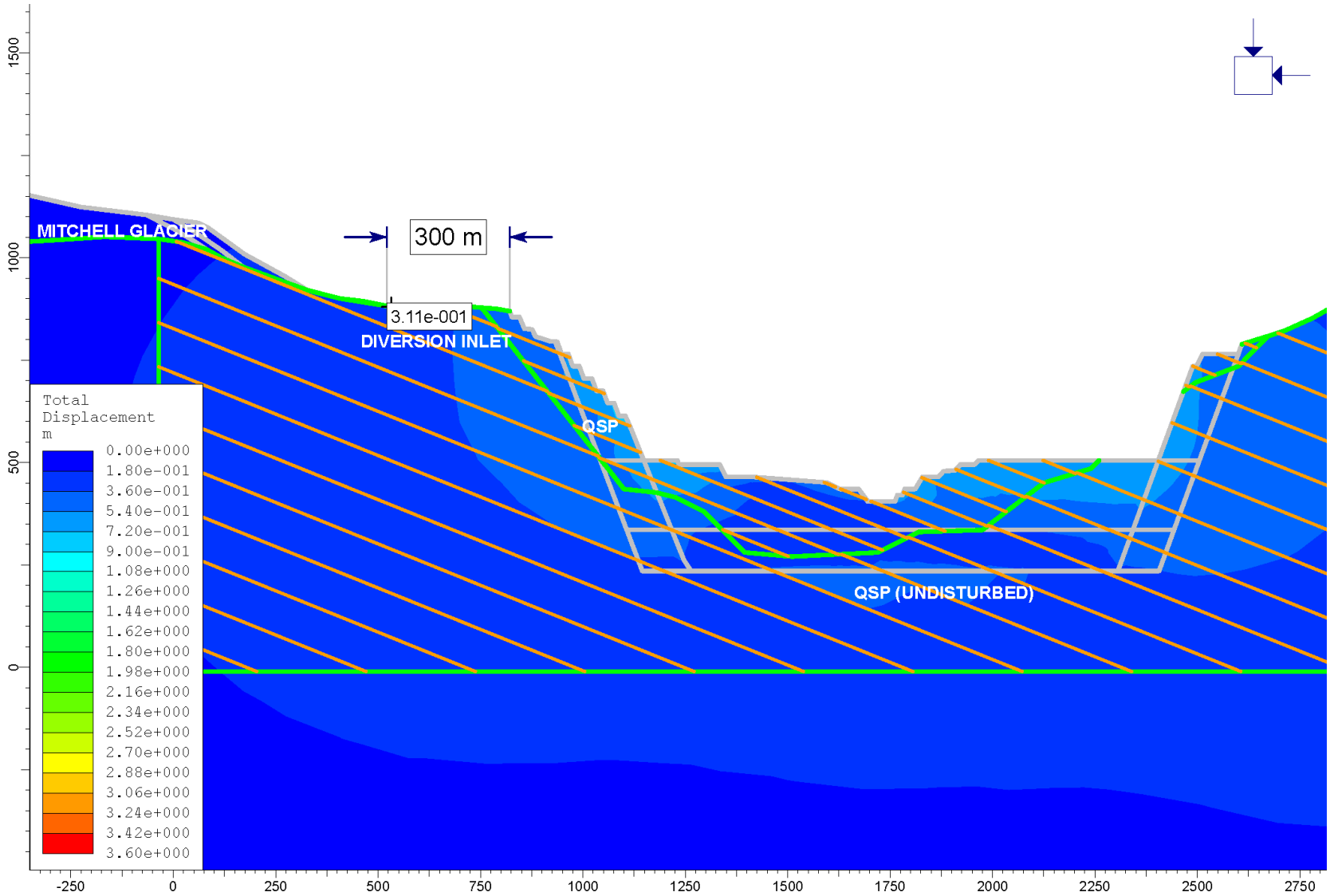

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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 10

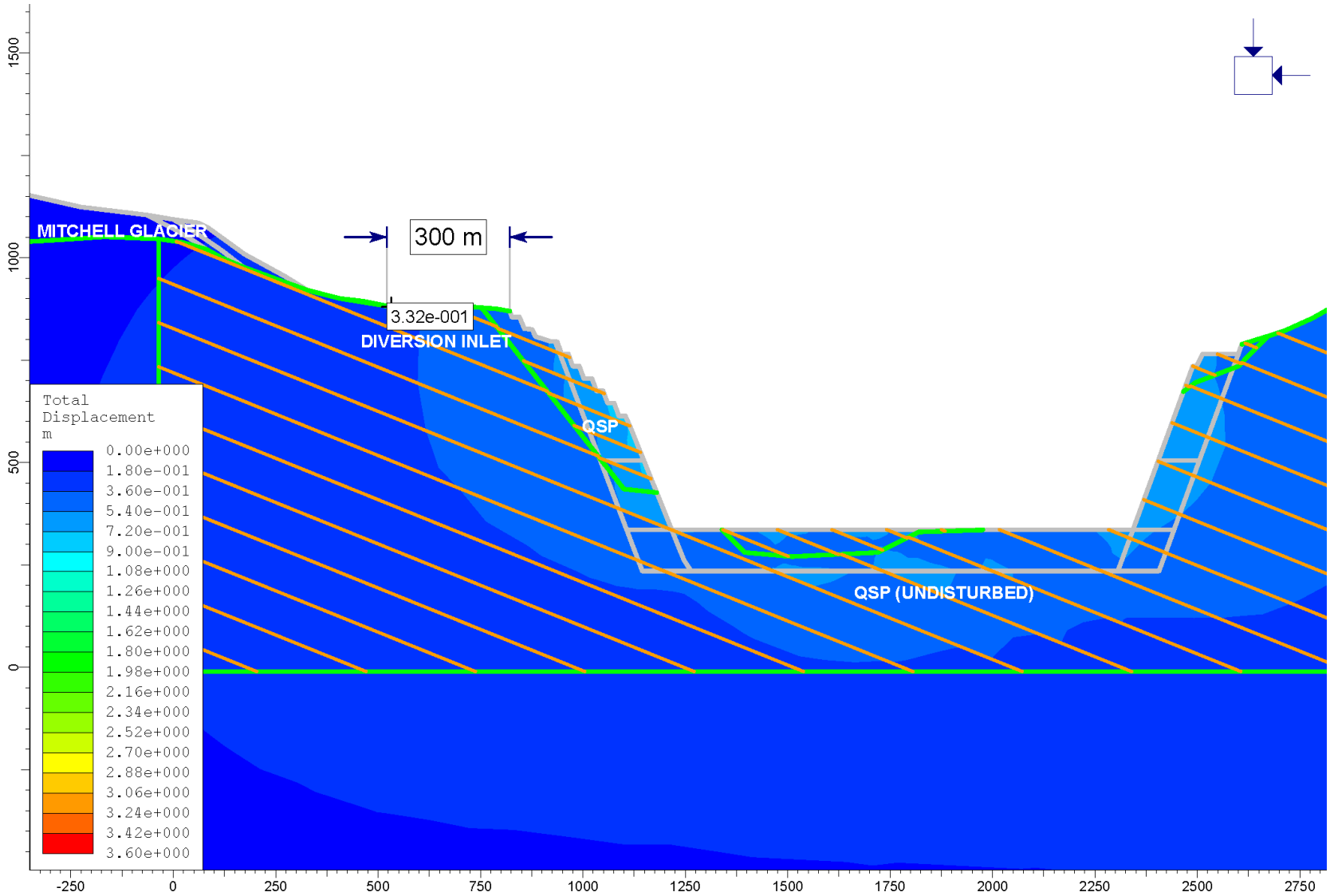
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D41

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 11

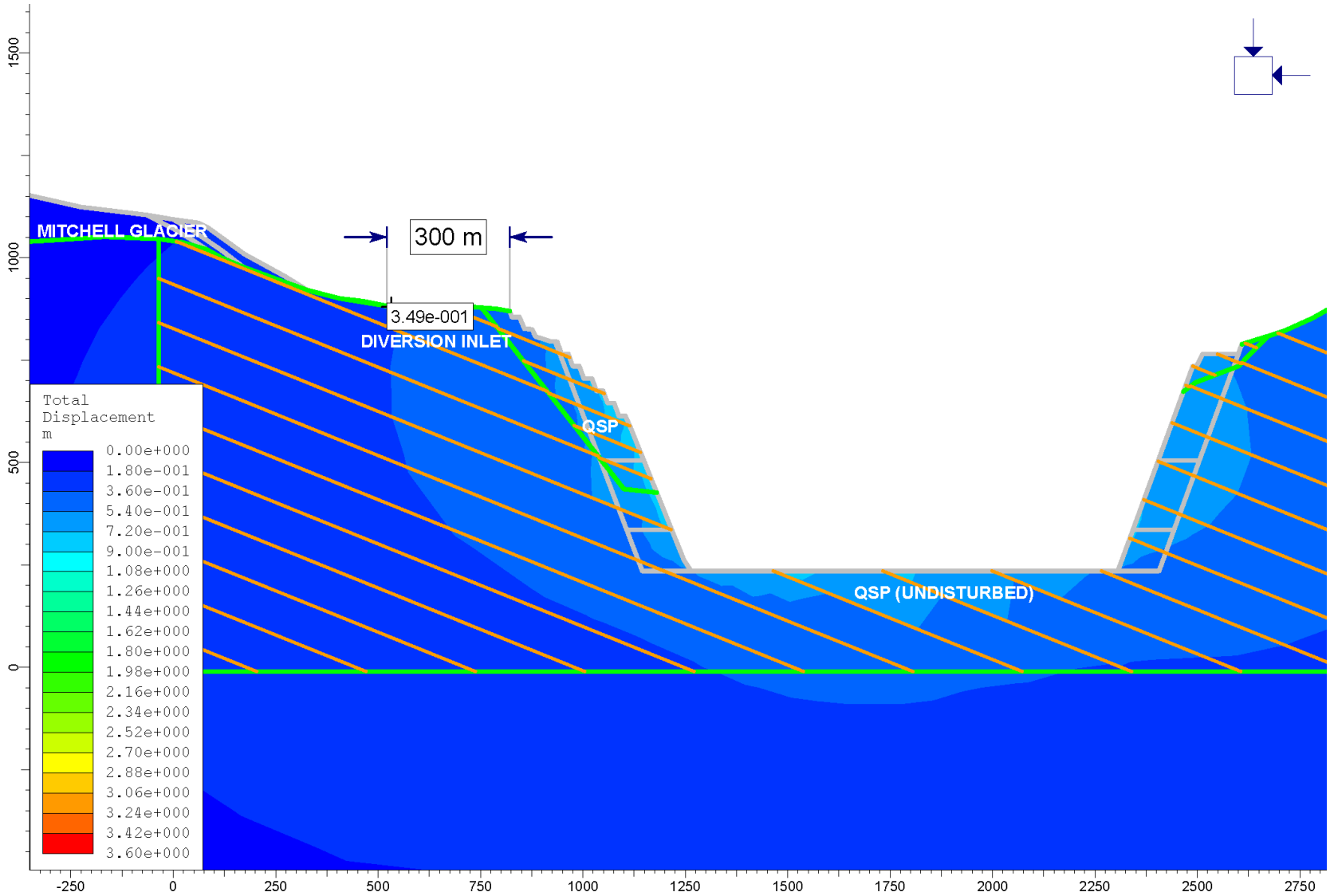
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D42

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT, ANISOTROPIC DRY CASE – STAGE 12

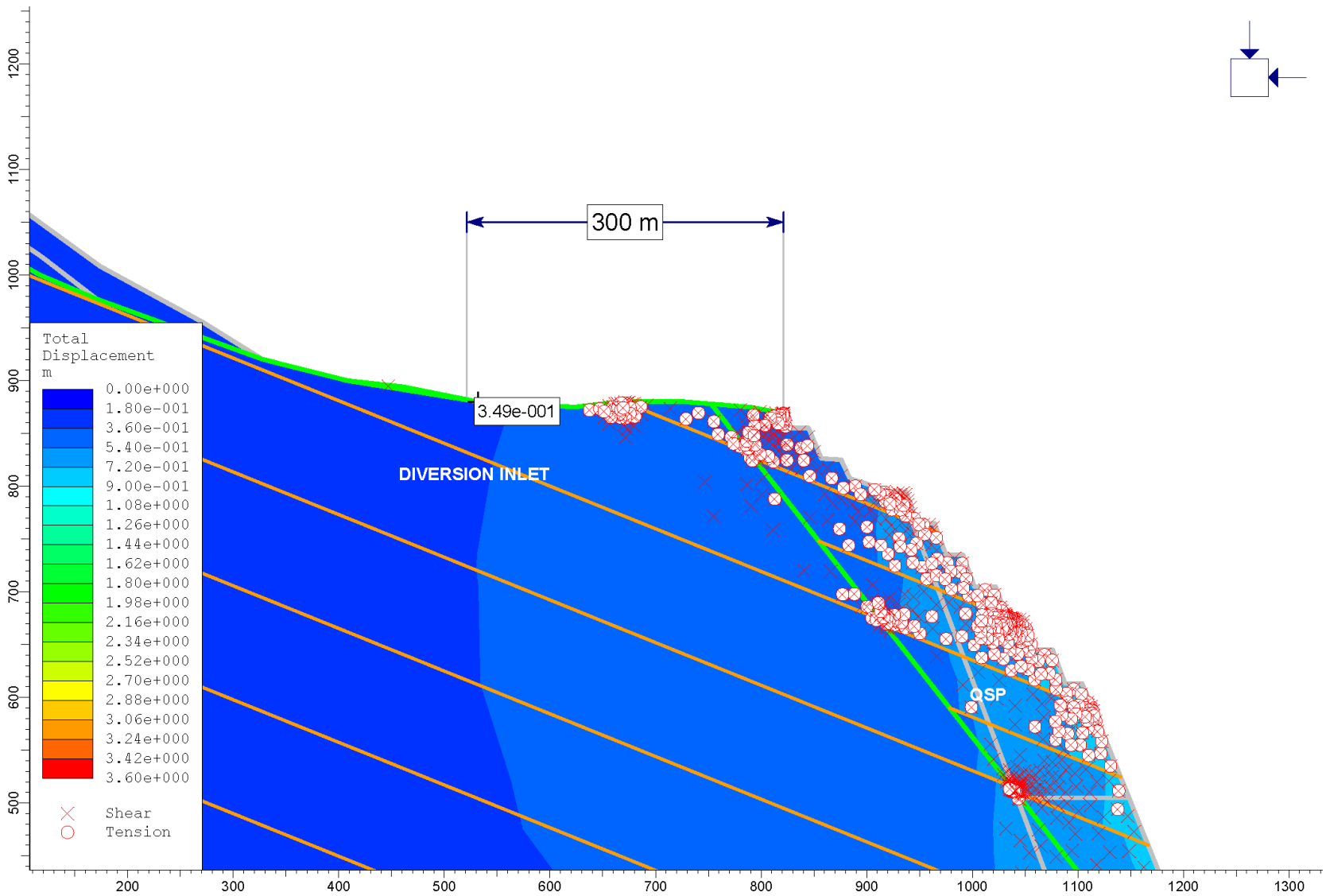
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D43

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D – TOTAL DISPLACEMENT NEAR THE MITCHELL GLACIER DIVERSION INLET, ANISOTROPIC DRY CASE- STAGE 13

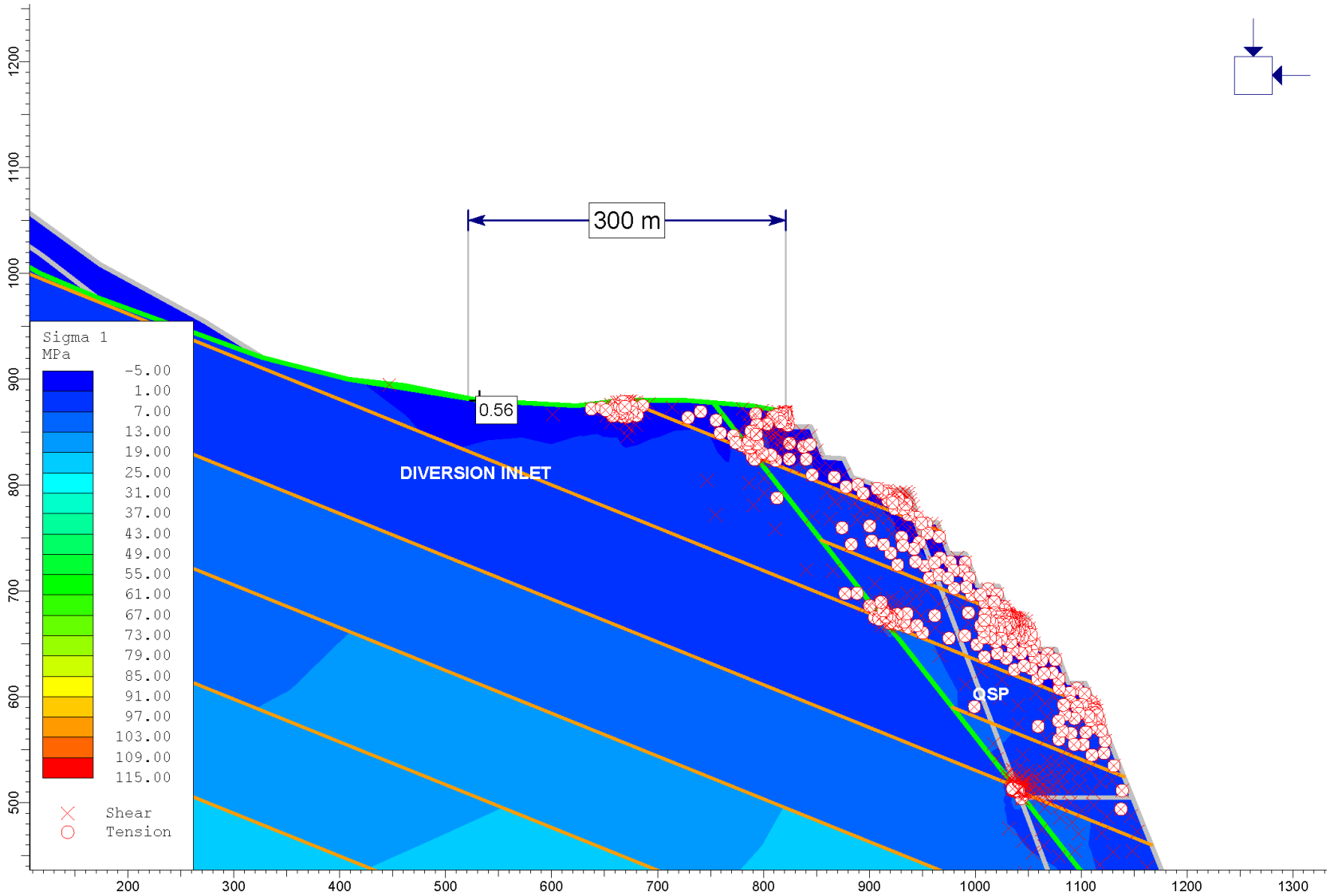
CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D44

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D - MAJOR PRINCIPAL STRESS NEAR THE MITCHELL DIVERSION INLET- ANISOTROPIC DRY CASE – STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:
0638-013-31

FIGURE No.:
D45

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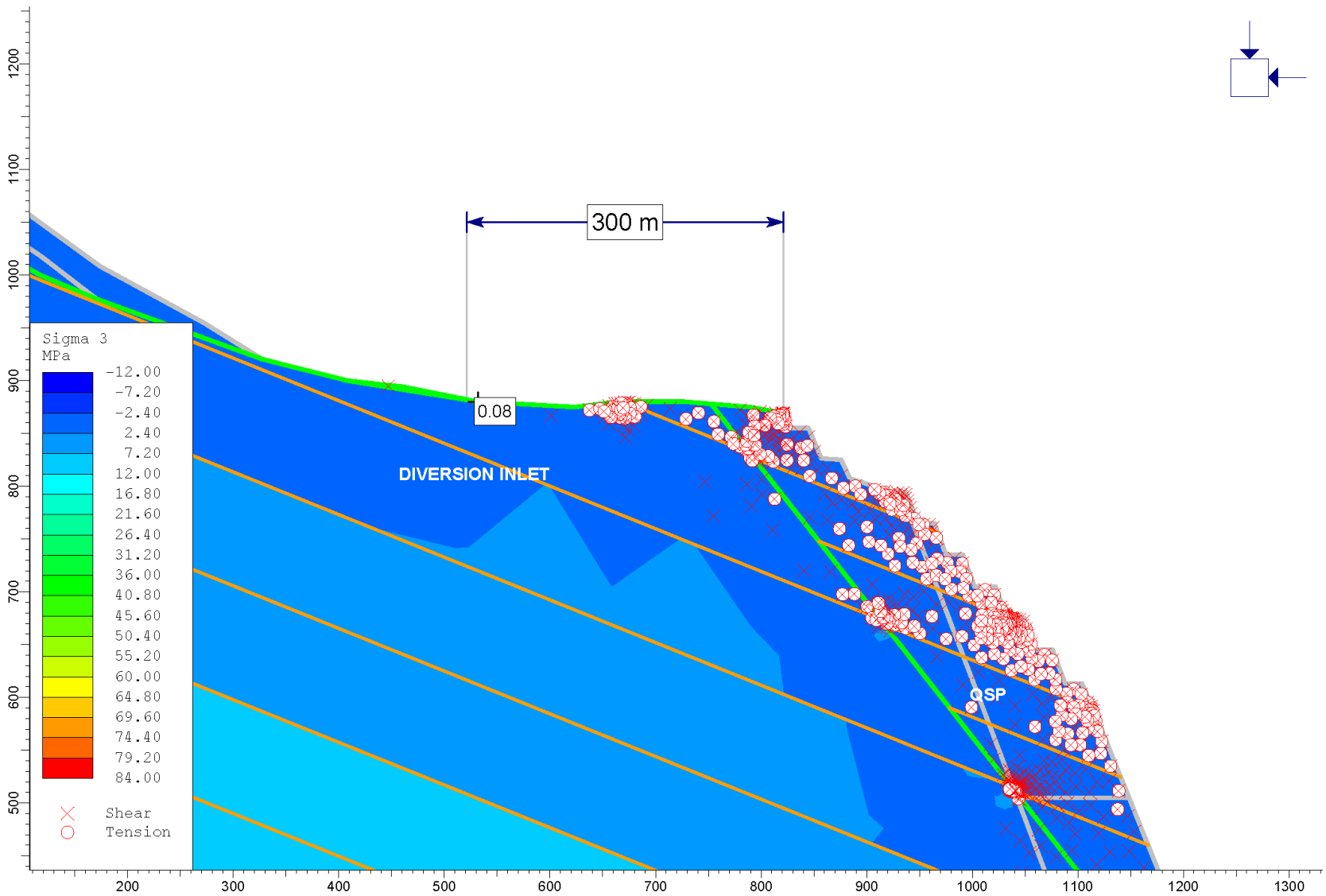
DECEMBER 24, 2012



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REPORT TITLE:
PRELIMINARY ASSESSMENT OF OPEN PIT SLOPE INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

FIGURE TITLE:
SECTION D - MINOR PRINCIPAL STRESS NEAR THE MITCHELL DIVERSION INLET – ANISOTROPIC DRY CASE- STAGE 13

CLIENT:
SEABRIDGE GOLD INC.

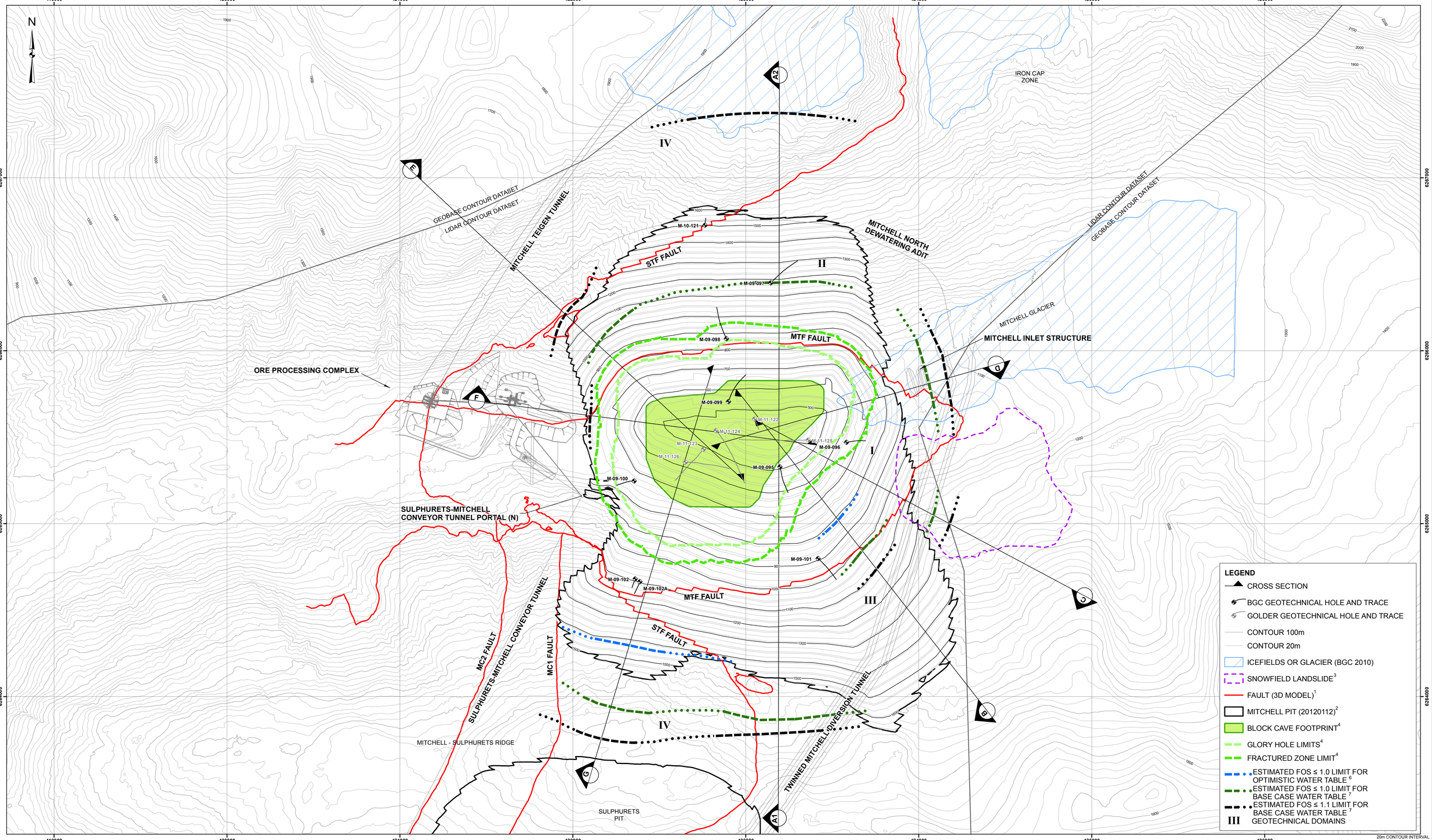
PROJECT No.:
0638-013-31

FIGURE No.:
D46

N:\BGC\PROJECTS\0638 SEABRIDGE\013 KSM PFS UPDATE AND EA SUPPORT\31. PFS BLOCK CAVE ANALYSIS\09 REPORTING\APPENDIX D

DECEMBER 24, 2012

DRAWINGS



20m CONTOUR INTERVAL
NAD 1983 UTM Zone 9N

0 75 150 300 450 600
METRES

NOTES:
1. FAULT TRACES AND INTERSECTION WITH PIT BASED ON 3D MODEL PROVIDED BY SEABRIDGE GOLD INC.
2. OPEN PIT SHELL PROVIDED BY MMTS ON FEBRUARY 6, 2012.
3. SNOWFIELDS LANDSLIDE BOUNDARY ON OPEN PIT WALL HAS BEEN ESTIMATED BY BGC.
4. BLOCK CAVE FOOTPRINT AND SUBSIDENCE LIMITS PROVIDED BY GOLDER N FEBRUARY 1, 2012.
5. PROPOSED INFRASTRUCTURE PROVIDED BY WARDROP, FEBRUARY 2012.
6. ASSUMES BOTH DRAINAGE ADITS AND VERTICAL PUMPING WELLS ARE MAINTAINED DURING BLOCK CAVING.
7. ASSUMES DRAINAGE ADITS ARE MAINTAINED BUT VERTICAL PUMPING WELLS ARE NOT MAINTAINED DURING BLOCK CAVING.

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:10,000
DATE:	DEC 2012
DRAWN:	LL
DESIGNED:	DS, AB
CHECKED:	DK
APPROVED:	HWN

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: SEABRIDGE GOLD INC.

PROJECT: PRELIMINARY ASSESSMENT OF OPEN PIT INSTABILITY DUE TO THE MITCHELL BLOCK CAVE

TITLE: MACRO-DEFORMATION LIMITS ESTIMATES

PROJECT No.:	DWG No.:	REV.:
0638013	01	

DWG TO BE READ WITH BGC REPORT TITLED "PRELIMINARY ASSESSMENT OF OPEN PIT INSTABILITY DUE TO THE MITCHELL BLOCK CAVE" DATED DECEMBER 24, 2012

X:\Projects\0638013\Workspace\20121122_REPORT_Preliminary_Assessment_of_Open_Pit_Instability_Due_to_the_Mitchell_Block_Cave\01_MACRO-DEFORMATION_LIMITS_ESTIMATES.mxd Date: Friday, December 21, 2012 Time: 2:55 PM