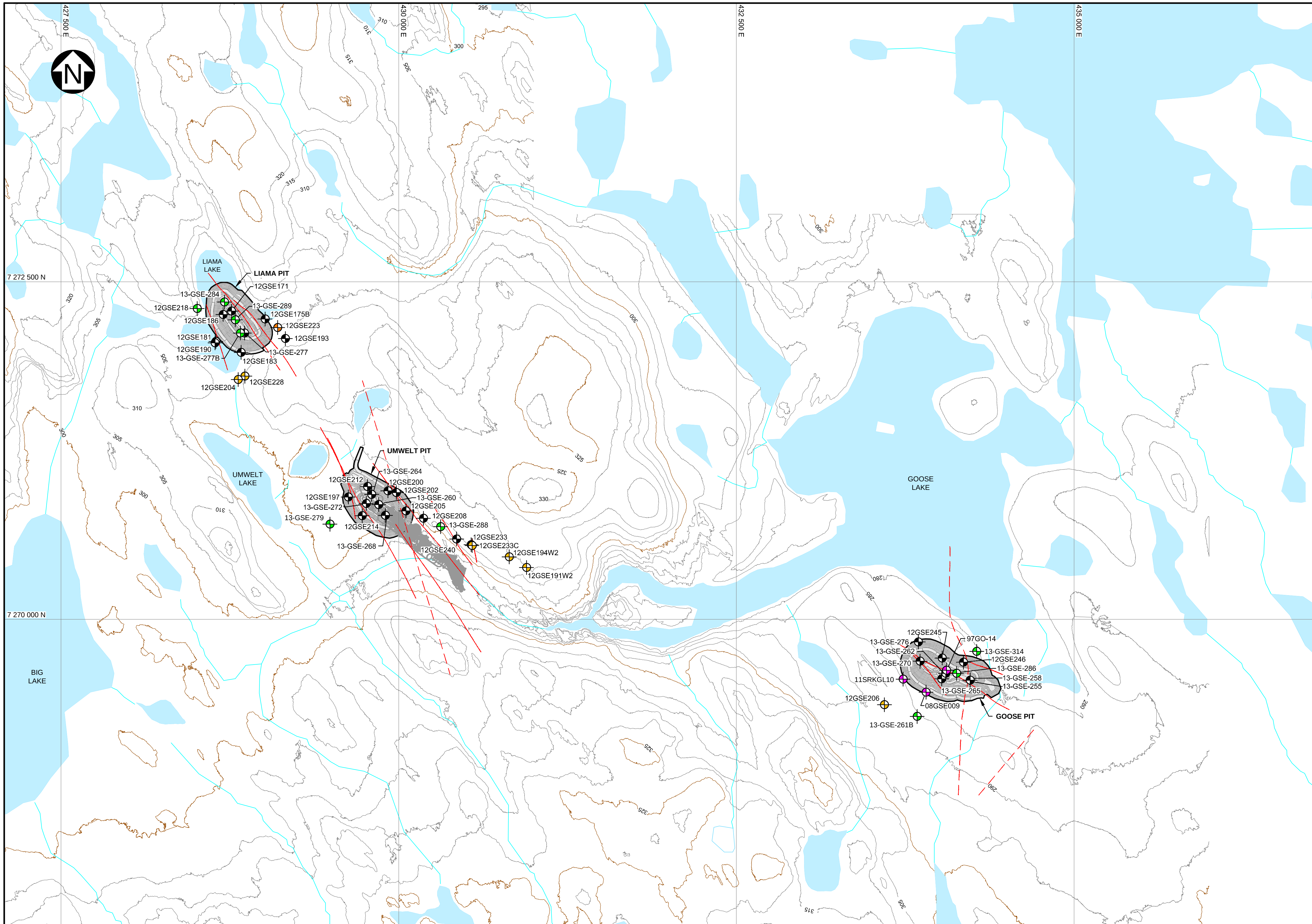


LEGEND:

- DRILLHOLE
- DRILLHOLE WITH PACKER TESTING
- DRILLHOLE WITH THERMISTOR
- DRILLHOLE WITH THERMISTOR / VWP
- DRILLHOLE WITH PACKER TESTING AND THERMISTOR / VWP
- PROPOSED OPEN PIT
- PROPOSED UNDERGROUND MINE
- FAULT INTERSECTION WITH SURFACE

NOTES:

1. COORDINATE GRID IS UTM (NAD83) ZONE 13.
2. LIDAR / TOPOGRAPHY BASED ON INFORMATION PROVIDED BY SABINA, DATED NOVEMBER 9TH, 2012.
3. CONTOUR INTERVAL IS 5 METRES.
4. APPROXIMATE WATERBODIES FROM RESCAN NTS MAPPING.
5. DRILLHOLE DETAILS BASED ON SURVEY INFORMATION PROVIDED BY SABINA.
6. PROPOSED UNDERGROUND MINE LAYOUT AND OPEN PIT SHELLS PROVIDED BY AMC, DATED MAY 8, 2013.

300 150 0 500 1000 1500 m
SCALE A

SABINA GOLD & SILVER CORP.

BACK RIVER PROJECT

GOOSE PROPERTY SITE LAYOUT

Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-517/2	VA13-01716

FIGURE 2 — REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	08OCT'13	ISSUED WITH LETTER VA13-01716	CHS	SIR	JDC	KJB

SAVED: I:\1\01\00517\02\A\Acad\FIGS\B15_r0, 10/8/2013 3:00:34 PM , ASIMPSON PRINTED: 10/8/2013 3:05:15 PM, Layout1, ASIMPSON
XREF FILE(S): Topo_5m; Open Pits IMAGE FILE(S):

Appendix B: SRK Memo - Back River Project:
Goose Property Talik Thermal Modeling

SRK Consulting (US), Inc.
Suite E-12
4700 Business Park Blvd
Anchorage, Alaska 99503

T: +1 907 677 3520
F: +1 907 677 3620

anchorage@srk.com
www.srk.com

Memo

To:	Project File	**Client:**	Sabina Gold & Silver Corp.
From:	Christopher W. Stevens, PhD	**Project No:**	1CS020.008
Reviewed By:	Maritz Rykaart, PhD, PEng	**Date:**	October 8, 2015
Subject:	Back River Project: Goose Property Talik Thermal Modeling – Final		

1 Introduction

SRK Consulting (Canada) Inc. (SRK) was retained by Sabina Gold & Silver Corp. to perform thermal modeling to estimate the extent of taliks beneath existing waterbodies and the potential development of new taliks resulting from pit lakes at the Goose Property of their Back River Project (the Project) in Nunavut.

Taliks are of particular interest due to the potential hydraulic connection between surface water, mined structures (open pits and underground workings), and subpermafrost groundwater.

2 Talik Definition

A talik is defined as "*a layer or body of unfrozen ground occurring in a permafrost area due to local anomalies in thermal, hydrological, hydrogeological or hydrochemical conditions*" (van Everdingen 2005). In most cases, taliks are formed by lakes and other water bodies which cause a local departure in terrestrial ground temperature (Smith and Hwang 1973; Burn 2002). The mean water bottom temperature, lake half width (or radius), and the surrounding terrestrial ground thermal regime are key variables that influence talik configuration and extent. Water bathymetry can also effect talik configuration where shallow water allows for ice to seasonally freeze to the bottom (bottom-fast ice) and conduct heat from the ground (Burn 2002; 2005; Stevens *et al*. 2010a; 2010b). Lunardini (1995b) showed temperature at depths up to 600 metres below ground surface (mbgs) can be influenced by surface temperatures as far back as 100,000 years.

In this memo, reference is made to both closed and open (or through) taliks; a closed talik is an unfrozen zone beneath a water body that is enclosed at the base and the surrounding sides by permafrost; and an open talik is an unfrozen zone beneath a water body that penetrates the permafrost completely and may connect suprapermafrost (i.e. the layer of ground above permafrost) and subpermafrost (i.e. the unfrozen ground below the permafrost) groundwater.

At the Goose Property, a combination of site groundwater quality, ground temperature, and vibrating wire pressure data suggest a freezing point depression of -2°C (SRK 2015). The groundwater is estimated to be more saline than sea water (salinity of 57,000 to 76,000 ppm). For the purpose of modeling talik extent, ground temperatures warmer than -2°C are expected to be unfrozen. The 0°C isotherm is also presented as a point of reference.

It should be recognized that the connection between surface water, mined structures, and subpermafrost groundwater is also a function of the hydraulic properties of the bedrock and the hydraulic gradients that drive water movement; i.e. unfrozen ground does not necessarily constitute significant groundwater movement.

The Goose Property is situated within the zone of continuous permafrost, as delineated in a database compiled by the Geological Survey of Canada (NRCan 2002). Based on site ground temperature data, a geothermal gradient of 0.013 to 0.014°C/m has been observed. The base of permafrost (basal 0°C isotherm) has been estimated from site ground temperature measurement to range from -190 to -260 metres above sea level (masl), which is approximately 490 to 570 mbgs (Rescan 2013). Deep ground temperature measurements from Rescan (2013) are shown in Figure 1.

3 One-Dimensional Talik Modeling

The presence of open (through) taliks was assessed during the Draft Environmental Impact Statement (DEIS) using a one-dimensional (1D) analytical model (Rescan 2013) that was based on the site geothermal gradient and the depth and shape of water bodies.

Taliks can be expected below lakes with depths greater than two thirds of the maximum thickness of ice forming annually on their surface (Mackay 1992). At the Goose Property, waterbody ice thickness is typically at least 2 m thick, and therefore it was assumed that open taliks can occur for lakes with depths greater than 1.3 m (Rescan 2013).

Thermal models documented by Mackay (1962), Smith (1976), and Burn (2002a) developed for study sites in the Canadian Arctic have been used for talik characterization at other proposed mine projects located in the continuous permafrost region of mainland Nunavut, including the Meliadine (Golder 2013), Kiggavik (Areva Resources Canada 2011), High Lake (Wolfden Resources Inc. 2006), Doris North (SRK 2005), and Meadowbank (Cumberland Resources Ltd. 2005) projects. Using these thermal models with data collected at the Goose Property, Rescan (2013) concluded that:

- Round water bodies with a radius up to 175 m (e.g., Echo Lake and Lytle Lake) are expected to overlie closed taliks up to 50 m deep.
- Elongated waterbodies with the smaller width dimension up to 150 m (e.g., Gander Pond), round waterbodies with a width up to 120 m (e.g., Mam Lake), and those with extensive shallow terraces (e.g., Rabbit Lake) are expected to overlie closed taliks ranging from 50 to 100 m deep.

- Larger lakes tend to have elongated shapes, and are expected to overlie open (through) taliks where the smaller lake width dimension exceeds 200 m.

These criteria were further refined based on a -2ºC freezing temperature, and the final lake talik mapping for the Goose Property is provided in SRK (2015).

4 Two-Dimensional Talik Modeling

4.1 Approach

Additional thermal modeling was carried out to refine the assessment of existing open taliks beneath lakes within areas where mining is planned, as well as to provide further definition of talik configuration as defined by the 0°C and -2°C isotherms. Two steady-state thermal models were used for this assessment: an analytical heat strip model (Andersland and Ladanyi 2004); and a two-dimensional (2D) numerical finite element model using SVHeat Version 6.0 (SoilVision Systems 2004) with the Flex PDE solver.

4.2 Model Inputs

Model inputs are summarized in Table 1. Ground temperatures were modeled with symmetry along the centreline of the water body with 500 m in the vertical and horizontal directions. The bottom boundary of the model space was assigned a geothermal heat flux (4.84 kJ m^{-2} day^{-1} $°C^{-1}$) which was calculated from the local geothermal gradient (0.014°C m^{-1}) and the estimated thermal conductivity of the bedrock. The thermal properties for greywacke rock, common to the Goose Property, were estimated using an approach based on the geometric mean of the minerals (Cote and Konrad 2005). A zero heat flux boundary was applied to both vertical sides.

Table 1: Thermal Modeling Inputs Used to Assess Lake Taliks

Parameter	Value (Base Case)	Value (Sensitivity Analysis)
Mean annual ground surface temperature (MAGST)	-6°C	-5°C to -7°C
Mean annual lake-bottom temperature (Tb)	4.5°C	3.5°C to 5.5°C
Geothermal heat flux (G)	0.014°C m^{-1}	n/a
Water body half width (lake width divided by two)	5 to 150 m	n/a
Unfrozen greywacke thermal conductivity	346 kJ m^{-1} day^{-1} $°C^{-1}$	n/a
Frozen greywacke thermal conductivity	350 kJ m^{-1} day^{-1} $°C^{-1}$	n/a
Unfrozen greywacke volumetric heat capacity	2,120 kJ m^{-3} $°C^{-1}$	n/a
Frozen greywacke volumetric heat capacity	2,110 kJ m^{-3} $°C^{-1}$	n/a

4.3 Model Assumptions

The modeling, as presented, is based on the following assumptions:

- Modeling does not account for the thermal influence of adjacent lakes and spatial variability in ground surface temperature. However, the sensitivity to lake-bottom temperature (Tb) and mean annual ground surface temperature (MAGST) are considered (Table 1).
- Thermal properties of the ground are assumed to be constant with depth and consist entirely of bedrock, and overburden is omitted. The higher thermal conductivity bedrock, when compared to overburden, results in a more conservative estimate of the timing of talik development; this implies the modeling is more conservative with the exclusion of overburden.
- Water depth is assumed to be greater than the maximum thickness of seasonal ice and the thermal influence of bottom-fast ice is not considered, which also makes the modeling more conservative.
- Steady-state models are used and therefore the effects of transient conditions, such as paleo-climate (i.e. long-term changes in ground surface and water temperature), are not considered.

4.4 Model Results

Table 2 summarizes the estimated lake half width required for open taliks to develop beneath waterbodies at the Goose Property. The model results are similar for each of the three models assuming equal model inputs.

The 2D analytical model results are shown in Figures 2 through 8. The results suggest that for base case conditions, an open talik based on the 0°C isotherm will develop for a water body with half widths greater than 100 m (lake width of 200 m). This reduces to a half width of 50 m for the case with a freezing point depression of -2°C. The finite element model shows a more conservative result, suggesting that a water body half width greater than 92 m may have an open talik for the 0°C isotherm. Ground temperatures from the finite element model for 50 m, 100 m, 150 m half widths are shown in Figures 9 to 11, respectively.

Table 2: Estimated Lake Half Width Required for Open Taliks to Develop

Model Description	Lake Half Width for Open Taliks to Develop	
	0°C Isotherm	-2°C Isotherm
1 D Analytical Model (Rescan 2013)	>100 m	NA
2D Analytical Model	>100 m	>50 m
2D Finite Element Model	>92 m	>42 m

Note:

1. Model results for steady state conditions
2. Lake width is two times half width

Sensitivity analysis demonstrates that changing the MAGST by 1°C results in a change in the half width distance of about 30 m; changing the Tb by 1°C has less of an effect, with only a 10 m change of the half width (Figure 8).

5 Mine Interactions with Existing Lake Taliks

The thermal modeling, supported by baseline ground temperature data confirms that the Umwelt, Goose Main, and Echo open pits do not intercept taliks. The Llama open pit overlaps the footprint of Llama Lake, which is expected to have an open (through) talik.

The Umwelt, Llama, and Goose Main underground mines will intercept unfrozen bedrock at depth, but the Echo underground mine is completely within permafrost.

6 Talik Development beneath Pit Lakes

6.1 Approach

All pit lakes are expected to eventually form open (through) taliks given thermal forcing from the pit lake. A 1D analytical thermal model was used to estimate the time for open taliks to form beneath pit lakes as a function of a step change in temperature from initial conditions:

$$\Delta T_{z,t} = \Delta T_s \cdot erfc\left(\frac{z}{2\sqrt{\alpha\, t}}\right) \quad \text{Eq. 1}$$

where:

ΔT_s - step change in temperature (°C)
t - time (s)
z - depth (m)
α - thermal diffusivity of the bedrock ($m^2\ s^{-1}$)
$erfc$ - complementary error function

The model results from Equation 1 were verified through 1D numerical modeling preformed with SVHeat (Figure 12).

6.2 Model Inputs

Initial ground temperatures were based on measurements from a ground temperature thermistor cable installed in drill hole 08-GSE-009, located within the proposed footprint of the Goose Main Pit (Rescan 2014). The deep ground temperature profile measured from this site is representative of measurements made at other locations within the Goose Property (Figure 1). The projected base of permafrost at this location is estimated to be 491 mbgs (-206 masl). A mean annual pit lake water temperature of +4°C was applied to the upper boundary of the model and a geothermal heat flux to the lower boundary. Table 1 provides the thermal properties prescribed for bedrock. Sensitivity of the model results to changes in pit lake water temperature were estimated for Goose Pit using a water temperature of +4°C, +6°C, and +8°C.

6.3 Model Assumptions

The following assumptions are made:

- The model does not account for lateral heat flow from adjacent water bodies or permafrost. Lateral heat flow with the surrounding permafrost would decrease the rate of permafrost thaw beneath the flooded pit.
- Phase change of water within the bedrock is neglected in the model, but would be expected to have a minor effect on the timing of thaw due to the low moisture content of the bedrock.
- Thermal disturbance from pit development was neglected and flooding is assumed to be an instantaneous event following mining.
- Thermal forcing at the base of the pit assumes a mean annual temperature of +4°C. No additional consideration was made for heat transfer through the pit lake water column or tailings placed within some of the pits.
- The thermal influence from flooding of the underground workings was not considered given the long time for open talik development.

Overall, the model results are considered to be conservative based on the assumptions stated.

6.4 Model Results

Table 3 summarizes the estimated time for open taliks to develop beneath the proposed open pits. The time ranges from 85 to 277 years based on the -2°C isotherm. Figures 13 to 15 show the estimated thermal response of the ground and development of the talik over time. The difference in open talik development between individual open pits is a function of the maximum pit depth at the end of mining (Figure 16); i.e. a shorter period of time is required to degrade thin permafrost remaining beneath the deepest open pits.

Table 3: Summary of Estimated Timing of Open Talik Following Pit Lake Flooding

Open Pit	Timing of Open Talik (Yrs.)	
	0°C	-2°C
Llama Pit	Assumed Open Talik	
Goose Pit	252	85
Umwelt Pit	306	111
Echo Pit	541	227

Note:

1. Time expressed as the number of years (Yrs.) after flooding of the pit.

Table 4 shows the sensitivity of the model results to an increase in pit lake water temperature for Goose Pit. The sensitivity analysis assumes instantaneous changes in water temperature during pit flooding, representing a conservative estimate. As expected, the model results show that less time is required for an open talik to develop as water temperature increases; i.e. the rate of thaw increases with the increase in water temperature. For the case of a +4°C and +8°C pit lake water temperature, the difference in time for an open talik to develop is about 12 years based the -2°C isotherm which considers the groundwater freezing point depression. Therefore, a long-term increase in water temperature related to climate change would have a minor influence on the time required for open taliks to develop beneath pit lakes.

Table 4: Sensitivity of Pit Lake Talik Development to Water Temperature for Goose Pit

Pit Lake Water Temperature (°C)	Timing of Open Talik (Yrs.)	
	0°C	**-2°C**
+4°C	252	85
+6°C	220	78
+8°C	201	73

Note:

1. Time expressed as the number of years (Yrs.) after flooding of the pit.

7 References

Andersland, O.B. and Ladanyi, B. 2004. Frozen ground engineering, 2nd Edition. Hoboken, NJ: John Wiley & Sons, 2004, 352 pages.

Areva Resources Canada Inc. 2011. Kiggavik Project Environmental Impact Statement Technical, Appendix 5B: Geology and Hydrogeology Baseline.

Burn CR. 2002. Tundra lakes and permafrost, Richards Island, western Arctic coast, Canada. Canadian Journal of Earth Sciences 39: 1281–1298.

Burn CR. 2005. Lake-bottom thermal regimes, western arctic coast, Canada. Permafrost and Periglacial Processes 16: 355–367.

Cote J., and Konrad, J-M. 2005. A Generalized Thermal Conductivity Model for Soils and Construction Materials. Canadian Geotechnical Journal. 42: 443-458.

Cumberland Resources Ltd. 2005. Meadow bank Gold Project: Final Environmental Impact Statement.

Flex PDE Solutions Inc. 2014. FlexPDE 6. Version 6.36. http://www.pdesolutions.com /download/flexpde636.pdf, Accessed March 2015.

Golder Associates 2013. Meliadine. Draft Environmental Impact Statement - Volume 7 Freshwater Environment - Appendix 7.2-A Groundwater Quality Baseline Report.

Lunardini V.J. 1995. Permafrost Formation Time. CRREL Report 95-8, US Army Corps of Engineers, Cold Regions Research & Engineering Laboratory, April 1995.

Mackay J.R. 1962. Pingos of the Pleistocene Mackenzie delta area. Geographical Bulletin, 18: 21-63.

Mackay J.R. 1992. Lake stability in an ice-rich permafrost environment: examples from the western Arctic coast. Aquatic ecosystems in semi-arid regions: implications for resource management Symposium Series 7: 1-26.

Natural Resources Canada (NRCan). 2002. Earth Sciences Sector. Government of Canada, Canadian Permafrost Thickness.

Rescan 2013. Back River Project: Draft Environmental Impact Statement Supporting Volume 5: Terrestrial Environment. Prepared for Sabina Gold & Silver Corp.

Rescan 2014. Back River Project Cumulative Permafrost Baseline Data Report (2007 to May 2014). Prepared for Sabina Gold & Silver Corp.

SoilVision Systems, 2004. SVHeat Tutorial Manual, Theory Manual, Verification Manual. SoilVision Systems, Ltd. Saskatoon, Sask.

Smith M.W. 1976. Permafrost in the Mackenzie delta, Northwest Territories. Geological Survey of Canada. Paper 75-28.

Smith MW. and Hwang CT. 1973. Thermal disturbance due to channel shifting, Mackenzie Delta, N.W.T., Canada. Second International Conference on Permafrost. U.S.S.R., National Academy of Science, Washington, D.C., 51-60.

SRK. 2005. Groundwater Assessment, Doris North Project, Hope Bay, Nunavut.

SRK 2015. Hydrogeological Characterization and Modeling of the Proposed Back River Property. Final EIS. Report submitted to Sabina Gold & Silver.

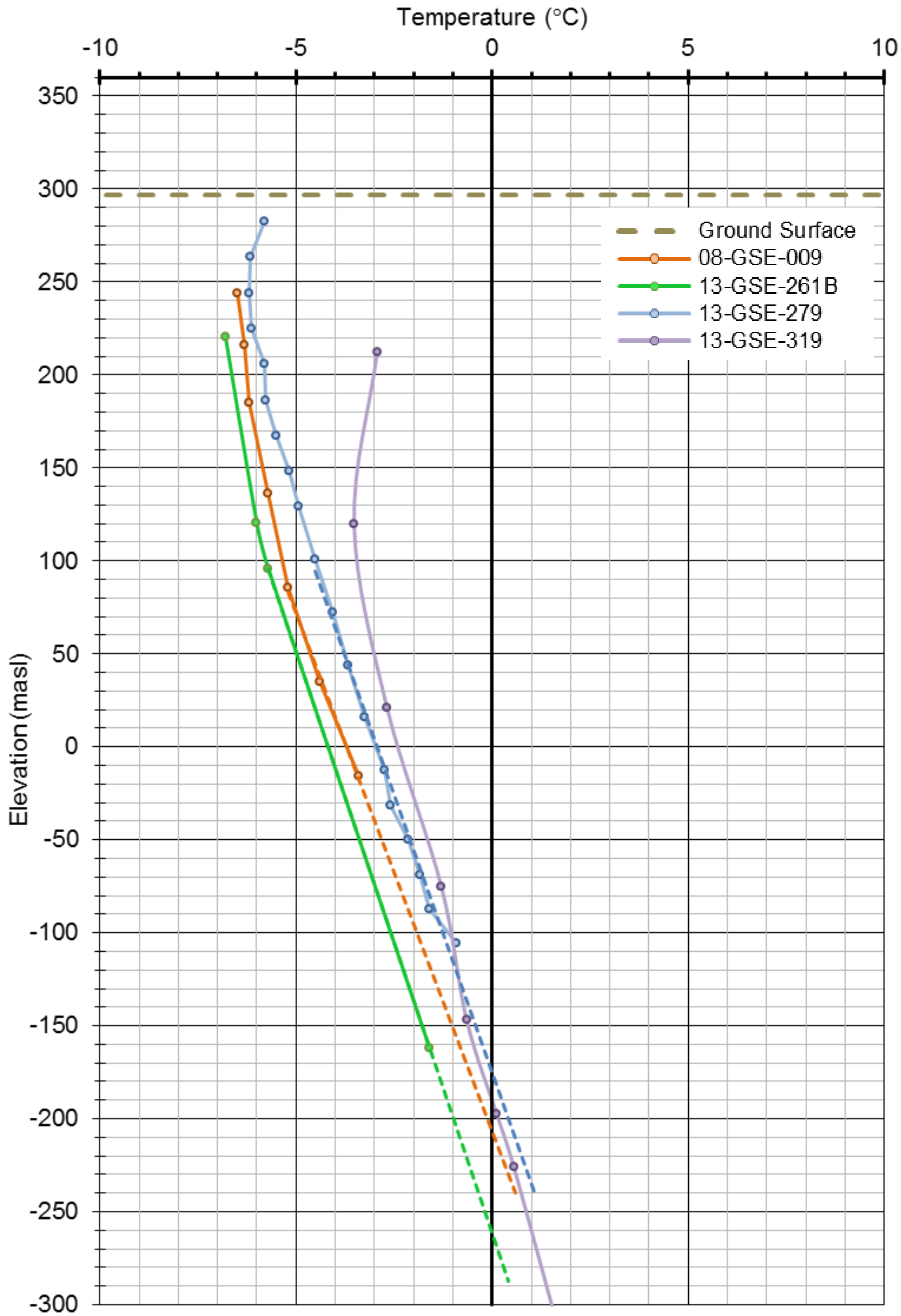
Stevens CW. 2010a. Interannual Changes in Seasonal Ground Freezing and Near-surface Heat Flow beneath Bottom-fast Ice in the Near-shore Zone, Mackenzie Delta, NWT, Canada. Permafrost and Periglacial Processes 21: 256-270.

Stevens CW. 2010b. Modeling Ground Thermal Conditions and the Limit of Permafrost within the Nearshore Zone of the Mackenzie Delta, Canada. Journal of Geophysical Research. 115: F04027.

van Everdingen, R. (ed.). 2005. Multi-language glossary of permafrost and related ground-ice terms. Boulder, CO: National Snow and Ice Data Center.

Wolfden Resources Inc. 2006. High Lake Project Environmental Impact Statement.

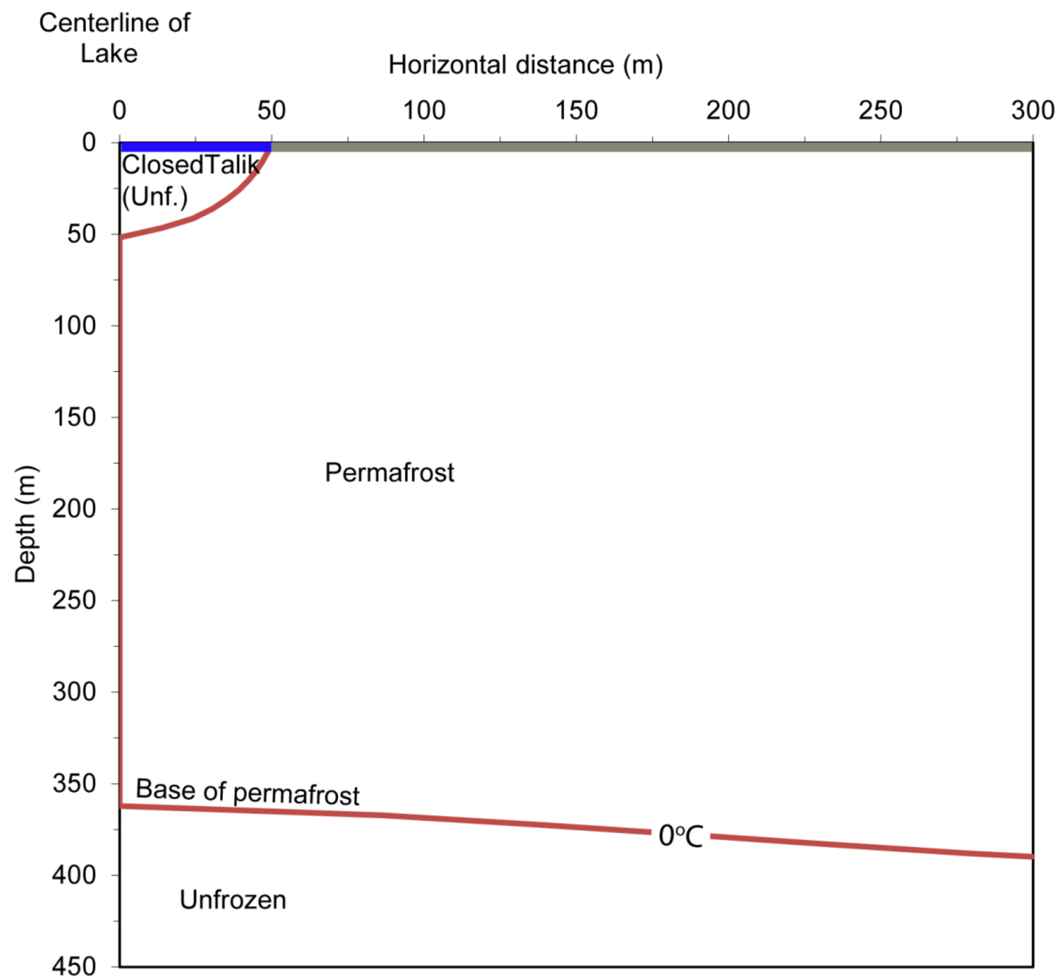
Figures



Notes:

1. Ground temperature measurements from Rescan (2014)
2. Site 13-GSE-279 and 13-GSE-319 located near proposed Umwelt Pit
3. Site 08-GSE-009, and 13-GSE-261B located near proposed Goose Pit
4. Dashed lines represent projected ground temperature

srk consulting	Sabina GOLD & SILVER CORP.	Goose Property Talik Thermal Modeling **Ground Temperatures**		
Job No: 1CS020.008 Filename: Deep Ground Temperature Measurements.pptx	BACK RIVER PROJECT	Date: 8/3/2015	Approved: cws	Figure: **1**

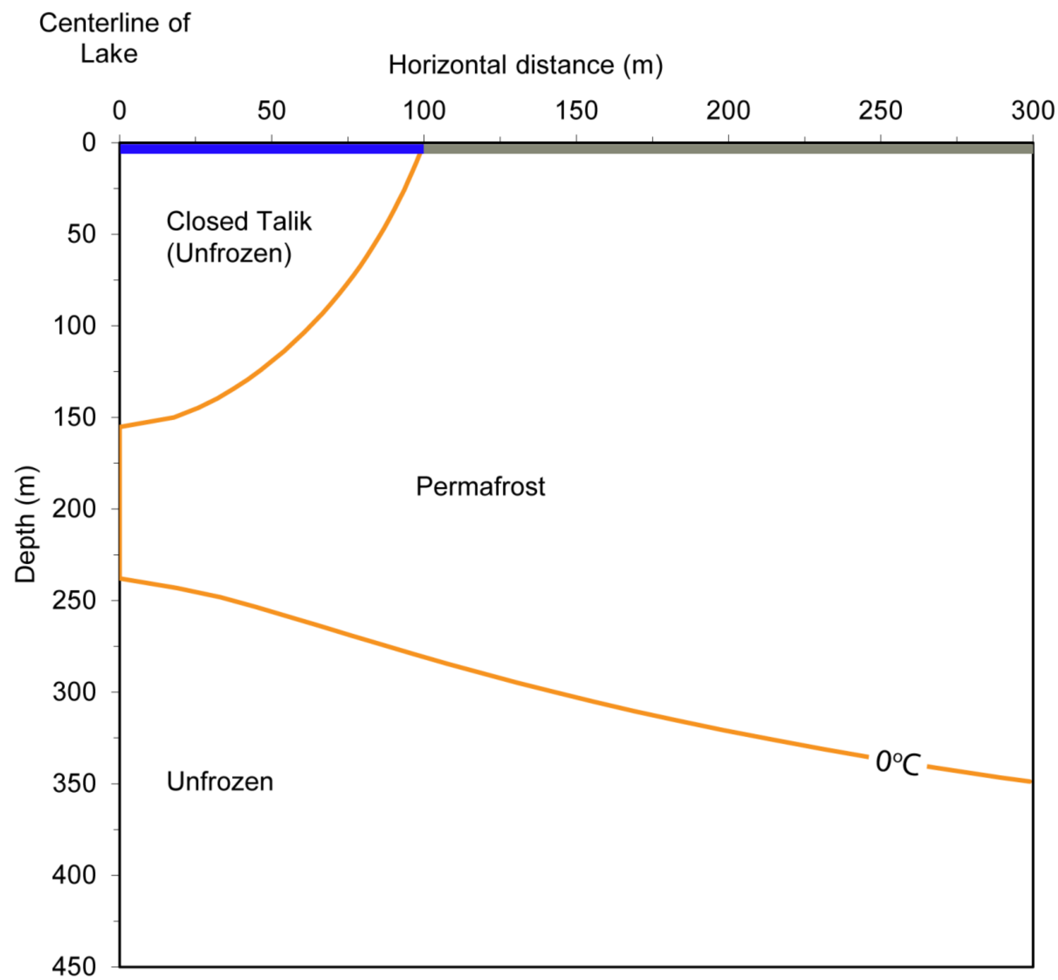


Notes:

1. Lake talik configuration based on steady state thermal model
2. Mean annual ground surface temperature (MAGST), -6°C
3. Mean annual lake bottom temperature (MALBT), 4.5°C
4. Lake half-width 50 m, lake width 100 m
5. Geothermal gradient, 0.014°C/m
6. Model results indicate an open talik is present
7. Maximum estimated talik thickness of 49 m
8. Estimated sub-talik permafrost thickness of 313 m

0°C Isotherm
Lake area (half width)
Land area

srk consulting	Sabina GOLD & SILVER CORP.	Goose Property Talik Thermal Modeling **Lake Talik Configuration, 50 m Lake Half Width (0°C)**
Job No: 1CS020.008 Filename: SteadyStateModel_neg6MAGST4.5MALBT_50mhalfwidth.ai	BACK RIVER PROJECT	Date: 8/15/2015 · Approved: cws · Figure: 2



Notes:

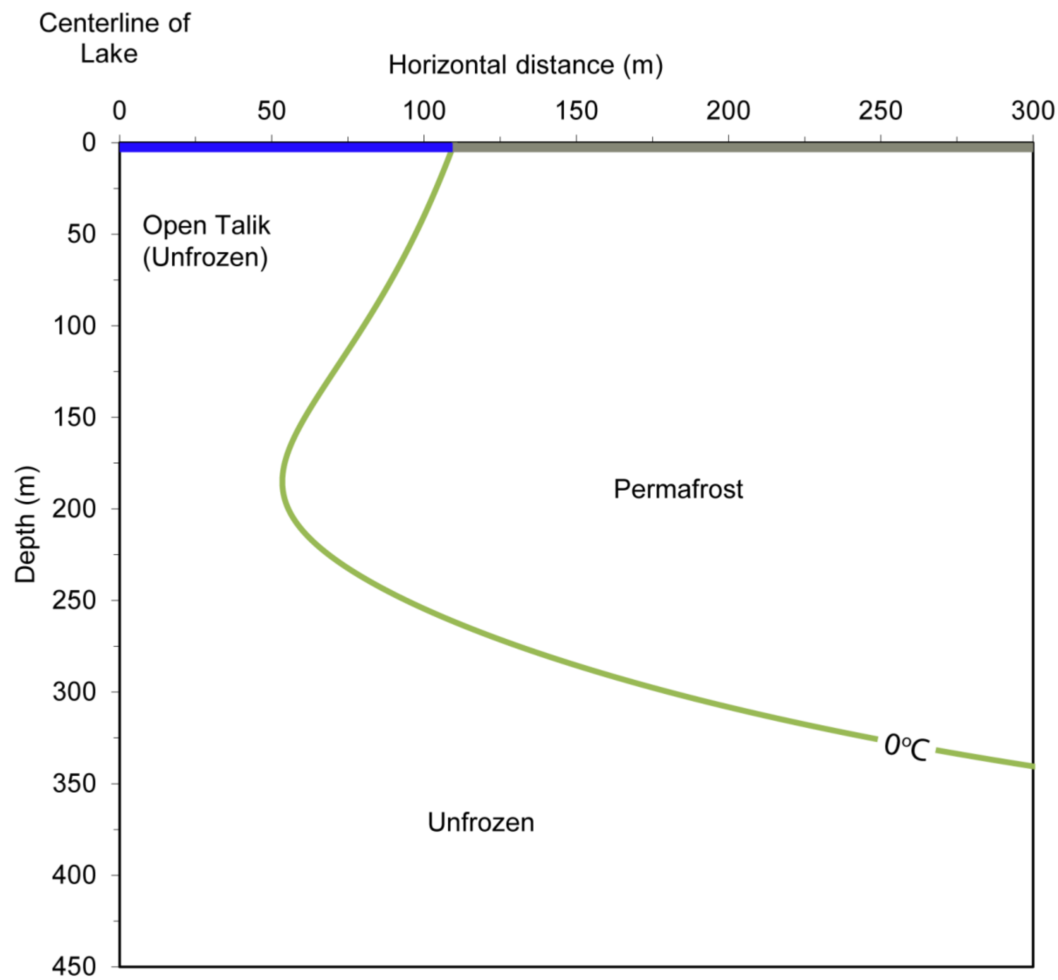
1. Lake talik configuration based on steady state thermal model
2. Mean annual ground surface temperature (MAGST), -6°C
3. Mean annual lake bottom temperature (MALBT), 4.5°C
4. Lake half-width 100 m, lake width 200 m
5. Geothermal gradient, 0.014°C/m
6. Model results indicate an open talik is present
7. Maximum estimated talik thickness of 155 m
8. Estimated sub-talik permafrost thickness of 83 m

0°C Isotherm

Lake area (half width)

Land area

srk consulting	Sabina GOLD & SILVER CORP.	Goose Property Talik Thermal Modeling **Lake Talik Configuration, 100 m Lake Half Width (0°C)**
Job No: 1CS020.008 Filename: SteadyStateModel_neg6MAGST4.5MALBT_100mhalfwidth.ai	BACK RIVER PROJECT	Date: 8/5/2015 / Approved: cws / Figure: 3



Notes:

1. Lake talik configuration based on steady state thermal model
2. Mean annual ground surface temperature (MAGST), -6°C
3. Mean annual lake bottom temperature (MALBT), 4.5°C
4. Lake half-width 110 m, lake width 220 m
5. Geothermal gradient, 0.014°C/m
6. Model results indicate a through talik is present

0°C Isotherm
Lake area (half width)
Land area

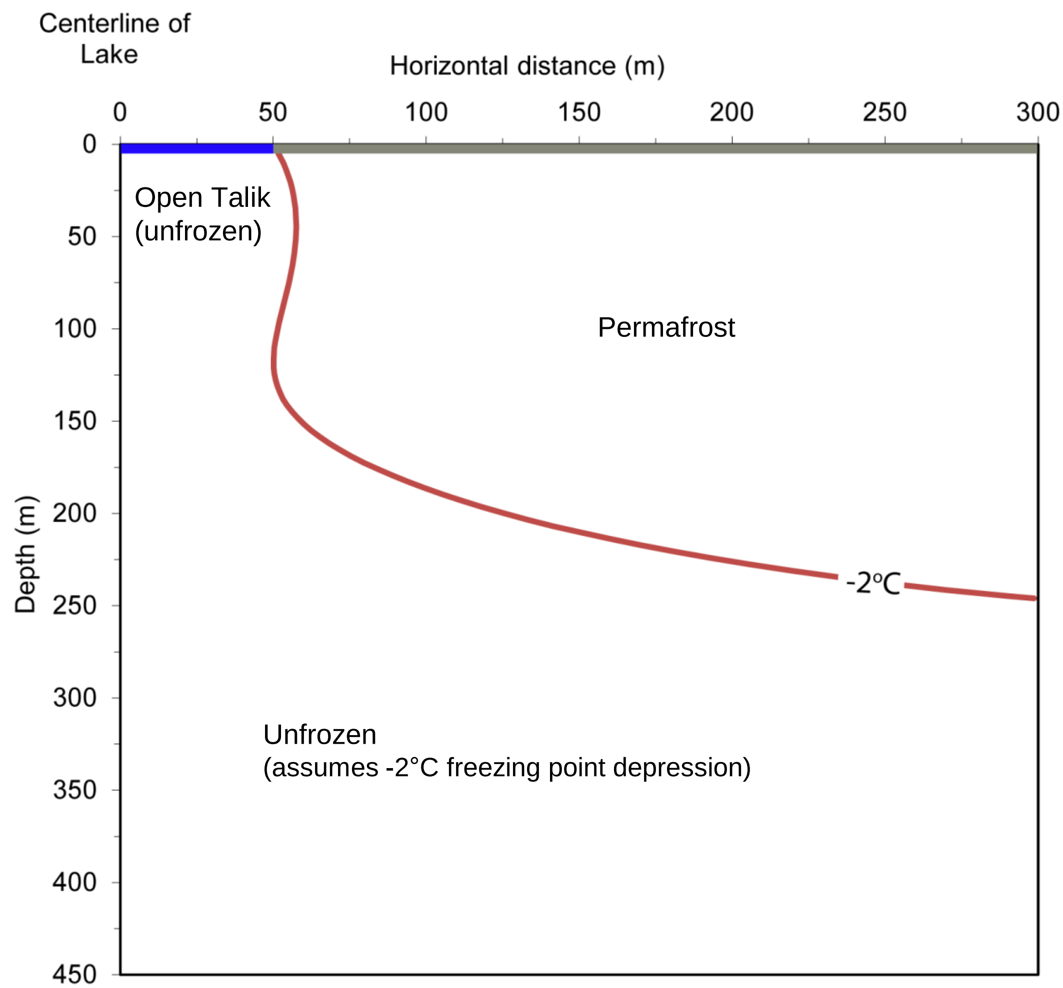
srk consulting

Sabina GOLD & SILVER CORP.

Goose Property Talik Thermal Modeling

Lake Talik Configuration, 110 m Lake Half Width

Job No: 1CS020.008	BACK RIVER PROJECT	Date: 8/5/2015	Approved: cws	Figure: 4
Filename: SteadyStateModel_neg6MAGST4.5MALBT_110mhalfwidth.ai				



Notes:

1. -2°C isotherm from steady state thermal model
2. Mean annual ground surface temperature (MAGST), -6°C
3. Mean annual lake bottom temperature (MALBT), 4.5°C
4. Lake half-width 50 m, lake width 100 m
5. Geothermal gradient, 0.014°C/m
6. Model results indicate an open talik is present
7. Maximum estimated talik thickness of 49 m
8. Estimated sub-talik permafrost thickness of 313 m

-2°C Isotherm
Lake area (half width)
Land area

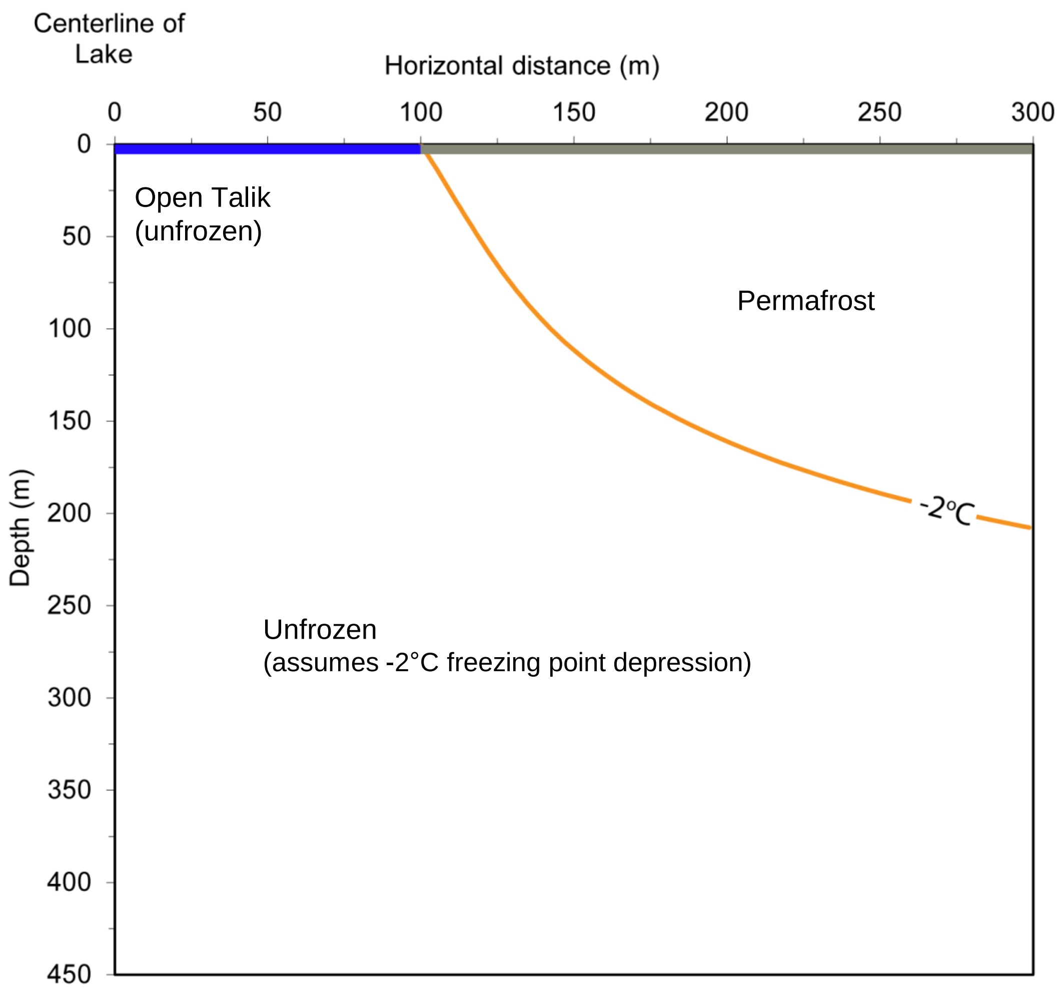
srk consulting

Sabina GOLD & SILVER CORP.

Goose Property Talik Thermal Modeling

Lake Talik Configuration, 50 m Lake Half Width (-2°C)

Job No: 1CS020.008 Filename: SteadyStateModel_neg6MAGST4.5MALBT_2_50mhalfwidth.ai	BACK RIVER PROJECT	Date: 8/5/2015	Approved: cws	Figure: 5

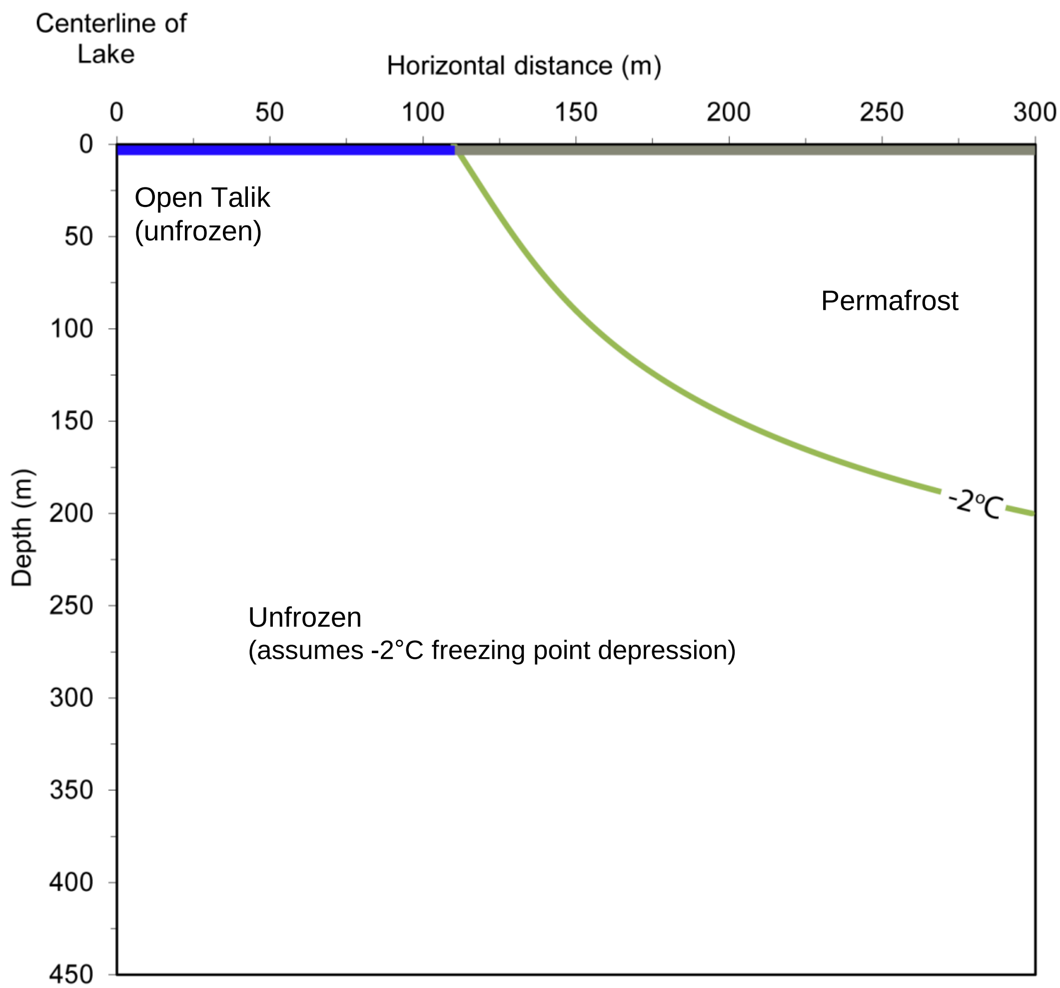


Notes:

1. -2°C isotherm from steady state thermal model
2. Mean annual ground surface temperature (MAGST), -6°C
3. Mean annual lake bottom temperature (MALBT), 4.5°C
4. Lake half-width 100 m, lake width 200 m
5. Geothermal gradient, 0.014°C/m
6. Model results indicate an open talik is present
7. Maximum estimated talik thickness of 155 m
8. Estimated sub-talik permafrost thickness of 83 m

-2°C Isotherm
Lake area (half width)
Land area

srk consulting	Sabina GOLD & SILVER CORP.	Goose Property Talik Thermal Modeling **Lake Talik Configuration, 100 m Lake Half Width (-2°C)**
Job No: 1CS020.008 Filename: SteadyStateModel_neg6MAGST4.5MALBT_2_100mhalfwidth.ai	BACK RIVER PROJECT	Date: 8/5/2015 · Approved: cws · Figure: 6

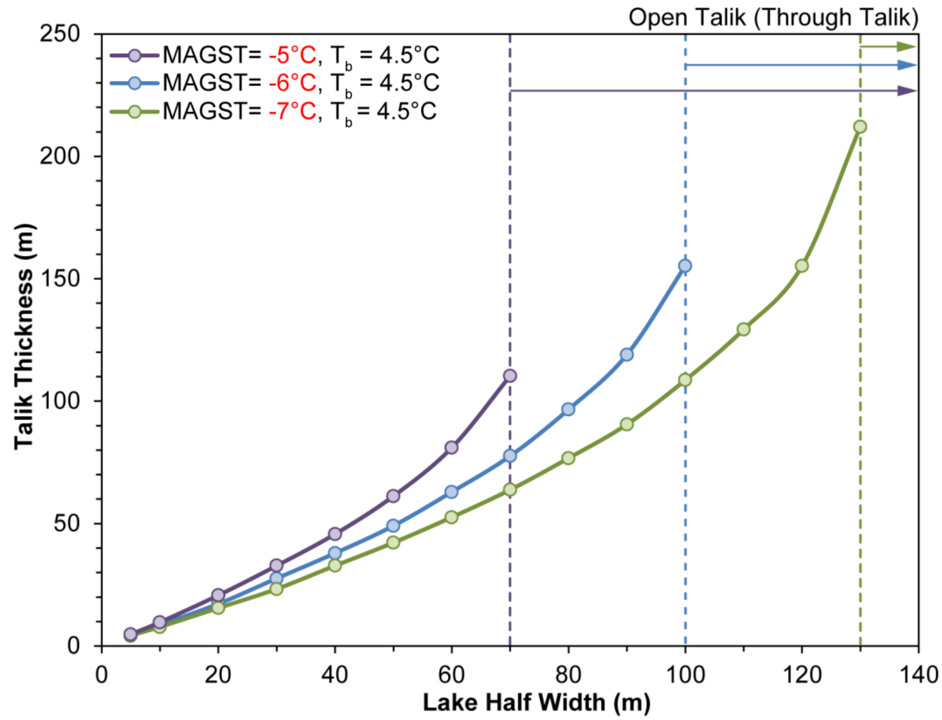


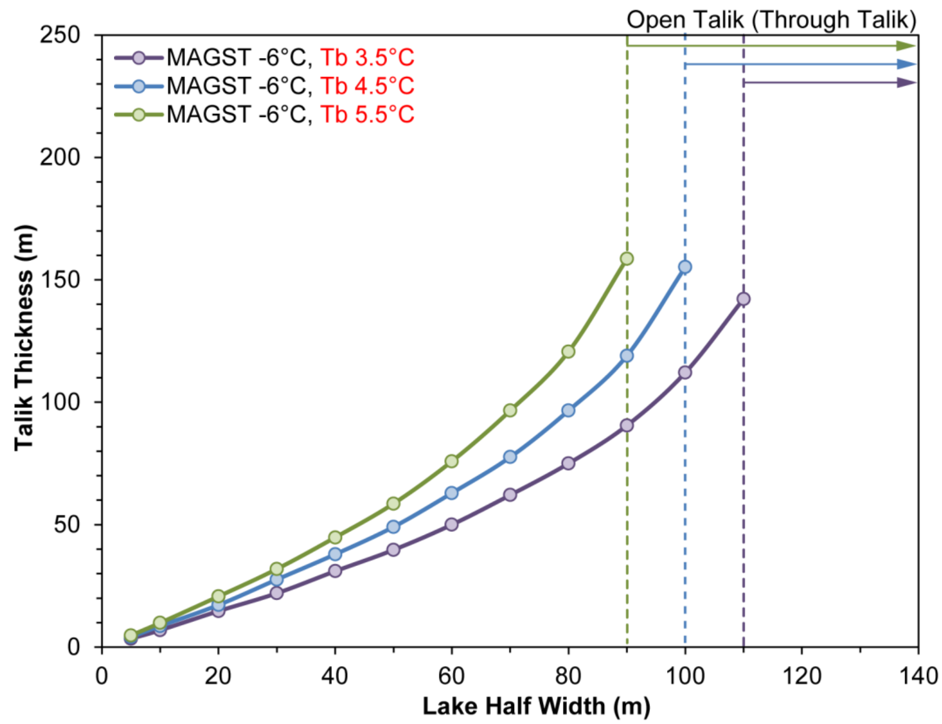
Notes:

1. -2°C isotherm from steady state thermal model
2. Mean annual ground surface temperature (MAGST), -6°C
3. Mean annual lake bottom temperature (MALBT), 4.5°C
4. Lake half-width 110 m, lake width 220 m
5. Geothermal gradient, 0.014°C/m
6. Model results indicate a through talik is present

-2°C Isotherm
Lake area (half width)
Land area

srk consulting	Sabina GOLD & SILVER CORP	Goose Property Talik Thermal Modeling	
		Lake Talik Configuration, 110 m Lake Half Width (-2°C)	
Job No: 1CS020.008	BACK RIVER PROJECT	Date: 8/5/2015	Approved: cws
Filename: SteadyStateModel_neg6MAGST4.5MALBT_2_110mhalfwidth.ai			Figure: 7





Notes:

1. Talik thickness based on steady state thermal model and 0°C isotherm
2. Mean annual ground surface temperature (MAGST)
3. Mean annual lake bottom temperature (T_b)
4. Lake width is 2 x lake half width
5. Geothermal gradient, 0.014°C/m
6. Dashed line indicates the approximate minimum lake half width to sustain an closed talik. Open talik (through talik) conditions are estimated for lakes with a great half width.

srk consulting

Sabina GOLD & SILVER CORP

Goose Property Talik Thermal Modeling

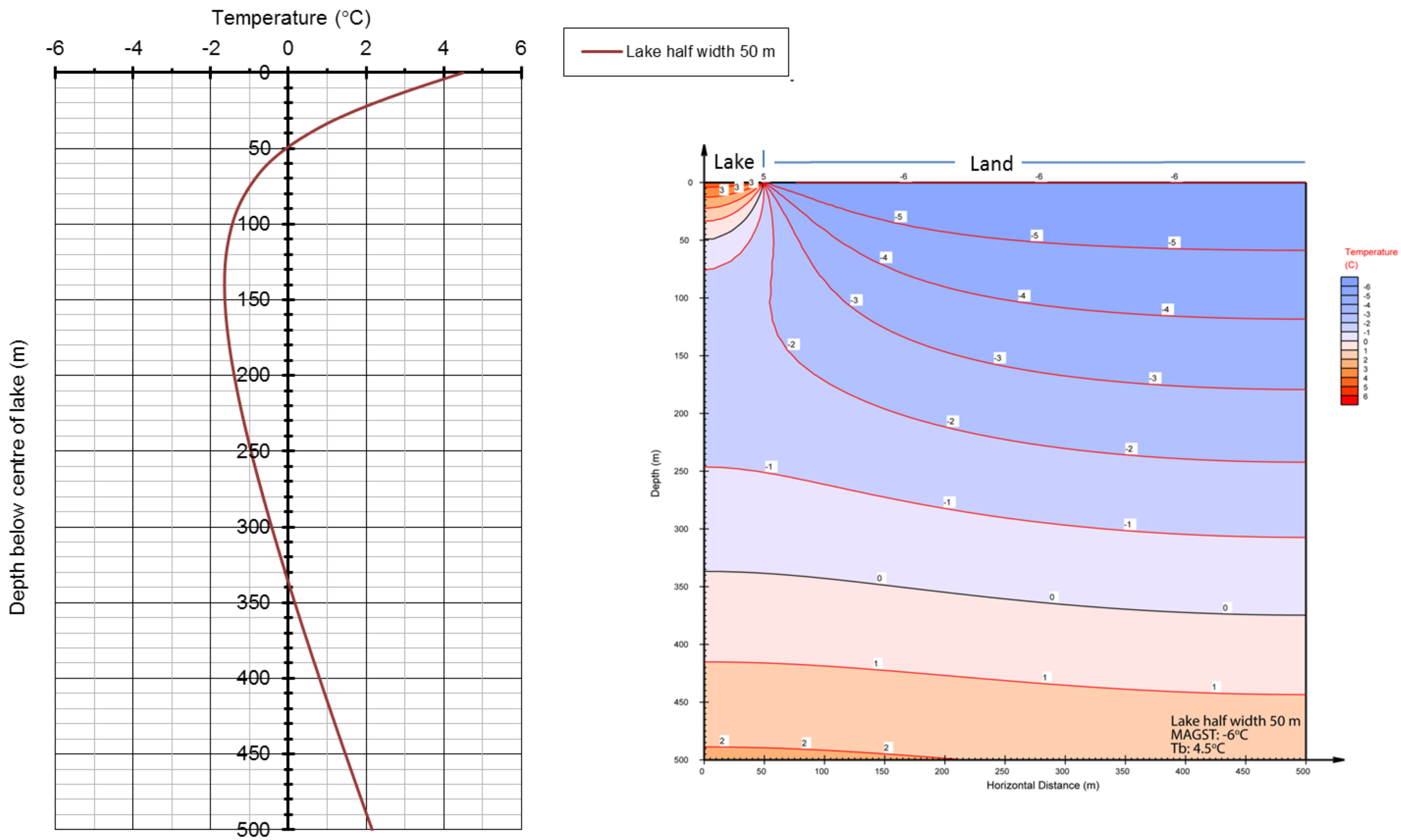
Lake Talik Thickness - Sensitivity Analysis

Job No: 1CS020.008

Filename: SteadyStateModel_neg6MAGST4.5MALBT_combined_plot.ai

BACK RIVER PROJECT

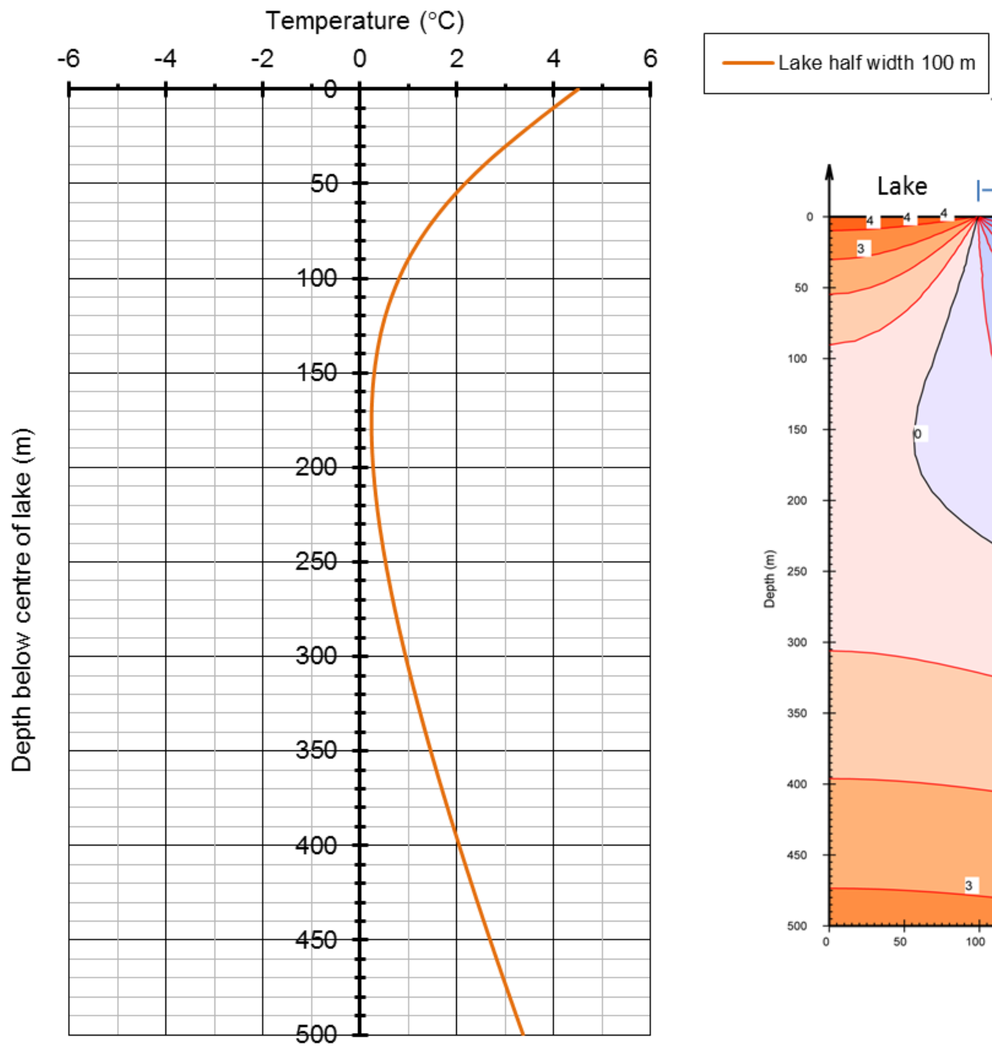
Date: 8/5/2015 | Approved: cws | Figure: 8

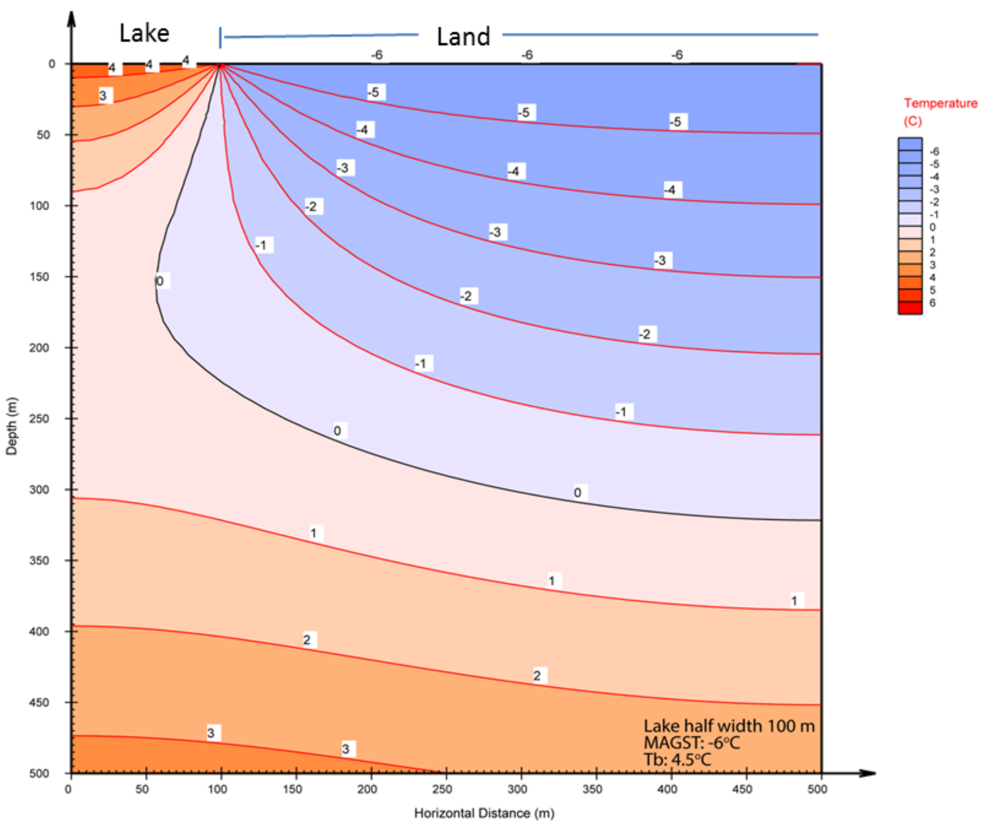


NOTES:

1. Ground temperatures modeled using SVHeat numerical finite element model
2. Model input parameters MAGST:-6°C, Tb: 4.5°C, Geothermal gradient: 0.014 °C/m

srk consulting	Sabina GOLD & SILVER CORP.	Goose Property Talik Thermal Modeling
		2D Steady Model Results – Lake Half Width 50 m
Job No: 1CS020.008 Filename: 2D Model Steady State100mhalfwidth.pptx	BACK RIVER PROJECT	Date: 8/3/2015	Approved: cws	Figure: **9**

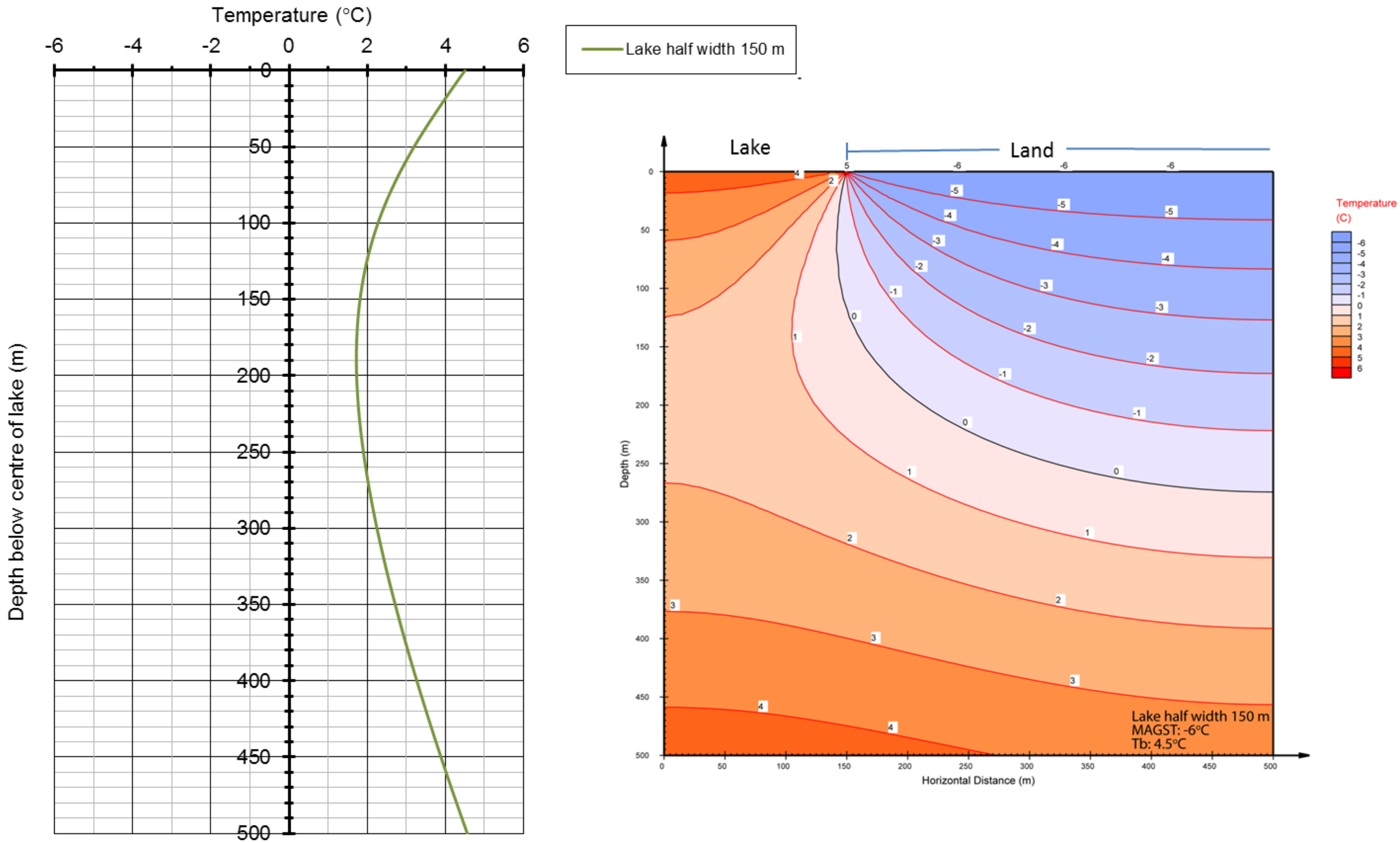




NOTES:

1. Ground temperatures modeled using SVHeat numerical finite element model
2. Model input parameters MAGST:-6°C, Tb: 4.5°C, Geothermal gradient: 0.014 °C/m

srk consulting	Sabina GOLD & SILVER CORP.	Goose Property Talik Thermal Modeling
		2D Steady Model Results – Lake Half Width 100 m
Job No: 1CS020.008 Filename: 2D Model Steady State100mhalfwidth.pptx	BACK RIVER PROJECT	Date: 8/3/2015 · Approved: cws · Figure: **10**



NOTES:

1. Ground temperatures modeled using SVHeat numerical finite element model
2. Model input parameters MAGST:-6°C, Tb: 4.5°C, Geothermal gradient: 0.014 °C/m

srk consulting

Sabina
GOLD & SILVER CORP.

Goose Property Talik Thermal Modeling

2D Steady Model Results – Lake Half Width 150 m

Job No: 1CS020.008

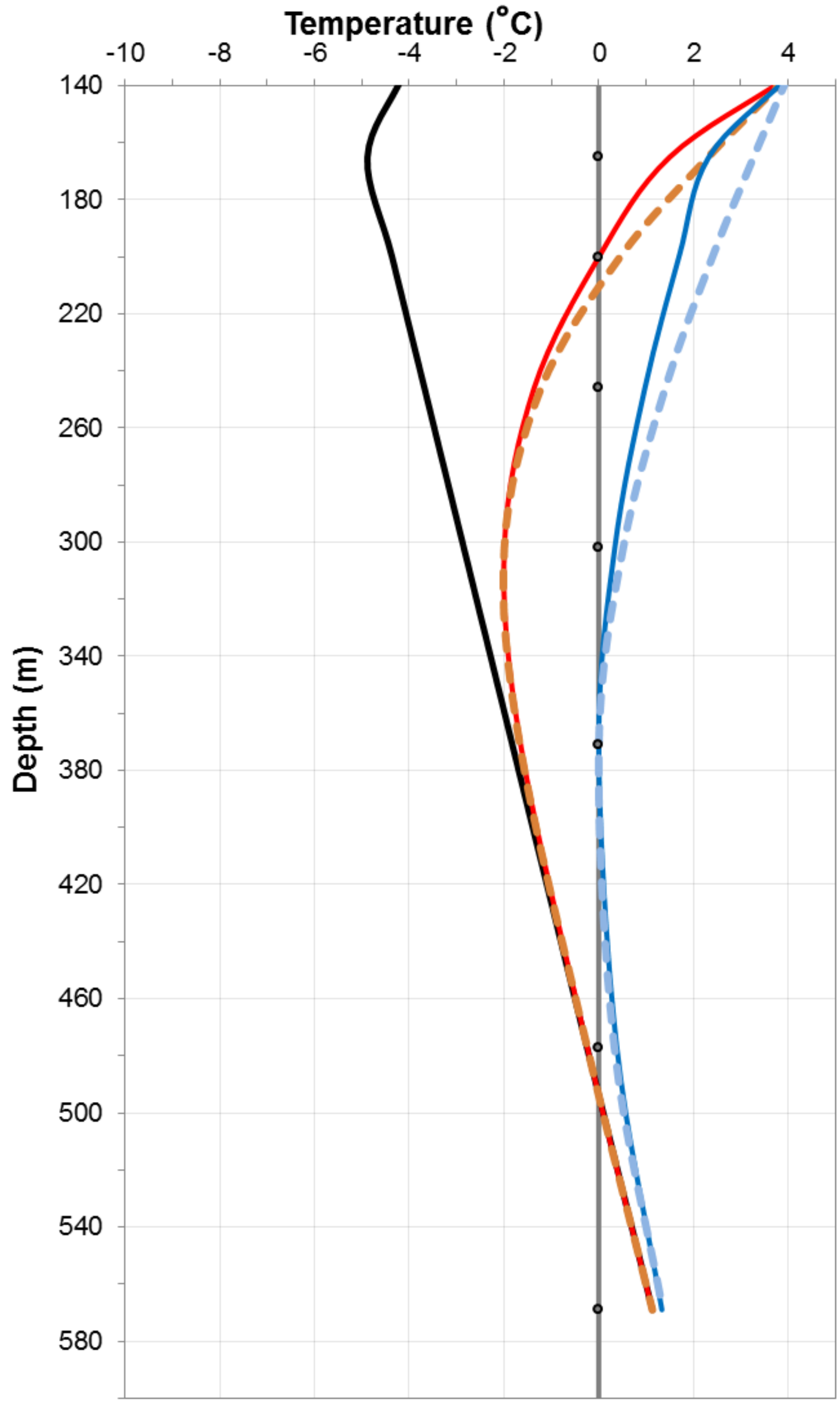
Filename: 2D Model Steady State100mhalfwidth.pptx

BACK RIVER PROJECT

Date: 8/3/2015

Approved: cws

Figure: **11**



Timing of open (through) talik		
	2°C Isotherm	0°C Isotherm
1D Analytical Model	87 yr	311 yr
1D SVHeat Model	79 yr	273 yr

srk consulting

Sabina GOLD & SILVER CORP.

Goose Property Talik Thermal Modeling

1D Model Comparison

Job No: 1CS020.008

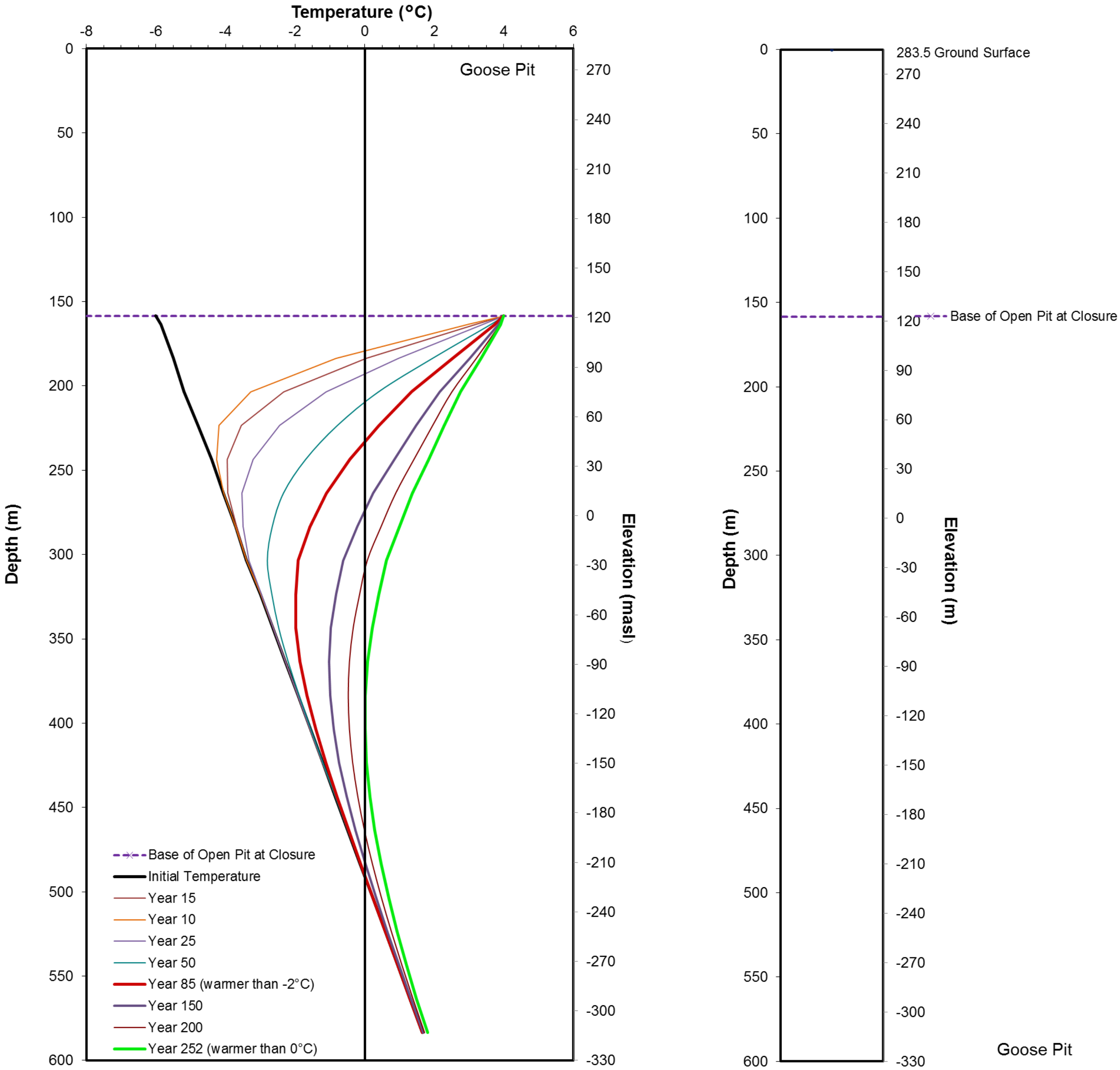
Filename: Umwelt Pit Lake Talik Development.pptx

BACK RIVER PROJECT

Date: 9/7/2015

Approved: cws

Figure: **12**



Notes:

1. Ground temperature response to pit flooding based on 1D analytical model
2. Time expressed as the number of years after flooding of the pit
3. Model results based on an average pit water temperature of 4°C

srk consulting

Sabina GOLD & SILVER CORP

Goose Property Talik Thermal Modeling

Modelled Ground Temperature – Goose Main Pit Lake

Job No: 1CS020.008

Filename: Goose Pit Lake Talik Development.pptx

BACK RIVER PROJECT

Date:	Approved:	Figure:
9/7/2015	CWS	13