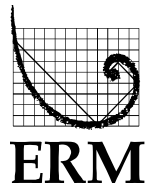


**BRUCEJACK GOLD MINE PROJECT**  
Application for an Environmental Assessment Certificate /  
Environmental Impact Statement

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## **Appendix 4-B**

### **Brucejack Project - Tailings Alternatives Assessment**



May 27, 2013  
Project No.: 1008-007-006-04  
Doc. No. BJ-2013-01

Ian Chang, Vice President Project Development  
Pretium Resources Inc.  
1600 - 570 Granville Street  
Vancouver, British Columbia, V6C 3P1

Dear Mr. Chang,

**Re: Brucejack Project – Tailings Alternative Assessment - Revised**

As requested, BGC Engineering Inc. (BGC) is pleased to provide you with the following tailings storage facility (TSF) alternative assessment for the Pretium Resources Inc. (Pretium) Brucejack Project, located in northwestern British Columbia. This technical memorandum identifies tailings management options involving combinations of various tailings technologies, and TSF locations, to store approximately 8 Mt of flotation tailings in the vicinity of Brucejack project area. An assessment of the various options is completed herein. Note that this assessment is a desk top study and does not incorporate any site specific information for any of the disposal options presented.

## **1.0 BACKGROUND**

Pretium's Brucejack project is a gold-silver deposit, located approximately 65 km north-northwest of Stewart, BC. The proposed mine will be an underground operation with a camp and mine facilities located immediately southwest of Brucejack Lake. Pretium is in the process of completing a feasibility (FS) study for the Brucejack project with BGC providing geotechnical, hydrogeological, hydrological, and acid rock drainage/metal leaching/water quality support for this study as well as the Environmental Assessment (EA).

From Rescan's (2013) project description issued in January 2013, the Brucejack project is projected to be an underground mine, producing approximately 16 Mt of ore at a rate of 2,700 tonnes per day (tpd) over a 16 year mine life. The ore will be processed through a conventional sulphide flotation and gravity concentration circuit, generating approximately 16 Mt of tailings and 5 Mt of waste rock. The gold-silver flotation concentrate will be dewatered

and trucked off-site to the port of Stewart, BC for shipment overseas or by rail to eastern North American smelters.

The current waste management plan is to store just over half of the flotation tailings underground as paste backfill, with the remaining 8 Mt of tailings stored above ground (Rescan, 2013). The purpose of this memorandum is to assess and recommend the preferred above ground tailings storage area. Waste rock will be primarily deposited underground with an estimated 2 Mt of waste rock (Rescan, 2013) deposited in the southwest corner of Brucejack lake – Refer to Section 3.

## 2.0 SITE SPECIFICS

Like all assessments, site specifics are important to identify practical mine waste disposal options, and to choose the optimal option from amongst them. The key site specific considerations for the Brucejack site are climate, access, borrow, topography, and flotation tailings characterization – as discussed below:

- i) Climate - The Brucejack project site is located in the coastal mountains of British Columbia, around 1400 meters above sea level (masl). Glaciers and ice fields surround the site. The climate of the area is relatively extreme and with unpredictable weather (Rescan, 2013). The mean annual temperature is -2°C and the average annual precipitation is around 2,000 mm, the majority being snow. As such, low cloud cover, deep snow pack, cold temperatures throughout most of the year, poor visibility, and potential difficulties reaching the site must be considered throughout the entire mine life (i.e. operating and closure).
- ii) Access – The Brucejack project site will be accessed via a 75 km long access road, which extends west of Highway 37 approximately 35 km south of Bell 2. Approximately the last 10 km of the road to the mine site extends across Knipple Glacier. The access road is scheduled to be completed in 2013 and is intended to be accessible year round. Upon closure of the mine, the road will be decommissioned unless it must remain open for other purposes (i.e. long term monitoring of any structures). As such, when considering the various TSF options, difficulties accessing the site upon closure must be given consideration.
- iii) Borrow – There is a lack of nearby, natural borrow materials – in the form of low permeability and granular soils - for dam earthworks construction. This conclusion is based on the 2012 feasibility level site investigations completed in the vicinity of Brucejack Lake. These investigations comprise: terrain assessment, air photo interpretation, test pits, drilling, and limited geological mapping.
- iv) Topography - The topography of the terrain surrounding Brucejack Lake is such that high embankment(s) relative to the actual tailings storage capacity being achieved would be required.

- v) Tailings Characterization - The flotation tailings are not anticipated to be acid generating, but will be predominantly clay and silt sized fraction – with approximately 80%<sup>1</sup> by dry weight passing the No. 200 sieve (74 microns). The fine-grained nature of the mine waste must be considered when looking at potential tailings technologies, and is problematic for technologies involving a significant degree of dewatering.

### 3.0 CURRENT MINE WASTE IN BRUCEJACK LAKE

Between 1986 and 1990, the previous owner of the Brucejack property, Newhawk Gold Mines Ltd. (Newhawk), excavated 5.3 km of underground workings in the West Zone Deposit as part of an advanced exploration and bulk sampling program. Construction of these underground workings generated waste rock and low-grade ore that was stored in piles or pads on surface. During this same period, Newhawk was issued a Mine Development Certificate for an underground mine, an on-site mill, and subaqueous disposal of fine tailings, mine water, and potentially ARD generating waste rock into Brucejack lake. However, Newhawk decided not to proceed with production and allowed the existing underground workings to flood.

In 1998, Newhawk decided to reclaim the property, including the removing all waste rock and ore above the water table. With the assistance of the BC Ministry of Energy and Mines (MEM), a qualitative assessment of the effectiveness, costs, liability and environmental risks of leaving the waste/ore pads on surface, using a soil cover to limit leaching, collection and lime treatment of drainage, underwater disposal in a constructed impoundment, and underwater disposal in Brucejack Lake was completed. BC MEM concluded that *'if the water quality impacts resulting from the dissolution of build-up weathering products could be shown to be insignificant, disposal of waste rock in Brucejack Lake would result in the lowest liability and environmental risk'* (MEND, 2005). As such, Newhawk disposed approximately 60,890 m<sup>3</sup> of waste rock and ore into Brucejack Lake the following year (1999). More detail on this mine waste disposal into Brucejack Lake can be found in the 2005 MEND (Mine Environmental Neutral Drainage) report.

More recently, Pretium was given approval to drive a new underground development towards the Valley of Kings (VOK) for bulk sample collection. Underground excavations started in August 2012 and will likely continue through the Spring of 2013. The new excavations are expected to produce 54,600 m<sup>3</sup> of waste rock. Since late 2012, Pretium has been subaqueously disposing waste rock into the southwest corner of Brucejack Lake, with approval from the various provincial ministries.

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<sup>1</sup> Provided by Bill Witte

For the Feasibility study, Pretium is currently assuming that during the first three years of operations, all waste rock generated cannot be stored underground as there is nowhere to put it until more of the underground stopes are opened up. Since Brucejack Lake emerged as the preferred alternative by MEM in the late 1990's and since the majority of the waste rock is classified as Potentially Acid Generating (PAG) rock, flooding the waste rock for closure is the recommended option, thus putting 2 Mt<sup>2</sup> of pre-development waste rock into Brucejack Lake was identified by Pretium as the preferred disposal option for this mine waste. A waste rock alternatives disposal assessment has been completed and submitted under separate cover.

#### 4.0 PAST TSF SITING STUDIES

Since 2009, BGC has been providing geotechnical support to Pretium's Brucejack and Snowfield projects. Over this period, BGC has looked at multiple surface locations for storing tailings within an 80 km radius from these deposits. These past studies were all completed at scoping level and looked at a wide range of tailings tonnage – from 2.4 Mt to 1,150 Mt. Table 1 summarizes these studies.

**Table 1. Summary of BGC Tailings Storage Facility Siting Studies completed between 2009 and 2012**

No.	Year Study Completed	Tailings Tonnage	Tailings Technology	Location
1	2009	100 Mt	Conventional tailings slurry, surface disposal with earthfill dams for containment	Five locations considered within 80 km from the Brucejack deposit, including Brucejack Lake.
2	2010	750 Mt & 1,150 Mt	"	One location considered - Scott Creek valley, located 31 km east of Brucejack Lake.
3	2011	3.0 Mt	"	Six locations considered within the Wildfire/Bell-Irving area, located 40 km east of Brucejack Lake.
4	2011	40 Mt & 180 Mt	"	Disposal into Brucejack Lake, with and without dams at the east and west ends of the lake.
5	2012	2.4 Mt	"	Six locations considered within the Knipple Lake area, located 14.5 km southeast of Brucejack Lake.
6	2012	6.3 Mt	"	Two locations considered, within less than 2 km of Brucejack Lake.

As stated in Section 1 above, approximately 8 Mt of flotation tailings must be stored above ground for the current feasibility study. As such, past TSF siting studies focused on tailings tonnages either significantly larger (up to 1,150 Mt) or smaller (2 to 3 Mt) than the project

<sup>2</sup> Quantity of pre-development waste rock from Rescan, 2013.

configuration currently envisioned. The last study (No. 6) is the most representative as 6.3 Mt of tailings storage was considered. For this study, BGC looked at storing tailings on surface at two potential locations, as shown on Drawing 1: 1) Site NW - less than 2 km northwest of the lake east of the abandoned Catear Resources Mine; and 2) Site E - immediately east of the lake and downstream of the nearby glacier. Site E is not considered a potential tailing storage facility due to inadequate storage capacity. Site NW has sufficient storage capacity, but requires two large dams (with large earthworks volumes) for tailings impoundment, at a poor ratio of tailings storage achieved to dam fill volume required.

## 5.0 OPTIONS – DESCRIPTION

For this tailings alternative assessment, the following three options for disposal of the remaining 8 Mt of flotation tailings above ground are considered:

- Option A – Subaqueous deposition of thickened slurry tailings into Brucejack Lake
- Option B - Subaerial deposition of conventional slurry, in the vicinity of Brucejack Lake
- Option C - Dry stacking of filtered tailings, in the vicinity of Brucejack Lake

These options consider different tailings technologies, but only tailings disposal in Brucejack Lake or on surface within a 2 km radius of the lake was considered. Potential TSF sites farther afield (15 to 80 km from the deposit) have been considered in previous TSF siting studies – described in Section 4 – but have been excluded from this assessment because they either have insufficient storage capacity, or are more suitable and cost effective for a larger tonnage operation:

- The Knipple Lake area is 15 km southeast of Brucejack mine site but storage of 8 Mt of tailings would require a ring dyke or side hill facility with foundations on the Bowser Creek floodplain. Given potential foundation condition issues (i.e. liquefaction) this area was excluded.
- The Scott Creek valley is approximately 30 km east of the Brucejack mine site, and has the potential to store up to 1,150 Mt of tailings, however this TSF location would likely require a 26 km long access tunnel (between Brucejack mine site and Scott Creek plant site), non-contact water diversion channels around the TSF, and possibly a short (2 km long) construction diversion tunnel. Lastly, there is some uncertainty of locating sufficient volumes of low permeability fill for dam earthworks close to the proposed embankment footprints.
- The Wildfire /Bell-Irving area is 40 km east from the Brucejack mine site, and thus would require either relocation of the plant site and/or tailings slurry to be conveyed to a surface TSF in this area. As well, this area has relatively flat topography and thus only side-hill or ring-dyke facilities are an option. As a result, multiple surface facilities would be required to store the 8 Mt of tailings.

### **5.1. Option A - Subaqueous deposition into Brucejack Lake**

As stated previously, Brucejack Lake has been used to deposit small volumes of waste rock in the past and is currently authorized to be used to dispose of waste rock (Refer to Section 3). Brucejack Lake is an attractive storage option given that it is a deep lake, does not have fish, and has a total volume of 28.5 Mm<sup>3</sup>, based on bathymetry provided by Rescan (2013). The lake is approximately 1,200 m long, 600 m wide, and has a maximum depth of 85 m in the central eastern portion. The lake drains in a north-westerly direction towards Sulphurets Creek.

For Option A, the 8 Mt of flotation tailings would be deposited sub-aqueously into Brucejack Lake. Tailings slurry will be discharged from a pipe that extends along the bottom of the lake to a sand filter located near the deepest part of the lake (85 m). Based on discussions with Tetra Tech in December 2012, a thickener will be used in the mill process, such that the tailings slurry at the pipe discharge will have 65% solids by weight<sup>3</sup>. Tailings will fill approximately 1/3<sup>rd</sup> of the existing lake volume at the end of mine life, or assuming a flat-line tailings surface there will be approximately 40 m (maximum height) of tailings on the lake bottom. No dams are required to impound this volume of tailings for this option.

Drawing 2 shows a schematic representation of the total flotation tailings in Brucejack lake at the end of the mine life. Water quality impacts to Brucejack Lake and Creek would need to be considered when assessing the feasibility of this option including potential total suspended solids issues during operation (TSS).

### **5.2. Option B - Subaerial deposition of conventional slurry, in vicinity of Brucejack Lake**

For Option B, the tailings slurry would be deposited into a cross-valley impoundment located less than 2 km northwest of Brucejack Lake (Site NW, Drawing 1). This option requires two large dams – one at the south end of the valley and one at the back of the impoundment. Drawing 1 shows a schematic plan view of impoundment with the two dams (maximum height of 20 and 80 m) at their ultimate height. The dams shown in this drawing are assumed to be rockfill with an upstream impervious liner, with slopes of 3H:1V and 2H:1V upstream and downstream, respectively. A detailed analysis of geohazards (eg. glaciers and avalanches) including potential design of mitigation structures would be required to confirm this disposal method to be viable.

### **5.3. Option C - Dry stack of filtered tailings, in vicinity of Brucejack Lake**

For Option C, high density thickeners would be used to reduce the flotation tailings density from 65% to approximately 80-85% solids by weight, thus producing a filter cake that can be

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<sup>3</sup> 65% solids by weight from Tetra Tech email to BGC dated December 11, 2012.

mechanically placed, compacted and stacked. These filtered tailings could be trucked or put onto a conveyor and stored in the same valley (Site NW, see Drawing 1) to the northwest of Brucejack Lake, as considered in Option B. A schematic representation of this dry stacking was not prepared because it was felt that capital and operating costs may preclude this from being a realistic option, irrespective of its technical merits. Moreover, given the high precipitation in the area, provision of suitable erosion protection for a dry stack of fine-grained tailings poses obvious concerns in terms of long term stability and requirements for periodic repair and maintenance. In addition, as with Option B, a detailed analysis of geohazards including potential design of mitigation structures would be required with this option.

## 6.0 OPTIONS ASSESSMENT & SELECTION

To compare the three TSF options for storage of the remaining 8 Mt of flotation tailings, a simple table was developed with considering technical characterization, impacts to water quality (environmental), and project economic characterization criteria:

1. Dam Size (Containment design) – Larger dams are not favorable as they are more complex, may pose greater risk, require more construction materials and a larger footprint.
2. Borrow (Containment design) – Determining what borrow is required and what is locally available for dam earthworks construction.
3. Constructability – Are there are any issues with constructing this TSF option taking into account the climate and access of the project site?
4. Closure Design – What are the issues with closure of this facility? What are the long term maintenance and monitoring requirements?
5. Precedent – What is the precedent for this TSF option in similar environments?
6. Water Quality – What is the potential impact on downstream receiving environments?
7. Life of Mine Costs – Relative to each of the three options, what would the capital and operating costs be?

The attached Table 2 shows the three TSF options and describes the pros and cons for each of the six site specific criteria listed above. Note that this assessment could be expanded to include additional environmental and socio-economic considerations, with support from others.

Option A, sub-aqueous disposal of the tailings in Brucejack Lake, is the most favourable option for every evaluation criterion considered in this assessment, provided adequate water quality in the lake can be maintained. Although some long term monitoring of lake and lake discharge water quality will be required, Option A requires the least monitoring and maintenance at closure, and has the lowest capital, operating and closure costs. As stated



in Section 3, PAG waste rock was deposited into Brucejack Lake in 1999 because it was demonstrated (MEND, 2005) that the impact on the downstream environment would not be significant. The water cover maintained over the waste rock should reduce ARD processes. Although the tailings are not anticipated to generate ARD the overlying water cover will limit the weathering of tailings solids. During closure and deposition, there exists the potential for the tailings to leach trace elements to the environment. Annual runoff into Brucejack Lake may help to mitigate the dissolved metal concentrations, however, this assumption will need to be supported by analysis and prediction of lake water quality during operations and at closure. Given the fine particle size of the tailings, there may be an increase in the TSS (total suspended solids) concentration in Brucejack lake during mine operation at certain times of the year (i.e. lake turnover). Potential mitigation of TSS (i.e. adding flocculant to the tailings stream) must be considered for this option.

Option B, cross valley impoundment with dams, is technically feasible; however, given that large dams would be required, the lack of locally available low permeability and granular soils (for dam earthworks construction), and wet cold climate, the capital costs would be significantly higher compared to Option A. Alternate dam types (i.e. Roller compacted concrete, asphaltic concrete core dam, etc.) could be considered however they would require bringing more materials into site, thus capital costs would likely be even higher than a predominantly earthfill/rockfill structure. Depending on the rock conditions, grout curtains may need to be considered therefore having a significant impact on overall capex. A very cold climate also imposes severe restrictions on the use of these alternate dam design configurations. As well, the potential for weathering of tailings located within tailings beaches (or with a water cap less than one meter) is higher than if the tailings were deposited subaquously at depth. If water held within the facility is released to the environment, flow amendment from Brucejack Creek acting to reduce dissolved metal concentrations might not be significant during periods of low flow. Lastly, as with all dams, there would be long-term maintenance and monitoring of the dam, which would be costly and could prove to be difficult due to the climatic and access issues noted in Section 2.0.

Option C is the least practical option of the three considered in this assessment. Dry stacking will be extremely challenging given this wet, cold, high elevation site; and is generally more effective in dry climates. This site experiences freezing conditions over half the year (approximately 7 months) thus, filters must be contained in a heated building, trucks used for conveying tailings to the disposal area must have heated boxes to prevent the tailings from freezing to the sides of the containers, and the tailings must be compacted before they freeze in order to get the densification to required standards. In addition, the operating and capital costs for dry stacking would be much higher in comparison to Option A. Metal leaching under pH neutral conditions could be a potential issue, particularly if the leachates are not collected and contained. The long term erosional stability of the dry stack will require an erosion resistant cover, and ongoing care and maintenance to properly maintain it. Lastly, there would be long-term monitoring of the dry stacked tailings at closure, with regards to both stability and water quality.

## **7.0 CONCLUSIONS**

This tailings alternatives assessment considered three options for storage of 8 Mt of non-acid generating flotation tailings. Option A, sub-aqueous deposition into Brucejack Lake, is recommended as the preferred option because: i) no large retaining dams are required, ii) there would be a reduction in metal leaching from the tailings and thus a reduction in dissolved metal loads to the downstream environment, and iii) ease of closure (i.e. least amount monitoring and maintenance compared to the other two options). Temporary periods of elevated TSS in the lake may occur during operation and closure; so potential mitigation options will have to be considered for the feasibility study. However, Option A is preferred for each of the evaluation criterion considered in this assessment and is considered sufficient for the Brucejack feasibility study. Rescan Environmental Services Ltd. (Rescan) is currently completing feasibility design of the tailings deposition within Brucejack Lake based on their experience with sub-aqueous tailings deposition.

## **8.0 CLOSURE**

BGC Engineering Inc. (BGC) prepared this document on the account of Pretium Resources Inc. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation. Any use which a third party makes of this document or any reliance on decisions to be based on it is the responsibility of such third parties. BGC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.

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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:**

Lori-Ann Wilchek, M.Sc., P.Eng.  
Senior Geotechnical Engineer

Reviewed by:

Vinod Garga, Ph.D., MBA, P.Eng., F.E.I.C.  
Senior Geotechnical Reviewer

Attach:  
Table 2  
Drawings 1 and 2

## REFERENCES

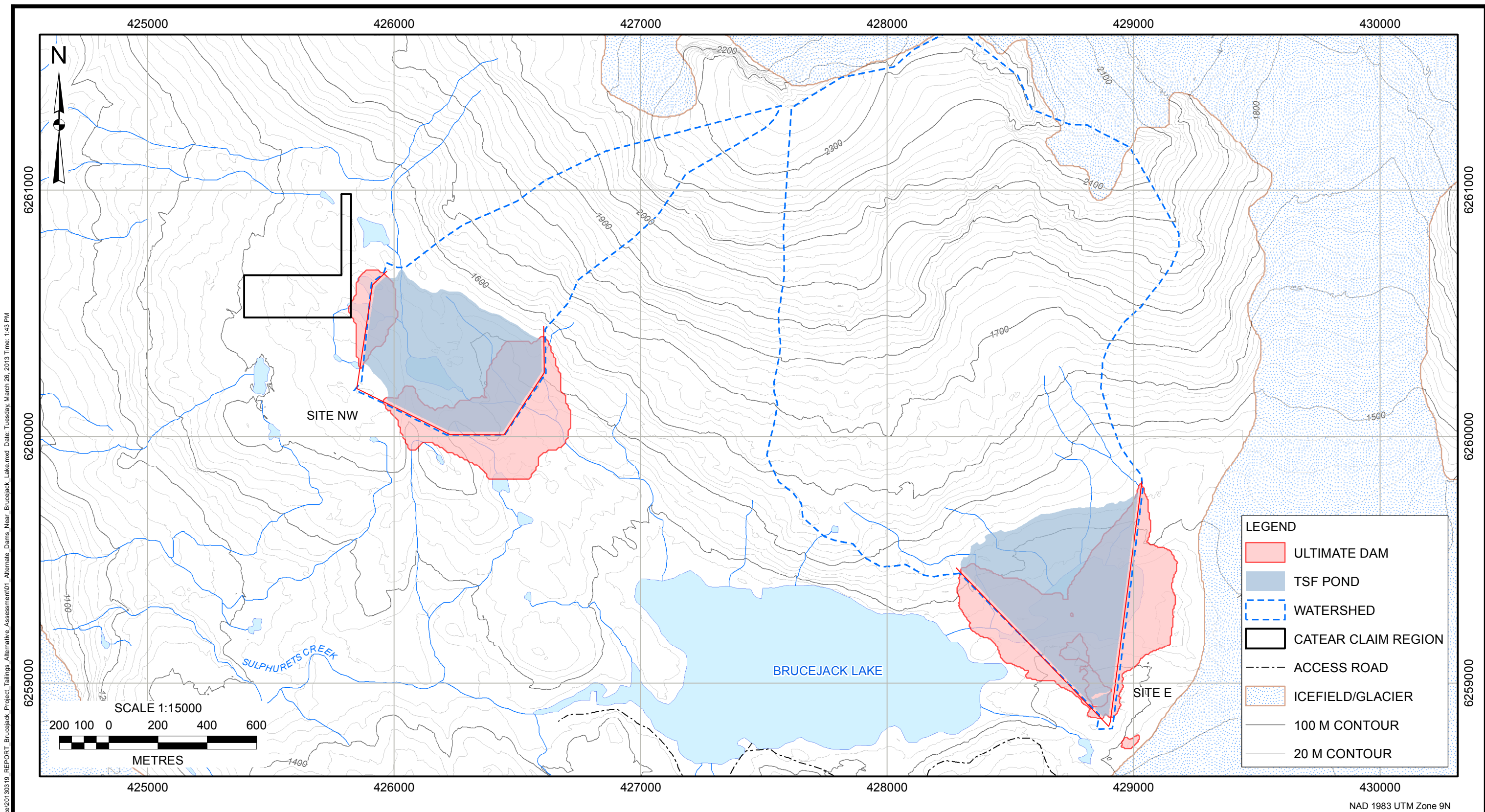
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## **TABLE 2 – Brucejack – Tailings Options Evaluation**

Table 2. Brucejack - Tailings Options Evaluation

			Option A	Option B	Option C
			Subaqueous, tailings slurry deposition into Brucejack Lake	Aerial deposition of slurried tailings; retained by dams/embankments within the vicinity of BJ lake	Dry stack of filtered tailings within the vicinity of BJ lake
Technical	Containment design	Dam size	No dams required.	Large dams (up to 80 m high) are required to contain the tailings.	No dams required.
Technical	Containment design	Borrow	No borrow required.	Large quantities of local building materials such as tills, granular soils, and rockfill would be required; and there is a lack of suitable tills and granular materials in the immediate vicinity.	No borrow required.
Technical	Constructability	Constructability	No issues.	Given the cold, wet climate, would likely be challenges constructing large earthfill embankments at this particular site including geohazard considerations.	Given the fine grained nature of these tailings (75% passing the #200 Sieve); there will likely be challenges dry stacking option. Dry stacking is also more suited to dry climates; in wet climates there can be operating issues such as trafficability of haulage and compaction . Will require fresh water diversions around the dry stack to prevent inundation of the dry stack and consideration of geohazards
Technical	Closure design	Ease of closure / long term monitoring	No dams to maintain after closure; lesser monitoring of the lake at closure relative to Option B and C.	Least preferred option in terms of ease of closure. Will require long term monitoring of the dams at closure.	Given the cold, wet climate and geohazards, such as avalanches; long-term monitoring of the dry stack will be required at closure.
Technical	Precedent	Precedent in similar operating & climatic conditions.	There is precedent of this disposal method; Barrick's Eskay Creek - Tom McKay Lake.	There is precedent of this disposal method;	There is little to no precedence of dry stacking in wet climates.
Environmental	Water Quality	Water Quality (i.e. surface water, groundwater, impacted waters)	No fish population at stake; strongly reduced rate of weathering (oxidation) of tailings; residence time of lake water provides flow augmentation to metal loads released into Brucejack Creek; option that is least likely to raise environmental concerns and risks to the exposed environment. May be temporary periods of elevated TSS in the lake during operations and closure.	Potential of increased weathering rate (oxidation) of tailings and reduced flow augmentation to metal loads compared to option A. Potential metal leachates are at least contained within the tailings containment structure. May also be periods of elevated TSS in the pond during operations.	Compared to other option(s) the weathering rates and metal loadings will only be reduced under relative dry conditions with reduced water contact. Under wetter conditions weathering rates and metal loadings to the downstream environment may be significantly without a containment structure. Potentially the worst option in terms of environmental risks to the environment.
Project Economics	Life of mine cost	Capital Cost	Likely the lowest capital costs in comparison to the other two options.	Requires higher capital costs relative to Option A (due to construction of starter dam, surface water diversions, etc.).	Requires higher capital costs relative to Option A and B, due to filtration (i.e. thickner, filter plant, conveyors).
Project Economics	Life of mine cost	Operational Cost	Likely the lowest operating costs in comparison to the other two options.	Higher operating costs compared to Option A, due to dam raising and moving spigot locations during the mine life.	The highest operating costs relative to Option A and B; additional costs due to producing the dry tailings, placement of the tailings with trucks/conveyors, etc.

## **DRAWINGS**



AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT. AUTHORIZATION FOR ANY USE AND/OR PUBLICATION OF THIS REPORT OR ANY DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS, THROUGH ANY FORM OF PRINT OR ELECTRONIC MEDIA, INCLUDING WITHOUT LIMITATION, POSTING OR REPRODUCTION OF SAME ON ANY WEBSITE, IS RESERVED PENDING BGC'S WRITTEN APPROVAL. IF THIS REPORT IS ISSUED IN AN ELECTRONIC FORMAT, AN ORIGINAL PAPER COPY IS ON FILE AT BGC ENGINEERING INC. AND THAT COPY IS THE PRIMARY REFERENCE WITH PRECEDENCE OVER ANY ELECTRONIC COPY OF THE DOCUMENT, OR ANY EXTRACTS FROM OUR DOCUMENTS PUBLISHED BY OTHERS.

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DATE:	APR 2013
DRAWN:	JCS, LL
DESIGNED:	LW
CHECKED:	
APPROVED:	

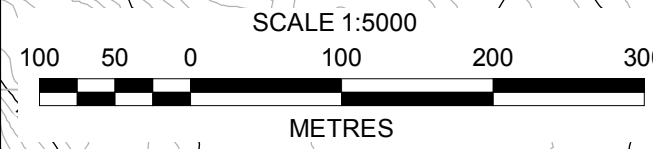
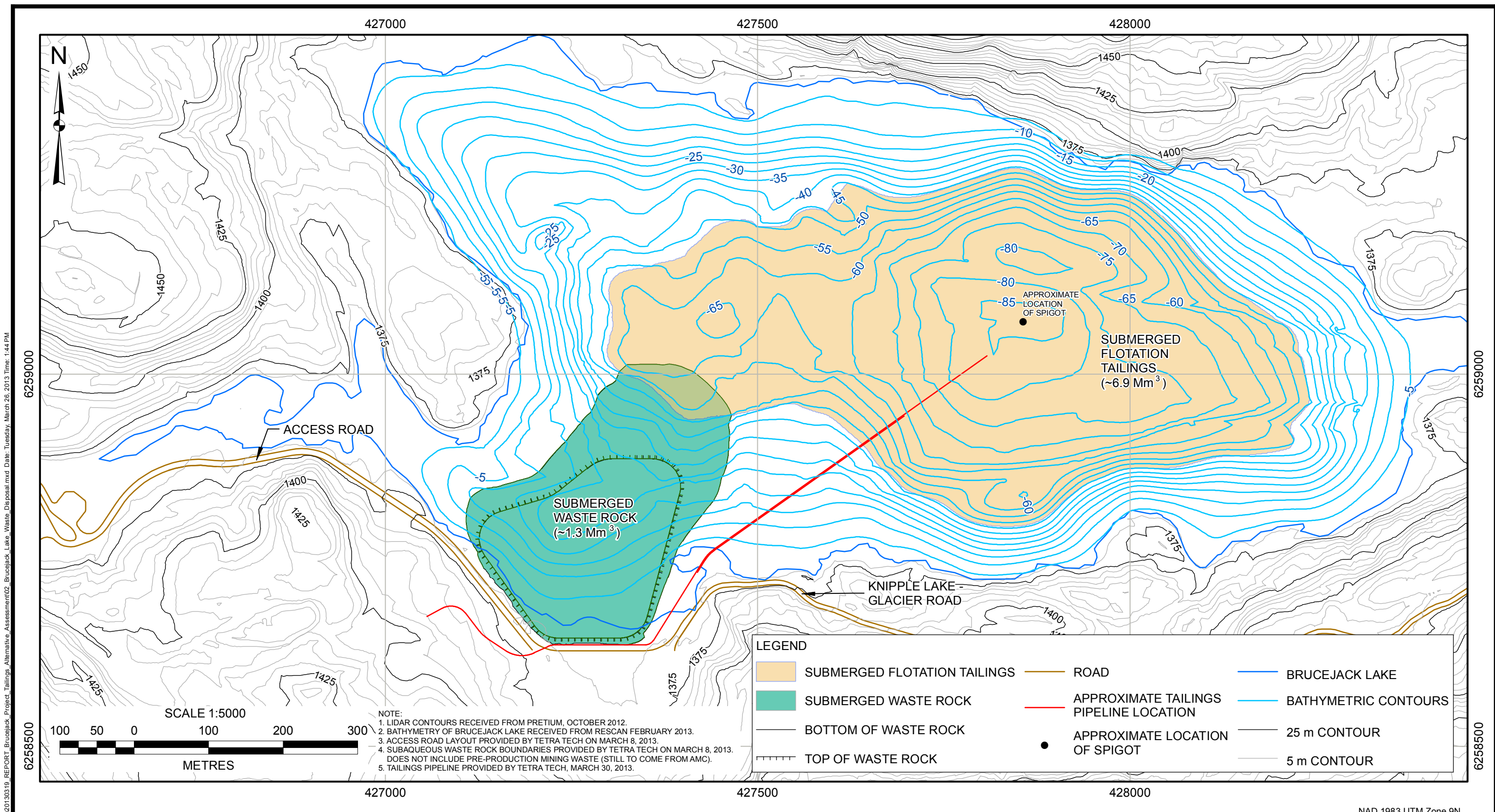
PROFESSIONAL SEAL:

**BGC ENGINEERING INC.**  
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: PRETIUM RESOURCES INC.

PROJECT: BRUCEJACK PROJECT – TAILINGS ALTERNATIVE ASSESSMENT		
TITLE: ALTERNATE DAMS NEAR BRUCEJACK LAKE		
PROJECT No.: 1008007	DWG No.: 01	REV.:





NOTE:  
 1. LIDAR CONTOURS RECEIVED FROM PRETIUM, OCTOBER 2012.  
 2. BATHYMETRY OF BRUCEJACK LAKE RECEIVED FROM RESCAN FEBRUARY 2013.  
 3. ACCESS ROAD LAYOUT PROVIDED BY TETRA TECH ON MARCH 8, 2013.  
 4. SUBAQUEOUS WASTE ROCK BOUNDARIES PROVIDED BY TETRA TECH ON MARCH 8, 2013.  
 DOES NOT INCLUDE PRE-PRODUCTION MINING WASTE (STILL TO COME FROM AMC).  
 5. TAILINGS PIPELINE PROVIDED BY TETRA TECH, MARCH 30, 2013.

LEGEND			
	SUBMERGED FLOTATION TAILINGS		ROAD
	SUBMERGED WASTE ROCK		APPROXIMATE TAILINGS PIPELINE LOCATION
	BOTTOM OF WASTE ROCK		APPROXIMATE LOCATION OF SPIGOT
	TOP OF WASTE ROCK		BRUCEJACK LAKE
			BATHYMETRIC CONTOURS
			25 m CONTOUR
			5 m CONTOUR

NAD 1983 UTM Zone 9N

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	1:5,000
DATE:	APR 2013
DRAWN:	JCS, LL, DM
DESIGNED:	LW
CHECKED:	
APPROVED:	

PROFESSIONAL SEAL:

**BGC ENGINEERING INC.**  
 AN APPLIED EARTH SCIENCES COMPANY

CLIENT: PRETIUM RESOURCES INC.

PROJECT: BRUCEJACK PROJECT – TAILINGS ALTERNATIVE ASSESSMENT		
TITLE: BRUCEJACK LAKE WASTE DISPOSAL PREFERRED OPTION		
PROJECT No.: 1008007	DWG No.: 02	REV.: