



KUDZ ZE KAYAH PROJECT

RESPONSE TO MINERAL RESOURCE BRANCH'S INFORMATION REQUEST

#6 ON BMC'S KZK QUARTZ MINING LICENCE APPLICATION

September 2024

BMC MINERALS LTD.

LIST OF ACRONYMS AND ABBREVIATIONS

AMI	Adaptive Management Initiative
BMC	BMC Minerals Ltd.
COPI	Constituent of Potential Interest
EMR	Yukon Department of Energy, Mines and Resources
FMEA	Failure Modes and Effects Analysis
GMWMF	Guidelines for Mine Waste Management Facilities
HC	Health Canada
IR	Information Request
KP	Knight Piesold
KZK	Kudz Ze Kayah
LoMWBM	Life of Mine Water Balance Model
MAC	Maximum Acceptable Concentration
MRB	Mineral Resources Branch
OMS	Operation, Maintenance and Surveillance
QML	Quartz Mining Licence
RCP	Reclamation and Closure Plan
TLU	Traditional Land Use
WQM	Water Quality Model
WQO	Water Quality Objective
WRSA	Waste Rock Storage Area
WTP	Water Treatment Plant
YCS	Yukon Conservation Society
YESAB	Yukon Environmental and Socio-Economic Assessment Board
YG	Yukon Government

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1 INTRODUCTION

BMC Minerals Ltd. (BMC) submitted a Quartz Mining Licence (QML) application (the Application) to the Yukon Department of Energy, Mines and Resources (EMR) in August 2022. This Application included the management plans developed for the Kudz Ze Kayah Project (the Project) in consideration of the Yukon *Quartz Mining Act* and other relevant regulations and guidelines.

In May 2024, EMR Mineral Resources Branch (MRB) issued the *Quartz Mining Licence Application, Information Request 6 – Reclamation and Closure Plan* (MRB, 2024) informing BMC that MRB had conducted a completeness review of the Reclamation and Closure Plan (RCP). This review concluded that additional information is required to support detailed review of the RCP, including 77 Information Requests (IRs) (IR6-1 through IR6-77).

This document provides BMC's responses to IR6-1 through IR6-77. For clarity and ease of understanding, BMC has listed the IRs from MRB's IR6 (in black text) followed by BMC's response (in blue text).

2 EDITORIAL

2.1 DEFINITIONS AND TERMINOLOGY

IR6-1: Provide definitions or explanations for the following terms used throughout the plan:

- a. Passive water treatment technology
- b. Semi-passive water treatment technology
- c. Reclamation
- d. Restoration
- e. Inert materials
- f. Non-inert materials
- g. Landform

BMC Response: These terms have either been removed from the RCP, or have been included in the RCP Glossary.

IR6-2: Clarify the means and use of “*wherever practicable*” in terms of achieving closure goals.

- a. If there are areas where closure goals cannot be achieved these should be clearly identified.
- b. If closure goals cannot be achieved, alternative goals should be established, or additional measures and mitigations identified that meet the same intent

BMC Response: The Merriam-Webster Dictionary defines ‘practicable’ as: *capable of being put into practice or of being done or accomplished.*

The Project Closure goal, as defined in the RCP, is to return the Project site and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with Traditional Land Use (TLU) activities. BMC is committed to achieving this goal and has developed measures to do so for all aspects of the Project, as detailed in the RCP.

The closure measures presented in the RCP are expected to be effective, but some measures may prove not practicable if they are found to, for example:

- Put the health and safety of Project personnel at risk;
- Put equipment or infrastructure at risk;
- Increase the risk of disturbance, health, injury, or mortality to wildlife; or
- Be impractical, not realistic or achievable, or are not likely to achieve the desired effect.

In such a case, alternative measures will be identified to achieve the objectives of the closure measures in question. Additional consideration of potential alternative measures, if needed, will be presented in updates to the RCP.

BMC notes that the term ‘wherever practicable’ in terms of closure goals originated from the Whitehorse Mining Initiative, and continues to be commonly used by Canadian jurisdictions

including the *Mine Rehabilitation Code of Ontario* (Ontario Ministry of Mines, 2024), the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB, 2013), and the *Mine Site Reclamation Policy for Nunavut* (INAC, 2002). Moreover, the term is used in licences issued by YG (e.g., Conditions 17, 52, 64, 76, 81 of Mining Land Use Approval LQ00424b), likely to provide flexibility to licensees to implement appropriate and effective closure measures based on actual condition at the time of implementation.

IR6-3: Clarify, and maintain consistent use, of “performance objectives” and “performance criteria” throughout the plan.

BMC Response: As discussed in Section 2.1, Figure 2.1 and Chapter 3 of the RCP, objectives are the desired results of Closure, with clear, specific objectives identified for all Project components. Performance criteria are the quantitative measures used to define success in achieving each specific objective.

IR6-4: Clarify the meaning of, or provide definitions for, “viable” and “self-sustaining” in the context of closure goals and objectives.

BMC Response: The terms ‘viable’ and ‘self-sustaining’ have the meanings as intended in the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB, 2013). BMC interprets the meaning of ‘viable’ to be ‘capable of functioning adequately’, and the meaning of ‘self-sustaining’ to be ‘able to be maintained independently.’

IR6-5: The definition for Permanent Closure should not include “and all other activities as authorized” as reclamation and closure of the site is an activity that is authorized.

BMC Response: The definition of Permanent Closure has been revised to reflect this comment.

2.2 INTERACTIONS WITH MANAGEMENT PLANS

IR6-6: Commitments made in the RCP regarding topsoil salvage have not been included in the waste rock and overburden management plan. As these commitments describe activities that should occur throughout development and operation of the project, they are to be included in the waste rock and overburden management plan.

BMC Response: Details of stripping and stockpiling of topsoil are provided in Section 3.3 of the Waste Rock and Overburden Management Plan, and topsoil stockpile areas are shown in Figure 1-1 of the Waste Rock and Overburden Management Plan. Additional details of topsoil salvage, as listed in Section 7.1.2 of the RCP, will be replicated in the final version of the Waste Rock and Overburden Management Plan.

IR6-7: Commitments made in response to IR1-19 and IR1-20 with respect to collection ditches, slope configuration, and erosion control measures must all be incorporated into the RCP.

BMC Response: As discussed in response to IR1-19 and IR1-20, design parameters and detailed specifications for the proposed Project closure covers will be completed during Detailed Design and will be reviewed and updated as required during Operations.

Details of closure measures, including slope configuration and erosion control features, for the Class A, B and C Storage Facilities, are provided in Table 7-8, Table 7-11 and Table 7-14 of the RCP. The closure cover design for the facilities will include erosion protection, slope breaks/catch benches, collection ditches, etc. and will conform with the *Guidelines for Mine Waste Management Facilities* (Yukon, 2023). Multiple benches will be required on the final slopes to mitigate erosion and stability risk of the cover system, and these benches will be included in Detailed Design. Features will be included to direct surface water away from the facility (sloped collection ditches) and at specified slope length intervals along the closure cover. Collection ditches will be sized to convey peak flows from the closure design storm event and will include appropriate erosion control measures (geotextiles, rip rap, etc.).

The Class A cover will be constructed to a minimum overall slope of 4H:1V, and the Class B and Class C cover will be constructed to a minimum overall slope of 3H:1V. The overall slope will be achieved by progressive placement of the cover materials in controlled lifts, with placement and compaction controls for each material and lift. Appropriate lift thicknesses, placement and compaction requirements, and testing for each material will be specified in the final design and construction QA/QC documents. Ongoing monitoring, performance reviews, and required maintenance and repairs of the closure covers will be completed as detailed in the Operations, Maintenance, and Surveillance (OMS) Manual, which will be prepared prior to construction, in conformance with industry standards such as MAC (2019; 2021), as discussed in the Tailings Management Plan and the Waste Rock and Overburden Management Plan.

3 CLOSURE PLANNING

3.1 EXISTING CONDITIONS

IR6-8: Table 7-2 provides post-mining land use conditions, provide a similar table that describes pre-impact conditions of the site. This table should be added to Section 4 of the RCP.

BMC Response: Section 4.5 of the RCP has been updated to incorporate baseline conditions to aid in future analysis of effectiveness of reclamation activities. The updates include Table 4-1 which shows the baseline ecosystem list with associated areas. Table 4-1 is similar to Table 7-2 and describes the ecosystems located within the area of each proposed facility. The RCP updates also include baseline summary discussions on rare plants, invasive species, wetlands and ecosystems that could be potentially affected by Project activities.

IR6-9: Incorporate pre-impact, baseline, or reference conditions into the RCP to aid in future analysis of effectiveness of reclamation and closure.

BMC Response: Please refer to our response to IR6-8.

3.2 CLIMATE CHANGE CONSIDERATIONS

IR6-10: Provide additional detail on how impacts of climate change were considered in the development of the RCP and the selection of closure measures.

BMC Response: Climate change has been considered in all aspects of Project design, and Project closure measures have been selected and designed such that their performance is not sensitive to climate change. As discussed in the Life of Mine Water Balance Model (LoMWBM) report (KP, 2024), climate change models predict that net annual precipitation at the site will increase by between 6% and 15% by the 2050s, and the magnitude of the 100-year 24-hour storm will increase by between 2% and 17%. The LoMWBM report is available as Exhibit 1.20.1 on Waterline (QZ20-068).

As discussed in Section 7.6 and shown in Figure 5-4 of the RCP, all ponds, collection ditches and diversion channels will be removed during Closure, leaving only the reclaimed Class A, Class B and Class C Storage Facilities and the ABM Lake. The closure design for the storage facilities, including liners, covers, and slopes, are highly robust, and capable of meeting performance objectives even in the case of climate scenarios much more extreme than those predicted to occur as a result of climate change.

The LoMWBM and the Project Water Quality Model (WQM) (Ensero, 2024) both simulated a range of climate scenarios and concluded that climate change will not significantly impact the performance of closure measures. These models will be updated regularly throughout Project Operations, and will incorporate updated climate change information to ensure that closure measures perform as intended. This information and any changes to proposed closure measures will be included in regular updates to the RCP.

IR6-11: Provide additional information on how climate change has been considered in temporary and permanent closure scenarios. This should include, but is not limited to,

- a. The location, sizing, and construction of water management infrastructure
- b. The long-term physical and chemical stability of mine waste management infrastructure

BMC Response: As discussed in response to IR6-10, climate change has been considered in all aspects of Project design, and Project closure measures have been selected and designed such that their performance is not sensitive to climate change.

With regards to the location, sizing and construction of water management infrastructure, all ponds, collection ditches and diversion channels will be removed during Closure, leaving only the reclaimed Class A, Class B and Class C Storage Facilities and the ABM Lake.

Temporary Closure would occur during Project Operations, which are predicted to extend through the mid-2030s. As discussed in the LoMWBM report, climate change is predicted to be relatively minor in the 2030s, and all Project infrastructure have been designed to withstand conditions much more extreme than are predicted to occur as a result of climate change. Monitoring will continue throughout Temporary Closure to confirm that all facilities continue to perform as expected.

With regards to the long-term physical and chemical stability of mine waste management infrastructure, the LoMWBM and WQM both considered a range of climate scenarios and concluded that climate change will not significantly impact the performance of these facilities during temporary or permanent closure. Moreover, the design and construction of the facilities (including covers, drainage, compaction, slopes etc.) ensure that the facilities will maintain minimum specified factors of safety even in the case of climate change that is many times more severe than is predicted. As discussed in Response to IR16-10, these models will be updated regularly through Project Operations, and will incorporate updated climate change information to ensure that closure measures will perform as intended. This information and any changes to proposed closure measures will be included in regular updates to the RCP.

3.3 CLOSURE ALTERNATIVES ASSESSMENT

IR6-12: Provide the alternatives assessment report as an appendix to the RCP.

BMC Response: The tailings management alternatives assessment was conducted to support Project design (including Closure) during the YESAA process. The preferred alternatives have been selected and were reviewed and approved by the Decision Bodies during the YESAA process. The alternatives assessment report is thus not immediately relevant to the RCP, which describes how the selected and approved closure alternatives will be implemented. However, for information purposes, the alternatives assessment report has been included as an appendix to this response report (Appendix A).

IR6-13: Provide a rationale as to why the alternatives were limited to mine waste management infrastructure. If closure alternatives were considered for other aspects of the project, provide the alternatives evaluated and rationale for chosen methods.

BMC Response: Many Project alternatives were considered, as detailed in Section 4.15 of the Project Proposal (BMC, 2017) submitted to the Yukon Environmental and Socio-economic Assessment Board (YESAB), some of which are summarized in Section 2.4 of the RCP. The only Project infrastructure that will remain on site during closure are the Class A, B and C Storage Facilities, and these alternatives assessments have been discussed in the RCP. Given that no other mine facilities or infrastructure will remain on site during closure (other than ABM Lake and the flooded underground mine), no other alternatives assessments are warranted.

IR6-14: The performance criteria “amenability to reclamation” does not explain what was included in this evaluation. Provide additional details on, or a definition of, the criteria and how it was used in the evaluation.

BMC Response: ‘Amenability to reclamation’ is a qualitative measure of the ability to quickly and effectively achieve closure objectives. It was evaluated using the professional judgement of the multi-disciplinary design team, based on the team’s experience designing and implementing reclamation measures for many mine waste storage facilities.

As an example, filtered tailings are generally more amenable to reclamation than slurry tailings because they are more dense, have lower in situ water content and do not retain a water pond. As another example, mine waste stored on a hillside is generally more amenable to closure than mine waste in a valley bottom because there is much less runoff and groundwater discharge that must be managed in and around the hillside storage facility.

IR6-15: Provide information on how the weighting of performance criteria impacted the selection of preferred options.

BMC Response: All performance criteria were weighted equally in selection of preferred options.

IR6-16: Where an alternative was listed as being preferred for “amenability to reclamation” was not chosen as the closure method, provide additional rationale for why an alternative was chosen. (Table 2-4)

BMC Response: Table 2-4 of the RCP presents temporary surface storage of waste rock and re-handling back to the pit for closure as the preferred option in terms of amenability to reclamation. While this option presents an effective closure approach for the waste rock that can be submerged in the pit, there are a number of reasons that it was not selected as the preferred closure approach:

- It would not allow for progressive reclamation, effectively deferring implementation of closure of this infrastructure until the end of mine life and increasing the closure liability of the Project. Deferring progressive reclamation may also negatively impact the quality of water in contact with the Class A Storage Facility during Operations, as oxidation of the Class

A material would increase, along with potential for release of COPIs. This would also increase the Project closure liability;

- Due to bulking, there is not enough storage in the ABM Lake to submerge much of the waste rock and tailings produced by the Project. This means that both in-pit and ex-pit storage of waste would be needed; and
- The high cost of moving waste rock and tailings to ABM lake at closure makes the option unpracticable.

These factors, along with consideration of other performance criteria, resulted in permanent surface deposition of all waste rock being selected as the preferred closure option. This has been clarified in Section 2.4.3 of the RCP.

BMC notes that the selected closure approach was reviewed and approved by the Decision Bodies during the YESAA process. Based on recent discussions with EMR, YG interprets the Act such that there is no flexibility to alter any aspect of the Project post-YESAA. BMC does not agree with this interpretation and believes that legislation allows for alternative approaches, particularly where an alternative approach would improve outcomes. Given the long duration of the YESAA and QML processes, it is not unexpected that YG, First Nation, or proponent views and approaches evolve over time. The legislation allows for this evolution. Given that the Decision Document language is forward-looking and envisions potentially different mitigations and/or processes (specifically Term 10), it is clear that the Decision Bodies believed the Project could evolve.

Future optimization of Project Closure will likely include consideration of submerged in-pit storage of a percentage of the waste rock, as outlined in Section 4.9 of the Project Proposal (BMC, 2017).

IR6-17: If in-pit storage of waste rock is being considered, as referenced in Section 2.4.3, this should be included in the reclamation research section of the plan.

BMC Response: BMC confirms that in-pit storage of waste rock will be considered for permanent storage of a portion of the waste rock produced by the mine. Placement of waste rock within the open pit will only be possible in the last few years of Operations as the excavation of the pit reaches its ultimate extents. Waste rock would be placed in the lower portion of the pit, such that it would be fully submerged as the pit fills with water on completion of mining activity. Permanent storage of waste rock under a water cover will prevent oxidation of minerals, ensuring physical and chemical stability of the waste rock.

In-pit storage of mine waste rock under water is not a novel concept (MEND, 2015), and is used at mine sites around the world as a best practice for reclamation and closure (SESOI, 2023). BMC does not consider it necessary to complete research into this scenario as requested in this IR. However, if BMC does plan to store waste rock within the pit during the Operations or Closure phases of the mine, the WQM will be updated to assess the impacts of this strategy prior to commencement of waste rock placement in the pit. This will allow adjustments to be made to the in situ treatment reagent addition

to ensure treatment of any additional metal load released by the waste rock. This would be further informed by planned water quality sampling of the pit lake during its formation.

IR6-18: The alternatives considered for waste covers do not show how each alternative was rated and screened against the stated criteria. Provide more detail on how each alternative was assessed based on the stated criteria and the rationale for the chosen method.

BMC Response: Additional information on the assessment of each alternative against the criteria has been included in Section 2.4.4 of the RCP.

IR6-19: Provide additional detail and rationale for the criteria chosen for assessing alternatives for waste covers and how these criteria were weighted during the alternatives assessment.

BMC Response: The four criteria for assessing the various alternatives for waste cover systems were constructability, permeability, stability and cost. Constructability of each system was rated by BMC and its engineering consultants based on the Project team's experience in construction with the different materials.

The permeability of each cover system was estimated from material properties sourced from liner manufacturers and lab testwork of field samples. The expected permeability performance of each cover system was then ranked.

Slope stability analyses for the Class A and B storage facilities were carried out for each cover system for post-closure conditions. Factors of safety were determined for each cover system and each cover system was then ranked.

Cost estimates for construction of each cover system for the Class A and B storage facilities were prepared by BMC's engineering consultants. Material costs for the various synthetic liners were sourced from manufacturers, and BMC's engineering consultant estimated installation costs based on their experience in construction of similar facilities. The estimated cost of each cover system was then comparatively ranked.

All performance criteria were weighted equally in selecting the preferred alternative.

3.4 FAILURE MODES AND EFFECTS ANALYSIS

IR6-20: It appears that the likelihood descriptions identified in Table 3-1, are based upon a frequency of events. In the closure scenario, when an event may occur while the site is not being frequently monitored, there is an argument that likelihood should be assessed based upon an event occurring in the design life or closure phase. Appendix E, Section 4.3, of the Guidelines for Mine Waste Management Facilities includes a likelihood scale, and how to interpret probability for the closure phases.

- a. Provide comment on how the likelihood scale in the MWMF guide differs from the approach taken in the 2018 assessment.
- b. Provide comment on how these differences would this impact the risk register created for the

project.

BMC Response: The RCP was submitted prior to publication of the *Guidelines for Mine Waste Management Facilities* (GMWMF) (Yukon, 2023), so the multi-stakeholder Failure Modes and Effects Analysis (FMEA) discussed in Section 7.10 and Appendix A of the RCP used a common methodology that differs from the methodology referred to in the GMWMF. The GMWMF methodology has been developed specifically for the evaluation of risks associated with mine waste management facilities, which typically have very different likelihoods and consequences than risks associated with other mine facilities. The FMEA in the RCP was used to evaluate risks associated with the following Project components: site wide; ABM Open Pit; underground mine; Class A/B/C Storage Facilities; water management structures and systems; mine infrastructure; access road; planned early closure; and temporary closure. An updated risk assessment considering all mine waste management facilities was conducted in 2024 (SRK, 2024), with involvement from MRB, YG Environment and the Yukon Conservation Society (YCS), and the summary report was provided to MRB in June 2024. BMC has committed to updating the Project RCP FMEA prior to Project construction, and this will be provided in an RCP update.

As discussed above, the likelihood scale used in the RCP FMEA is intended for a range of mine facilities, whereas the likelihood scale in Table E-2 of the GMWMF is intended only for mine waste management facilities. Categories in the RCP FMEA and their approximate relation to categories in the GMWMF include:

- Very Rare, corresponding to Not Likely or Low;
- Unlikely, corresponding to Low or Moderate;
- Possible, corresponding to Moderate to High;
- Likely, corresponding to High to Expected; and
- Almost Certain, corresponding to Expected.

It is not possible to adjust the Project risk register simply by adjusting risk likelihoods to conform with GMWMF, as risk consequences also differ between the RCP FMEA and the GMWMF, and completing this process properly requires input from a range of stakeholders on both likelihood and consequence. A high-level review of the Project closure risks evaluated in the RCP FMEA indicates that all risks will likely have Risk Rating I, II or III, as defined in Table E-4 of the GMWMF, meaning that risks with higher likelihood have lower consequence, and vice-versa. This aligns with the conclusions of the 2024 FMEA (SRK, 2024) for mine waste management facilities.

IR6-21: It appears that potential failure modes that were addressed by closure measures or commitments in the RCP were eliminated from the analysis. The analyses should be undertaken prior to the consideration of commitments, mitigations, or controls in place. Where failure modes have been excluded or identified as “no risk” due to mitigations, provide additional information as to how these would be rated without the mitigations in place.

BMC Response: As discussed in Section 4 of Appendix A of the RCP, risks deemed already mitigated by the proposed design and closure activities were left in the Risk Register with the associated design and mitigation measures listed for information, but no risk ratings were assigned to those risks. This is typical under common risk assessment methodologies such as FERC (2021). As discussed above, BMC conducted an FMEA focusing on mine waste management facilities (SRK, 2024) and has committed to updating the Project RCP FMEA prior to Project construction.

IR6-22: Provide clarification on how the additional mitigations measures identified in the FMEA were incorporated into the RCP.

- a. If recommended mitigations were not carried forward provide a rationale for their exclusion.

BMC Response: Six additional design and mitigation measures were identified during the RCP FMEA, as detailed in Section 5 of the FMEA report. These measures are repeated here for context.

- 1) Consider additional pumping of water from water management ponds to fill the pit faster during the Transition Closure phase;
- 2) Adaptively manage the in situ treatment of the ABM open pit through ongoing monitoring of results, with the commitment to conduct a second round of treatment, or additional lime/alkaline material addition if required;
- 3) Lower the invert of the ABM open pit spillway to achieve positive pressure continuously into the pit. This will eliminate the risk of groundwater flowing from the ABM open pit to South Lake post-closure;
- 4) Evaluate the potential for pumping all collection water from the Class A and B storage facilities to the ABM open pit starting in Year 9.5;
- 5) Design the ABM Lake spillway to account for the potential for glaciation; and
- 6) During temporary closure, apply 1 m glacial till cover to the Class A Storage Facility to prevent water ingress and oxygen ingress immediately upon temporary closure.

As Project planning evolved following completion of the FMEA, some of these potential measures were incorporated into the RCP (or will be in future work), while others have been discarded following further review and consideration.

Measure (1) is no longer applicable. As detailed in Section 8.1 of the RCP, the UWMP and LWMP will both be decommissioned during Active Closure and will no longer exist during Transition Closure. In addition to this, while it would increase the rate at which the pit fills, it would reduce the flow to Geona Creek, unnecessarily impacting the downstream environment.

Measure (2) has been included in Section 7.2 of the RCP, detailing that monitoring of ABM Lake water quality that will be carried out through Closure, and that if water quality monitoring indicates that the initial treatment is not sufficiently effective, additional treatment will be conducted.

Measures (3) and (5) relate to the ABM Lake spillway. Spillway design will be developed during

Detailed Design, and will be updated towards the end of Operations as needed to take into account the most current geotechnical features of the mine and the final pit outline. BMC confirms that these measures will be taken into consideration as part of spillway design.

Measure (4) has not been adopted. During Active Closure, water from the Class A and B collection ponds will be routed to the Water Treatment Plant (WTP) for treatment and subsequent discharge to either the Lower Water Management Pond (until it has been decommissioned) or directly to Geona Creek.

Measure (6) has been incorporated into Section 6.3 of the RCP. As noted in response to IR6-23(l), the cover thickness has been modified from that originally noted in the FMEA to placement of a 0.25 m to 0.50 m overburden cover within twelve months of cessation of development and production activities that is compacted to be trafficable by construction equipment. In the short term (within six months of cessation of development and production activities), a heavy duty plastic cover will be installed over the surface to prevent water contacting stored tailings and waste rock.

IR6-23: Provide clarification or rationale for the following potential failure modes identified in Table A-1 of the Failure Modes and Effects Analysis report.

- a. Risk No 2.2: The potential failure modes identified for the AMB Open Pit did not consider chemical stability in the context of pit wall failure. It is important to consider the impacts of exposed pit walls in the event of a failure and the potential impacts to pit water quality in each closure phase.
- b. Risk No 4.1: This failure mode is identified as low risk, and it is noted that the water treatment plant would be in place along with the collection pond. It is unclear why the failure mode was assessed with the treatment plant and collection pond when both facilities are removed during closure.
- c. Risk No 4.6 and 5.5: This failure modes lists no consequences due to design measures. It is unclear if loss of cover material or uncontrolled seepage were considered when looking at 'higher than anticipated weather events'.
- d. Risk No 4.7: This failure mode appears to consider the active and transition periods of closure when a water treatment plant is in place and does not consider the long-term trend in the post-closure period.
- e. Risk No. 7.1 to 7.6: The risk register notes that all ponds and ditches are decommissioned. No failure modes are identified for the risks to facilities in the closure period where water management infrastructure is not in place (e.g. impacts to cover systems)
- f. Risk No 8.3: The mitigations identified are inconsistent with those presented in the RCP. RCP states that concrete pads and foundations would be broken and closed in place.
- g. Risk No 9.1 to 9.6: The risk register notes that the access road will be decommissioned. No failure mode has been identified regarding the post- closure period where the access road is decommissioned, and an on-site failure occurs.
- h. Risk No 10.1: This scenario seems to rely upon mitigation measures that require further research and development (e.g. in-pit treatment, constructed wetlands).
- i. Risk No 10.3: Given that socio-economic impacts of mine closure was identified as concern during assessment, reliance on project economics to eliminate likelihood and risks overly

minimizes the concerns identified.

- j. Risk No 10.4: This failure mode indicates that BMC is responsible for the site and mitigates the risk of having an insufficient bond to cover closure costs. It is important to recognize the risks of a scenario where BMC is unable to implement the closure plan.
- k. Risk No 10.5: The financial impacts to other parties in the event of an early closure are important to recognize, especially in the context of socio-economic impacts. The risk register seems to overly minimize these considerations.
- l. Risk No 11.1: The mitigation identified is inconsistent with what is presented in the RCP. RCP states that placement of a 0.25m to 0.50m isolation cover would be an appropriate practice but it is not clear that there is a commitment to do this.

BMC Response:

- a) This comment is correct, potential ABM Open Pit failure modes did not consider chemical stability related to a pit wall failure. This potential failure mode will be considered in the planned FMEA update.

The classification of this risk is expected to be Low to Very Low for the following reasons: 1) the probability of a large-scale pit wall failure occurring above the ABM Lake level is low due to characteristics of the rock and local hydrologic conditions; 2) final pit walls above the ABM Lake level comprise approximately 0.5% Class A material, 18% Class B material and 81% Class C material, meaning that there's a low probability of a failure exposing fresh, highly-PAG material; and 3) if there were a large-scale failure that exposed fresh, highly-PAG material, acid generation and metal leaching would develop over a period of years, and runoff in contact with this material would comprise less than 1% of total flow through ABM Lake, meaning that metals concentrations flowing out of ABM Lake would be highly dilute.

- b) This failure mode considers a failure of the Class A Storage Facility during the Transition Closure phase. The Class A collection pond is scheduled to be decommissioned at some time during this phase. As noted in Section 7.6.2.2 of the RCP, once it has been determined that the closure cover on the Class A Facility is meeting its design objectives and the draindown of the Class A material is determined to have ceased such that active pumping is no longer required, the collection pond will be removed.

As detailed in Sections 7.6.2.4 and 7.7.2.5, the WTP will remain on site through to the end of the Transition Closure phase, as required by Decision Document Term 9. Once the Class A collection pond has been removed, any water from the region of the Class A Facility will be passively released to Geona Creek and not passed through the WTP. However, the plant will remain on site in an operational ready state in the event that there is a change in water quality and WQOs are not being met.

On this basis, BMC respectfully submits that the classification of risk during the Transition Closure phase is appropriate.

- c) BMC confirms that risk No 4.6 and 5.5 both consider loss of cover material or uncontrolled seepage in relation to higher than predicted weather events, as noted in the Design and Mitigation measures in Table A-1 of the FMEA. With respect to loss of cover material, in the event that an extreme rainfall event impacted some of the surficial topsoil and overburden in the upper portion of the composite cover system, BMC does not consider that there is any risk to the chemical stability of either facility. Underlying the topsoil and overburden layer is a Class C rock frost protection layer that is a minimum of three metres thick, which will prevent any further loss of the cover liner system, and will maintain the integrity of the closure cover and therefore maintain the chemical stability of the facility.

Similarly, each facility has been designed in accordance with the Yukon *Guidelines for Mine Waste Management Facilities* (YG, 2023), which establish the criteria for safe management of extreme rainfall events. As noted in the Design and Mitigation measures, the facilities have been designed to allow for such extreme events.

- d) BMC confirms that risk 4.7 considers Post-Closure, as well as Active and Transition Closure. The Water Treatment Plan is documented as a mitigation measure during the Transition Closure phase. One of the milestones that will be completed during the Transition Closure phase is that the water quality objectives are being consistently met. The site will not progress into Post-Closure if this milestone is not achieved.
- e) Risk 7.1 to 7.5 are focused on water management structures and systems, and as noted for Post-Closure, all water ponds, channels and diversion ditches will be removed as part of closure activities. There are thus no risks to note due to a failure of water management structures and systems during Closure. The question appears to be questioning damage to site infrastructure from water flows. These scenarios are considered within the risk area for each item of infrastructure.
- f) The inconsistency is noted and BMC confirms that concrete slabs will be broken and buried in place as described in the text of the RCP. This will be reflected in an updated FMEA report.
- g) Following closure and reclamation of the Access Road, access to the site for Post-Closure monitoring will be facilitated with helicopters (or possibly snowmobiles during winter). Should failure of a closure landform occur after the Access Road is reclaimed, initial access will occur using helicopters and/or snowmobiles. In the event that heavy equipment access is required, discussions will commence with Yukon Government regarding re-establishment of the Access Road (including temporary crossing of the Finlayson River at km 17).
- h) BMC disagrees with the statement that the mitigation measures identified for risk 10.1 require further research and development. Pit water treatment is one of multiple mitigation measures, however as noted in Section 2.5.3 of the RCP, the majority of the required research on pit lake treatments has been completed, demonstrating that the pit lake treatments are capable of lowering concentrations of constituents of potential interest (COPIs) in ABM Lake. This includes bench-scale testing using Project materials and synthetic pit lake water, and

examples of full-scale application of pit lake in situ treatment elsewhere in North America, as discussed in Appendix C of the RCP.

The many other mitigation measures identified for risk 10.1 (e.g. use of the existing WTP) do not require further research and development. The constructed wetland has not been proposed as a mitigation measure for this risk, and as detailed in Section 2.5.4 of the RCP, the wetlands are a contingency measure and the Project does not rely on wetlands to meet WQO.

- i) Condition 16 of the Decision Document addresses the socio-economic risks arising from an unplanned early closure of the mine, and BMC fully supports the establishment of the proposed transition fund.
- j) Security levels are set by EMR and the Yukon Water Board on the planned Project development and surface disturbance on a two year forward-looking basis. As detailed in the RCP, BMC intends to complete progressive reclamation of the waste storage facilities during Project Operations. This will reduce the ongoing closure liability and risk of insufficient funds to complete closure activities.

The continual two-year review process allows regulatory bodies to review BMC's performance in terms of progressive reclamation and if reclamation work is not undertaken as proposed, it allows for security requirements to be adjusted accordingly, reducing the risk that insufficient funds will be available to fund reclamation activities.

In addition, Terms 19 and 20 of the Decision Document detail considerations that need to be taken by regulatory bodies in setting security requirements.

- k) BMC acknowledges that this risk is applicable to all business ventures, and that the Bankruptcy and Insolvency Act is in place to address the risk that business debts are unable to be paid. BMC does not believe that any additional mitigation measures are required to address this risk.
- l) BMC acknowledges the inconsistency between the text in Section 6.3 of the RCP and Risk 11.1 in the FMEA, and this will be revised in the updated FMEA. BMC confirms that the management approach that will be adopted in the event of temporary closure will be placement of a cover over the Class A and B storage facilities. In the short term (within six months of cessation of development and production activities), a heavy duty plastic cover will be installed over the surface to prevent water contacting stored tailings and waste rock. In the longer term (within twelve months of cessation of development and production activities), an overburden cover will be placed over the exposed surface. The cover will be 0.25 m to 0.50 m thick and compacted enough to be trafficable by construction equipment. This has been clarified in Section 6.3 of the RCP.

3.5 RECLAMATION RESEARCH

IR6-24: Aspects of the closure plan that require further research or development to demonstrate effectiveness require timelines for the implementation of the relevant research/development and, where applicable, expected completion. Timelines should include expectations of when results would become available and how these results will be incorporated into future iterations of the plan.

BMC Response: Details of research timelines have been added to Section 2.5 of the RCP, and are discussed in response to IR6-36.

IR6-25: The program and considerations for waste management areas is limited to the application of the cover systems and does not seem to consider deviations from expected liner performance as is required in Decision Document term 7. Include additional detail on how the ongoing investigations, as required in Decision Document term 7, will be considered in the reclamation research program.

BMC Response: Decision Document Term 7 states that *"The Proponent shall conduct ongoing investigations into waste rock storage area (WRSA) liners and cover systems to ensure that the expected liner and cover performance is achieved during all Project phases."* BMC believes that the plan for research into waste cover systems discussed in Section 2.5.1 of the RCP fully complies with Decision Document Term 7.

IR6-26: Section 7.1.2, and Table 7-2, describe how waste management facilities will be revegetated to promote conditions similar to baseline conditions, with varying vegetation across facilities. Provide a description of how the research program will be tailored to understand the how the proposed cover systems will support the vegetation species proposed and identify additional closure measures to achieve objectives.

BMC Response: Section 7.1.2 of the RCP has been updated with additional details of how the proposed research program will be tailored to provide information on how the proposed cover systems will support the growth of proposed vegetation species and how this information will be used to identify if any additional closure measures will be required to achieve Project reclamation goals. As discussed in Section 2.5.2 of the RCP, trial plots will be constructed to evaluate the physical properties of the different storage facilities and each trial site will examine a combination of different revegetation treatments to determine the most efficient and effective closure option. Part of the revegetation treatments will be to assess the best way to support growth of vegetation species that are naturally adapted to the area.

IR6-27: Section 2.5.1 describes the revegetation research program and identifies that 'an area of unaffected surface disturbance' will be selected as a control and indicates that soil and tissue samples from trial and control sites will be 'periodically collected'.

- a. Provide additional information on the selection of control sites including existing or potential locations, timeframes for establishment, rationale for site selection, and methodology for ensuring control site remains unimpacted.
- b. Provide additional information on the monitoring program including frequency of sampling.

BMC Response: As discussed in Section 2.5.2 of the RCP, two revegetation research plots were established in 2018 and were planned to be monitored annually throughout the life of the Project. Appendix B of the RCP describes the criteria that was used for the selection of the trial sites (see Section 2.1). Due to the global pandemic and forest fires near the Project, access to the trial sites was not possible between 2019 and 2022. BMC is currently in discussions with Yukon University and the University of Saskatoon regarding re-initiating the reclamation research program. Additional plots will be constructed during Operations to collect site-specific data once there's sufficient material available to evaluate each of the waste storage facilities to be reclaimed.

IR6-28: In-situ treatment of the ABM pit lake is identified as a manner of source control for the project. Did BMC consider other methods of control such as isolation or removal of the source?

BMC Response: A range of closure measures for the ABM pit were considered during early stages of Project design, with source control being identified as the only practical approach. Pit submergence combined with in situ treatment was selected as the preferred approach due to its proven effectiveness and flexibility. It is important that the pit be filled with water upon closure, as the chemical reactions needed to release significant concentrations of COPs require oxygen, so occur at vastly slower rates under water than they do in air.

The potential source of COPs from the pit results from the combination of water, oxygen and chemically active geological materials. Other methods of source control are not considered practical. For example, source isolation would require either permanently covering the entire exposed surface of the pit prior to the pit filling with water. Source removal would mean either mining out all chemically active geological materials from the pit, or collecting and disposing of approximately 5 million m³ of water from the pit every year, in perpetuity.

IR6-29: Section 2.5.3 and Appendix C of the RCP describe the studies that have been completed in relation to in-pit water treatment. Details are not provided for ongoing research and pilot studies to confirm the expected performance, optimize designs, and ensure timely implementation as is required in Decision Document term 3. Provide additional detail with respect to program design and timing for the ongoing research of in-pit treatment.

BMC Response: The proposed in situ pit lake water treatment process is well known and has been successfully used to treat mine impacted water in pit lakes, underground mine workings and shallow groundwater in North America, including Yukon (Gault et al., 2018).

BMC intends to conduct additional monitoring and studies as required by Decision Document Term 3, to confirm expected performance for all relevant COPs, optimize design and ensure timely implementation. Results of these studies will be summarized and submitted as part of routine updates (i.e. every 2 years) to the RCP. It is expected that these studies will include, but not be limited to:

- Studies prior to and during Project Operation to collect supporting information for in situ water treatment including hydrodynamic pit lake modelling which incorporates water

balance updates informed by site data (e.g., precipitation, climate change, ABM pit shell, groundwater, local runoff);

- Water quality monitoring as ABM Lake begins to form;
- On-site ABM Lake in situ water treatment pilot-scale studies; and
- Prototype demonstrations of the pit treatment. This includes the system operating at near full-scale under relevant site-specific environmental conditions prior to removal of the WTP.

Additional details have been added to Section 2.5.3 of the RCP.

IR6-30: Decision Document term and condition 31 requires that types of treatment alternatives and their implementation timelines be provided an Adaptive Management Plan. This is required to include a modelling and monitoring approach including trigger values for when alternatives must be implemented and, if monitoring shows exceedances and alternative treatment is implemented, how discharges will be addressed until new water treatment becomes operational. Provide details on how the AMP will inform the reclamation research program and future revisions of the RCP.

BMC Response: As noted in this IR, Decision Document Term 31 requires that a comprehensive adaptive management initiative (AMI) be provided for ABM Lake water treatment in regulatory applications. This AMI has been added to Section 7.2 of the RCP to separate it from the AMIs intended for Construction and Operations that are presented in the AMP.

IR6-31: Section 2.5.4 and Appendix D of the RCP describe the studies that have been completed in relation to Constructed Wetland Treatment System (CWTS). Decision Document term 3 requires that pilot studies occur during operations to confirm the expected performance, optimize designs, and ensure timely implementation. The RCP refers to the Phase 2 and 3 test work 'completed to date' while Appendix D indicates that Phases 2 and 3 are complete and the next phase is on-site demonstration scale design and monitoring.

- a. Provide clarification on the current status of the CWTS research and design program.
- b. Provide clarification if Phases 2 or 3 will be repeated with updated site characterization information for water quality and balance models, climate change predictions, or water quality objectives established in regulatory instruments.
- c. Provide additional information on the next steps, including timing, of the program.

BMC Response: The Project WQM predicts that water quality in the receiving environment in Post-Closure will meet all Water Quality Objectives (WQOs) without further treatment, and in situ treatment in the ABM Lake will be implemented to ensure that this is realized. The CWTS is thus intended as a redundant measure only, and will continue to be tested and optimized as it may function to further improve water quality, though is not needed or intended as a primary treatment mechanism.

As discussed in Section 2.5.4 of the RCP, BMC has initiated a comprehensive program to design, test, optimize, implement and maintain constructed wetlands in a site-specific manner for Post-Closure.

CWTS design and implementation is following a phased approach to achieve predictable and robust performance, including:

- Phase 1a: Information gathering and site assessment. Completed in 2016 (Contango, 2016);
- Phase 1b: Conceptual design and sizing. Completed in 2017 (Contango, 2017a);
- Phase 2: Off-site bench-scale testing and optimization. Initiated in 2018 and completed in 2020 (Appendix D of RCP);
- Phase 3: Off-site pilot-scale testing and optimization. Initiated in 2018 and completed in 2020 (Appendix D of RCP);
- Phase 4: On-site demonstration-scale design and monitoring; and
- Phase 5: Full-scale implementation as appropriate.

The objective of Phase 2 and Phase 3 was to refine the sizing of the full scale CWTS and the expected CWTS outflow water quality. Repeating Phase 2 and Phase 3 is not warranted, given the minor Project updates made in response to site characterization and modelling advancements made since Phase 2 and Phase 3 were conducted.

The next step will be to implement Phase 4, the on-site demonstration-scale CWTS to further refine the design and sizing of the full-scale CWTS. This will be used to test the CWTS's ability to treat COPIs under site-specific conditions using mine-impacted water. To commence this phase, the Project must be advanced to the Operations phase where mine impacted water will be available to test. This will form part of the reclamation research program for the RCP.

4 SOCIO-ECONOMIC

IR6-32: Outline the socio-economic implications of, and management tools for, closure scenarios. This should include temporary closure and permanent closure and address the relevant Decision Document terms and conditions.

BMC Response: This request is addressed in the Socio-economic Management Plan.

IR6-33: Provide the socio-economic criteria that will be used define the effectiveness and success of closure.

BMC Response: Chapter 5 of the Socio-economic Management Plan describes the monitoring that will be conducted and reported on over the life of the Project. The metrics that will be monitored will provide a database on the socio-economic benefits that were gained through the Project life (including training, transferable skills, etc.), and that can be utilized to help staff and contractors transition to new employment when the Project closes. Additional details of BMC's commitments to help transition staff to new employment are also described in the Socio-economic Management Plan.

IR6-34: Provide a timeline and planned actions to further conversations on final closure access road closure in relation to traditional land use purposes by First Nations.

BMC Response: BMC and Ross River Dena Council (in its role as lead community for the Kaska Nations, the including Liard First Nation) are parties to an existing Socio-Economic Participation Agreement (SEPA) for the Project. In 2019, BMC and RRDC signed a Letter of Intent committing both parties to a modernization process for the existing SEPA. In March 2021, BMC proposed a modernized SEPA to all Kaska leadership. The proposed SEPA includes provision for establishment of a Kaska/BMC Environmental Management Advisory Committee (EMAC). Once formed, the EMAC will determine the timelines and planned actions to further discussions with respect to the final closure of the Access Road. Until such a time that the Tote Road lease conditions are modified, BMC is obliged to plan to close the road in accordance with the lease conditions.

5 CLOSURE MEASURES

5.1 GENERAL

IR6-35: Provide a copy of, or additional information regarding, the preliminary investigation that was completed for borrow material availability and material requirements for closure purposes.

BMC Response: This question is similar to that of IR84 in YG's Type A Water Licence Application Intervention. The response to YG Intervention IR84 is repeated here for reference.

Information from drillholes, test pits and geological maps and sections indicates that topsoil is generally between 0.2 m and 0.3 m thick. Assuming 0.2 m of topsoil is stripped from the full area to be cleared of 5.5 Mm² yields topsoil volume of 1.1 Mm³. The full area of all facilities to be covered with growth medium is 4.4 Mm², which yields a required topsoil volume of 0.66 Mm³ assuming 0.15 m of topsoil incorporated into the growth medium, or 0.88 Mm³ assuming 0.2 m of topsoil incorporated into the growth medium. It is correct that topsoil will be more limited than overburden, but it is expected that there will be more than enough topsoil available as the large surface area of the open pit will be stripped, but not covered.

In addition, the volume of material required for reclamation of the Project site has been estimated from the surface area of the engineered design of each facility and the planned thickness of cover of each material, and is detailed in the closure cost estimate (Appendix E to the RCP). There is expected to be significantly more overburden and waste rock borrow available than is required for closure purposes.

IR6-36: Progressive placement of covers on Class A and Class B facilities is referenced throughout the RCP. Provide additional information on the sequencing of progressive reclamation, and how the progressive reclamation fits within the timing and implementation reclamation research programs.

BMC Response: Progressive reclamation of the waste rock storage facilities will be undertaken throughout Project Operations. As noted in Section 2.5.1 of the RCP, a number of activities are planned to be completed during Operations to finalize the cover design and predict performance. The following outlines the expected progression of reclamation of the Class A and B Storage Facilities, together with research activities planned to support cover design, however the timing and sequencing of activities will vary as the mine is developed and understanding of site conditions evolves.

Reclamation research will commence during Project Construction and will continue throughout Operations, targeting various aspects of the proposed research activities. The proposed timing of reclamation research activities is shown in Table 5-1.

Table 5-1: Progressive Reclamation Research Timeline

Research Activity				Operations							
	Y-3	Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Yr7	Yr8
Cover material characterization											
Update geochemical modelling											
Geotechnical material characterization of glacial till material											
Frost penetration depth assessment											
Predictive modelling of cover performance											
Evaluation of performance monitoring options											
Rooting depth assessment											

Progressive reclamation activities will be focussed on the Class A Storage Facility in preference to that of the Class B Storage Facility. Given that Class A material is more reactive than that of Class B, it makes sense to prioritize active management of this facility. Progressive reclamation of the Class B Facility will still be undertaken, but it will likely be at a slower rate than that of the Class A Facility.

During the first one to two years of Operations, reclamation activities for the Class A Facility will focus on placement of growth media on the Class A buttress and commencement of revegetation of this area. Placement of tailings and Class A waste rock within the Class A Facility will occur through this time. The working elevation of the stored Class A rock and tailings will have advanced sufficiently after two years of operations to allow the commencement of placement of the closure cover, which will be progressively expanded in subsequent years. It is expected that there will be multiple working fronts for construction of the closure cover (compacted glacial till underlying the HDPE geomembrane, HDPE geomembrane installation, protective cover layer, Class C frost protection layer and growth media) to efficiently and safely manage the various closure cover construction activities.

IR6-37: Several sections of the RCP refer to wetlands and the restoration of riparian vegetation. Provide additional information on the closure objectives and measures for restoration of wetlands and riparian areas.

BMC Response: The generic closure objectives for Ecological Conditions and Sustainability (which includes wetlands and riparian vegetation) are presented in Table 3-1 of the RCP and are directly from YG's Mine Closure Guidelines (YG, 2013). For ease of review they are:

"Reclamation and closure activities protect the aquatic, terrestrial and atmospheric environments from Mine-related degradation and restore environments that have been degraded by Mine-related activities. The Mine supports a self-sustaining biological community that achieves land use objectives."

More specific closure objectives and measures for Ecological Conditions and Sustainability (including wetlands and riparian vegetation) are presented in Table 7-1 of the RCP. For ease of review these are repeated in Table 5-2

Detailed measures that will be employed to restore wetlands and riparian areas are presented in Section 7.1.2 of the RCP.

Table 5-2: Closure Objectives and Measures for Ecological Conditions and Sustainability

Value	Reclamation and Closure Objectives	Measures
Ecological Conditions and Sustainability	Reclamation and closure activities protect the aquatic, terrestrial and atmospheric environments from Mine-related degradation and restore environments that have been degraded by Mine-related activities. The Mine site supports a self-sustaining biological community that achieves land use objectives.	Revegetation strategies are informed by a comprehensive terrestrial ecosystem mapping inventory of pre-existing conditions. Revegetation prescriptions for disturbed areas will balance the objectives of restoring like ecosystems with erosion stabilization and stability monitoring objectives. Revegetation prescriptions will also consider traditional foods and medicines and input from Kaska.

5.2 TEMPORARY CLOSURE

IR6-38: A temporary isolation cover is identified as ‘the most appropriate practice’ to minimize risks from Class A and B material in a temporary closure scenario. Additional information is required to understand the proposed actions in a temporary closure scenario.

- Provide clarification whether this is a commitment BMC is making in any temporary closure scenario.
- Provide additional information on when this would occur in a temporary scenario (i.e. immediately upon closure, within a specified timeframe etc.)
- If there are specific thresholds that must be met to warrant the placement of an isolation cover, provide details of these thresholds and how they were developed.

BMC Response: Temporary Closure is defined in the RCP as “closure of the undertaking as evidenced by the cessation of development and production authorized by the QML and Type A Water Licence for a period longer than six (6) consecutive months and is not expected to last longer than five years and can include both planned and unplanned closure”. Placement of the temporary isolation cover on the Class A Storage Facility will be completed within six months of the cessation of development and production activities.

Given the much slower onset of oxidation and metal leaching from the Class B Storage Facility, the expected duration of the Temporary Closure period will be considered when planning for placement of a temporary ‘isolation’ cover on the Class B Facility. For expected durations of 24 months or less, no action will be taken, unless monitoring identifies conditions that warrant placement of the cover, as per the Project AMP. If Temporary Closure extends beyond 24 months, or is expected to last longer than 24 months, the temporary ‘isolation’ cover will be placed within 6 months.

Additional text reflecting this approach and timeline has been added to Section 6.3 of the RCP.

IR6-39: Provide a timeframe for the removal of explosives and other hazardous materials in the event of a temporary closure. Include the decision-making thresholds that will be used to determine if materials will be secured and stored in place or removed from site.

BMC Response: As noted in the RCP, advice will be sought from the explosives supplier as to the most appropriate measures to take in response to a Temporary Closure scenario. The expected duration of the Temporary Closure period would also be taken into account in planning for removal of explosives and other hazardous materials from site.

If the expected duration of the cessation of development and production activities is expected to be greater than six months, BMC expects that bulk explosives stored on site would be removed from site within three months of cessation of development and production activities. Packaged explosive products and detonators will have a shelf life identified on their packaging and this will be referred to in planning for removal of these products. BMC will arrange with the explosives supplier for removal of packaged explosive products and detonators that will pass their shelf life during the expected period of Temporary Closure.

Similar to that of explosives management, management of other hazardous materials stored on site in a Temporary Closure scenario would take into account the expected duration of the Temporary Closure period, together with advice from suppliers as to shelf life and safe storage of the hazardous materials. It is not possible to provide a definitive timeframe for removal / reducing stock levels on site of hazardous materials, however BMC commits to completing an inventory of stock levels of hazardous materials held on site within one week of the commencement of Temporary Closure, followed by preparation of a plan for the management of hazardous material stocks within one month of the commencement of Temporary Closure, taking into account the specifics of the expected duration of the Temporary Closure period, existing stock levels and advice from suppliers.

IR6-40: The temporary closure plan indicates that the run of mine pad and low grade ore stockpiles will be left in place in the event of a temporary closure scenario and the permanent closure measures note that these materials do not 'necessarily require relocation'. Provide additional information on the sampling protocols in place for material present on pads and whether the management and monitoring measures are sufficient for extended temporary closure periods.

BMC Response: Surface water affected by ore on the run of mine pad and low grade ore stockpiles will be collected in the ROM Pad sump, which will be pumped to the WTP for treatment. In the event of commencement of Temporary Closure, the collection and treatment of affected water will continue. The water quality of water collected in the ROM Pad sump will be monitored on a weekly basis through the Temporary Closure period. Water will be analysed for the following: Physical parameters, conductivity, TSS, TDS, hardness, alkalinity, sulphate, ICP-total metals, ICP-dissolved metals, nutrients (Ammonia-N, Nitrate-N, Nitrite-N) and dissolved organic carbon.

The monitoring regime will allow trends in water quality to be assessed. Section 3.6 of the Adaptive Management Plan details how the quantity and quality of water reporting to the WTP will be assessed. Should a trigger be activated the staged management responses identified in the Adaptive Management Plan will be enacted, which includes reviewing the sources of water to the WTP. Should

the water quality from the ROM Pad sump be identified as a contributing factor to breaching the trigger, adaptive management mitigation options will be enacted, in accordance with the Adaptive Management Plan. This monitoring and management approach is appropriate for potentially extended periods of Temporary Closure.

IR6-41: Describe the adaptive management measures that are available in an extended temporary closure scenario where ore stockpiles may require relocation.

BMC Response: As noted in the response to IR6-40, water affected by material on the ROM Pad and low grade ore stockpile will be pumped to the WTP for management. Should the quality of the water entering the WTP trigger a response under the Adaptive Management Plan and it was determined that exceeding the trigger threshold is related to the ROM Pad or low grade ore stockpiles, appropriate mitigation will be enacted under the Adaptive Management Plan. These measures may include:

- Placement of a liner over the stockpiles, similar to that proposed for the Class A and B Storage Facilities. In the short term (within six months of cessation of development and production activities), a heavy duty plastic cover may be installed over the surface to prevent water contacting stockpiled ore. In the longer term (within twelve months of cessation of development and production activities), the cover may be replaced with a 0.25 m to 0.50 m overburden cover that is compacted enough to be trafficable by construction equipment; or
- Identification of the portions of the stockpiled ore and low grade ore that are impacting the water quality reporting to the WTP, and relocation of this material into the open pit.

5.3 ROADS AND TRAILS

IR6-42: Reclamation and closure measures for roads and trails are not specified in the RCP. Provide information on the removal and reclamation of roads and trails. This should include the sequence of removal to illustrate which roads will be required for the closure of the site itself and the timing for removal of roads based upon closure phases.

BMC Response: Reclamation and closure measures for roads and trails have been added to Section 7.9 of the RCP. Reclamation of roads is planned to occur during the following closure phases:

Active Closure: The perimeter roads for the Upper and Lower Water Management Ponds will be reclaimed, however road access to the pond locations will be maintained into Transition Closure to allow monitoring of the effectiveness of reclamation measures. The Explosives Facility road will also be reclaimed during this phase.

While all other major infrastructure (excluding the WTP) will be removed and reclaimed during Active Closure it is anticipated that the site road network (other than that noted in the previous paragraph) will be maintained through Active Closure and into Transition Closure to allow access for monitoring the effectiveness of reclamation measures.

Transition Closure: As the performance of the reclamation measures for each infrastructure area is demonstrated to meet closure performance criteria and monitoring requirements for each area reduce accordingly, road access will no longer be critical and Site Roads will be reclaimed accordingly. The Process Plant Road will remain open while the WTP remains on site and available for treatment of water on an as-required basis. For the purposes of closure planning, it is assumed that the WTP will be decommissioned and the area reclaimed in the latter few years of Transition Closure, and at this time the Process Plant Road will also be reclaimed.

Post Closure – The Access Road will remain open for the first two years of Post Closure Phase to facilitate ease of access to Site for monitoring requirements, and then will be closed and reclaimed. Access to site following reclamation of the Access Road will be achieved helicopter or snowmobile as the seasons permit.

IR6-43: If long-term monitoring and maintenance of the site requires roads or trails to remain on site, identify the infrastructure on a map and provide information on how access will be managed.

BMC Response: See response to IR6-42.

5.4 INFRASTRUCTURE

IR6-44: Table 7-20 is missing Chemical Stability as a value; this is an important value in the context of contaminated soils and foundations in the industrial area and areas where mobile equipment and fuel are stored. Include chemical stability as a value in this table.

BMC Response: Chemical Stability has been added as a value to Table 7-20.

IR6-45: Section 7.7.2.1 includes burial of waste in the Class A facility, this is not included in the Waste Management Plan or Tailings Management Plans provided with the application. Provide clarification of this statement.

- a. If waste material will be placed in the Class A facility provide additional detail on how this will occur with the progressive placement of covers, potential impacts to physical stability, and what types of waste would be disposed of.

BMC Response: As stated in Section 7.7.2.1 of the RCP, the camp and related infrastructure will be salvaged, recycled or disposed of, with the preferred disposal location being the Waste Management Facility. If disposal in the Waste Management Facility is not possible, some material may be disposed of in the Class A Storage Facility, if this is practical and will not adversely impact the reclamation objectives of the facility. This would only occur if there were an area of the Class A Storage Facility that had not yet been reclaimed and would allow for burial of the material without impacting the long-term chemical or physical stability of the facility. For example, a small area on the top of the facility would likely be appropriate, if not yet reclaimed.

If material could not be salvaged or recycled, and disposal could not occur in either the Waste Management Facility or the Class A Storage Facility, it would be disposed of off-site in an appropriate landfill.

IR6-46: Section 7.7.2.2 describes the closure of concrete footings, foundations, and slabs indicating that these will be broken and closed in place. The FMEA in Appendix A indicates that the material will be excavated and disposed in the pit with contaminated material being trucked off-site. Provide clarification of the intended closure measures.

BMC Response: As noted in the response to IR6-23(f), the planned method for management of concrete footings, foundations and slabs is that they will be broken and buried in place. This will be reflected in an updated version of the FMEA in Appendix A of the RCP.

IR6-47: If concrete footings, foundations, and slabs will be closed in place, provide additional information on the confirmatory sampling that will occur prior to closure to ensure migration of contaminants beneath the infrastructure has not occurred.

BMC Response: BMC confirms that confirmatory sampling of the soils underlying concrete footings, foundations and slabs will be completed prior to burying the concrete in place. This may take place in advance of breakage of concrete, or during the breakage process. Details of sampling locations and analyses will be confirmed during detailed Closure Planning prior to the commencement of Active Closure. Sections 7.7.2.2 and 7.7.2.9 of the RCP have been revised to reflect this commitment.

IR6-48: Disposal methods for tires are not included in the RCP. Provide clarification on how and where tires will be disposed of.

BMC Response: Disposal of tires is discussed in Section 3 of the Waste Management Plan. Tires with a rim size of 24.5 inches diameter or less will be transported off site to a depot that accepts tires in accordance with the Yukon Used Tire Management Program. YG does not currently have a facility to dispose of tires with a rim size of greater than 24.5 inches. These larger tires may be used as protection barriers on site, will be disposed of via encapsulation in the Class B Storage Facility, or will be sent off site for disposal if this becomes practical in the future.

IR6-49: Provide clarification of how and where ammonia or nitrate contaminated soils from explosive facilities would be disposed of if emulsion facilities are used on site.

BMC Response: BMC highlights that all bulk explosives will be stored in purpose-built storage vessels located within a concrete impoundment designed to safely contain explosives products in the event of spillage. Thus, the potential for soil contamination with ammonia or nitrates is considered extremely unlikely.

In the unlikely case that soils contaminated with ammonia or nitrate are found during closure, BMC proposes to excavate the impacted soil and place it within the Class A Storage Facility. The impacted soil would be fully enclosed within the Class A Storage Facility liner and cover system.

5.5 MINE WASTE MANAGEMENT FACILITIES

IR6-50: The RCP notes that material remaining on the run of mine pad and in low grade ore stockpiles do not 'necessarily require relocation' and would be encapsulated within the Class B facility at closure. It is not clear if there are thresholds, whether based on volumes present at closure or the grade and geochemistry of material, that would indicate if relocation to other facilities such as the Class A facility or the open pit would be warranted.

BMC Response: As noted in Section 7.5.1 of the RCP, relocation of material from the ROM pad or low grade ore stockpiles at closure would not be required as it would be encapsulated within the cover and liner system of the Class B Storage Facility. The Class B cover and liner system is identical to that of the Class A Facility, isolating the enclosed material from water and oxygen and minimizing minerals oxidation. Sections 7.5.1 has been updated to clarify that the run of mine pad and low grade ore stockpiles "do not require relocation".

IR6-51: The waste rock and overburden management plan indicated that the Class C material may be used as capping material for reclamation of the Class A and Class B Storage Facilities, while the RCP notes that a cover layer will be installed on the Class C facility "once the appropriate volume of waste has been stored in the facility as per the Mine Development and Operations Plan." Provide clarification on when the cover would be placed on the Class C facility and the thresholds or triggers established that would indicate that a cover be placed rather than keeping it open for future cover materials.

BMC Response: BMC notes that Class C material will be placed as a frost protection layer as part of the composite cover system at both the Class A and Class B Storage Facilities. This IR states that Class A material may be used, which is incorrect. This is discussed in Sections 1.1.3, 1.3 and 3.9.3 of the Waste Rock and Overburden Management Plan. The use of Class C material for progressive reclamation of the Class A and Class B Storage facilities will start during Operations, limiting the Project's outstanding closure liability.

Upon commencement of Active Closure, any portion of the Class A and B Facilities that has not been reclaimed will have the composite cover system installed, including placement of the Class C frost protection layer. Until the placement of the frost protection layer has been completed for both the Class A and B Facilities, construction of the Class C cover cannot be completed.

To clarify, construction of the Class C Storage Facility cover will commence in tandem with construction of the Class A and Class B Facility covers, but will not be completed until those covers are completed. As detailed in the RCP, construction of covers on all three storage facilities will be completed during Active Closure.

IR6-52: Provide additional information about the placement of the progressive reclamation cover proposed in section 2.4.4 of the RCP including:

- a. The construction of slope features (benches, drainage breaks, key trenches for liner, etc.)
- b. How the liner will remain accessible for the welding to next stage of cover system.

- c. How remedial measures of the facility itself would be addressed if cover and growth media were already in place.

BMC Response: As discussed in response to IR1-18 to IR1-20, details of progressive reclamation of the Class A and Class B Storage Facilities have been provided in the Tailings Management Plan and the Waste Rock and Overburden Management Plan respectively, and general details of progressive reclamation are provided in the RCP. Detailed Design of the progressive reclamation of these facilities will be developed prior to Construction and will be revised as appropriate during Operations. This Detailed Design will consider the specific features mentioned in this IR, likely following standard practices for waste cover design widely used for covering mine and other waste storage facilities upon closure.

BMC expects that progressive reclamation of these facilities may present some challenges, and some trial and error is to be expected while optimal construction and vegetation techniques are determined, as is the case at most mines undertaking progressive reclamation. BMC management has applied the principles of progressive reclamation at multiple mine sites and is confident that the objectives of progressive reclamation can be met at the Project. Progressive reclamation is common for waste rock storage facilities and for dry stack tailings storage facilities and this is one of the reasons that dry stack tailings are considered a best practice (Oberle et al., 2020; MEND, 2012).

5.6 WATER MANAGEMENT

IR6-53: Water management infrastructure sizing, capacity and reasoning for selection should be clearly outlined for each structure that is required to be constructed and/or relied upon during the closure period.

BMC Response: The water infrastructure that remains in place during Active and Transition Closure will be constructed during Project Construction or Operations, and details of sizing, capacity and operation are presented in the Water Management Plan. All water ponds, collection ditches and diversion channels are removed during Active and Transition Closure. The ABM Lake spillway will be constructed during Transition Closure and will be the only piece of water management infrastructure present during Post-Closure. Details of the ABM Lake spillway sizing will be developed during Detailed Design. As the spillway will be located in the valley bottom, its performance will not be sensitive to high flows.

IR6-54: The post-closure water management infrastructure is not clearly outlined in the RCP, Table 7-8 indicates that there will be “appropriately sized drainage diversions around the facility to reduce up slope run-on waters” while Table 7-16 indicates that all infrastructure will be removed. Provide clarification on the water management infrastructure that will be in place post-closure, particularly around the Class A and Class B facilities.

BMC Response: This note in Table 7-8 of the RCP was misleading and has been removed. All diversion channels around the waste storage facilities will eventually be removed during Closure, as discussed in Table 7-16. As discussed in Section 7.6.2.3, some diversions will be maintained during

Active and Transition Closure to facilitate reclamation activities, but will be removed entirely by the end of Transition Closure.

IR6-55: For water management structures required in the post-closure period, provide details with respect to the design event diversion channels will be sized to, water capacity requirements for ponds, and areas where armouring or lining would be required.

BMC Response: As discussed in response to IR6-53, there are no water management structures required in Post-Closure, with the exception of the ABM Lake spillway.

IR6-56: Provide a figure with the water management infrastructure required for each phase of closure.

BMC Response: Figure 5-2, Figure 5-3 and Figure 5-4 of the RCP show water management infrastructure at the end of Operations, at the end of Active Closure and at the end of Transition Closure, respectively.

IR6-57: The physical stability rows of Table 7-16 indicate that all ponds, collection ditches and diversion channels are removed in post-closure. Provide clarification if the ponds associated with the constructed wetland system would be considered a pond if constructed, and if so, provide comment on the physical stability value for these ponds.

BMC Response: The CWTS will not include storage of water impounded by dams, so physical stability is not a necessary consideration.

IR6-58: The 'Health and Safety' row of Table 7-16 indicates that runoff patterns and channels would be returned where possible/practical. Provide additional detail on how this value will be addressed if returning to pre-mining patterns is not possible.

BMC Response: The reclamation measures discussed in Chapter 7 of the RCP include removal of all ponds, collection ditches and diversion ditches, mitigating the health and safety risks related to these structures.

The Class A, Class B and Class C Storage Facilities, and ABM Lake will remain in Post-Closure, resulting in permanent changes to pre-mining runoff patterns. The storage facilities will be recontoured and reclaimed to ensure that they do not retain water, mitigating health and safety risks related to water flow. High wall edges around ABM Lake will be protected by double rock safety berms to prevent inadvertent access by people or wildlife.

IR6-59: Section 7.6.2.2 indicates that the collection ponds for the Class A and Class B facilities will be removed once the covers are determined to have been design criteria. Provide clarification of the design criteria being referenced, if this is an immediate action following achievement of design criteria or if there is a period of time over which BMC will demonstrate that the criteria are consistently met.

BMC Response: The objective of the Class A and Class B Storage Facility covers is to minimize COPI concentrations in water flowing off the storage facilities, thus minimizing water quality impacts in the receiving environment. This occurs by minimizing contact between water and PAG waste rock. The LoMWBM and WQM together predict that the Class A and Class B collection ponds can be removed during Transition Closure without risking WQO exceedances in the receiving environment.

The LoMWBM and WQM will be updated regularly during Construction, Operations and Closure as more information becomes available, and will be used to support decision making around Project water management, including when it is appropriate to remove the collection ponds. The collection ponds will not be removed until monitoring data and model predictions show that flows and water quality from the storage facilities do not significantly elevate the risk of WQO exceedances in the receiving environment. The removal of the ponds will not be an immediate action upon meeting this criteria, and will likely need to be supported by meeting these criteria for a period of at least two years. More information will be provided in RCP updates as Operations progress, additional monitoring data are collected, and the WQM and WBM are updated.

IR6-60: Provide clarification of contingency measures if water is not suitable for release to Geona Creek following the removal of the collection ponds for the Class A and Class B facilities.

BMC Response: As discussed in Section 7.6.2.4 of the RCP, the WTP will be available for use throughout Transition Closure. In the unlikely case that water from the Class A and Class B Storage Facilities becomes unsuitable for release to Geona Creek during Transition Closure, it could be routed either to the WTP or to ABM Lake. If this were to occur following removal of the Water Treatment Plan, it could be routed to ABM Lake, or a small portable water treatment plant could be brought to site to treat the water.

IR6-61: Provide clarification of the water management measures in place that would enable to unsuitable water to be collected and re-routed to the water treatment plant following the removal of collection pond.

BMC Response: In the unlikely case that flow and water quality following removal of the collection ponds becomes unsuitable for discharge to Geona Creek, water would be routed to one or more sumps, then would be pumped to the WTP or ABM Lake, as discussed in response to IR6-60.

IR6-62: Provide additional information regarding the design and construction of the spillway from Fault Creek into the ABM open pit, and the outflow spillway from the pit to Geona Creek.

BMC Response: Both the spillway from ABM Lake to Geona Creek and the discharge from Fault Creek to ABM Lake will be designed using standard approaches for conveyance structures to ensure that they perform as intended. Given the relatively simplicity and low risks associated with these structures, detailed design and construction specification have not yet been developed. These will be developed as part of Detailed Design, which will be completed after licensing is complete. These designs will be sealed by a Professional Engineer licensed by Engineers Yukon. Design and construction specifications may be updated throughout Operations as additional information is collected, and these changes would be reported in RCP updates.

IR6-63: Provide additional information about the removal of the upper and lower water management ponds and re-establishment of Geona Creek.

BMC Response: The Upper and Lower Water Management Ponds will be removed using standard methods for removing small dams (e.g. BC MFLNRORD, 2019). Given the relatively simplicity associated with the removal of these structures, detailed procedures have not yet been developed. These will be developed as part of Detailed Design, which will be completed after licensing is complete. These designs will be sealed by a Professional Engineer licensed by Engineers Yukon. Procedures may be updated throughout Operations as additional information is collected, and these changes would be reported in RCP updates.

IR6-64: Section 7.9.2 states that “Adaptive management strategies may need to be implemented to reduce the effects from the reduction of flows and water levels in the receiving environment of South Lakes once Fault Creek is diverted back to Geona Creek. BMC has committed to developing these strategies (if required) in collaboration with Kaska.” This is further discussed in Table 2-1 where it’s noted that “management options may include a partial diversion of Fault Creek both to the ABM open pit and to the South Lakes”. Provide clarification of the objectives for flow in the South Lakes and how it will be determined if additional measures are required.

BMC Response: The timing of the re-diversion at closure of Fault Creek from South Lakes to Geona Creek could result in a fluctuating water level in South Lakes that might affect nesting success of waterfowl and shorebirds. Therefore, the re-diversion of Fault Creek at closure will be scheduled to avoid fluctuations during nesting periods (ideally during the late fall or through the winter). However, if avoidance through scheduling cannot be achieved, mitigations to minimize the impacts will be evaluated (i.e. including consideration of a partial diversion during nesting season) in collaboration with Kaska. Where impacts on nesting birds cannot be avoided, BMC will obtain the necessary permit under Section 6 of the *Migratory Birds Regulations*.

5.7 WATER QUALITY

IR6-65: As indicated in IR6-59, it is not clear what design criteria are being used to indicate when the collection ponds for the Class A and Class B facilities can be removed. Table 7-8 states “active water treatment systems (WTP) maintained until performance objectives are achieved” and “passive treatment systems to yield water quality acceptable for discharge in long-term” while Table 7-11 for the Class B facility only states the later. Provide clarification of the indicators used to determine closure success of these facilities in terms of water quality.

BMC Response: Please refer to our response to IR6-59 for discussion of how ongoing monitoring and modeling will be used to confirm when Class A and Class B Storage Facility closure objectives have been met and it is appropriate to remove the collection ponds.

IR6-66: Provide clarification of the indicators that will be used to determine if additional mitigation measures will be required for exposed pit walls that are not Class C material (e.g. application of shotcrete).

BMC Response: While Class A and Class B material in exposed pit walls will continue to be a source of COPIs in Active and Transition Closure, most of this material will eventually be submerged by ABM Lake, as discussed in response to IR6-23a. If monitoring shows unexpectedly high COPI concentrations in ABM Lake, the AMI included in Section 7.2 of the RCP may be triggered. In this case, it is likely that additional treatment would be conducted, rather than attempting to control the source of COPIs. It will likely not be practical to safely access upper pit benches upon closure, and application of shotcrete or other cover materials is likely not an effective long-term approach to source control.

IR6-67: Provide clarification of the indicators that will be used to determine if contingency water treatment measures are required in the ABM pit lake (e.g. ferric iron addition, CWTS construction).

BMC Response: As discussed in Section 7.2 and Section 7.6.2.4 of the RCP, ferric iron addition is expected to be conducted, and is not a contingency measure. BMC has committed to CWTS construction, though it is not expected to be necessary to achieve closure water quality objectives in the receiving environment, and is considered a redundant water treatment measure. An AMI for ABM Lake water quality is provided in Section 7.2 of the RCP.

IR6-68: Sludge produced from the water treatment plant will be disposed of in the ABM pit during all closure phases. Provide information on the anticipated impacts of sludge to pit water chemistry and whether there are concerns regarding long-term impacts to water quality.

BMC Response: The volume of sludge produced from the WTP will be very small relative to the volume of water in the pit during Closure, and it will be deposited through a pipe to deeper parts of the pit to limit oxidation potential. As a result, it is expected that the sludge will have little or no measurable impact on pit water chemistry. Pit water chemistry will be monitored throughout closure to ensure that this is the case, and adaptive management measures will be implemented if appropriate in response to unexpected conditions, in accordance with the Adaptive Management Plan.

6 CLOSURE MONITORING AND MAINTENANCE

IR6-69: During Active Closure the requirement for annual physical monitoring will remain unchanged. Update Table 7-24 to reflect an annual requirement for physical monitoring.

BMC Response: BMC agrees with the recommendation to conduct annual physical monitoring during Active Closure, and this revision has been made in Table 7-27 of the RCP.

IR6-70: The Transition Closure phase will be the first stage to monitor physical stability following the implementation of the closure plan. Annual physical monitoring will remain a requirement in this phase until continued physical stability is demonstrated. Update Table 7-24 to include an annual requirement for physical monitoring for this stage.

BMC Response: Table 7-24 of the RCP has been updated to include annual physical monitoring for the first two years of Transition Closure, changing to monitoring every three years for the remainder of Transition Closure, assuming physical stability has been demonstrated. BMC notes that physical instability would trigger the Adaptive Management Plan, likely resulting in more frequent monitoring.

IR6-71: Section 7.9.2 describes a commitment to “compare the surface and groundwater to the Guidelines for Canadian Drinking Water Quality.” It is unclear if the commitment is to only compare values or if there are adaptive management measures associated with the comparison. Provide clarification if actions will be taken if the water quality does not meet all or some of the parameters.

BMC Response: The standalone Project AMP has been developed to address the Construction and Operation phases of the Project. Details of adaptive management for Project closure will be developed in detail once Operations have been underway for some time and the AMP has been implemented and validated. Adaptive management initiatives related to ABM Lake discharge and water quality in the receiving environment will reflect BMC's commitment to protect water quality for aquatic life and human and wildlife consumption, and will be developed in consultation with RRDC.

It is important to note that baseline water quality in the receiving environment often does not meet all Health Canada (HC) drinking water quality guidelines regarding maximum acceptable concentrations (MAC). Nevertheless, the Project has been designed, and will be constructed, operated and reclaimed responsibly to ensure that water in the receiving environment is not impacted by the Project in a way that will adversely impact water users. WQOs have been developed for 20 COPIs following guidance in Yukon (2021) to be protective of aquatic life, and these WQOs are expected to be met at all times during Construction, Operations and Closure.

Of the 20 COPIs, 11 have HC-MAC guidelines. Four of the 20 COPIs have HC-MAC guidelines at lower concentrations than the WQOs. These include antimony, arsenic, lead and manganese. The Project Water Quality Model predicts antimony, arsenic and lead concentrations well below HC-MAC guidelines, indicated that they are protective of human consumption at all times. The Project Water Quality Model predicts sporadic minor exceedances of the HC-MAC guideline for manganese, but the

elevated background concentrations of manganese, combined with the short reach of the affected watercourse and no human exposure pathway (i.e. people won't drink the water in effected reaches during Construction, Operations, and Active Closure) indicate that manganese levels will not present a risk to human health.

IR6-72: Table 7-25 shows surface water monitoring of the ABM lake reducing from monthly monitoring to quarterly monitoring after 2 years in the transition phase. Provide clarification if the reduction in monitoring will also be linked to water quality indicators in the lake.

BMC Response: Additional monitoring of ABM Lake may be conducted as needed to confirm that in situ treatment objectives are met, and to help direct the optimal location and timing of in situ treatment(s). This has been noted in Table 7-28. Adaptive Management procedures, discussed in Section 7.2.1 of the RCP and in the Adaptive Management Plan will apply to monitoring of ABM Lake and other surface water monitoring stations during Closure, meaning that additional monitoring may be conducted if needed to characterize unexpected conditions.

IR6-73: Brushing of deep rooting vegetation species is identified as a maintenance measure to protect covers placed. Provide clarification of the species being planted on site that may have rooting depths that would negatively impact cover systems and describe the revegetation practices that will be implemented to reduce the likelihood of this occurring.

BMC Response: No deep rooting vegetation is planned. Section 7.11.3 of the RCP has been amended to reflect this.

IR6-74: Section 7.9.3 notes that reclaimed wetlands will be monitored for biodiversity. Provide clarification on where the wetlands referred to are located in the project area and provide additional information on the type of wetlands that are present and how the appropriate biodiversity will be identified and monitored.

BMC Response: All wetlands that are significantly impacted by the Project will be reclaimed, where practicable. This is expected to include wetlands F, I and J, shown in Figure 7-1 of the Site Characterization Plan. Wetland characteristics are provided in Table 7-1 of the Site Characterization Plan. Wetlands A and B are not expected to be significantly impacted by the Project, and wetlands C, D, E, G and H are located within the footprint of mine facilities that will be reclaimed at closure.

Biodiversity within wetlands will be monitored following the procedures discussed in Chapter 9 and Chapter 12 of the Environmental Monitoring, Surveillance and Reporting Plan. These procedures may be updated as appropriate throughout Operations and Closure to ensure that they are adequate. Adaptive management procedures will be implemented as per the Adaptive Management Plan, which will be updated for Closure.

IR6-75: Provide additional information on the reasoning and methodologies of monitoring of vegetation growth that may impact the ground thermal regime.

BMC Response: The ecologist that prepared this section of the RCP on BMC's behalf has retired and is not available to respond to this IR. BMC's current vegetation ecologist and other experts in reclamation monitoring have reviewed the RCP section and this IR, and are not familiar with such monitoring. Thus, the text related to this IR has been removed from the RCP.

IR6-76: Update the monitoring and maintenance activities associated with wildlife to reflect the caribou effects monitoring and mitigation program (Decision Document term 38) and the late-winter moose monitoring survey (Section 110E).

BMC Response: The Caribou Effects Monitoring and Mitigation Program are discussed in Section 1.5.3.7 and Chapters 4, 5, 6, 7 and 8 of the Wildlife Protection Plan, in accordance with Decision Document Term 38. The moose effects monitoring program is described in Section 7.1 of the Wildlife Protection Plan, and methods are detailed in Appendix E of the Wildlife Protection Plan. A reference to the Wildlife Protection Plan has been added to Section 7.11.3 of the RCP.

IR6-77: Provide clarification on Table 7-2 with respect to revegetation objectives and the potential for wildlife use and how these uses will be monitored to inform the success of the closure measures.

BMC Response: Section 7.1.2 has been updated with more details on the potential for wildlife use discussed in Table 7-1. The previous information on potential wildlife use within the table was based on baseline wildlife models which only describe the suitability of an ecosystem to meet certain wildlife species' life requisites. The models do not confirm presence or use of the habitat by a species; rather, they only describe how suitable the habitat is for the described life requisite. Similar to the baseline model information, it could be assumed that once an area has reached the revegetation objectives then it also has the potential of being suitable habitat for the species and life requisite described.

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APPENDIX A

TAILINGS MANAGEMENT ALTERNATIVES ASSESSMENT

**BMC MINERALS (NO. 1) LTD.
KUDZ ZE KAYAH PROJECT**



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VA101-640/2-2
Rev 0
October 20, 2016

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FS 64925
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EXECUTIVE SUMMARY

This alternatives assessment presents an evaluation of tailings storage concepts for the Kudz Ze Kayah Project, to support the 2016 Project Proposal and Prefeasibility Design. This report documents the process of characterization and selection of the most suitable tailings management location for the Project. The assessment includes environmental, technical, and project economic considerations.

Thirteen potential tailings storage sites were identified within approximately 10 km from the deposit. Two methods of tailings storage technology were considered: slurry and filtered tailings. The tailings technology for each candidate was selected based on site specific constraints.

Pre-screening criteria were developed to evaluate and eliminate candidates with evident shortcomings. Eight candidates were removed in the pre-screening process and four candidates were advanced to the next assessment phase. The four candidates remaining after the pre-screening were:

- **Candidate 1:** Slurry tailings facility located in Geona Creek
- **Candidate 7:** Slurry tailings facility located in the East Hanging Valley
- **Candidate 10:** Filtered tailings facility located near the current exploration camp, at the confluence of Geona and Finlayson Creeks, and
- **Candidate 12:** Filtered tailings facility located on the western hillside of Geona Creek.

Site specific information such as environmental considerations, embankment construction requirements, site water management plans, and closure objectives were then defined for each of the four candidates to provide a basis for comparison.

Environmental, technical and project economic effects were selected for consideration. Socioeconomic effects were not considered. Specific criteria within each of these categories were established; for example, within the environmental category, the criteria included waterbodies and/or wetlands affected, fish habitat affected, caribou habitat, and the potential long-term impacts of the facility.

Ratings were established to allow for a high-level ranking of the alternatives. Ratings of “preferred”, “acceptable” and “least preferred” were then assigned to the site specific criteria of each candidate to provide a means of comparison.

Candidate 12 received the preferred overall rating of the four alternatives, achieving “preferred” ratings in environmental and technical categories, and “acceptable” in project economics. This assessment indicates Candidate 12, a filtered tailings facility located on the western hillside of Geona Creek, is the preferred location for tailings and waste rock management.

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ABBREVIATIONS

Access	Access Consulting Group
ARD	acid rock drainage
BMC	BMC Minerals (No. 1) Ltd.
Cominco	Cominco Ltd.
Golder	Golder Associates
KP	Knight Piésold Ltd.
KZK	Kudz Ze Kayah Project
PAC	potentially acid consuming
MAT	most appropriate technology
MMER	Metal Mining Effluent Regulations
PAG	potentially acid generating
PFS	Pre-Feasibility
SPAG	strongly potentially acid generating
Teck	Teck Resources Ltd.
tpd	tonnes per day
TSF	tailings storage facility
WPAG	weakly potentially acid generating

1 – INTRODUCTION

1.1 PROJECT DESCRIPTION

The Kudz Ze Kayah (KZK) Project is a proposed copper-zinc-lead-silver-gold mine in southeastern Yukon Territory, Canada. The project is located in the Saint Cyr Range area of the Pelly Mountains, approximately 250 km northeast of Whitehorse. The project location is shown on Figure 1.1.

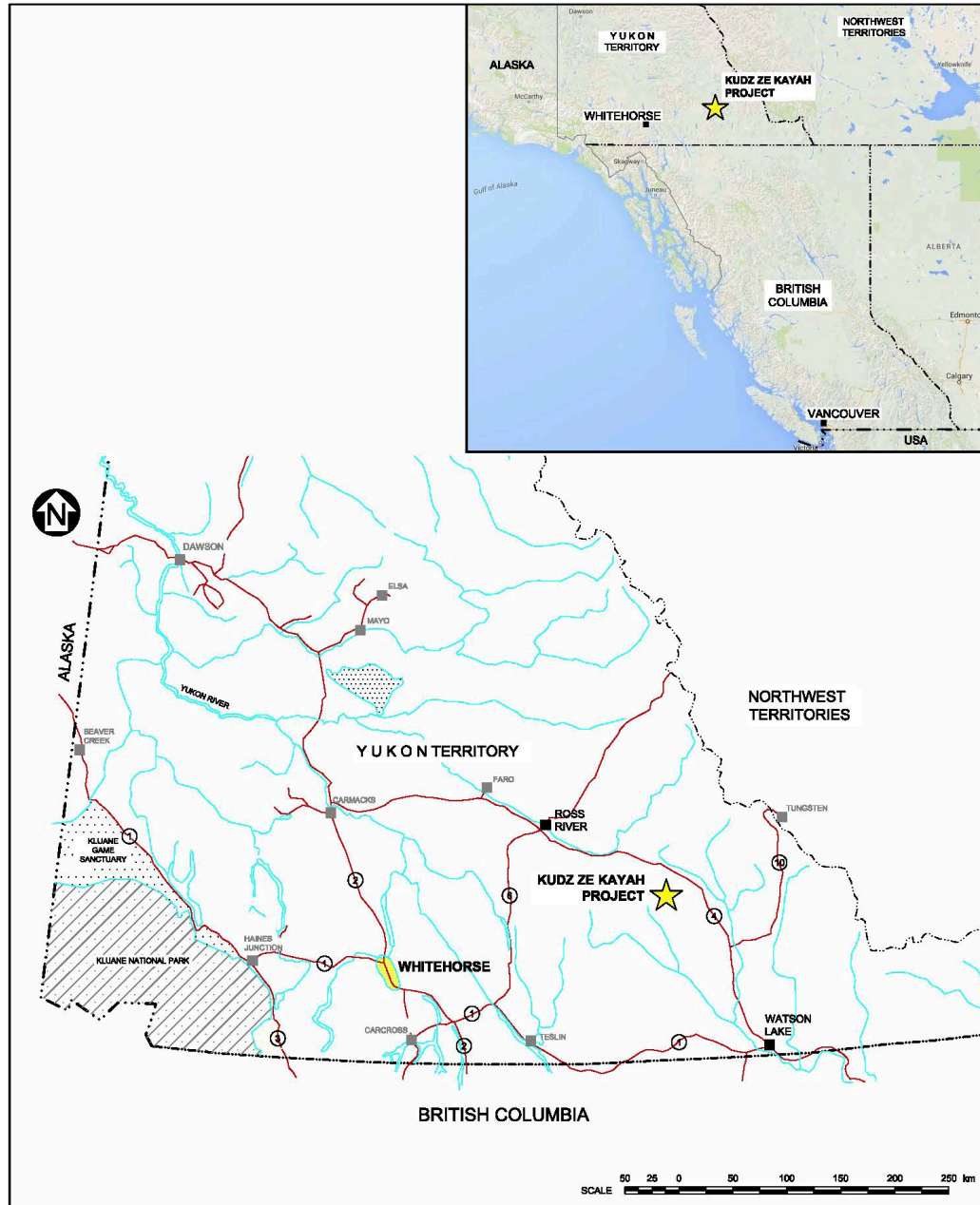


Figure 1.1 Project Location Map

BMC Minerals (No. 1) Ltd. (BMC) is currently advancing the KZK Project to a Pre-Feasibility (PFS) design stage. The resource will be extracted by open pit and underground mining methods with a milling rate of approximately 2 million tonnes per year over a 9.5 year mine life, and producing approximately 120 million tonnes of waste rock material. The topography of the KZK Project area consists of rolling hills with creeks and lakes in the valley bottoms. A small stream, Geona Creek, runs through the open pit and project area.

1.2 PREVIOUS STUDIES

The previous project owner, Cominco Ltd. (Cominco), conducted exploration work in 1994 and 1995 to delineate the ABM deposit, support engineering design and to begin baseline environmental studies. The Cominco mine plan included development of one open pit over a 9 year mine life, extraction of 9.4 million tonnes of ore, and storage of approximately 72 million tonnes of waste rock (Cominco, 1997).

A high level tailings management alternatives study was completed in 1994 by Norecol and Simons. Golder Associates (Golder) reviewed the study and prepared a high level ranking of the alternatives based on storage capacity, storage ratio, distance from the open pit, seepage, closure considerations, watersheds impacted, length of creek affected, and the lake areas affected (Golder, 1995). The areas are shown in Appendix A and summarized in Table 1.1. The desktop study ultimately recommended storing tailings in the Geona Creek valley, referred to as "Site 1D".

Table 1.1 Historic Tailings Management Alternatives Assessment

Tailings Management Sites	
1a, 1b, 1c & 1d	Geona Creek Site A, B, C, and D (<i>Recommended site</i>)
2	North Lakes Creek
3	East Creek
4	Lower Finlayson Creek
5	Upper Finlayson Creek
6	North Creek
7a & 7b	East Hanging Valley
8	Fault Creek
9 & 10	North Hanging Valley Upper and Lower

The proposed tailings and waste rock management strategy included the following:

- A Tailings Storage Facility (TSF) located in Geona Creek to contain strongly potentially acid generating (SPAG) slurry tailings material, as well as SPAG waste rock. The closure plan included permanently covering the tailings and waste rock with water.
- Weakly potentially acid generating (WPAG) waste rock was to be stored temporarily on surface and hauled to the open pit at closure and placed below the final water level in the flooded pit.
- Non-acid generating (NAG) waste rock was to be permanently stored on surface.

Cominco completed site investigation programs in 1995 and 1996 to support the mine design (Golder, 1996). The feasibility study for the KZK project was completed in 1998 and the project was approved under the Canadian Environmental Assessment Act (Screening Level Assessment) and received a Water Licence, however project development ceased after 1998 (Cominco, 1997).

BMC acquired the KZK Project in February 2015. BMC completed additional site investigations in 2015 to update the mineral resource estimation to support an updated mine plan. The updated mineral resource estimation and total waste rock produced includes 18.1 million tonnes of ore and 121 million tonnes of waste rock, which is greater than the previous Cominco mine plan of 9.4 million tonnes of ore and 72 million tonnes of waste rock.

1.3 SCOPE OF WORK

This report presents the preliminary assessment of tailings management concepts to support the KZK Project PFS design and Project Proposal. The objective of this alternatives assessment is to locate the most suitable project specific solution to manage the tailings material for the life of mine and post closure.

A total of thirteen alternatives were evaluated. Factors considered in this evaluation were environmental, technical and economic project impacts. Socio-economic considerations were not included in this assessment. This report is intended to present a preliminary technical recommendation based on the current project information.

2 – TAILINGS AND WATER MANAGEMENT

2.1 INTRODUCTION

This section summarizes project specific tailings, waste rock and water management details and design considerations. This information should be updated as the project develops and additional studies are completed.

Geotechnical and geochemical design considerations are required for long-term physical and geochemical stability. Consideration of these sometimes opposing design objectives is required to determine the most appropriate site specific tailings and water management strategy. The alternatives considered in this assessment incorporate the Most Appropriate Technologies (MAT) for tailings and water management that will reduce project specific physical, environmental, and economic risks.

2.2 TAILINGS

Tailings are defined as the fraction of processed ore produced at the mill that is not considered to be economically valuable. Tailings are managed as a waste material and require a geotechnically and geochemically stable storage option that will manage the tailings throughout the mine life and after closure.

The tailings throughput for the KZK Project is approximately 5,500 tonnes per day (tpd), over a 9.5 year mine life. The total tonnage of tailings material is approximately 15.3 million tonnes based on the current mineral resource estimate (18.1 million tonnes as ore). All the tailings material is considered to be SPAG. This alternatives assessment assumes all tailings produced during the life of mine will be stored on surface and produced in one tailings stream.

Tailings characteristics such as particle size, geochemistry, and rheology were not available at the time of this report; therefore this assessment assumes the tailings materials are amenable to filtration at a feasible cost. Tailings technology optimizations (such as splitting the tailings stream into PAG and NAG streams, or coarse and fine streams) were not considered for this report but may be considered in future studies.

2.3 TAILINGS TECHNOLOGIES AND MANAGEMENT STRATEGIES

The tailings continuum is shown on Figure 2.1. The continuum qualitatively describes the tailings solids content, the thickening/dewatering effort required, the method of conveyance, and segregation potential of the tailings.

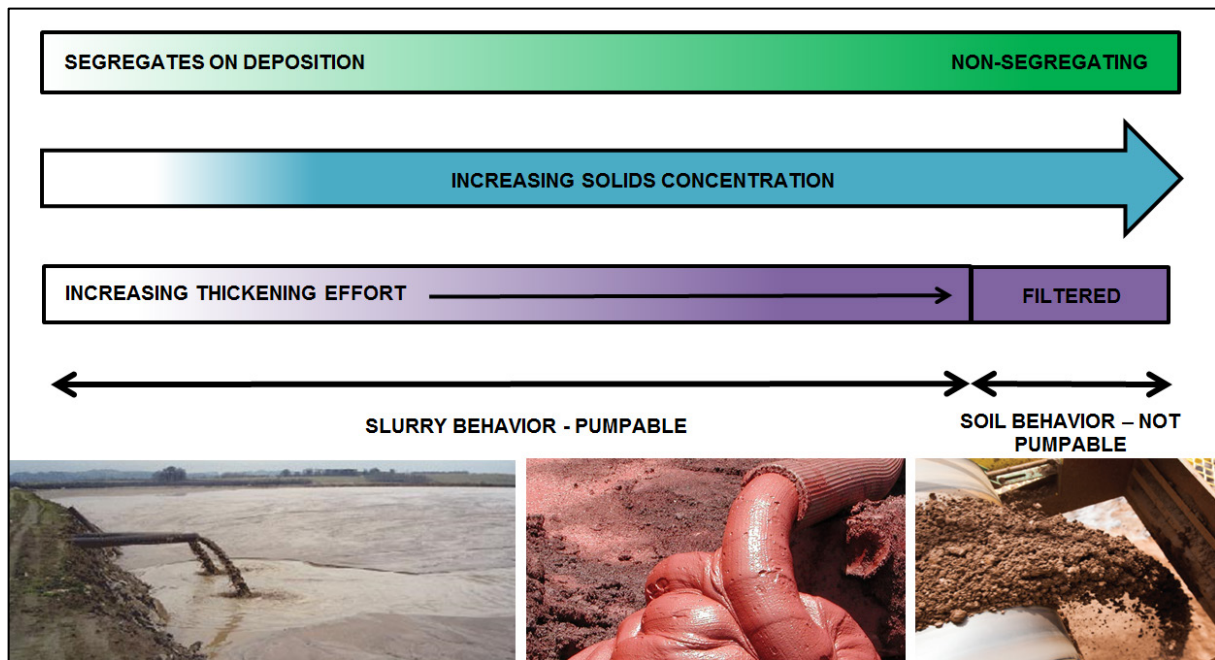


Figure 2.1 Tailings Continuum

The tailings solids content (i.e.: pumpable versus non-pumpable) is one aspect of the overall tailings management strategy, however, the tailings technology used will impact many other aspects of the project, therefore it should be considered when determining the mine development concept. The following section describes the tailings technologies considered in this assessment and reasoning for the inclusion or exclusion of certain technologies.

2.3.1 Slurry Tailings

Slurry tailings include the full range of pumpable tailings, as shown on Figure 2.1. Slurry tailings with a solids content of approximately 20 to 40% are typically referred to as conventional slurry tailings. This assessment assumes that slurry tailings are piped, using gravity and/or pumping, to a TSF. The average dry density of the tailings slurry was assumed to be 1.3 t/m^3 to estimate storage volume requirements.

Some advantages of conventional slurry tailings are that no additional processing is required following the milling process, and tailings can be pumped to a remote facility.

Slurry tailings can be thickened at the mill to extract additional water for re-use; however slurry tailings with any solids concentration will consolidate to a consistent density regardless of the moisture content at discharge. This assessment did not include considerations for thickening the tailings, since the KZK project is not anticipated to experience a water deficit; however, thickening could be examined in future studies.

Paste or "ultra-thickened" tailings offer maximum water recovery while maintaining the ability to pump the slurry tailings. Surface storage of paste tailings was not considered in this alternatives assessment but could be investigated in future studies if it is identified as an opportunity for optimization.

2.3.2 Non-Pumpable Tailings (Filtered)

Filtered tailings are mechanically dewatered to a point where they behave as a soil. Mechanical dewatering can be achieved through vacuum and pressure filtration processes. The alternatives assessment conducted by Norecol and Simons in 1994 did not consider filtered tailings as an option for tailing management.

This assessment assumes filtered tailings will be transported by truck to the TSF. The moisture content of the filtered tailings is assumed to be approximately 15 to 20% with an average dry density of 1.6 t/m^3 to estimate the storage volume requirements. The use of filtered tailings technology was selected for consideration in this assessment based on the benefits and disadvantages outlined below.

The benefits of filtered tailings, as they relate specifically to the KZK Project, are:

- Filtered tailings have been implemented successfully for low throughput operations of around 20,000 tpd or less, therefore there is a precedent for this technology to be successful at the KZK Project (5,500 tpd).
- Separation of tailings and water reduces the potential consequence in the event of a facility failure because tailings material cannot be mobilized by supernatant water.
- Filtered tailings can be progressively capped for reclamation, allowing for re-contouring, and resulting in a stable landform with a walk-away closure solution at the end of the mine life.

Disadvantages or risks associated with filtered tailings technology, as they relate specifically to the KZK Project, are:

- Filtration technology generally has a higher capital and operating costs associated with power consumption and the maintenance required. The KZK Project is located in a remote northern climate; therefore there will be an increased power generation demand, and standby filters may be required to prevent delays to production in the event the tailings filters are incapacitated.
- Desaturated PAG tailings may generate ARD and metal leaching when exposed to the environment. The design of the facility and water management plan will require long-term geochemical stability considerations.
- The physical properties and geochemistry of the tailings will determine the feasibility of filtration technology.
- Dust generation may add to operating costs.

2.4 WASTE ROCK

Waste rock material from the Open Pit and underground workings is classified into three categories, based on the ARD test results provided by BMC in April 2016:

- Class A material: strongly potentially acid generating (SPAG) – 8.4 M tonnes
- Class B material: weakly potentially acid generating (WPAG) – 35 M tonnes, and
- Class C material: potentially acid consuming (PAC) – 78 M tonnes.

Class A waste rock material will be encapsulated in the tailings mass for all slurry and filtered options. The total volume of Class A material is approximately 4 Mm^3 , assuming a density of 1.9 t/m^3 .

Class B waste rock material is to be stored on the surface of the western slopes, adjacent to the Open Pit. This location is similar to the location identified in the Cominco design (Golder, 1996). The location of the Class B storage facility was assumed to be the same for all the candidates

considered. This material is assumed to be encapsulated at closure for permanent storage. The total volume of Class B material is approximately 18 Mm³, assuming a density of 1.9 t/m³.

Class C waste rock material will be stored on surface adjacent to the Open Pit in the East Hanging Valley area, in approximately the same location as proposed in the Cominco design (Golder, 1996). The location of the Class C storage facility was assumed to be the same for all alternatives considered in this report. The long term water quality from the Class C runoff and seepage is assumed to be acceptable for discharge to the environment without treatment. The material has been treated as a zero-cost construction rock fill material for this assessment. The total volume of Class C material is approximately 42 Mm³, assuming a density of 1.9 t/m³.

2.5 WATER MANAGEMENT

Water management is a critical component of the successful design, operation and closure of a tailings facility. Water management strategies include reducing contributing catchment areas, diversion of non-contact water, and effective capture and management of contact water. This section outlines the water management considerations included in this assessment. The KZK site is anticipated to be in an annual site water surplus for each alternative considered (Access, 2016a).

This assessment assumes slurry tailings options are covered with water at closure, in perpetuity, to prevent acid generation. Slurry facilities have been located in valleys and areas where the storage ratio of embankment material to tailings storage is preferable. Emergency site water storage is included in the design capacity of the tailing storage facility.

This assessment assumes filtered tailings material is encapsulated with a low permeability material and sealed from oxygen contact to prevent acid generation and seepage to the downstream environment in the long-term. Filtered tailings facilities have been located in topographically flatter areas to minimize water ponding on the facility surface and allow diversion of non-contact water away from the facility. Filtered tailings alternatives require additional water management ponds to store site water. It is presumed the water management pond will be located in Geona Creek during the life of mine and decommissioned at closure. Emergency site water storage is included in the design capacity of the water management pond(s).

3 – ALTERNATIVES ASSESSMENT METHODOLOGY

This section outlines the methodology and assumptions used in this alternatives assessment.

3.1 INTRODUCTION

Environment Canada published the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* in September 2011. These guidelines are intended to be used by project proponents to evaluate of mine waste and water management alternatives. The guidelines are recommended if a project proponent is considering using a natural water body frequented by fish as a tailings and waste management facility, which would require a Schedule 2 amendment to the Metal Mining Effluent Regulations (MMER) of the Fisheries Act of Canada. The guidelines were used as a general framework for this alternatives assessment.

3.2 PRELIMINARY CANDIDATES

The first step in determining the preferred mine waste and water management strategy was to define preliminary tailings facility locations based on threshold criteria.

The threshold criteria established for the KZK Project included:

- To locate the facility within a 10 km radius of the Open Pit
- To locate the facility in an area of practical topography and with access to the Open Pit
- To not use subaqueous storage of tailings in existing lakes, and
- To use a single facility for tailings management.

The locations from the historic Cominco tailings management alternatives assessment were included in this assessment due to their relative proximity and favourable topography for slurry tailings impoundments (Candidates 1 to 9). These locations were re-developed for the 2016 mine plan waste quantities. Four new TSF alternatives were developed for filtered tailings management (Candidates 10 to 13) based on the threshold criteria.

The candidates are summarized below in Table 3.1 and shown on Figure 3.1.

Table 3.1 Preliminary Candidates

Slurry Tailings Candidates (Adapted from 1994 Assessment)		Filtered Tailings Candidates (2016 Assessment)	
1	Geona Creek	10	Exploration Camp
2	North Lakes Creek	11	Long Haul
3	East Creek	12	Western Hillside
4	Lower Finlayson	13	Adjacent to Open Pit
5	Upper Finlayson		
6	North Creek		
7	East Hanging Valley		
8	Fault Creek		
9	North Hanging Valley		

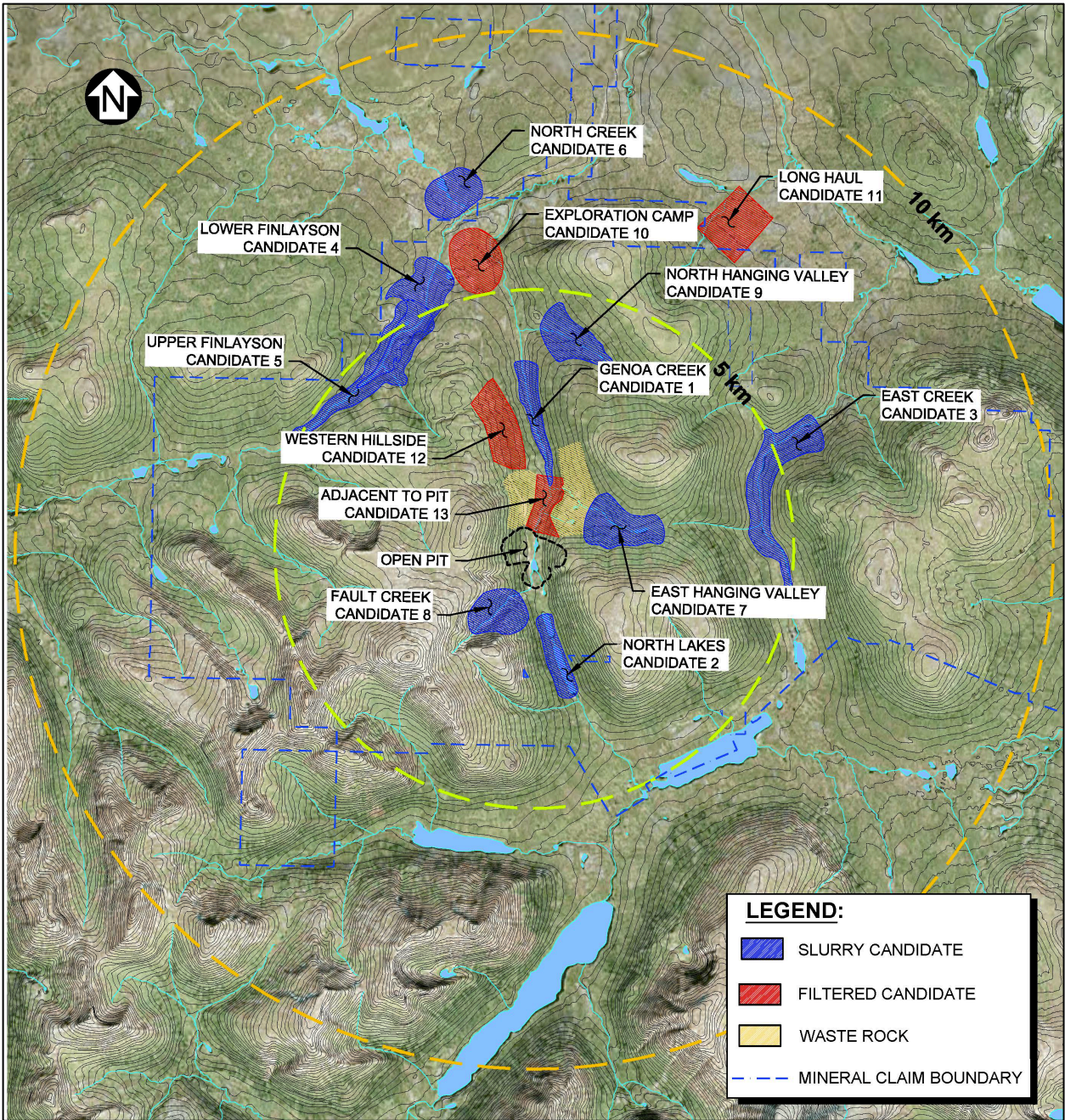


Figure 3.1 Preliminary Candidates

3.3 PRE-SCREENING ASSESSMENT

The second stage of the assessment was to apply pre-screening criteria to each of the candidates, with the goal of eliminating candidates with perceived fatal flaws and carrying the remaining candidates forward for further analysis. Pre-screening questions were developed with input from BMC. The pre-screening criteria and the results of the assessment are summarized in Table 3.2.

Table 3.2 Pre-Screening Assessment

Pre-Screening Criteria	Candidates												
	1	2	3	4	5	6	7	8	9	10	11	12	13
The facility is unable to reasonably contain the required volume of tailings and Class A material (very poor storage ratio of tailings to embankment material)						✓		✓	✓				
The facility is located outside the BMC mineral claim boundary						✓					✓		
There are significant water management issues associated with this option		✓											
The facility is located in a catchment area outside of Geona Creek, increasing the environmental footprint of project		✓	✓	✓	✓	✓					✓		
Starter dam material requirement is in excess of the initial material availability						✓		✓	✓				
The facility prevents re-establishment of flow of Geona Creek at closure													✓
The alternative passes the pre-screening criteria and should be carried forward for further assessment	✓						✓			✓		✓	

Candidates 2–6, 8, 9, 11, 13 were precluded from further assessment based on the pre-screening criteria, and Candidates 1, 7, 10, 12 were carried forward for further assessment.

3.4 CHARACTERIZATION OF THE PRE-SCREENED CANDIDATES

The candidates remaining after the pre-screening process were then characterized in detail. The purpose of the characterization was to provide details that could be used to compare the candidates. The four remaining candidates for tailings management are shown in Figure 3.2:

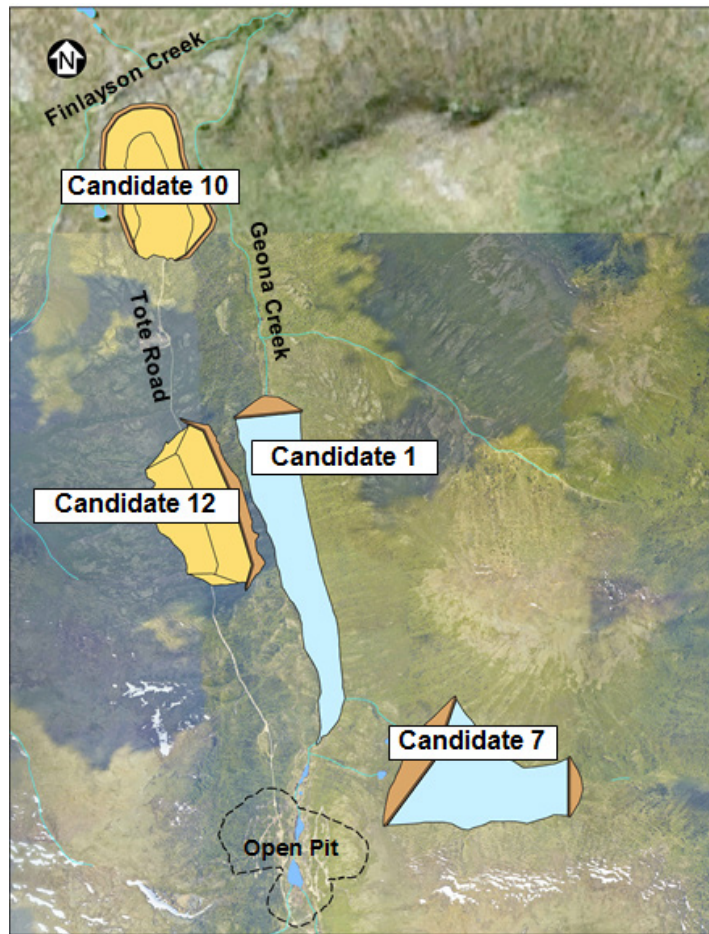


Figure 3.2 Pre-screened Candidates

3.4.1 Candidate 1

Candidate 1 (previously referred to as Geona Creek “Site D”) was the preferred tailings facility location for the Cominco mine plan. The previous design was updated to include the increased tailings and waste rock tonnages from the 2016 BMC mine plan. Candidate 1 is shown in Figure 3.3.

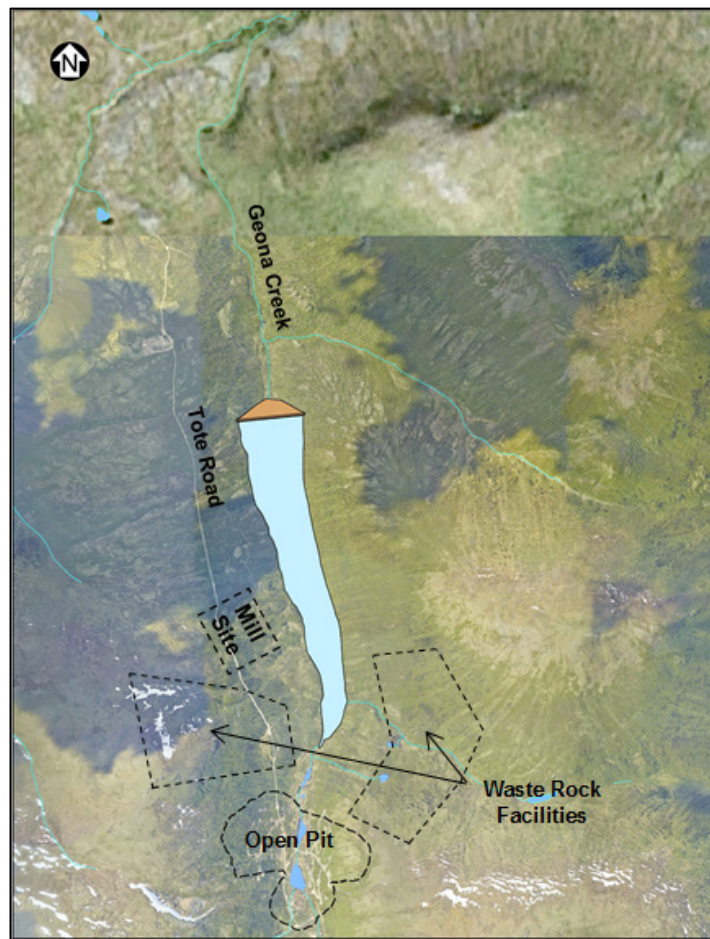


Figure 3.3 Candidate 1

The Geona Creek site is approximately 3 km from the Open Pit. Candidate 1 is a conventional slurry tailings facility with a water cover over the entire facility to prevent ARD. Slurry tailings discharged to a TSF located close to the Open Pit and Mill is cost efficient since no additional processing is required after the milling process, and the tailings can be gravity discharged from the Mill to the facility.

Candidate 1 requires one dam to contain the tailings material in Geona Creek valley. The embankment height is approximately 50 m and the total estimated volume of material required to construct the embankment is 2.3 Mm³ (a 140,000 m³ starter dam is required). The total footprint of the facility is approximately 60 ha.

The construction of the facility would permanently alter approximately 3.4 km of Geona Creek, from the Open Pit area to the downstream toe of the tailings embankment. Grayling do not overwinter in Geona Creek, however there is seasonal migration from the downstream environment and spawning in Geona Creek (Access, 2016).

Tailings and waste rock will be co-disposed in the TSF. Placing tailings and waste rock in Geona Creek may require a Schedule 2 amendment to the Fisheries Act of Canada. The tailings and waste rock will be permanently submerged, and at closure the creek will be re-established over the facility,

and pass over the embankment through a spillway. This alternative is considered a permanent removal of the creek, however flow will be returned to Geona Creek at the end of the mine life.

The tailings facility embankment would be constructed from Class C rockfill and includes a low permeability core. There is opportunity to buttress the embankment with additional material to increase the overall stability of the facility due to the abundance of Class C construction material. There are potential opportunities for optimization of this alternative, such as separating tailings streams into PAG and non PAG material so large non PAG beaches could be developed, reducing the extent of the water cover on the facility.

The area is anticipated to have discontinuous permafrost (KP, 2016). Permafrost conditions would require investigation, design considerations and monitoring. Long-term closure objectives will require consideration of changing permafrost conditions due to climate change.

The geotechnical and hydrogeological conditions beneath the tailings facility in Geona Creek were investigated by Golder in 1995 and 1996, Tetra Tech and KP in 2015. Overburden thickness in the area ranges from 10 to 20 m and generally consists of glaciofluvial deposits (KP, 2015). Bedrock in the Geona Creek area generally consists of weathered to slightly weathered, highly fractured sedimentary mudstone schist and mafic ash tuff and fresh bedrock is found at approximately 50 m in depth and generally consists of highly fractured sedimentary mudstone schist (KP, 2015).

Bedrock hydraulic conductivity in the Geona Creek area ranges from 2E-05 cm/s to 3E-03 cm/s, with artesian conditions (KP, 2015). The hydraulic conductivity values could indicate additional seepage control measures may be required. The Cominco design included grouting the bedrock beneath the embankment as a seepage control measure. An advantage of Candidate 1 is the seepage path from the facility is contained in the valley bottom and the direction of seepage is predictable, so seepage can be monitored and managed downstream.

The closure plan for Candidate 1 is unchanged from the Cominco design. The Open Pit will gradually fill with groundwater after closure. The closure of the facility includes a water cover flowing from the Open Pit area over the facility and through a spillway. The facility and downstream environment will be re-vegetated and will remain saturated long-term and water quality will mimic pre-mining conditions.

3.4.2 Candidate 7

Candidate 7 is located in the East Hanging Valley, east of the Open Pit and near the location of the proposed Class C Storage Facility. Candidate 7 is shown in Figure 3.4:

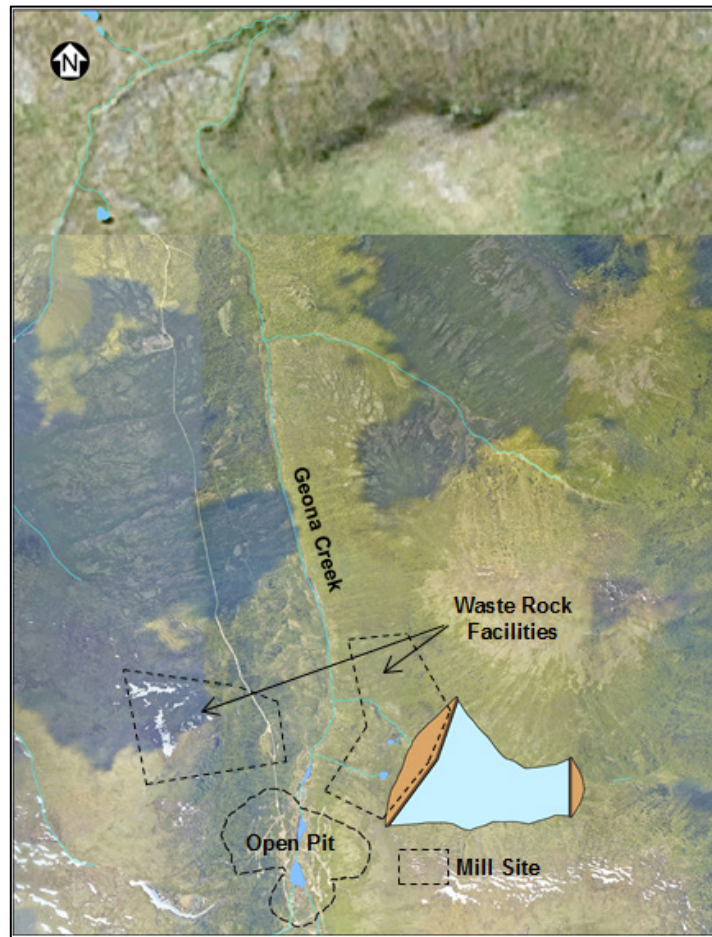


Figure 3.4 Candidate 7

Candidate 7 is a conventional slurry tailings facility with a water cover. Two embankments are required to contain the slurry tailings and waste rock material in the valley. The embankments would be constructed from Class C rockfill and includes a low permeability core. The Class C waste rock storage facility will be constructed downstream of the main embankment, creating a massive buttress and increasing the stability of the facility.

The East Hanging Valley site is approximately 1.5 km from the Open Pit. The Mill Site shown in Figure 3.4 has been re-located to the hillside above the facility for this option. Slurry tailings located in a facility close to the Open Pit and Mill area is cost efficient. The ore haul from the Open Pit will require an elevation gain of approximately 150 m, which will increase the cost of tailings management, however, no additional processing is required after the milling process and tailings could be gravity discharged from the Mill to the TSF.

The estimated embankment height is 75 m and the total estimated volume of material required to construct the embankment is 9 Mm³ (a 540,000 m³ starter dam is required). The total footprint of the facility is approximately 130 ha.

The East Hanging Valley contains a small tributary stream to Geona Creek, however no fish have been identified in this area and it is not considered fish habitat (Access, 2016). Constructing a

tailings facility in this location would not directly impact fish habitat but may reduce the flows in Geona Creek.

Minimal exploration, geotechnical or hydrogeological site investigations have been completed in this area. Tetra Tech completed one monitoring well installation in 2015 in this area (Tetra Tech, 2015). Geotechnical and hydrogeological site investigations will be required in the area to investigate seepage potential. The facility straddles two catchment areas, increasing the water management requirements, and complicating seepage monitoring and control because PAG seepage from the tailings facility could potentially report in multiple directions. Detailed hydrogeological investigation, groundwater modelling and monitoring may be required to predict and mitigate seepage.

The facility includes a permanent water cover to prevent acid generation in the tailings and waste rock materials. There are potential opportunities for optimization of this alternative, such as separating tailings streams into PAG and non PAG material so large non PAG beaches could be developed, reducing the extent of the water cover on the facility.

The area is anticipated to have discontinuous permafrost (KP, 2016). Permafrost conditions would require investigation, design considerations and monitoring. Long-term closure objectives will require consideration of changing permafrost conditions due to climate change.

3.4.3 Candidate 10

Candidate 10 is a filtered tailings facility located in the approximate area of the current exploration camp, near to the confluence of Finlayson and Geona Creek. Candidate 10 is shown in Figure 3.5:

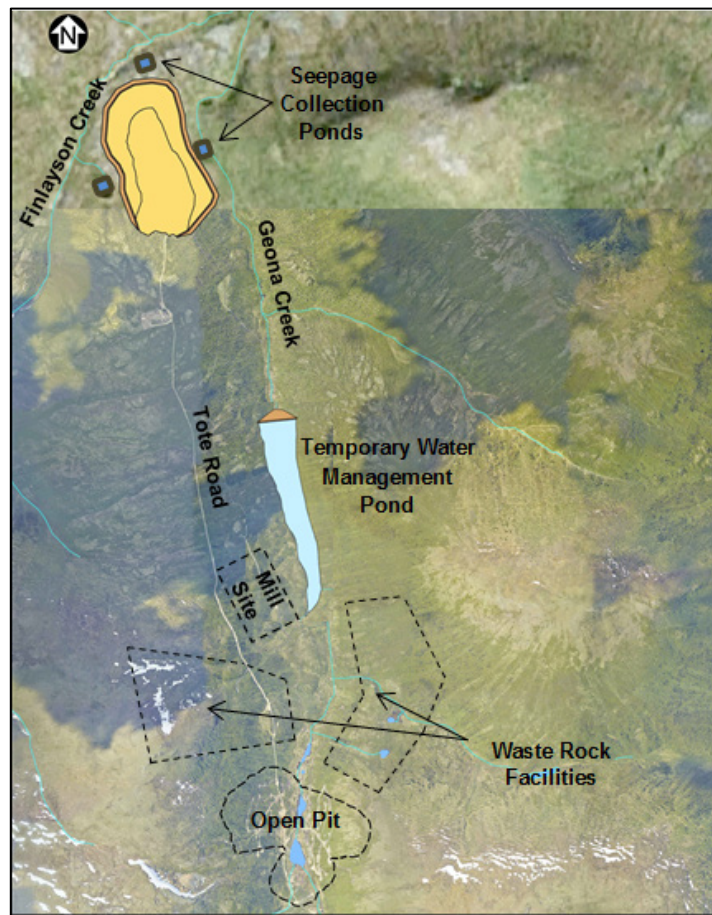


Figure 3.5 Candidate 10

Candidate 10 is located approximately 7 km from the Open Pit. The facility would be constructed from filtered tailings and waste rock material hauled by truck and placed and compacted. A water management pond is required to store site surplus water, and will be removed at closure. The water management pond is assumed to be located in Geona Creek, close to the Open Pit and Mill Site.

The estimated buttress height to contain the filtered tailings is approximately 15 m and the total estimated volume of material required to construct the buttress is 2.7 Mm³. The footprint of the facility is approximately 100 ha. Hauling filtered tailings from the Mill Site to the Candidate 10 area is a negligible elevation change, but is a moderate haul distance therefore it will increase the tailings management costs.

No exploration, geotechnical or hydrogeological site investigations have been conducted in this area. Geotechnical and hydrogeological site investigations will be required. Seepage could theoretically report to two drainages (Finlayson and Geona Creek) since the facility is located on a catchment divide.

The area does not contain any water bodies and is therefore not considered to be fish habitat, however constructing the facility in this area may temporarily alter the seasonal flows to Finlayson and Geona Creeks during the mine life.

Foundation preparation beneath the facility would include a low permeability foundation, with drains to convey and collect seepage. Seepage collection ponds are located around the facility. The buttress would be constructed with a Class C material.

The area is anticipated to have discontinuous permafrost conditions (KP, 2016). Permafrost conditions would require investigation, design considerations and monitoring. Long-term closure objectives will require consideration of changing permafrost conditions due to climate change.

The closure plan for the facility includes progressive reclamation with a low permeability cover. The cover would limit water and oxygen infiltration into the tailings and Class A waste rock material. The facility would be covered with Class C waste rock as frost protection for the low permeability material, and re-vegetated.

3.4.4 Candidate 12

Candidate 12 is a filtered tailings facility located on the western slope of Geona Creek valley. Candidate 12 is shown on Figure 3.6.

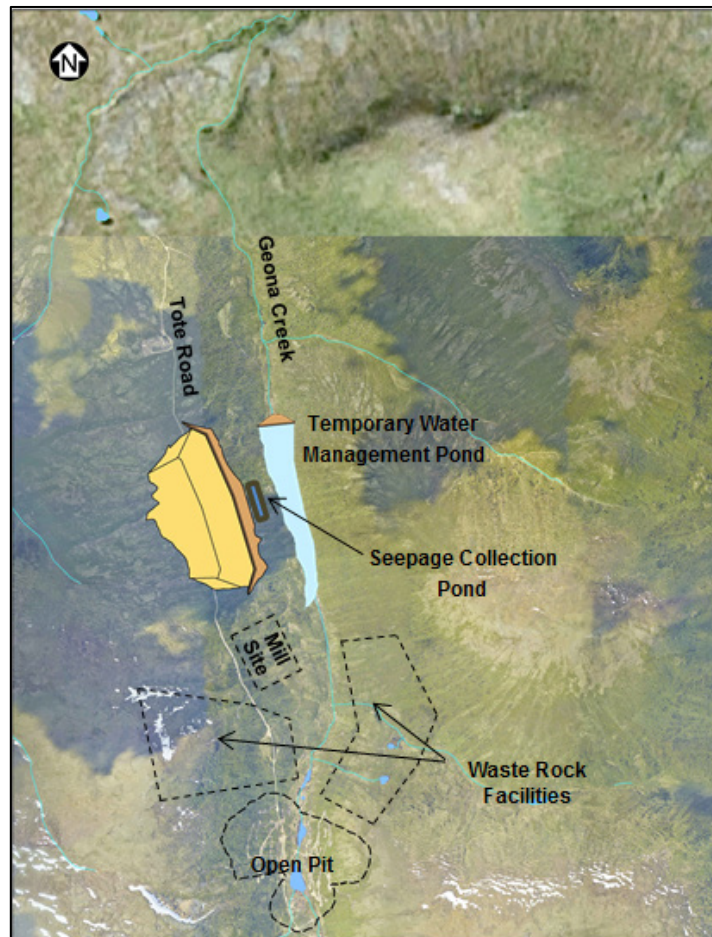


Figure 3.6 Candidate 12

Candidate 12 is located approximately 3 km from the Open Pit. The estimated buttress height is 30 m and the total estimated volume of material required to construct the buttress is 1.4 Mm³. The

buttress would be constructed with Class C material. Class C material is considered to be low cost, readily available construction material.

The total footprint of the facility is approximately 100 ha. Hauling filtered tailings from the Mill Site to the facility requires an elevation gain of 50 m, but short haul distance of 0.3 km, reducing the cost to manage tailings and challenge of handling the material in the winter.

The area does not contain any water bodies and is not considered fish habitat however constructing the facility in this area may temporarily alter the seasonal flows to Finlayson and Geona Creeks during the mine life.

Minimal exploration, geotechnical or hydrogeological site investigations have been completed in this area. Test pit were completed by Golder in 1995 and 1996 in the area of the facility buttress (Golder, 1997). The seepage path from the facility is towards Geona Creek, which simplifies collection and mitigation measures. Foundation preparation for the facility would include a low foundation, with drains to convey and collect seepage.

The area is anticipated to have discontinuous permafrost conditions (KP, 2016). Permafrost conditions would require investigation, design considerations and monitoring. Long-term closure objectives will require consideration of changing permafrost conditions due to climate change.

The closure plan includes progressive reclamation with a low permeability cover. The cover would limit water and oxygen infiltration into the tailings and Class A waste rock material. The facility would be covered with Class C waste rock as frost protection for the low permeability cover, and re-vegetated.

4 – RATING AND RANKING OF ALTERNATIVES

Site specific characterization criteria were developed to compare the candidates. The criteria are grouped into three categories: environmental, technical, and project economics. The criteria are summarized below:

- **Environmental**
 - Waterbodies and/or wetlands affected
 - Fish habitat affected
 - Caribou habitat
 - Long-term impact of facility
- **Technical**
 - Tailings technology
 - Geochemical stability (ARD mitigation)
 - Geotechnical characterization
 - Hydrogeological characterization
 - Dam requirements
 - Water management
- **Project Economics**
 - Tailings technology
 - Short-term closure requirements
 - Long-term closure requirements

Ratings were developed to compare the criteria. Ratings are “preferred”, “acceptable” and “least preferred”. Table 3.4 summarizes the ratings and their descriptions.

Table 4.1 Ratings and Descriptions

Rating	Environmental	Technical	Project Economics
<i>Preferred</i>	Negligible impact to the environment	Conditions are thoroughly understood, design objectives are feasible	Negligible impact to project costs
<i>Acceptable</i>	Impact to the environment with feasible mitigation	Conditions are unknown or known to be challenging, however design objectives are feasible	Cost to implement is anticipated to be within project budget, however may be a risk to the project in different market conditions
<i>Least preferred</i>	Impact to the environment with challenging mitigation	Design objectives or requirements add potential risks to the project	Cost to implement is anticipated to be a risk to the project

The ratings were then applied to the criteria of each candidate. The resulting ratings and their specific justifications are summarized in Tables 3.4, 3.5 and 3.6.

Table 4.2 Environmental Impacts

Criteria	Candidate 1		Candidate 7		Candidate 10		Candidate 12	
	Details	Rating	Details	Rating	Details	Rating	Details	Rating
Waterbodies and/or wetlands affected	Geona Creek is permanently altered, but flow is re-established at end of mine life. Wetland areas of Geona Creek are permanently altered, but habitat compensation is possible	Acceptable	East Hanging Creek is a tributary of Geona Creek. Wetland/marsh areas in the East Hanging Valley are permanently altered, but habitat compensation is possible	Acceptable	Water pond constructed in Geona Creek, but removed at closure. No permanent impacts	Preferred	Water pond constructed in Geona Creek, but removed at closure. No permanent impacts	Preferred
Fish habitat	Geona Creek is habitat to Artic Grayling	Acceptable	None	Preferred	None	Preferred	None	Preferred
Caribou habitat	Facility covered with water will be permanent reduction in caribou habitat	Least preferred	Facility covered with water will be permanent reduction in caribou habitat	Least preferred	Re-contoured and revegetated facility is not considered permanent reduction to caribou habitat	Acceptable	Re-contoured and revegetated facility is not considered permanent reduction to caribou habitat	Acceptable
Long-term impact of facility	Permanent dam located in creek	Least preferred	Permanent dam located in valley	Least preferred	No permanent structures	Preferred	No permanent structures	Preferred
Result	<i>Least preferred</i>		<i>Least preferred</i>		<i>Preferred</i>		<i>Preferred</i>	

NOTES:

- Results were determined by ranking candidates that achieving no "least preferred" scores and the most "preferred" scores.

Table 4.3 Technical Impacts

Criteria	Candidate 1		Candidate 7		Candidate 10		Candidate 12	
	Details	Rating	Details	Rating	Details	Rating	Details	Rating
Tailings Technology	Slurry tailings are well understood technology, requiring no additional processing	Preferred	Slurry tailings are well understood technology, requiring no additional processing	Preferred	Filtered tailings are more challenging to produce and manage than slurry tailings	Acceptable	Filtered tailings are more challenging to produce and manage than slurry tailings	Acceptable
Geochemical stability (ARD mitigation)	Water cover	Acceptable	Water cover	Acceptable	Encapsulation with low permeability material	Acceptable	Encapsulation with low permeability material	Acceptable
Geotechnical conditions	Historic and recent site investigations	Acceptable	Recent site investigations	Acceptable	No historic or recent site investigations.	Acceptable	Recent site investigations	Acceptable
Hydrogeological conditions	Seepage reporting through facility in one direction can be monitored and managed	Acceptable	Seepage could potentially report in two directions to different catchments	Least preferred	Seepage could potentially report to Finlayson and Geona Creek	Least preferred	Seepage would be constrained to the Geona Creek valley, and can be monitored and managed	Acceptable
Dam requirements	Dam required in perpetuity	Acceptable	Dam required in perpetuity	Acceptable	No dam	Preferred	No dam	Preferred
Water management	Site water managed within the tailings facility with pond required in perpetuity for ARD management	Acceptable	Site water managed within the tailings facility with pond required in perpetuity for ARD management	Acceptable	Separate water management pond required (no pond on tailings facility)	Preferred	Separate water management pond required (no pond on tailings facility)	Preferred
Result	Acceptable		Least preferred		Least preferred		Preferred	

NOTES:

- Results were determined by ranking candidates that achieving no "least preferred" scores and the most "preferred" scores.

Table 4.4 Project Economic Impacts

Criteria	Candidate 1		Candidate 7		Candidate 10		Candidate 12	
	Details	Rating	Details	Rating	Details	Rating	Details	Rating
Tailings technology	No additional processing after mineral extraction, slurry pumped to nearby facility	Preferred	No additional processing after mineral extraction, slurry pumped to nearby facility	Preferred	Tailings filtered, hauled 7 km, placed and compacted	Acceptable	Tailings filtered, hauled 0.3 km, placed and compacted	Acceptable
Short-term closure requirements	Monitoring required until water quality meets discharge requirements	Acceptable	Monitoring required until water quality meets discharge requirements	Acceptable	Monitoring required until water quality meets discharge requirements	Acceptable	Monitoring required until water quality meets discharge requirements	Acceptable
Long-term closure requirements	Dam safety inspections required in perpetuity	Acceptable	Dam safety inspections required in perpetuity	Acceptable	None	Preferred	None	Preferred
Result	Acceptable		Acceptable		Acceptable		Acceptable	

NOTES:

- Results were determined by ranking candidates that achieving no "least preferred" scores and the most "preferred" scores.

5 – CONCLUSIONS

This preliminary tailings management alternatives assessment began with thirteen candidates, which were developed using threshold criteria. The thirteen candidates were then reduced to four final candidates based on pre-screening criteria. The final four candidates included two slurry tailings options located in valleys, and two filtered tailings options located on hillsides. The assessment indicates Candidate 12 is the preferred option for tailings management, as it received the best overall rating of the four remaining alternatives.

Table 5.1 summarizes the results of the environmental, technical and economic ratings:

Table 5.1 Results of Alternatives Assessment

Category	Candidate 1 Slurry Tailings Geona Creek	Candidate 7 Slurry Tailings East Valley	Candidate 10 Filtered Tailings Exploration Camp	Candidate 12 Filtered Tailings Western Hillside
Environmental	Least preferred	Least preferred	Preferred	Preferred
Technical	Acceptable	Least preferred	Least preferred	Preferred
Project Economics	Acceptable	Acceptable	Acceptable	Acceptable
Result				<i>Preferred</i>

Candidates 10 and 12 (filtered tailings options) do not include any permanent structures in Geona Creek, do not cause long-term impact to fish habitat, and allow for complete re-establishment of Geona Creek at closure, therefore both candidates received “preferred” ratings in the environmental category. Candidates 1 and 7 received “least preferred” ratings due to their requirement for permanent water retaining dams.

Candidate 1 achieved “acceptable” scores for all the technical criteria. Candidates 7 and 10 received “least preferred” ratings in the technical category due to the potential risk of seepage reporting in multiple directions. Candidate 12 does not require construction and maintenance of a tailings and water retaining dam in perpetuity and is not anticipated to have challenging seepage conditions, therefore this option received the “preferred” rating overall in the technical category.

All the candidates received “acceptable” ratings in the project economics category.

Overall, after achieving “preferred” rankings in the environmental and technical categories, this assessment indicates Candidate 12 is considered to be the preferred location for tailings and waste rock management based on this preliminary assessment.

6 – REFERENCES

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7 – CERTIFICATION

This report was prepared and reviewed by the undersigned.

Prepared:

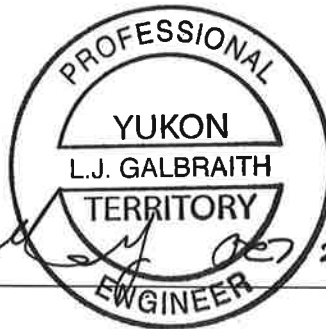


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Reviewed:


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Approval that this document adheres to Knight Piésold Quality Systems:



APPENDIX A

COMINCO ALTERNATIVES ASSESSMENT FIGURES

(Pages A-1 to A-3)



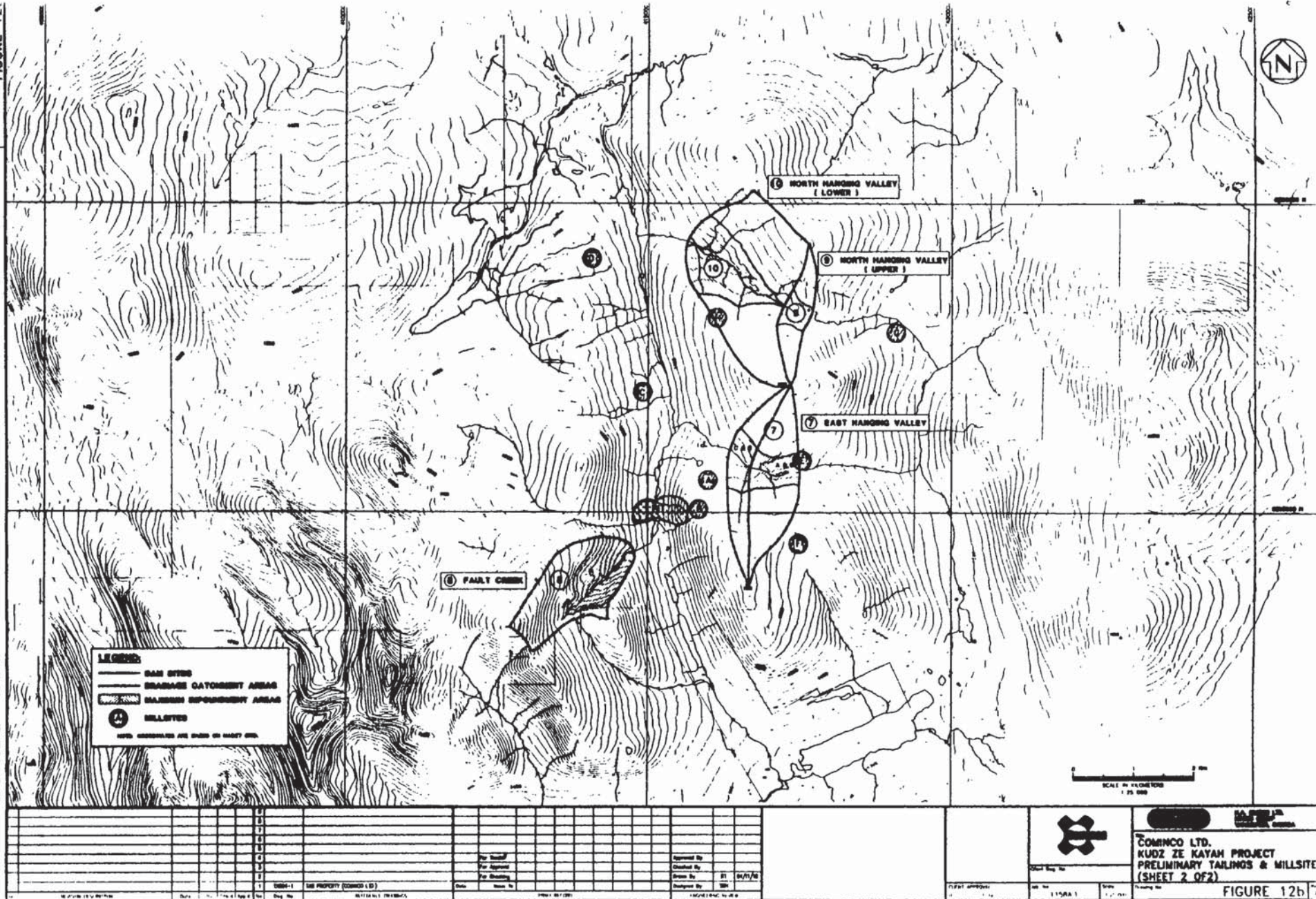


TABLE 2.1
IMPOUNDMENT SITE STATISTICS

Site	Catchment Area (ha)	5 million m ³ Storage				33 million m ³ Storage			
		Dam Height (m)	Dam Volume million (m ³)	Ratio	Rank	Dam Height (m)	Dam Volume million (m ³)	Ratio	Rank
1a	2,404	37	1.0	5.0	4	73	8.7	3.8	4
1b	2,262	35	0.7	7.1	1	71	7.0	4.7	2
1c	1,593	40	0.9	5.6	3				
1d	1,360	40	1.0	5.0	4				
2	766	31	1.0	5.0	4	63	7.5	4.4	3
3	2,134	32	0.7	7.1	1	64	4.5	7.3	1
4	3,061	40	1.5	3.3	7	77	10.5	3.1	6
5	2,685	44	1.6	3.1	8	83	10.0	3.3	5
6	141	27	2.4	2.1	9				
7a&7b	160	46	4.0	1.3	12				
7c&7d	256	42	3.5	1.4	11				
8	194								
9	69								
10	384	50	3.0	1.7	10	104	27.0	1.2	7

- Notes:
- Preliminary volumes were based on 25 m contour intervals.
 - Sites 8 & 9 were excluded due to extremely low storage ratios.
 - Sites were excluded from the 33 million m³ case due to insufficient volume.
 - Ranking based on storage ratio only.