

Adequacy Review Report

Information Request No. 2

Project Assessment 2017-0083

**BMC Minerals Inc.
Kudz Ze Kayah Mine**



August 4, 2017

Prepared by
Executive Committee
Yukon Environmental and Socio-economic Assessment Board

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TABLE OF CONTENTS

1.0 Introduction 2
 Acknowledgements 2
 Summary of Adequacy Review Approach 4
 2.0 First Nations and Community Consultation 5
 3.0 Project Location 5
 4.0 Project Description 5
 Waste Rock 5
 Tailings Technology 5
 Conceptual Closure and Reclamation Plan 7
 Open Pit and Underground Mining 10
 5.0 Effects Assessment Methods 13
 6.0 Air Quality 13
 7.0 Noise Levels 13
 8.0 Surface Water Quality and Quantity 14
 Waste Rock and Tailings Management 14
 Water Management 16
 Future Acidic Conditions at Closure and Post-closure 21
 Constructed Wetland Treatment Systems 22
 Surface Water Quality and Quantity 23
 9.0 Groundwater Quality 27
 10.0 Aquatic Ecosystem Resources 28
 11.0 Terrain and Soils 32
 Access Road and Mine Site Terrain Analysis 32
 12.0 Vegetation Cover and Composition 34
 13.0 Wildlife and Wildlife Habitat 34
 Caribou 36
 Moose 41
 Grizzly and Black Bears 42
 Other Wildlife Species 43
 14.0 Heritage Resources 46
 15.0 Socio-economic Effects Assessment 46
 16.0 Effects of the Environment on the Project 48
 17.0 Malfunctions, Accidents, and Unplanned Closure 49
 18.0 Conceptual Management Plans 50
 19.0 Summary and Conclusions 50

1.0 INTRODUCTION

The Executive Committee has reviewed the supplementary information provided for the “Kudz Ze Kayah Mine Project” submitted by BMC Minerals on June 30, 2017 in response to the Adequacy Review Report. The Executive Committee has determined that the response does not sufficiently address all of the deficiencies identified in the Adequacy Review Report. This Adequacy Review Report (Information Request No. 2) includes requests for supplementary information that is still required. In areas where the information was not provided the Executive Committee has reiterated the original information request. In other areas where partial responses were provided, additional information has been requested as follow-up or for clarification.

A proposal is deemed adequate if the Executive Committee determines the proponent:

- has consulted with first nations and the residents of communities in accordance with subsection 50(3) of the *Yukon Environmental and Socio-economic Assessment Act* (Act);
- has taken into account the matters referred to in paragraphs 42(1)(b),(c) and (e) to (h) of the Act;
- contains sufficient information to enable the Executive Committee to prepare a statement of the scope of the Project under s. 34 of the *Executive Committee Screening Rules*;
- contains sufficient information to enable the Executive Committee to commence the screening; and
- complies with the applicable rules.

The *Screening Rules* provide the proponent up to 180 days to either submit the requested supplementary information or to advise the Executive Committee in writing when it will be submitting the supplementary information. All supplementary information must be provided to the Executive Committee within two years from the date the proposal was submitted to the Executive Committee. The form and content of the supplementary information submission should comply with all applicable Rules and requirements of the Board, including the general filing requirements.

For questions or comments regarding this report, please contact Daniel Beaudoin, YESAB Senior Assessment Officer assigned for this Project, by telephone at 867-668-6420, by email at daniel.beaudoin@yesab.ca, or in person at Suite 200 – 309 Strickland Street, Whitehorse, Yukon, Y1A 2J9.

Acknowledgements

The Executive Committee invited comments on the adequacy of the Project proposal and supplementary information from various First Nations, Decision Bodies, and regulators including:

- Ross River Dena Council
- Liard First Nation
- Government of Yukon
- Environment and Climate Change Canada
- Indigenous and Northern Affairs Canada
- Northern Projects Management Office
- Fisheries and Oceans Canada
- Transport Canada
- Natural Resources Canada

Table 1 lists input the Executive Committee received from parties invited to participate in the adequacy review of the proposal. The Executive Committee has considered this input when preparing this Adequacy Review Report.

Table 1: Input received from external parties

Party	Document Description	YOR Document #
Health Canada	Health Canada – Input on Supplementary Information	2017-0083-210-1
Environment and Climate Change Canada	Environment and Climate Change Canada – Input on Supplementary Information	2017-0083-211-1
Government of Yukon	Government of Yukon – Input on Supplementary Information	2017-0083-208-1
Transport Canada	Transport Canada – Input on Supplementary Information	2017-0083-209-1

In addition, to support the adequacy review of the supplementary information the Executive Committee retained four independent consultant teams to undertake a technical review of select components as listed in Table 2. Consultants in their respective knowledge areas were requested to review relevant sections of the supplementary information, identify if the responses were sufficient or not, and provide rationale where responses were deemed inadequate. Where the provided information led to additional questions, these were to be identified by the consultants.

As a result of their review, consultants provided the Executive Committee with memorandums focused on the adequacy of information. The Executive Committee considered the technical memorandums in preparing this Adequacy Review Report – Information Request No.2.

Table 2: Consultants retained by the Executive Committee

Knowledge Area	Independent Consultant
Hydrology and aquatic resources	EcoMetrix Inc.
Wildlife and wildlife habitat	SLR Consulting (Canada) Ltd.
Engineering design and geotechnical considerations	SNC Lavalin Inc.
Socio-economic considerations	EEM Inc.

Summary of Adequacy Review Approach

The Executive Committee developed this information request based on its review of the supplementary information provided, memoranda from consultants, and input from decision bodies as identified in Tables 1 and 2 above. The four technical memorandums from the Executive Committee’s consultant teams and comments from Decision Bodies and regulators have been uploaded to the YESAB Online Registry (YOR). The Executive Committee took into consideration all information provided by Decision Bodies, regulators and its consultant teams in determining whether the supplementary information provided by BMC was sufficient.

This Adequacy Review Report – Information Request No.2 follows a similar format as the first Adequacy Review Report – indicating the original information request, a description of the issues, and supplementary information requests with rationale. Many requests from the first Adequacy Review Report have been reiterated because the response provided by BMC was insufficient. In other cases, information provided by BMC provided a partial response or requires additional clarification. In these cases, additional follow-up requests with rationale have been requested.

Request for Supplementary Information

ARR No. 1 Request	Issue	Information Request and Rationale
2.0 FIRST NATIONS AND COMMUNITY CONSULTATION		
No information required		
3.0 PROJECT LOCATION		
No information required		
4.0 PROJECT DESCRIPTION		
Waste Rock		
	The tables provide a summary of sample numbers relative to geodomain, anticipated waste tonnage, and static test types / numbers. It is not clear that these tables incorporate KZK Formation (host to significant Volcanogenic Massive Sulphide (VMS) mineralization) geodomains since the rock codes vary from those presented on page 5 describing KZK geology and geodomains.	R2-1. Clarify if KZK Formation rocks are represented in Tables 4-1 and 4-2 and/or the apparent discrepancy in geodomain rock coding between these tables and the text description on page 5.
	It is not clear whether samples listed for Krakatoa Zone in Tables 4-1 and 4-2 are exclusive to the Krakatoa open pit development or also include samples from underground development.	R2-2. Clarify the representation of Krakatoa underground samples by geodomain and expected waste tonnages.
Tailings Technology		
R278	A project risk assessment with an FMEA will demonstrate that a systematic review of the mine development has considered potential hazards and assessed the risk to the development, health and safety and the environment. At this level of development the assessment and FMEA will be high level but will examine the more significant risks with the most potential for harm. YESAB require evidence that the systematic review has occurred and that the primary hazards have been identified, classified and appropriate mitigations assigned.	R2-3. Provide a risk assessment for mine waste management facilities including a failure modes effects analysis. Insufficient response: A risk assessment is recommended at this stage of the project for mine waste management which can be further optimized and revised at the detailed design stage. The assessment can provide an understanding of the key risks in the current plan and how they can impact the success of the plan.

ARR No. 1 Request	Issue	Information Request and Rationale
R21, R22	<p>Chapter 4, Section 4.16.2 (page 4-148) states, “...as this has been successfully implemented at a number of mines already, BMC does not believe that the required operational practices will be unreasonable to implement and maintain”.</p> <p>Filtration technology is widely used in arid environments, where water recycling is critical, and also for places with difficult foundation conditions for the tailings storage facility design. There are particular challenges to implement this technology in a northern climate; the Proponent referenced Greens Creek Mine in Alaska, often referred as a successful dry stacking facility in a northern climate; however, it took many years of operation and learning to develop feasible operational practices at Greens Creek Mine.</p>	<p>Insufficient response: The Proponent provides a conceptual response on how there are lessons learned and knowledge gained from the Greens Creek and Pogo Mine operations; however, there is no detail on the elements of tailings management and environmental mitigation that will be incorporated as a part of this project and why these elements may have been chosen.</p> <p>R2-4. Provide the conceptual tailings management plan and demonstrate how it has addressed issues that have arisen at other mine sites (e.g., Greens Creek and Pogo Mine.)</p> <p>R2-5. What mitigation strategies or alternatives have been considered in the event that the operation of the KZK mine cannot consistently meet design output?</p> <p>Insufficient response: The expectation of the proponent is not to “summarize 30 years of advances in knowledge” in the areas of filter tailings management. Rather it was to understand what realistic steps and approaches had been planned to incorporate some of the learning. This could include engaging internationally recognized experts on filter tailings management (this is already done by the proponent), set up a framework of communications with one or more successful mines (such as Greens Creek) to share knowledge and learning, carry out study/test plots to identify project specific operational challenges and develop mitigations options, etc.</p> <p>The Proponent speaks to plans that are not filed as a part of the application, further underlining the need for EA reviewers to review said plans in order to satisfy the intent of the information request.</p> <p>R2-6. Provide the Mill Development and Operations Plan.</p> <p>R2-7. Does the proponent have any additional plan to incorporate operational learning other than what has been completed already (i.e. engaging external experts)?</p>
R23	<p>A target of 15% moisture content for filter tailings appears reasonable and may have been set based on the success achieved at other metal mines.</p>	<p>R2-8. Demonstrate why a target of 15% moisture content for filter tailings is realistic for this project and can be maintained.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
		<p>Insufficient response: It has not been demonstrated how the target of 15% moisture can be achieved or what measures will be used to ensure this target can be consistently reached .</p>
<p>Conceptual Closure and Reclamation Plan</p>		
<p>Final Landform Design for Waste Storage Facilities</p>		
<p>R25</p>	<p>The submission proposes progressive construction of a closure cover system over each of the storage facility landforms as areas of the stockpiles reach their final design elevation. The cover system designs vary depending on the level of net percolation reduction required which is based on the results of downstream water quality modelling; however, each cover system design includes an upper 0.3 m thick growth media layer, comprising a mixture of local topsoil and glacial till materials, to support growth of a sustainable cover of native plant species. Until the vegetation covers mature, the growth media layer will be susceptible to erosion, particularly for longer and steeper slopes and on larger terrace footprints (i.e., from slope catchments above the terrace during contributing to run-on from spring freshet and storm events).</p>	<p>Insufficient Response: The Proponent notes that risks associated with increased gully erosion on the Class A, B and C Storage Facilities will be mitigated through the inclusion of benches to reduce the length of the overall slope. The Proponent further states that this design concept is commonly used for reducing the potential for gully erosion and has become accepted practise throughout the mining industry.</p> <p>Benches with lateral drainage channels are prone to failure over the long term due to blockages from either sediments eroded from upslope areas (Hancock et al., 2003)¹, overgrown vegetation or fallen trees, or glaciation (the accumulation of snow and ice) (MEND, 2012)². Blockages within the bench drainage channels will lead to ponding and ultimately higher seepage through the spent heap leach material. Blockages within the bench drainage channels may also lead to overtopping and channelling of water in concentrated flow paths onto lower slope areas, leading to severe gullying and damage to the closure cover systems (see Ayres <i>et al.</i>, 2006 and in particular, the Whistle Mine backfilled pit final landform design)³.</p> <p>A benched final landform design for the Waste Storage Facilities represents a landform that is highly engineered and does not mimic natural slopes; natural slopes are characterized by a variety of shapes with drainage systems following natural drop lines and catchment sizes defined by undulating relief on the slope.</p>

¹ Hancock, G.R., Loch, R.J. and Willgoose, G.R.. 2003. The design of post-mining landscapes using geomorphic principles. *Earth Surf. Process. Landforms*, v. 28, p.1097-1110.

² [MEND] Mine Environment Neutral Drainage. 2012. Cold Regions Cover System Design Technical Guidance Document. Report No. 1.61.5c., July.

³ Ayres, B., Dobchuk, B., Christensen, D., O’Kane, M. and Fawcett, M. 2006. Incorporation of natural slope features into the design of final landforms for waste rock stockpiles. In Proceedings of the 7th International Conference for Acid Rock Drainage, St. Louis, MO, USA, March 26-30, pp. 59-75.

ARR No. 1 Request	Issue	Information Request and Rationale
		<p>The Proponent also states that the upper terraces will be graded to a slope of 2% to convey water at a reduced velocity and reduce ponding water. The direction of the 2% slope on the upper terraces is unclear (i.e. whether it is forward or back sloped to the crest). The catchment sizes for the upper terraces are relatively large, ranging from 16 ha for the Class B Facility to 93 ha for the Class C Facility.</p> <p>R2-9. Clarify the overall direction of the planned 2% slope on the upper terraces and in particular, will incident precipitation waters be allowed to flow in an uncontrolled manner over the crest and onto the upper reaches of the reclaimed slopes?</p> <p>R2-10. Provide further details on the planned final landform design for each of the Waste Storage Facilities and in particular, how a benched final slope profile will limit long-term liabilities in terms of maintenance requirements and sustainability of the low-infiltration cover systems.</p>
Cover System Design for Class A and B Waste Storage Facilities		
R31	The designer anticipates that a substantial portion of the estimated “runoff” for both cover systems will be diverted as interflow, not surface runoff. There is no indication of the estimated volume of interflow and, more importantly, how interflow waters will be managed to prevent excessive build-up of pore-water pressures (and potential softening or ponding) near the toe of the reclaimed facilities.	<p>R2-11. What is the differentiation between “surface runoff” and “interflow” volumes in the mean annual water balances completed for each waste storage facility cover system?</p> <p>Insufficient response: Proponent has not provided the requested breakdown between “surface runoff” and “interflow” volumes.</p>
R33	Higher or lower evapotranspiration will affect the predicted net percolation rate, which ultimately affects seepage rates from base of the waste storage facilities.	<p>R2-12. How will higher or lower evapotranspiration rates from the 30 % estimate affect seepage rates from the base of the waste storage facilities and what are the implications to stability and water management?</p> <p>Insufficient response: Given the uncertainty in estimation of PET and the assumption and use of a factor of 0.5 to convert PET to AET, the response to R33 should be in a more quantitative manner with a breakdown in water balance component volumes for various conditions (i.e., mean, dry wet). This will provide a better understanding of potential seepage rates from the base of the waste storage facilities. It is noted that landform and cover design will affect the factor assumed to convert PET to AET.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
		<p>R2-13. As per R30, provide documentation related to the statement that “a factor of 0.5 gives 180 mm per year which is within the reasonable range of estimates based on estimates for the region in the 200 mm range”. In addition, it is noted that the factor of 0.5 was derived as part of the baseline hydrometeorology study. Justification is required for use of the factor of 0.5 for the cover system design.</p>
Long-term Physical Integrity of Cover System Reduced Permeability Layers		
R37	<p>The Class A and B facilities’ cover system designs incorporate a reduced permeability layer. If the underlying foundation materials or stockpiled waste undergoes differential settlement, then the potential exists for cracks and other defects to develop in the reduced permeability layers. This may lead to substantial increases in net percolation rates into the waste. As well, geosynthetic products have a finite service life due to various factors that cause geosynthetic fibres to age or deteriorate over time. The submission does not indicate the required longevity of the geosynthetic liner proposed for the Class A Storage Facility cover system.</p>	<p>R2-14. Describe how the cover system will be monitored to ensure it continues to achieve design objectives. Describe mitigative measures or alternatives that may be implemented in the event that the cover system is not performing as expected.</p> <p>Insufficient response: The proponent did not address long-term performance of the class A and class B facilities’ cover designs.</p> <p>R2-15. Describe the performance measures for the class A and class B facilities’ covers that will be assessed during operations to ensure performance in the long term?</p>
R279	<p>Section 9 of the CRCP includes a preliminary closure liability estimate, MRB would like to note that the estimate provided is not consistent with the 2013 guidance document prepared by Yukon government (YG) and the Yukon Water Board entitled “Reclamation and Closure Planning for Quartz Mining Projects.” Specifically the estimate does not provide for indirect costs such as reclamation research, engineering design, interim care and maintenance and other costs associated with the development of closure plans. Given the uncertainty surrounding the waste disposal methods and treatment of impacted water, it is important for the proponent to give full consideration to the costs associated closure plan development and implementation.</p>	<p>R2-16. Provide an updated Conceptual Reclamation and Closure Plan demonstrating that the mine site will remain chemically and physically stable in the long-term using proven technologies demonstrated to work in northern climates.</p> <p>Insufficient response: In response to R279, the proponent has not provided adequate information to demonstrate the long-term stability of the mine site. As with other mine sites in Yukon, a reclamation and research program will be required as a part of closure planning, this will include the need for demonstration scale testing to be conducted, and until the test plots demonstrate that the flow rates and contaminant loads can be adequately treated, alternative treatment technologies will be required. Without sufficient testing, it is not possible to determine whether or not this treatment technology will be sufficient for the site conditions and if another alternative is required. Until a pilot scale study supports the outcomes predicted, alternative treatments must also be considered in the assessment. The Yukon Mine Site Reclamation and Closure Policy does support the</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
		<p>use of new technologies as long as they are supported by “feasibility assessments showing technical and economic viability in Yukon”, as the water quality objectives of the site are not known, and the wetlands have not been tested in the field this condition has not been met.</p> <p>The proponent has stated, “closure costs have little if any bearing on assessing effects of a project, beyond the insolvency on the part of a proponent.” Given the long-term implications and the uncertainties with waste management and water treatment, some estimation should be provided for the expected costs of temporary closure, permanent closure, and care and maintenance. This is important in the adequacy stage to be able to understand if financial security is a reasonable mitigative measure or whether it is so large as to be unreasonable. MRB understands the costs will not be exact, but are estimated based on the reclamation and closure methods being assessed, and should include costs for temporary closure, permanent closure, and post closure long term care and maintenance.</p> <p>R2-17. Provide the following information in relation to the Conceptual Reclamation and Closure Plan:</p> <ol style="list-style-type: none"> a. A timeline for the implementation of the Constructed Wetland Treatment System (CWTS) using updated water quality objectives and predictions from the additional kinetic tests mentioned in R81 and R106; b. Alternative closure approaches for the Kudz Ze Kayah site, demonstrating long-term chemical and physical stability, as an alternative to CWTS; c. An updated closure liability estimate including costs for temporary closure, permanent closure, and care and maintenance costs in perpetuity. Costing should include periodic maintenance and repair costs as well as monitoring costs.
<p>Open Pit and Underground Mining</p>		
<p><i>Open Pit</i></p>		

ARR No. 1 Request	Issue	Information Request and Rationale
R38	<p>In Section 4.6.2.1, a minimum 5 m wide bench at the pit crest is proposed to catch any material raveling down the pit wall slopes. The proposed bench width is very narrow. The rationale behind the selection of this bench width is not clear, and it is not clear that this will be sufficient to minimize the risk of rock fall to an adequate level.</p>	<p>R2-18. Provide the rationale for selecting a 5 m wide bench and any relevant numerical analysis confirming the adequacy of the bench width.</p> <p>Insufficient response: Proponent failed to provide any reference to justify this ‘minimum’ bench width. It was stated in their response that the minimum bench width is ‘fairly standard minimum and is in accordance with custom & practise internationally in small circumferences and relatively shallow pits such as ABM and Krakatoa.</p> <p>It is worth nothing that the minimum bench width is proposed to be 7 m in “Guidelines for Open Pit Slope Design (Read and Stacey, 2009). Moreover, and as another example, the minimum bench face is 8 m in British Columbia (Health, Safety and Reclamation Code for Mines in British Columbia, 2017).</p> <p>R2-19. The minimum bench width should be justified by widely accepted engineering references or numerical modelling. It is recommended to use the higher estimate in this level and then justify a narrower bench with more detailed method rather than the opposite.</p>
R39	<p>Golder Associates (January 26, 1996) stated in its Executive Summary that “groundwater levels are generally high and follow the topography, with some of the holes in the valley floor exhibiting artesian flow”. In the Mine Dewatering section, the report stated that additional drain holes will also be required to investigate the potential for artesian pressure in the south wall.</p>	<p>R2-20. Provide additional information related to rock characteristics and the potential for artesian conditions. Provide any additional detailed plans that are available and if they are not, describe the future investigations that will occur to check rock characteristics and artesian conditions.</p> <p>Insufficient response: Future investigations were not described.</p> <p>R2-21. Describe investigations that will provide information on rock characteristics and artesian conditions.</p>
Underground Mining		
<i>In-Situ Stresses and Possible Failure Mechanism</i>		
R49, R50, R51	<p>Section 3.4 states, “for the purpose of the underground mining at Krakatoa, the major and intermediate stresses are assumed to be 2.5 and 1.5 times the vertical stress respectively (Martin et.al. 2003).” It is correct that in Canada the horizontal</p>	<p>R2-22. What are the expected potential failure mechanisms (both structural failure and stress-induced)?</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
	<p>stress is greater than vertical stress. However, it should be noted that Martin et al. is based on their investigation at the Underground Research Lab (URL) located in Manitoba.</p> <p>Potential failure mechanisms such as structurally controlled failure (i.e., wedge failure) and stress-induced failure (i.e., spalling and slabbing) have not been discussed in the Rockland report.</p> <p>The in-situ horizontal to vertical stress ratio will be the input for the underground mine design, support design, excavation geometry, potential failures (progressive or sudden) and other considerations. This information is normally obtainable by in-situ tests such dilatometer tests or plate load tests.</p>	<p>R2-23. How have the outlined mitigation measures accounted for the potential scenario where assumptions made in the preliminary design are non-conservative?</p> <p>R2-24. What are the gaps in information and what is the plan for addressing these gaps for the detailed design and operations?</p> <p>Insufficient response: The proponent did not provide answers. Some of the gaps, as described in R51, are proposed to be deferred to a later stage.</p> <p>The proponent referred to Rockland report Section 8 where it is stated that “in the next stage of assessment, a dedicated geotechnical drilling program will be planned in order to obtain representative geotechnical information across the main lenses and where other important infrastructure such as the ramp will be located underground”. As per our initial reviews, there are no robust geotechnical findings provided in the Rockland report that explicitly address the anticipated challenges in open pit or underground design and operations. The Rockland report refers to future additional investigation, in line with the response provided by the proponent. However, the requested items are a crucial part of any investigation even at preliminary stage and SNC-Lavalin believes they should be addressed prior to permitting stages.</p>
<i>Support Design</i>		
R287	<p>Transportation Engineering Branch also reviewed the information provided on the proposed upgrades to the airstrip and has identified that further, more detailed information on the proposed design, and how it relates to the surrounding terrain, is required. As indicated in the project proposal, HPW previously considered options for upgrading this airstrip. From this exercise HPW is aware that the surrounding terrain (e.g. close proximity to the lake), the location of the road, and the availability of materials for upgrading present challenges to the design, cost and feasibility of potential upgrades.</p>	<p>R2-25. Provide confirmation that the airstrip can be upgraded in accordance with specific design requirements as set out by the appropriate regulations and by Government of Yukon. Or provide an alternative for transportation to the mines site.</p> <p>Insufficient response: In their response, the proponent has stated that because of the remoteness of the airstrip and because the current usage of the airstrip is “minimal,” they do not believe any upgrade considerations will need to accommodate other aircraft or design components (e.g. apron) to allow for passengers, or the loading/unloading of aircraft. However, review of this response by the Aviation Branch has indicated that this information does need to be considered and incorporated into their design considerations for airstrip upgrades. The Aviation Branch has indicated that there is the need for this design consideration for the following reasons:</p>

ARR No. 1 Request	Issue	Information Request and Rationale
		<p>Breakdowns – Aircraft can break down or get grounded for other reasons, so there is a need for apron space to accommodate two 18-passenger aircraft. This includes space for the original aircraft that is grounded and additional space for another 18-passenger aircraft that needs to be flown in to pick up the stranded passengers.</p> <p>Cargo handling space – Aircraft need to be off the runway in order to have cargo loaded and unloaded, and there needs to be adequate space for delivery trucks to move safely around the aircraft.</p> <p>Multiple users of the site - More than one air carrier uses the Finlayson Airstrip, so if BMC's 18-passenger aircraft is parked on the apron, there needs to be adequate space for another carrier's plane to park on the apron.</p> <p>Furthermore, because this is an airstrip under the jurisdiction of the Yukon government, any upgrades being undertaken by the proponent will need to meet the specific design requirements (e.g. an apron as indicated above) as set out by the appropriate regulations and by Yukon government. The proponent does not have the authority to rationalize or make a determination as to which upgrades may or may not be required or undertaken. To date, the proponent has not had detailed discussions with either the Transportation Engineering Branch or the Aviation Branch about the details, requirements and considerations for upgrading the airstrip to the level of service that they are proposing.</p>
5.0 EFFECTS ASSESSMENT METHODS		
No information required		
6.0 AIR QUALITY		
No information required		
7.0 NOISE LEVELS		
No information required		

ARR No. 1 Request	Issue	Information Request and Rationale
8.0 SURFACE WATER QUALITY AND QUANTITY		
Waste Rock and Tailings Management		
R82	<p>The most critical deficiency in this assessment of water quality was the absence of acidic drainage estimates in the water quality modelling for post closure conditions. The use of the leach test results for neutral conditions represents a deficiency for water quality predictions over the long term. This also has implications for the proposed use of passive treatment with engineered wetlands after closure.</p> <p>It was acknowledged in the geochemical assessment that the PAG waste rock and tailings, in the Class A stockpile, and the waste rock in the Class B stockpile will produce acid in the future. The depletion of the neutralization potential will result in times to onset of acid drainage that are expected to be after the proposed mine closure period. Nonetheless, the PAG materials will eventually produce acid drainage even though the drainage will be mitigated to some extent by lower infiltration covers. The significance of the acid drainage is that the low pH will be accompanied by increased loadings, and concentrations, of many metals and other constituents that can adversely affect water quality. Although mitigation of the stockpiles by limiting infiltration with covers is planned, the increased concentrations and loadings associated with acid conditions compared to those predicted for neutral pH in this assessment will result in increased loadings and concentrations in the residual drainage from the covered piles. This will increase the loadings and concentrations requiring mitigation post closure. The acidic drainage with higher concentrations than those in the neutral drainage may not be treatable in a passive engineered wetland system.</p>	<p>Insufficient response: While the concentrations of many constituents of potential concern have been predicted for acidic conditions in the Class A and Class B stockpiles as well as the pit wall drainage, the pH of the site water has not been provided. In addition, iron that has a large loading rate as shown in table 8-1, was not shown or discussed in the predicted concentrations plots. The iron in the acidic drainage will be important because it represents a source of acidity and may affect the final pH of the receiving waters as the iron oxidizes and precipitates as ferric hydroxide.</p> <p>R2-26. Present the results for predicted iron concentrations as well as the pH of the receiving waters in the post closure period.</p> <p>R2-27. Clarify if the predicted concentrations at KZ-37 include any assumed mitigating effects from the proposed wetland treatment system and, if so, provide the untreated concentrations as well.</p>
R289	<p>The Class A facility is predicted to be net acid generating within the mine life, while the Class B facility is expected to be net acid generating during the closure period. As such, seepage collection from these facilities is required to ensure protection of both surface and ground water resources. It is unclear however how the proponent</p>	<p>R2-28. Demonstrate that the proposed liner system will be sufficient to direct seepage from the Class A and Class B facilities to the seepage collection ponds for treatment. This should be demonstrated for both the operational and closure facilities.</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
	<p>has tested the proposed liner system to ensure that all seepage from the facility will be collected.</p>	<p>Insufficient response: In response to R289, the proponent did not provide adequate information to demonstrate the effectiveness of the liner systems beneath the Class A and Class B waste management facilities. BMC should provide additional information to demonstrate that the compacted till layer will be sufficient to act as a low permeability foundation layer, and that all seepage will be directed to the collection ponds. (See new information requests above)</p> <p>The proponent has described the collection system and methods during operations when pumping from the sumps to the ponds will be active. There was no discussion of the post closure period after active pumping ceases. This is an important issue because the natural groundwater flow post closure (Figure 9-3 in response R138) clearly shows that all seepage from the Class A facility, without pumping, will bypass the lower water management pond that will be developed into the North Wetland Treatment system.</p> <p>R2-29. Clarify if the proponent intends to have active pumping in perpetuity after closure or if there will be other mitigation of the acidic seepage from the Class A facility.</p>
R86	<p>The data suggest that the predicted selenium concentrations and/or loading rates associated to drainages from the stockpiles may be substantially underestimated.</p> <p>Data provided in Appendix D-7 and Section 6.2.2.1 of the proposal show that the selenium leaching rates for waste rock are a function of the selenium content in the solids, a phenomenon that is observed at other mines, and indicates that a further assessment of selenium content in the mine rock is warranted.</p> <p>Other results from the test program also suggest that selenium will be high in drainage from the tailings. The results of the field barrel tests as shown in Section 5.2.1.3 also indicate elevated concentrations of selenium in drainage.</p> <p>Also, It was not clear whether the results from the tailings leach tests that included the humidity cell HC-3 and column test C-10 were used to estimate loading rates from the Class A storage facility that will contain the tailings along with the high sulphur waste rock.</p>	<p>R2-30. Reconsider, and update if necessary, the predicted selenium concentrations in the context of water treatment technology that will be used and the effects on selenium removal during operations.</p> <p>Insufficient response: While treatment options are discussed in greater detail (Appendix 4 in Response document) than in the Project Description, there was no resolution of the management of the ion exchange and RO waste streams that were identified as 5% and 21% of the original treated volumes, respectively. Although there was discussion of reducing volumes of residual in the RO system, it is clear that there will be a need for residual management. In Appendix 4, there is reference to KZK being able to “manage up to 7.5 m³/hr (180 m³/day) of reject”. That is only 3% of the average annual treatment flow of about 6,000 m³/day or less than 1 % of the maximum treatment flow of about 19,000 m³/day in the month of June.</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
		R2-31. Describe how the residual waste streams from ion exchange and RO treatment will be managed and update the water quality modelling if some of that residual is returned to the site/mine water system.
Water Management		
R87, R88	<p>The current baseline hydrometric program, as reported in Section 3.1.2.2 of the report, comprised a network of ten flow monitoring installations of which seven were continuous. The information provided in the report for the current baseline hydrometric program is from the end of April 2015 to late March 2016. Data for the continuous flow monitoring installations are available from the end of April 2015 to the Fall of 2015, are within the order of five spot measurements made from the Fall of 2015 through March of 2016, and are used to infer streamflow for that period.</p> <p>Typically, the minimum period considered for collection of baseline hydrometric data to characterize streamflow response is three years. This is required to begin to understand the natural variability of hydrometric data. The hydrometric network coverage is considered good and data collected in the current hydrometric program considered reasonable, however, only eleven months of data are available. The 1995 hydrometric data are considered useful for general information purposes only, as these data are sparse, have gaps, and their quality cannot be confirmed.</p> <p>The limited hydrometric information for the local study is considered an information gap. This information gap is important as results from the hydrometric monitoring program are used to calibrate and verify developed water balance models which are used to make projections related to receiving water quantity and quality. Additional hydrometric monitoring information would be useful to verify the work completed to-date and provide additional confidence in projections.</p> <p>Notwithstanding, it is anticipated this information could be collected through the next project phase and used to further verify developed water balance models and projections related to receiving water quantity and quality</p>	<p>R2-32. Provide a detailed overview of the work planned to collect additional hydrometric monitoring information through the next project phase to further verify developed water balance models and projections related to receiving water quantity and quality.</p> <p>Insufficient response: Proponent has not provided a detailed overview of the work planned to collect additional hydrometric monitoring information.</p> <p>R2-33. Updated hydrometric baseline information, water quality objectives, and water models (e.g., water quality model, site and watershed balance models, surface water flows, etc.) for the site are required to be submitted prior to the Executive Committee drafting the screening report. To develop a reasonable understanding of short-term variability, sampling is required to be conducted and reported on at least two sampling events, including one during low-flow conditions and one during high-flow conditions, for each year in which 5 samples are collected in 30 days.</p> <p>Insufficient response: Proponent did not provide and did not commit to provide the Executive Committee with updated information prior to drafting the screening report. The Proponent has stated they will provide additional information to the Yukon Water Board to meet their obligation during licensing.</p> <p>The Executive Committee requires updated hydrometric baseline information water quality objectives, and water models (e.g., water quality model, site and watershed water balance models, surface water flows, etc.) prior to drafting the screening report. This will ensure that our assessment is conducted on more accurate information for the site.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
<p>R90, R91, R92</p>	<p>A water balance modeling exercise was completed for average, wet, and dry climatic scenarios: average precipitation, 1 in 50 year precipitation, and 1 in 10 year dry precipitation. While it does not seem to be specified in the Water Balance Model Report, we understand that the water balance modeling exercise is for operations at year 10.</p> <p>The water balance modelling exercise does not provide information for all phases of the mine life from construction through operations, and the active, transition, and post closure phases. This is not considered consistent with industry standards and is considered to be an information gap. Typically, through the different phases of mine life there are changes in the volumes of water generated from various sources, and how it is managed and discharged to the environment and these should be accounted for in the assessment.</p> <p>Appendix D-6, s.1.2 Modelling Philosophy. The proponent refers to a Microsoft Excel spreadsheet format developed for the Finlayson Creek watershed model. The proponent should provide a functioning copy of the spreadsheet water balance.</p> <p>The proponent states “The modelling goal was to estimate surface water discharge for mean, 50 year wet and 10 year dry precipitation years”.</p>	<p>R2-34. Update the detailed water balance model for the project site to include all phases of the mine life from construction through operations, and the active, transition, and post closure phases.</p> <p>Insufficient response: Proponent has not provided the requested information. The Proponent’s response refers back to documentation, which was reviewed and provided the basis for the information request. The water balance for the operations phase is based on conditions in the final operational year (Year 10). In addition to Year 10, the water balance modelling exercise should include results separately for Year 1, Year 2, Year 3, Year 4, Year 5, Year 6, Year 7, Year 8, and Year 9 with the water balance set-up to reflect anticipated mine infrastructure for those respective years.</p> <p>R2-35. Provide rationale for return periods used in modeling. In addition, using the updated water balance model, evaluate the following scenarios:</p> <ol style="list-style-type: none"> a. impact of an event, such as the 24-hour design events used in sizing of water management facilities; b. impact of an event such as extreme summer and winter low flows (7Q20 and 7Q10); c. greater than normal snowfall accumulation; and d. shorter and more critical snowmelt durations. <p>Insufficient response: Proponent has not provided the requested information pertaining to evaluation of the identified scenarios. It is important to evaluate additional potential scenarios and how they relate to the site water balance. This will allow a greater degree of confidence in the proposed water management works. As it stands, the water balance model and results are based on evaluation of only three specific scenarios (i.e., mean conditions, dry year, wet year) and associated assumptions.</p> <p>R2-36. Undertake a sensitivity analysis to assess variability of model predictions given variation in key model input parameters and assumptions.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
		<p>Insufficient response: Proponent has not provided the requested sensitivity analysis. We note that it is stated in Section 4.1 of the Water Balance Report (Appendix C-7) “<i>The water balance is sensitive to the input assumptions and the potential variability in the results should be considered when used for planning purposes. The input variables that have the greatest influence on the results are the water management assumptions, the diversion ditch efficiency, and the climatic values.</i>” In this regard, it is important to understand the effect that variation in assumptions related to water balance model parameters will have on water balance model results. This information can be provided by conducting a sensitivity analysis.</p>
R93	<p>No information is provided on the detailed water balance computations illustrating the breakdown of typical water balance components (e.g., storm water, groundwater, seepage, evaporation/evapotranspiration, water management facility operations inclusive of projected pond water levels, and inter-basin water transfers). This information is important in understanding the Project Site water balance.</p>	<p>R2-37. Include summary water balance model computations to the Water Balance Model Report, including the breakdown of typical water balance components, such as but not limited to: storm water; groundwater; seepage; evaporation/evapotranspiration, and; water management facility operations and inter-basin transfers.</p> <p>Insufficient response: Proponent provided a schematic illustrating water balance components but has not provided requested information pertaining to actual values (i.e., volumes) attributed to the various water balance components.</p>
R97	<p>The Surface Water Management Plan (SWMP) is based on a water balance modelling exercise that does not provide information for all phases of the mine life from construction through operations and closure. This is not considered consistent with industry standards and is considered to represent an information gap. Typically, through the different phases of mine life there are changes in the volumes of water generated from various sources, and how it is managed and discharged to the environment and the variation in volumes should be assessed.</p>	<p>R2-38. Update the Surface Water Management Plan as appropriate based on the updated water balance model (requested in R90 of this Report).</p> <p>Insufficient response: Proponent has not provided the requested information. The Proponent’s response refers back to documentation which was reviewed and provided the basis for the information request, and has not provided any water balance model updates.</p> <p>Provided in the Water Balance Model Report (Appendix C-7) is a schematic with the various water balance components. For clarity, we require the annual values be included on the schematic for the various water balance components for the scenarios evaluated (i.e., mean conditions, dry year, and wet year).</p>

ARR No. 1 Request	Issue	Information Request and Rationale
R99, R100	<p>Water management structures include ponds and diversions. While design criteria are provided for the proposed ponds in Table 18-6, no design criteria are provided for the proposed diversions. However, it is noted in Section 4.10.1.1 (Water Diversions and Ditches) of the Proposal that all diversion ditches will be designed to manage a 1 in 200-year flood event. For both the ponds and diversions, no information is provided to assess if the provided volumes/designs are sized sufficiently to manage the stated design criteria or how the overall SWMP functions during the stated design conditions.</p>	<p>R2-39. Provide computations demonstrating that proposed ponds as specified in the Proposal have sufficient storage volumes necessary to meet stated design criteria and safely convey the applicable Inflow Design Flood.</p> <p>Insufficient response: Proponent has not provided the requested information. Detailed information must be provided in order to determine whether the pond, diversion ditches, and spillways are sized sufficiently to manage the stated design criteria. As an example, there is no information related to spillway design (i.e., type and size) to give the Executive Committee confidence that they are appropriately sized to manage the design criteria.</p> <p>R2-40. Provide water balance model computations demonstrating the Site Water Management Plan and proposed water management structures can function, on an overall basis, as intended under stated design conditions for all phases of the mine life.</p> <p>Insufficient response: Proponent has not provided the requested information.</p>
	<p>ECCC notes that contact water from the ditches designed to divert flows around the proposed Overburden Stock pile and Class C Storage facilities is proposed to be discharged directly to Geona Creek at the same location as the non-contact water downstream from the lower water management pond (Figure 1.1 Appendix C-7 Water Balance Model Report). The Proponent states:</p> <p><i>“The Class C Storage Facility is designed to contain Class C material. Class C material is potentially acid consuming and therefore specific ARD management strategies are not required. The Class C Storage Facility is located in a small hanging valley along the east side of the project area. Overburden from the Open Pit excavation will be excavated and stockpiled. Glacial till material will be selectively sourced from the stockpile and used for the low permeability foundation and closure cover layers of the Class A and Class B Storage Facilities, and for construction of the Water Management and Collection Ponds. The stockpile will be located north of the Class C Storage Facility, along the western slope of the project area. The overburden material is not anticipated to be potentially acid generating and therefore specific ARD management strategies are not required.”</i></p>	<p>R2-41. Provide rationale for not diverting contact mine water drained from the Overburden Stock pile and Class C Storage facilities into the water management or treatment facilities.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
	<p>The Proponent should note that the lack of acid conditions does not preclude metal leaching and as a result, contact water from project components should be properly monitored and managed prior to discharge into the environment.</p>	
	<p>ECCC notes that there is no discharge of water from the Lower Water Management pond. It is unclear if the pond will remain in balance with the noted “evapotranspiration” [evaporation], or if there will be overflow and subsequent discharge to the environment. Additionally, the Water Balance Flow Schematic does not indicate any losses to groundwater.</p>	<p>R2-42. Clarify if/when there will be discharge to the environment from the Lower Water Management Pond and identify any losses to groundwater.</p>
<p>R103</p>	<p>It is uncertain if the proposed sediment collection pond volumes as specified in the Proposal have sufficient storage volumes to provide the hydraulic retention time necessary to achieve the design criterion identified.</p> <p>Section 18.6.3.2 of the Proposal states that sediments ponds will be:</p> <p><i>Designed to trap sediment particles of 10 microns in size or larger with flow volumes equivalent to a 1:200 year, 24-hour rainstorm for the Class A and Class B Storage Facilities Collection ponds and 1:10 year, 24-hour rainstorm for the Class C Storage Facilities Collection and Overburden Stockpile ponds.</i></p>	<p>R2-43. Provide computations demonstrating that collection pond volumes as specified in the Proposal have sufficient storage volumes to provide the hydraulic retention time necessary to achieve the stated design criteria.</p> <p>Insufficient response: Proponent has not provided the requested information.</p>
<p>R104</p>	<p>Information provided in Table 16-9 of Section 16.6.1 provides a list of typical high and very high confidence findings related to climate change. However, no analyses related to the water balance analyses have been provided which consider changes in climatic input design assumptions or change in type of design events.</p>	<p>R2-44. Undertake a sensitivity analysis, in support of the discussion of effects and mitigation measures associated with both extreme events and climate change, using the water balance models developed for the Project to obtain an understanding of potential effects on water management structures and discharges strategies with variation in both model input assumptions and type of events.</p> <p>Insufficient response: Proponent has not provided the requested information.</p>
<p>R105</p>	<p>The issue of downstream flow changes associated with the Project, specifically those related to alteration of natural hydrologic flow regime and associated impacts on downstream erosion, stream morphology and riparian vegetation may not have been assessed.</p>	<p>R2-45. Provide an assessment of impacts associated with the Project on erosion, stream morphology and riparian vegetation of all affected drainages from projected downstream flow changes during all Project phases.</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
		<p>Insufficient response: Proponent has not provided the requested information. The response provided is qualitative. Statements have been made addressing the Information Request, however, no information has been provided substantiating the statements. The Proponent should provide an erosion assessment that considers key factors which affect erosion and sedimentation processes. For instance, average permissible velocities could be identified for reaches (sections) of affected watercourses, and an assessment made on whether average permissible velocities would be exceeded and if they are already being exceeded what would be the increase in duration of exceedance. Based on the results of the above, an evaluation could be made on associated impacts on downstream erosion, stream morphology, and riparian vegetation.</p>
<p>Future Acidic Conditions at Closure and Post-closure</p>		
<p>R106</p>	<p>The mitigation measures proposed for the Class A, B and C stockpiles involve some types of engineered covers to be constructed at closure. It was assumed that the loadings from each stockpile will decrease by effectively limiting the infiltration into each facility.</p> <p>The initial loadings prior to mitigation by the constructed covers were assumed to be the same as those predicted from the results of the neutral pH laboratory and field barrel tests. The use of these initial loadings is inconsistent with the understanding that the Class A rock and tailings, and Class B rock piles will eventually produce acidic drainage. Therefore, the predicted loadings after closure are biased low because they are based on the neutral pH leaching results. Once acidification occurs, the loading rates for many metals and other constituents would be expected to increase substantially above those that were estimated for neutral pH conditions. And, although the loadings from the stockpiles will be mitigated to some extent by reducing infiltration rates, the much greater intrinsic loading rates within the piles will affect the residual loadings of COPCs from each of the A and B stockpiles.</p> <p>Ignoring the future acidic drainage conditions in the A and B stockpiles represents a critical deficiency in the water quality predictions and may represent a flaw in the</p>	<p>R2-46. Provide an assessment of the long-term loadings and water quality associated with the acidic drainage that will eventually be produced in the A and B stockpiles as well as from the pit walls above the final water level.</p> <p>Insufficient response: In response to R81 and R106, the proponent has indicated that two additional kinetic tests will be commissioned using NP depleted Class A and Class B material; the results from these tests will be used to update the water quality models and water quality predictions. This information is critical to understand the potential environmental impacts of the project, determine closure objectives for the mine site, and in particular for this project is critical information to demonstrate the effectiveness of the constructed wetland treatment system.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
	<p>assumption that passive treatment will be possible in an engineered wetland system after closure. Acidic drainage will be accompanied by substantial loading rates of many metals and other constituents and the final drainage from the facilities may not be treatable in a wetland system to the extent required to protect the receiving environment.</p>	
<p>Constructed Wetland Treatment Systems</p>		
<p>R108</p>	<p>The discussion of the transition and post closure periods for the mine as discussed in Section 7.2 of Appendix D-7 indicates that there are treatment factors for the wetlands that are proposed for passive treatment after closure. The treatment factors are constituent-specific and affected by hydraulic retention time of the system. Appendix B of Appendix H-1, states that “proxies were applied from other projects with as similar of chemistry and conditions as possible”. However, there is no indication of what the treatment factor values are and how they affect the water quality leaving the wetlands. Clarification of the treatment factors is required.</p>	<p>R2-47. Provide details on the assumed water quality adjustment factor. Discuss these factors in the context of the predicted effluent concentrations for an engineered wetland in Tables 4 and 5 of the Contango report (Appendix B – Conceptual Wetland Design - of Appendix H-1 Conceptual Reclamation and Closure Plan).</p> <p>Insufficient response: The proponent has not provided details on the treatment factors (Removal Rate Coefficients). The response only reiterates the original text of Section 2.5.3 of Appendix H in Appendix B. It is not sufficient to indicate that the values used “are proxies that were developed for other projects”.</p> <p>R2-48. Please provide details of the basis of the coefficients in order to understand whether these are supported by appropriate data that are relevant to the proposed wetland treatment.</p> <p>R2-49. Also, now that the post closure water quality has been updated to reflect acidic drainage (see R106 above), please provide an update on the expected treatment effects for the site water.</p>
<p>R109</p>	<p>The Proposal recognized the potential for ARD to develop over time in the class A and B materials. There is a need to evaluate the potential effects of acidic drainage on wetland treatment performance. It is likely that the quality of inflow water to the wetland will change in the future as ARD develops in Class A rock and tailings, and the Class B rock. For example, as ARD develops, greater loading of metals such as aluminum, cadmium, copper, iron, manganese, nickel and zinc can be expected.</p>	<p>R2-50. Provide cold weather case studies for passive wetland treatment systems designed for acidic conditions as well as case studies for passive wetland treatment systems that have successfully transitioned from treating neutral drainage to effectively treating acidic drainage with increased metal loadings.</p> <p>Insufficient response: While some case histories are presented for cold climate wetland type treatment systems, there is no indication of performance in the information provided.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
		<p>Therefore, although examples are given, there is no indication of the success of the wetland type treatment under the conditions described.</p> <p>R2-51. Provide some indication of treatment performance for the case histories presented or for other relevant treatment systems.</p>
Surface Water Quality and Quantity		
R113	<p>A statistician with a background in WQO derivation was recently contracted by Yukon government to prepare a statistical justification for baseline water quality data requirements for quartz mining projects.</p> <p>The statistician was provided with available, relevant water quality data collected in Yukon, including data from the Wolverine mine, a mining project nearby and analogous to the proposed Kudz Ze Kayah project. The statistician concluded that three years of recent, continuous baseline water quality data is the minimum duration required to (a) generate a reasonable understanding of natural variability of water quality, and (b) detect systematic changes in water quality over time, if present.</p>	<p>R2-52. Updated water quality baseline information, water quality objectives, and water models (e.g., water quality model, site and watershed balance models, surface water flows, etc.) for the site are required to be submitted prior to the Executive Committee drafting the screening report. To develop a reasonable understanding of short-term variability, sampling is required to be conducted and reported on at least two sampling events, including one during low-flow conditions and one during high-flow conditions, for each year in which 5 samples are collected in 30 days.</p> <p>Insufficient response: Proponent did not provide and did not commit to provide the Executive Committee with updated information prior to drafting the screening report. The Proponent has stated they will provide additional information to the Yukon Water Board to meet their obligation during licensing.</p> <p>The Executive Committee requires updated water quality baseline information, water quality objectives, and water models (e.g., water quality model, site and watershed water balance models, surface water flows, etc.) prior to drafting the screening report. This will ensure that our assessment is conducted on more accurate information for the site.</p>
R114, R115	<p>The water balance modeling exercise at the watershed scale was for operations at year 10 and several closure conditions. No information was provided in this report for the construction phase or any of the projected years of operation. This is not considered consistent with industry standards and considered an information gap.</p> <p>The watershed water balance model was calibrated with data from the 2015/2016 hydrometric monitoring program. Additional hydrometric data would be useful to further calibrate the watershed water balance model, verify model development</p>	<p>R2-53. Update the watershed model to include all phases of the mine life from construction through operations, and the active, transition, and post closure phases.</p> <p>R2-54. Undertake a sensitivity analysis to assess variability of model predictions given variation in key model input parameters and assumptions.</p> <p>Insufficient response: Updating the watershed model and undertaking a sensitivity analysis is the next step after updating the water balance model. Rationale for this</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
	and model parameter assumptions, verify work completed to-date, and provide additional confidence in projections.	requirement is essentially the same as the rationale identified under R2-34 (original R90 and R91) above.
R116	The proposed threshold criteria for surface water quantity and quality used to assess the magnitude of projected changes in the receiving environment seem arbitrary. For example, for water quality, exceedance of a pWQO is often considered to be a high effect, whereas the Proponent is proposing a threshold of 10 times the pWQO or greater to represent a high level effect.	<p>R2-55. Provide justification and rationale for the proposed threshold criteria for surface water quantity and quality used to assess the magnitude of projected changes in the receiving environment.</p> <p>Insufficient response: Proponent defends their definition of high magnitude effect as 10 times the water quality objective (WQO). Such an interpretation would establish a precedent. In our experience, other Yukon mining projects assessed by the EC have typically been evaluated based on a high magnitude effect threshold of 1 time the WQO. Without convincing rationale provided by the Proponent, we cannot recommend to the EC to deviate from the previously considered high magnitude effect threshold.</p>
R118, R119	<p>The Proponent proposes variable pWQOs for several water quality parameters, including sulphate, nitrite, selenium, cadmium and zinc. However, the Proposal does not clarify how such variability could be applied in a practical sense to control emissions during each phase of the Project (e.g. as part of licensing).</p> <p>Variable WQOs may be justified from a toxicological perspective but can prove difficult to apply for regulatory purposes. It is common to reduce the complexity of variable objectives by applying a fixed WQO, a site specific WQO, or a seasonal WQO. In all cases, the most conservative WQO is generally applied.</p>	<p>Insufficient response: The proponent states they will establish water quality thresholds as part of the operational Adaptive Management Plan (AMP) that will be used to manage the discharge. But the proponent does not provide further information to assess the suitability of their proposed thresholds. Although the proponent points to the Adaptive Management Plans for Minto Mine (QZ14-031), and Sa Dena Hes Mine (QZ16-051) as examples of sites where this approach has been applied they do not detail aspects of these AMPs that could be pertinent for the KZK project. In our opinion, the responses to R118 and R119 do not provide the EC with sufficient information to evaluate the effectiveness of the proposed approach for managing the discharge to the environment for the KZK project.</p> <p>R2-56. The proponent should provide additional information regarding the proposed water quality thresholds that could be proposed as part of an AMP for the KZK project so as to allow the Executive Committee to determine if they have confidence in the effectiveness of the proposed approach.</p> <p>R2-57. The proponent should identify aspects of the Minto Mine and Sa Dena Hes Mine AMPs that could be pertinent for the KZK project.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
R121, R122	<p>The Proponent's assessment of potential effects on the receiving environment assumes that a high degree of treatment efficiency will be achieved. The Proponent's conclusion of no significant adverse effects to surface water quality is substantially tied to the assumed treatment efficiencies. However, the Proposal does not provide sufficient information to defend the assumed efficiencies.</p>	<p>R2-58. Provide justification for the assumed treatment efficiencies.</p> <p>R2-59. Provide contingency options in the event that proposed water treatment options do not achieve their intended efficiencies.</p> <p>Insufficient response: We acknowledge that in their responses to R121 and 122, the proponent has committed to identifying and resolving issues relating to variable throughputs before the WTP is operating at design capacity and to obtaining performance criteria prior to full operational status. Our concerns with the proposed water treatment options pertain to the lack of resolution of the management of the ion exchange and RO waste streams which was described for R86.</p>
R125	<p>Comments provided by Mineral Resources Branch describe deficiencies related to waste management, options assessment, and the conceptual reclamation and closure plan. Furthermore, limited details are provided concerning the proposed in situ treatment of the ABM Lake or the conceptual constructed wetland treatment system. The removal rates and treatment factor used in the water quality model are not justified. It is not possible to assess potential significant, adverse effects to the downstream receiving environment without this information.</p>	<p>R2-60. Provide a report that details the proposed treatment methods, justifies site-specific treatment rate coefficients, and predicts the chemistry of the treated effluent. Based on the information in this report, provide an updated water quality model (i.e., with updated mine source loads) and, if necessary (e.g., if new contaminants of potential concern are identified), an updated water quality objectives report.</p> <p>Insufficient response: Similar to the Proponent's response to R108, the Proponent has not provided sufficient details to support the assumed treatment performance of the proposed water treatment systems.</p>
R126, R127	<p>A water treatment plant is proposed for the management of water quality during the operation. The necessity of a water treatment plant is based on the acknowledgement that the high sulphur PAG material will produce drainage during operations that requires management before release to the environment. The assumption of reverse osmosis technology for water treatment is reasonable. However, reverse osmosis is an expensive treatment option and the feasibility of treating large quantities of waste water should be proven.</p> <p>In addition, the byproduct of reverse osmosis is a high concentration effluent that also requires management and this was not acknowledged or considered in water management or in the water quality model during the operation. The disposal of high contaminant concentration waste generated by the use of reverse osmosis</p>	<p>R2-61. Provide rationale and justification for the use of reverse osmosis as a feasible treatment option considering the large quantities of waste water needed to be treated.</p> <p>R2-62. Provide details on how the by-product of a reverse osmosis water treatment plant will be addressed. This can be done by either including the by-product in the assessment or proposing an alternate treatment process. If an alternative to reverse osmosis is considered, update Section 5.2.1.7 of Appendix D-7 (Water Quality Report) of the proposal based on the revised assumptions for the quality of treated water.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
	<p>can be problematic. The current assumptions for treated water quality are summarized in Table 5-15 and Appendix D-7. Treatment technologies other than reverse osmosis will lead to different concentrations than those shown in Table 5-15 for treated water and will alter the water quality predictions during operations.</p>	<p>Insufficient response: Our concerns with the proposed water treatment options pertain to the lack of resolution of the management of the ion exchange and reverse osmosis waste streams.</p> <p>While treatment options are discussed in greater detail (Appendix 4 in BMC Response to Executive Committee ARR) than in the Project Description, details were not provided on the management of the ion exchange and reverse osmosis waste streams. These waste streams have been identified as 5 percent and 21 percent of the original treated volumes, respectively. Although there was discussion of reducing volumes of residual in the reverse osmosis system, it is clear that there will be a need for residual management. In Appendix 4, there is reference to BMC being able to “manage up to 7.5 m³/hr (180 m³/day) of reject”. That is only 3 percent of the average annual treatment flow of about 6,000 m³/day or less than 1 percent of the maximum treatment flow of about 19,000 m³/day in the month of June.</p>
R128	<p>It is not clear if the capacities of the water management ponds are sufficient to accommodate both demands, and if not, how this would affect water management, specifically release volume controls and discharge to Geona Creek and Finlayson Creek.</p> <p>The operations water management strategy states that the discharge to Geona Creek and Finlayson Creek will be limited to discharge volume ratios no less than 3:1 at KZ-37 and 2:1 at KZ-15. The Proposal does not clarify how it intends to achieve this at all times.</p>	<p>R2-63. Provide details and justification to support sufficient capacity in the water storage ponds to accommodate the design storm during a wet year, and how the water management ponds will be managed to achieve release volume controls at all times.</p> <p>Insufficient response: Proponent has not provided the requested information</p>
R131	<p>The equations used to predict surface water quality include an attenuation factor yet the Proposal does not specify the values used or their justification. The chemical loading discharged to the receiving environment may attenuate through various chemical, biochemical or physical process (other than dilution). The attenuation for nitrogen compounds may be high in headwater creeks, such as those which characterize the receiving environment. However, the attenuation for</p>	<p>Insufficient response: The proponent states that the attenuation factor is being applied as a calibration factor for cases where the model was unable to accurately predict baseline concentrations. For transparency, the proponent should show which parameters they were unable to predict accurately and by how much.</p> <p>R2-64. Provide the calibration factors used in the model for each contaminant of potential concern.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
	<p>most metals may be low. It is common to conservatively assume no attenuation for those parameters having low potential for attenuation.</p>	
R132	<p>The attenuation of nitrogen compounds (ammonia, nitrite, nitrate) is expected to be high for headwater creeks, such as those which characterize the receiving environment. However, the Proposal does not specify the values used or their justification.</p> <p>In such creeks, ammonia generally nitrifies to nitrite followed by rapid oxidation of nitrite to nitrate. As such, the ammonia concentration is expected to attenuate during ice-free periods at a rate greater than dilution, and nitrate is expected to be elevated above the diluted concentration. Nitrite is expected to be negligible. The results presented differ from expectations.</p>	<p>R2-65. Provide the attenuation factors used in the model for nitrogen compounds and provide justification for their use.</p> <p>Insufficient response: The proponent states that the attenuation factor is being applied as a calibration factor for cases where the model was unable to accurately predict baseline concentrations. For transparency, the proponent should show the calibration factor used for each nitrogen compound. It is understood these apply to background loadings only and that no calibration factor was applied to loadings from the project.</p> <p>R2-66. The proponent should provide the calibration factor used for each nitrogen compound.</p>
9.0 GROUNDWATER QUALITY		
R136	<p>Mine dewatering creates stress on groundwater flow regimes. Assessment of potential effects of mine dewatering on the quantity and quality of groundwater and related surface water are critical aspects of the EA. For ECCC to understand the effect of mine dewatering on quality and quantity of groundwater and surface water hydrology at Kudz Ze Kayah, a thorough understanding of groundwater inflow estimates with respect to the various mine phases is required.</p> <p>The Proponent has indicated that overburden dewatering will initially be performed for a six-month period to permit access to the bedrock. Overburden dewatering will result in a reduction of the base flow to Geona Creek around the proposed open pit and immediately to the north. The Proponent has proposed flow augmentation in Geona Creek by discharging the ABM pit water into the creek, and is expecting that dewatering of the overburden will not to have any adverse effects on groundwater quality.</p> <p>Groundwater quality in the overburden will likely differ from the water quality in Geona Creek. Further, mixing of groundwater in the pit from shallow overburden</p>	<p>R2-67. Provide an assessment of the potential impacts of mine dewatering on quantity and quality of the head waters of Finlayson Creek, unnamed creeks south and southwest of the ABM pit, and the North Lake Systems.</p> <p>Insufficient response: The proponent has not provided the requested information. Refer also to R105 pertaining to water quantity impacts.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
	<p>aquifer and bedrock aquifers will result in water quality different from Geona Creek. The overburden and bedrock dewatering will likely have adverse effects on water quality in the receiving environment. The Proponent’s plan to discharge the ABM pit water to Geona Creek requires clarification. Further, the discharge water management plan (pp 9-20) has not clearly indicated the types of treatment that will be applied and the resulting water quality to be discharged into the receiving environment.</p> <p>ECCC notes that the mineralized zone in the pit and underground workings could likely contribute contact groundwater with elevated concentrations of contaminants of concern. In addition, elevated concentrations of contaminants could mix with shallow groundwater via structures and impact water quality of shallow groundwater and receiving environment.</p>	
R142	<p>The Proponent has not conducted sensitivity analysis to capture those uncertainties associated with fault zone hydraulic properties. Faults may act as a barrier to groundwater flow, or as a conduit. Further analysis of the conductivity of the fault zones is required using the available site data.</p>	<p>R2-68. Conduct a sensitivity analyses for the predictive hydrogeological model in order to assess potential impacts on quantity and quality of groundwater inflow to the pit and its impact on surface hydrology. The analysis should address uncertainties associated with fault zone hydraulic properties.</p> <p>Insufficient response: The Proponent did not adequately address the uncertainties associated with the potential impacts of the major geological faults on groundwater-surface water interaction resulting from the project activities.</p> <p>Conduct a formal sensitivity analysis to address the uncertainties resulting from the potential impacts of the major faults on the water quality and quantity in the project area. .</p>
10.0 AQUATIC ECOSYSTEM RESOURCES		
R143	<p>The Proponent has proposed in their preliminary offsetting plan an option involving restoration of fish passage for the Robert Campbell Highway culvert crossing of Finlayson Creek.</p> <p>The Proponent has identified that this culvert crossing structure is the responsibility (ownership) of the Yukon Government Highways and Public Works.</p>	<p>R2-69. Provide additional information in relation to the Fish Offsetting Plan as presented in Appendix 4. Details should include a discussion on:</p> <ul style="list-style-type: none"> a. the feasibility of including the culvert restoration as part of the plan given it is the jurisdiction of the Government of Yukon;

ARR No. 1 Request	Issue	Information Request and Rationale
	<p>DFO's preference is for an open bottom structure (clear span or arch culvert) that mimics the natural stream channel to have confidence in the permanence of fish passage restoration.</p> <p>Baseline information is available for Genoa Creek as well as for some locations in East Creek and in Finlayson Creek upstream of the Robert Campbell Highway; however, there is limited baseline information for areas in Finlayson Creek downstream of the Robert Campbell Highway and in the surrounding areas of the Finlayson River. The baseline data is required for both upper and lower reaches in sufficient quantity as to clearly demonstrate what the gaps in fisheries productivity are. The intent of offsetting measures is to result in increased fisheries productivity. The effectiveness monitoring plan and associated performance measures, in conjunction with the baseline data, should be robust enough to demonstrate that an overall increase in fisheries productivity has resulted and not simply a redistribution of fisheries productivity</p> <p>The Proponent cites two recent DFO guidance documents for the proposed Fish Offsetting plan in Appendix E-4:</p> <ul style="list-style-type: none"> • Fisheries and Oceans Canada (DFO). 2013a. Implementing the New Fisheries Protection Provisions under the Fisheries Act. Discussion Paper. Fisheries and Oceans Canada, April 2013. • Fisheries and Oceans Canada (DFO). 2013b. An Applicant's Guide to Submitting an Application for Authorization under Paragraph 35(2)(b) of the Fisheries Act, November 2013. <p>However, the most recent <i>Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting</i> (DFO, 2013c) is not cited and it is not clear if this guidance was used. The proposed offsetting plan generally includes most of elements prescribed by DFO (2013c). However some suggested components are not included in the plan. Losses and gains are not particularly well quantified and uncertainty is not accounted for.</p>	<ul style="list-style-type: none"> b. other potential offsetting measures that have been explored with reasons for discounting them; c. how the plan will take into account the most recent DFO policy, <i>Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting</i> (DFO, 2013c), including how the guidance will be incorporated into a revised offsetting plan (e.g., quantifying losses and gains, and accounting for uncertainties). <p>Insufficient response: Although feasibility is addressed somewhat, the likelihood of culvert replacement occurring sooner than 10 years from now is not clear.</p> <p>The rating system used to evaluate potential fish habitat compensation projects is reasonable. Ratings determined for most classifications are generally understood; however, the basis for determining the ratings for Environmental Benefit and Community/Aboriginal benefit is not clear.</p> <p>R2-70. Please provide some assurance that the proposed compensation can proceed within a shorter timeframe.</p> <p>R2-71. How were High, Medium and Low values quantified?</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
R147	<p>The proponent has chosen Arctic grayling for monitoring aquatic health among fish species. To identify potential effects they state they will monitor for changes in fish distribution (presence/absence data), abundance estimates and fish condition factor. As it is currently written, the proponent has only used presence and absence electrofishing techniques to establish their baseline. They did not adequately sample for abundance, nor did we see estimates of condition factor.</p> <p>The data above will aid in standardizing the sampling effort and therefore allow for repeatability when estimating abundance. To adequately address fish abundance the proponent should include the following:</p> <ul style="list-style-type: none"> • To adequately sample for abundance the proponent must establish electrofishing stations of a defined length. • UTM's should be reported at the top and bottom of each station (So that repeat trials can occur within each station, among years). • Water conductivity and temperature, for each station, at the time of each sampling should be reported. • Stream stage should be reported (How deep was the section (station) of stream, where and when it was sampled). • Wetted width should also be reported within the section (station) area. • Preferably, each station should be block netted and a removal method employed to allow for a reasonable assessment of abundance. Several sweeps (passes) should occur within each station • Control stations should be established outside any potential impact area. • Estimates or indices, of species abundance should be established for each station. 	<p>R2-72. Demonstrate how abundance estimates and fish condition factor have been considered in the sampling to date and proposed sampling moving forward.</p> <p>Insufficient response: Confirmation of proper reference is needed, therefore follow-up is suggested.</p> <p>R2-73. Please confirm that the references to R143 in the response should be to R144.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
R148	<p>Section 10.6.5 of the Proposal states that fish tissue monitoring for heavy metals and selenium will be conducted as per the existing water license, every two years, at Finlayson Creek stations, using slimy sculpins as the target species. There is no mention of how the fish tissue quality data will be interpreted, for example, by examination of trend, or by comparison to fish tissue guidelines. In the latter case, fish tissue guidelines, such as the BCMOE guidelines for selenium or others, have not been identified in the Proposal</p> <p>Metals Testing in fish was limited to Slimy Sculpin from the Geona Creek and Finlayson Creek systems. The South Creek, North Creek, and North Lakes systems have also been under represented for metals sampling. This sampling is of particular importance for the North Lake which is an important fisheries resource for First Nations in the area.</p>	<p>R2-74. Identify the criteria to be used in the interpretation of fish tissue monitoring data over the course of the Project.</p> <p>Insufficient response: The response identifies that fish tissue guidelines used will be CCME guidelines for protection of wildlife consumers, and CFIA guidelines for marketed fish. It also explains why testing on Arctic Grayling is not proposed (limited distribution and low population). Selenium is not included in the cited guidelines although BCMOE has guidelines for selenium in fish tissue based both fish health and human health considerations.</p> <p>R2-75. Given that selenium is not included in the cited guidelines, and that selenium uptake to fish is of concern, the Proponent should explain why selenium in fish tissue is not part of the proposed program or include selenium in fish tissue as part of the proposed program.</p>
R154	<p>The proposed procedures for “careful control” of Project discharge water to meet WQOs in the receiving environment at all times are not clearly defined. The surface water management strategy described in Section 18.4.2 of the project proposal states that “<i>Water will be discharged to both Geona Creek and Finlayson Creek at established water quality discharge standard concentrations and at discharge volume ratios no less than 3:1 (receiving water volume: effluent volume) for Geona Creek at KZ-37 and 2:1 for Finlayson Creek at KZ-15 to meet water quality objectives in the receiving environment</i>”. However, in Section 8.4.2 we do not see a description of how the effluent discharge will be controlled to ensure the WQOs are met. On one hand, the Proponent has suggested that the effluent meet MMER standards for release of deleterious substances. On the other hand, many of the proposed WQOs are variable, as discussed in section 6.3.3, and are adjusted based on water hardness or other parameters in the receiving environment.</p> <p>It is important for reviewers to understand how the Proponent will manage effluent during releases to meet the WQOs. For example, is the Proponent suggesting that</p>	<p>R2-76. Provide details to demonstrate that there will be adequate storage capacity for effluent to allow holdback and controlled release of effluent.</p> <p>Insufficient response: The proponent restated the information already presented in the project proposal. The intent of the question was for BMC to demonstrate that the 54,000 m³ of additional storage was sufficient capacity to provide adequate storage of effluent to protect downstream water quality during periods of limited dilution (i.e., allow for holdback and controlled release of effluent).</p>

ARR No. 1 Request	Issue	Information Request and Rationale
	receiving environment conditions that affect the WQOs be considered prior to discharge to ensure no exceedance of WQOs upon discharge?	
11.0 TERRAIN AND SOILS		
Access Road and Mine Site Terrain Analysis		
Terrain Stability, Geohazards and Risk		
R162, R163	<p>The study provided by the Proponent provides neither terrain stability mapping nor detailed definitions for the terrain stability classes presented. A preliminary hazard inventory (Terrain Analysis Map) is presented but it appears preliminary and coarse. Field assessment to confirm the extent and hazard processes has not been conducted. Appendix E-5 of the submission states that recent debris floods have impacted an active fan at Fault Creek in the proposed Open Pit footprint.</p> <p>The proponent should produce a terrain map, terrain stability and hazard map for the mine footprint and access road (including associated methodology and analysis). The terrain stability and hazard maps should follow YESAB's geohazard guidelines for recommended scale, methodologies, and data collection. The guidelines can be found at:</p> <p>http://www.yesab.ca/wp/wp-content/uploads/2015/11/Geohazards-Guide-Nov-1-2015-2.pdf</p>	<p>R2-77. Provide a terrain map, terrain stability and hazard map for the mine footprint and access road (including associated methodology and analysis) that:</p> <ol style="list-style-type: none"> identifies surficial geology and related geomorphologic processes; identifies the type, nature, relative frequency and magnitude of hazards (baseline map); evaluates how current hazard dynamic may be altered due to changes in climate; identifies specific risks to the proposed infrastructure; and, identifies specific risks to the environment from the proposed project (e.g.: changes to slope stability). The risk map should include consideration of climate change over the life of the Project. <p>Insufficient response: The proponent states that “updated terrain hazard mapping and risk assessment will be completed as part of the detailed design phase.” Terrain and geohazards are baseline studies conducted to provide technical data to the environmental assessment and engineering. YESAB's Geohazards and Risk guidelines) establish that the geohazard and risk assessment should be designed to allow YESAB to adequately evaluate the effect of the proposed project environmental and socio-economic values required under YESAA (Guthrie and Cuervo 2015). Therefore the expectation is that terrain, and geohazard mapping should be provided at the proposal stage, not during the design phase. At the design phase, detailed geohazard studies are typically targeted to critical areas. Later, the proponent also states that “the work conducted to date is sufficient</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
		<p>to support an effects assessment”. Appendix E5 is a “preliminary overview of the geohazards at the site” (KP, 2016). The overview report is a desktop study, and no field validation was conducted. The spatial and temporal data utilized by the proponent is insufficient for the level of effort required to support a Project proposal. The same report recommends in its conclusion section that “reconnaissance terrain and terrain stability mapping of the project site be undertaken to provide baseline soils and terrain data to support on-going project development”. Uncertainties remain concerning the extent and nature of deposits and permafrost conditions where proposed infrastructure, including the road alignment, will be located.</p> <p>Risk assessment is specific to hazard types (e.g. debris flood, active layer detachment). The specific risks to infrastructure described in Section 17.2 of the Project Proposal refer mostly to the risk of failure of the infrastructure rather than the risk from existing geohazards. Although this assessment is required to understand potential malfunctions and accidents, it is incomplete if potential terrain constraints and hazards have not been included in the analysis.</p> <p>R2-78. Describe how have permafrost degradation processes at the proposed Water Management Ponds footprint been addressed.</p> <p>Insufficient response: Failure to consider permafrost, in particular permafrost degradation could lead to loss of stability of the Water Management Ponds.</p>
Permafrost and Related Hazards		
R167	<p>Only a limited permafrost discussion has been provided in the submission. The proponent should produce a more comprehensive permafrost study, including mapping and related analysis indicating permafrost distribution within the mine footprint and access road area. The investigation should include an analysis of the permafrost degradation potential. The analysis should include a baseline scenario (current condition) and potential changes during the project operation (due to climate change and impact from proposed infrastructure). Sufficient detail should be provided in areas where surface water runoff is expected to be altered (e.g.,</p>	<p>R2-79. Provide a comprehensive permafrost study, including mapping and related analysis indicating permafrost distribution within the mine footprint and access road area. Indicate the magnitude and extent of soil erosion potential within this area that is attributed to thermal erosion of permafrost.</p> <p>Insufficient response: Proponent has not provided enough information. Permafrost distribution and degradation is paramount to understand potential constraints and limitations (with emphasis on geohazards) for Project development.</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
	<p>water management ponds) and where existing geohazards may be exacerbated. The investigation should include a detailed permafrost hazard map (predictive) with an associated methodology and analysis identifying permafrost related hazards in the study area, including: type, nature and magnitude. The study should identify specific risks to the Project from the permafrost hazard map. The risk map should include consideration of climate change over the life of the Project. The study should also identify specific risks to the permafrost regime from the Project (e.g. potential permafrost degradation exacerbated by water management ponds, changes to slope stability due to the construction of road, stockpiles and storage facilities). The risk map should include consideration of climate change over the life of the Project.</p>	
<p>12.0 VEGETATION COVER AND COMPOSITION</p>		
<p>No information required</p>		
<p>13.0 WILDLIFE AND WILDLIFE HABITAT</p>		
<p>R170, R171</p>	<p>The selection of some subcomponents (notably cliff-nesting raptors and olive-sided flycatchers) and the use of these subcomponents to represent the habitat of other species could lead to an inaccurate assessment of potential project effects on other bird species, including species at risk, and consequently inadequate mitigation and monitoring measures for these species.</p>	<p>Insufficient Response: The project area is within the range of the Horned Grebe, Rusty Blackbird, and Short-eared Owl (all listed as Special Concern in Schedule 1 of SARA). The Short-eared Owl is being represented by raptors in the project proposal, but the owls are ground nesters and not appropriately represented by cliff nesting raptors. The Olive-sided Flycatcher and Rusty Blackbird have differences (e.g. elevation) that need to be considered.</p> <p>R2-80. Describe the preferred habitats for the Horned Grebe, Rusty Blackbird, and Short-eared Owl and the effects of the project on these habitats.</p>
<p>R175</p>	<p>An effects assessment for the Olive-sided Flycatcher is appropriate as per subsection 79(2) of SARA.</p>	<p>R2-81. For the habitat suitability model provide justification for the rank classes, data limitations and any modifications or enhancements made and methods and results of any validation analyses conducted.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
		<p>Insufficient Response: The methodology used for developing the olive-sided flycatcher model is not clearly defined and does not appear to follow standard modelling convention. Categories of high, medium and low habitat suitability are presented but no information is provided regards to the thresholds that are applied to define these categories. This is directly applicable to the effects assessment for this species as only high-suitability habitat is used to evaluate the potential impacts of the project on olive-sided flycatcher. This may underestimate the potential impacts to this species. Utilizing high suitability alone is not consistent with a conservative approach.</p> <p>Figure 13-18 identifies habitat suitability for olive-sided flycatcher in addition to olive-sided flycatcher detections. We note that 7 out of 8 detections are within modelled low-value habitat - this does not represent a strong case for the model being able to predict suitable olive-sided flycatcher habitat. Only a single detection appears to occur within high-value habitat. As such, the model appears to do a poor job at quantifying potential olive-sided flycatcher habitat.</p>
R176, R178	<p>Information on methods is missing in the proposal. As noted in Chapter 5, Section 5.1 (effects assessment approach), the existing conditions should be described in enough detail to provide the benchmark against which the project effects will be evaluated. It is, therefore, important that an adequate baseline assessment is completed, including providing detailed description of methods and results.</p>	<p>R2-82. Provide a complete description of the passerine survey methods, including information on number of times each station was visited, description of the point count methodology, and information on settling periods.</p> <p>Insufficient response: Insufficient details are provided to replicate or validate the method. It is not clear whether temperature, weather, behaviour, vocalization type (song vs alarm) data was collected. Spacing of point counts in some cases is much closer than the BBS protocol. There is a risk of counting the same individuals twice.</p>
Unnumbered	<p>As noted in Chapter 5, Section 5.1 (effects assessment approach), the existing conditions should be described in enough detail to provide the benchmark against which the project effects will be evaluated. Given this approach, it is important that an adequate baseline assessment is completed, including providing detailed description of methods and results. Consistency with methods and results is important to provide a reliable baseline review.</p>	<p>R2-83. Provide a complete description of survey methods, including survey effort; survey frequency; protocols used; and dates, duration and linear distance of waterfowl/shorebird surveys. What is the rationale for using 5-minute point count stations?</p> <p>Insufficient response: The response does not include the following: no protocol for wetland survey given; no measure of survey effort (duration, linear distance, frequency); not clear on which dates different survey types were conducted.</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
R179, R180, R181	<p>Since habitat suitability mapping is utilized to define change in suitable habitat in the effects assessment, with the magnitude of the effect tied to this assessment, an accurate and validated habitat suitability model is an important component of the baseline assessment.</p> <p>The habitat suitability modelling exercise should include a clear description of model assumptions, validation, reliability, and the incorporation of zones of influence, as appropriate. If the effects assessment, as is the case here, applies a fixed buffer to suitable habitat, in lieu of zones of influence for the modelling exercise, to account for indirect habitat loss, this should be noted in the baseline assessment.</p>	<p>R2-84. Provide information on model assumptions, validation, reliability and zones of influence for the three habitat suitability maps for birds.</p> <p>Insufficient Response: The methods used for developing models are not clearly defined and do not appear to follow standard modelling convention. Categories of high, medium and low are noted as being used but no information is provided with regards to the thresholds that are applied to define these categories.</p> <p>Adequate model validation was not provided. It is noted by the proponent that detections were used as a simple validation of the predicted areas of suitable habitat. For olive-sided flycatcher there were 8 detections, one of which was within modelled high suitable habitat. For cliff-nesting raptors (Figure 13-7) there is one detection. For waterfowl (Figure 13-19) there are no detections noted. It is, therefore, unclear how the detections provide any level of validation.</p>
Caribou		
R183	<p>The proposal does not adequately address all effects to caribou because key aspects of caribou ecology have not been discussed and included in the effects assessment and mitigation measures. Further discussion on each sub-point is available in the SLR technical memo.</p>	<p>R2-85. Provide additional information on project interactions and effects with caribou in the context of each of the following parameters:</p> <ol style="list-style-type: none"> a. Migration b. Predator/prey dynamics c. Predator efficiency d. Displacement e. Calving habitat and neonatal calf mortality f. Snow patches g. Influence of fidelity to seasonally used areas h. Population decline and caribou distribution i. 'Range rotation' and increase in Finlayson Lake use during some seasons

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
		<p>For topics a) through d) listed above, consider also the indirect effects of the Project. For topics e) through i) listed above, provide information that will help determine how significant this geographic area is with respect to caribou population dynamics, rather than just to habitat suitability.</p> <p>Insufficient Response: The response acknowledges the issues but does not provide the requested information on project interactions and effects with caribou in the context of each listed parameter. In general, statements are not backed up by references and some of the population dynamics topics are not fully addressed. For example, there is no information on snow patches or migration routes.</p>
R185, R187	<p>The caribou effects assessment seems to be based largely on percentage of habitat disturbed. This overlooks aspects of caribou ecology which could influence the outcome of the effects assessment for caribou.</p>	<p>R2-86. Revise the caribou effects assessment, taking into consideration the significance of factors outlined below. Focus on caribou habitat and use related to proposed activities.</p> <ul style="list-style-type: none"> a. Rutting areas b. Traditional use of post-calving areas c. Snow patch use during post-calving d. Calving success in the project area vs. the overall range e. Stressors outside of post-calving season <p>Insufficient Response: The Information Request specifically asked for a revised effects assessment for caribou accounting for a variety of factors. This has not been provided. The response does not indicate any change to the effects assessment.</p> <p>R2-87. Traffic effects on other caribou herds: What are the potential effects of increased hauling traffic on other Yukon caribou populations along the haul route between the mine and the boundary with B.C. (Little Rancheria and Horseranch herds)?</p> <p>Insufficient response: The response only says how many trucks per day, but does not actually address the effects on the other caribou herds.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
R188	Model methods have not been clearly disclosed. Information on the model methods will enable its adequacy to be evaluated and will assist in interpreting the model outputs.	<p>R2-88. Provide further detail on the parameters used in developing the model (elevation, vegetation cover, slope, and aspect.) In addition, provide the following information regarding the caribou habitat suitability model:</p> <ul style="list-style-type: none"> a. Sex/age classes: How many data points are in each age/sex class for each of the development and evaluation phases of the caribou HSI model? b. Calving success and habitat alteration: Why has calving success not been used as part of the model for post-calving? Does the model take into account habitat alteration? c. Expert opinion: Who provided expert opinion and for what aspects of the model? d. Predictive Ecosystems Map: What is the accuracy of the PEM used? e. Model equation: What model equation was used? <p>Insufficient response: Parameters have not been fully described and the responses to specific questions on the habitat suitability model have not been answered.</p>
R189	There are unclear points and inconsistencies in presentation of information which make it difficult to assess adequacy of the model.	<p>R2-89. Provide clarity on the inconsistency detailed below.</p> <ul style="list-style-type: none"> a. Measure of availability not included: It is useful to look at use, and use in relation to availability, when assessing value of a habitat category. What is the availability of each of the aspect and vegetation cover classes in relation to caribou use? <p>Insufficient response: A simple measure of habitat availability is the area covered by each habitat category, which should be fairly simple to generate.</p>
R190	The Assessment Endpoint/Threshold Criterion for "Health condition" appears to be an error as it does not address health condition.	<p>R2-90. Provide details about the methodology for the proposed qualitative assessment of no observable deterioration in physical condition for caribou, moose, grizzly bear, grey wolf, wolverine, and collared pika.</p> <p>Insufficient Response: The health threshold for Finlayson caribou, moose, grizzly bear, grey wolf, wolverine and collared pika has been updated to a qualitative assessment of “no</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
		observable deterioration in physical condition“. Assessing the health condition of any animal would require repeated observations of individuals.
R191	Residual effects to caribou may not be considered fully. Although each individual effect may not be considered significant, the overall (additive) effect of all the effects combined is also important in assessing the impact to caribou.	R2-91. Provide additional discussion on the additive effect of all residual effects of the project to caribou. Insufficient Response: Additional discussion has been provided, but statements made have not been adequately supported or clarified with literature. Provide references for statements made.
R193	Some of the surveys in 2015 and 2016 (and possibly in 1996) appear to have been conducted when exploration activities were occurring. Exploration activities could have affected distribution of caribou during those surveys. The authors do not address how the explorations activities may have affected survey results, which could affect some interpretations.	Insufficient Response: Information on exploration activities was provided. However, it is difficult to verify the statement that "there was no discernible change from historical distributions." because historical distribution locations were not shown or perhaps not known. R2-92. Provide information that has been used to come to the conclusion that “there was no discernible change from historical distributions.”
R194	If caribou are using the area near Finlayson Lake in deeper snow winters on the main winter range, then it suggests that the area around Finlayson Lake is important when winter conditions may be more limiting. If caribou are using the area during winters of low snow accumulation and lower snow levels are expected due to climate change, we should expect to see more use of the area.	R2-93. Discuss the implications of the use of the area around Finlayson Lake during the late winter surveys of 2007 and 2016. Particular focus should be given to the displacement effects of increased traffic on the Robert Campbell Highway and the Finlayson air strip. Insufficient Response: It is not clear why maps of FCH winter locations from historical surveys could not be shown - they are presented in the 2007 winter survey report (Adamczewski et al. 2010). The response refers to the statement in Section 13.4.1.1, which states that there will be interactions, but the response does not address the implications of the interactions.
R195, R196	Section 3.5.2 reports that fewer caribou were seen during post-calving surveys in 2015 and 2016 but does not consider how the population decline may have influenced the lower number of observations. As caribou populations decline, their	R2-94. What are the implications of the low calf:100 cow ratios during the post-calving surveys in 2015 and 2016? Provide a more thorough discussion about calf survival, including neonatal mortality, substantiated with references.

ARR No. 1 Request	Issue	Information Request and Rationale
	<p>ranges tend to contract, which could contribute to fewer caribou seen during surveys in 2015 and 2016.</p>	<p>Insufficient Response: The response states "Significant research over the past 30 years indicates that five-month-olds tallied during rut counts do represent recruitment." This statement needs to be supported with a reference and the response should specifically address how rut calf:cow ratios represent recruitment. There are still at least 6 or 7 months before calves are recruited into the 1-year old category, and mortality can occur during this time. Also, the response does not provide a more thorough discussion about calf survival, including neonatal mortality, substantiated with references, which was requested.</p> <p>R2-95. Discuss the geographical importance of the project area to caribou considering their continued use of the area despite population decline.</p> <p>Insufficient Response: The response does not discuss the importance of the specific project area to caribou in the context of continued use despite the population decline. Also, in contrast to the statement referring to range contraction not being clear for woodland caribou, particularly in Yukon, there are examples of shrinking ranges in relation to declining populations for woodland caribou in BC and Alberta. Additionally, the statement "...however experience shows that Yukon woodland caribou go through substantial population shifts without losing or gaining home range." needs to be substantiated with data or with a reference.</p>
R198	<p>Inconsistencies in interpretations of information or inappropriate conclusions drawn from data could lead to inaccuracies in assessing effects of the Project on caribou.</p> <p>The potential questions for this set of issues all relate to resolving inconsistencies in interpretations of information or correcting inappropriate conclusions drawn from data. The points are very specific and detailed, but individually and collectively they could lead to inaccuracies in assessing effects of the Project on caribou.</p>	<p>R2-96. Rut survey interpretation: What is the density of individuals (individuals/km²), and density of groups (groups/km²) for each 5-km concentric ring? Revise the discussion of use of the area surrounding the proposed Project by caribou as a function of distance category to reflect these densities.</p> <p>Insufficient Response: It is not possible to assess the validity of the information outlined in the response without seeing some form of actual data.</p>
R202	<p>The baseline information needs to be adequate, and to be adequately described, to provide a solid basis upon which to build the effects assessment. Some of the points are related to lack of clarity or lack of information about methods and others are suggestions for additional information that will help in interpretation of the baseline data.</p>	<p>R2-97. Provide additional information on baseline surveys and maps as detailed below.</p> <ol style="list-style-type: none"> a. Use of historical post-calving surveys: Are locations from historical post-calving surveys, available? If so, provide a map that displays these for the whole range of the herd.

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
		<p>b. Results of 2016 rut survey missing: Provide the results of the 2016 rut survey.</p> <p>Insufficient Response:</p> <p>a. The response states that the historical data are confidential due to the data sharing agreement between YG and BMC, but that the locations confirm continued use and dispersion throughout the FCH southern post-calving range. It is difficult to determine if this statement adequately reflects the data if the data are not provided.</p> <p>b. The question has been partially answered. The only mention of the 2016 rut survey is in Table3-3. There is no further discussion of the 2016 rut survey in Appendix E-8. Figure 3-11 does not specify what period of time the numbers cover, but it does not appear specific to 2016.</p>
Moose		
R205, R206	<p>A post-rut moose survey was completed in 2016, but the results have not been included or incorporated into the discussion.</p> <p>Information on ungulate survey methods is not sufficient to determine if methodology was sound.</p>	<p>R2-98. Review the table provided (13-13) and revise so that group sizes and classified individual sightings align. Incorporate these results into the discussion and conclusion.</p> <p>Insufficient Response: Late winter 2017 survey data and information has been provided but one section needs further review. Please check and revise Table 13-13, as the group sizes are different from the sum of the classified observations (i.e. cows + bulls + calves) in several cases.</p> <p>R2-99. Provide details on survey methods and protocols used, including area covered or total length of survey paths.</p> <p>Insufficient Response: Information on which survey standards/protocols were followed for the moose surveys has not been provided.</p>
R208	<p>Clear articulation of methods and assumptions is required to properly assess the suitability of the HSI model.</p> <p>Interspersion of habitat: It is unclear why the habitat suitability index (HSI) model does not account for the interspersion of available habitat (available forage with</p>	<p>R2-100. Articulate methods and assumptions used in the moose habitat suitability index model as indicated below.</p> <p>a. Model equation: Clarify how models were developed for each season and provide the equation used. (e)</p>

ARR No. 1 Request	Issue	Information Request and Rationale
	security and thermal cover). Moose are known to be rely on access to forage that is closely associated with security and thermal cover.	Insufficient Response: (a): The equations as depicted for both post rut and late winter moose habitat use do not allow for an output of 1.0 owing to a maximum rating of 0.8 for aspect classes. The equation also assumes that aspect is nearly inconsequential for moose habitat use (maximum contribution of 0.04). The contribution of aspect to moose habitat selection may be underrepresented by the current models.
R209	Failure to include moderate suitability habitat in the project area during the effects assessment could lead to underestimating impacts to moose.	Insufficient Response: It remains unclear what the effect of not including moderate habitat in the assessment is, and the methods for modeling moose habitat are unclear. R2-101. Confirm that the methods utilized for modeling moose habitat followed standards as depicted in RISC (1999) and provide the thresholds that were used to identify habitat into the three classes (high, moderate and low). Note that RISC (1999) does not utilize 3 class models.
Grizzly and Black Bears		
R210	The proponent uses thresholds about acceptable amounts of habitat loss and disturbance for grizzly bears. It is unclear how thresholds were established. The primary reference provided for Grizzly Bear thresholds in Table 13-3 is for woodland caribou (Environment Canada. 2011. Scientific assessment to inform the identification of critical habitat for woodland caribou (Rangifer tarandus caribou), boreal population, in Canada. Ottawa, ON, pp. 102.)	R2-102. Provide a reference for the thresholds used regarding acceptable amounts of habitat loss and disturbance for grizzly bears. Insufficient Response: The response is incomplete. Literature to support selected thresholds for disturbance to grizzly bears is not provided.
R213	The proposal contains insufficient analysis of mortality rates. In the baseline report, the proponent only describes harvest history in GMA 10-07 and not surrounding GMAs or bear management unit.	R2-103. Discuss the population of grizzly bears and mortality rates in the area. This should include a discussion of mortality of female bears. Insufficient Response: The question remains unanswered as little information is provided on populations and mortality rates of grizzly bears beyond harvest rates.
R215, R218	Aerial den surveys focused on modelled high and moderate suitable grizzly bear den habitat. If the surveys were completed based on a model that may need to be refined then the spatial focus of these surveys may have been incorrect.	R2-104. Which model was used to provide focus for the den surveys? Insufficient Response: Two different models are provided in the Project Proposal. It is unclear why different models were used and whether this would have impacted the ability to detect grizzly bear dens. It is unclear how potentially differing results were rationalized.

ARR No. 1 Request	Issue	Information Request and Rationale
	<p><i>Lack of use of Yukon information.</i> Please make use of geographically/ecologically appropriate literature as background to the habitat suitability model.</p> <p><i>Slope thresholds and den site selection.</i> A focus on geographically and biologically appropriate information may influence model inputs and outputs. This may influence the delineation of grizzly bear denning habitat.</p> <p>The lack of information on model assumptions, model reliability and model validation make it not possible to fully assess the adequacy of the model.</p>	<p>R2-105. What survey methods standards were used for den surveys? What was the survey effort by date? Provide information on the daily flight lines. How was the Project area stratified? How many observers were there and what were their qualifications?</p> <p>Insufficient Response: Flight lines are not provided.</p> <p>R2-106. What were the model assumptions that were used to build the model? Was model reliability determined? Was the model statistically validated?</p> <p>Insufficient Response: The methods used for developing models are not clearly defined and do not appear to follow standard modelling convention. Categories of high, medium and low are noted as being used but no information is provided with regards to the thresholds that are applied to define these categories. The use of a three-class system does not follow standard convention. No model validation was completed, so it is difficult to agree with the assertion of moderate reliability. In addition, it is impossible to validate the model equation without having a comprehensive presentation of model inputs, including a description of how slope, elevation, aspect and vegetation communities were ranked.</p>
Other Wildlife Species		
R228, R230	<p>Although RISC (2001) standards were identified as being used, the methods described vary in some important aspects from these standards.</p> <p>Completing a total of fourteen 75-m transects (1,050 m total length) within an LSA that is 11,321 hectares may be inadequate to reflect actual baseline conditions.</p> <p>To determine the baseline conditions for a project it is important that:</p> <ol style="list-style-type: none"> a. Appropriate survey standards are utilized, so that results are comparable and reliable; and b. An appropriate level of effort is completed for an adequate assessment of baseline conditions. Completing a total of fourteen 75-m transects (1,050 m total length) within an LSA that is 11,321 hectares may be inadequate to reflect actual baseline conditions. 	<p>R2-107. Provide rationale for the methods used, including how sample sites and transect lengths were selected.</p> <p>Insufficient Response: The rationale provided for survey transect length is insufficient. Rationale and literature are needed to support the assertion that 75-m transects are adequate, with consideration that RISC standards identify 1,000 m transect length.</p> <p>R2-108. Are transect lengths sufficient to provide reliable baseline information on habitat use in the area affected by the Project?</p> <p>Insufficient Response: The proponent has not adequately supported, through reference to relevant literature, the assertion that 75-m transects are sufficient to document the variety of wildlife utilizing the Project footprint and to locate main sites of wildlife use with consideration of RISC standards. The response should include reference to appropriate</p>

ARR No. 1 Request	Issue	Information Request and Rationale
		literature to support the assertion that 75-m transects would be sufficient to document the occurrence of rare or elusive species.
R235, R237	<p>The little brown myotis is listed as endangered under the <i>Species at Risk Act</i> (SARA) and by the Committee on the Status of Wildlife in Canada (COSEWIC), as is the northern myotis. Under Section 37 of SARA a recovery strategy (proposed) has been developed for these two species (Environment Canada 2015). This recovery strategy details the threats and issues associated with these bats and the justification for required protections. This includes habitat loss and degradation as well as heavy mortality that have occurred in eastern Canada as a result of white nose syndrome.</p> <p><i>Bat capture program.</i> It is recognized that the calls of some bat species, in particular some <i>Myotis</i> species, can be difficult to distinguish through echolocation analysis alone. As such, it is typical that a bat capture program, under approved permit where required, co-occurs with echolocation surveys to aid in species detection confirmation.</p> <p><i>Survey period length.</i> Surveys completed in 2015 and 2016 were limited to 7 days and 18 days, respectively. Given the seasonality of habitat use, including migration, this is a very short survey period which will not fully account for the potential occurrence of bats within the Project area during their active seasons.</p> <p><i>Analysis of recordings.</i> Information on the methods used for the analysis of recordings is missing.</p> <p>The assertion that non-detection results for subalpine habitats equate to non-occurrence is not supported. Considering the limited deployment of detectors, the potential seasonal occurrence of use of subalpine habitats by bats is potentially missed.</p> <p>According to Government of Yukon comments, “Baseline monitoring conducted in 2016 had “several instances” of bat detections.”</p>	<p>R2-109. What does “several incidences” of <i>Myotis</i> spp. Mean? The results for the bat detection surveys note that “The detector established at the wetland at km 5 along the Tote Road had “several incidences” of <i>Myotis</i> spp.” and is further stated that it “It is unknown how many bats “several incidences” equates to.”</p> <p>Insufficient Response: The analysis of bat detector data typically includes the sorting of noise files from bat echolocation calls (with noise files requiring manual review for the presence of bat echolocation detections). As such, the files that were simply noise would have been filtered out and the bat echolocation calls available for analysis to species and for notation on relative abundance, including the number of calls per day, etc.</p> <p>R2-110. Please provide information on the analytical methods that were used for the bat detection data including, at a minimum, information on software used and reference libraries utilized.</p> <p>R2-111. Provide a description of model assumptions, validation, reliability and zones of influence.</p> <p>Insufficient Response: No model validation is provided. The response should include further information as to how model reliability was defined as moderate. The response should also include references to appropriate literature to support the $\geq 70\%$ threshold for structural stage.</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
R238	No methodology is described for monitoring waterfowl use at water management facilities, water treatment ponds, and ponds built for fish habitat compensation.	R2-112. Provide methodology to monitor ponds for waterfowl use. Insufficient Response: Insufficient detail has been provided to understand what is planned
R241	<p>Insufficient detail regarding future monitoring plans throughout the life of the project.</p> <p>The proponent states that the monitoring program will occur every three years (or more frequently if adaptive management plan deems required), and will follow baseline study protocols with focus on key species and seasons.</p>	<p>R2-113. For the construction, operations, decommissioning and post-closure phases of the project, provide details on the monitoring plans including:</p> <ul style="list-style-type: none"> a. methods b. timing c. duration d. frequency e. location <p>Insufficient Response: Overall, Table 13-20 requires updates to reflect a clear description of methods to be utilized.</p>
R252	<p>The assessment is limited to defining habitat suitability within Geona Creek. The baseline assessment assumes that no other areas within the LSA will support beaver. Given that there are several other streams and small waterbodies within the LSA, this assumption is not supported.</p> <p>There are inconsistencies in the report regarding the suitability of habitat for beaver in this upper reach of Geona Creek.</p> <p>The information on modelling methods, model assumptions, reliability and validation is needed to assess the reliability of the model outputs, which form part of the effects assessment.</p>	<p>R2-114. What is the rationale for only including Geona Creek in the assessment?</p> <ul style="list-style-type: none"> a. How was the Allen (1982) model adapted and applied to the LSA? b. Provide information on model assumptions, an assessment of model reliability and model validation. c. Provide information on whether the model delineates habitat suitability within the LSA. d. Provide a clearer justification for the assumption that the upper 2.7 km of Geona Creek is poor beaver habitat. <p>Insufficient Response: Baseline surveys are intended to document the occurrence of species within the entire study area (often the LSA and/or the RSA). As noted, several other areas were documented as supporting beaver. It is not clear why an HSI model was produced to determine the suitability of Geona Creek for beaver occupancy.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
R253, R255	The assessment may underestimate the potential effects of the Project on waterfowl, collared pika, cliff-nesting raptors and passerine birds related to habitat loss through the exclusion of moderate suitability habitat.	<p>Insufficient Response: Utilizing high suitability alone is not a conservative approach. The relevance of the approach cannot be adequately assessed without a full understanding of how the categories of high, moderate and low were assigned.</p> <p>R2-115. Provide details on how the categories of high, moderate, and low habitat were assigned for waterfowl, collared pika, cliff-nesting raptors, and passerine birds.</p>
14.0 HERITAGE RESOURCES		
15.0 SOCIO-ECONOMIC EFFECTS ASSESSMENT		
R262	Further, the proposal does not provide details about the ‘conservative assumptions’ made in the prefeasibility study as they relate to operation of the mine and temporary or unplanned closures.	<p>R2-116. Identify situations or scenarios where the project might operate on a reduced scale (including temporary or unplanned closure). This should include detail about assumptions made in the financial assessment of the prefeasibility study (referred to in Section 17.4 of the proposal). Characterize the potential effects of these scenario’s and proposed mitigation.</p> <p>Insufficient Response: The proponent has not provided detail about assumptions made in the financial analysis of mitigation measures for temporary or unplanned closure.</p>
R263	The proponent has identified a desire to source goods and services locally. Additional information about the timing of the need for these goods and services will allow the local community to anticipate these needs and be more likely to fill them.	<p>R2-117. In order to assess how the proponent has considered competing demands for goods and services within communities, provide tables with anticipated procurement needs by project phase.</p> <p>Insufficient Response: In order to understand the potential economic impact of this project on local communities, a general list of procurement needs by project phase is warranted.</p>
R265	Aside from statistical data about divorces and separations, the <i>Socio-economic Baseline Report</i> does not contain any information or analysis relating to family structure in the project communities. Families in small communities with little-no access to childcare may experience additional stress based on the fly-in, fly-out shift structure.	<p>R2-118. Provide additional statistical data about family structure in the project communities, with a particular focus on single parent households and couples with children.</p> <p>Insufficient Response: The proponent states that this information is not publically available. It can be found on the Government of Yukon Socio-Economic Web Portal.</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
R267	<p>The proposed Project is located in close proximity to areas where traditional activities are taking place (e.g. hunting, trapping, fishing, gathering plants, etc.). There are also registered traplines and First Nations' cabins in the areas of North Lakes, Wolverine Lakes, Money Peak, all of which are adjacent to the local study area.</p> <p>This project proposal did not include an assessment of human health, with the justification that there are no permanent or semi-permanent residents nearby.</p> <p>However, people using the cabins at the project boundary were not considered in the assessment.</p> <p>There was no assessment of the Project's effects on country foods and the potential for human health impacts.</p> <p>However, the project proposal notes that culturally significant species are hunted (caribou, moose, sheep) and fished (grayling, trout, jackfish, whitefish, sucker fish) in the Ross River Dena Council and Liard First Nation traditional territory which overlaps with the Project footprint.</p>	<p>R2-119. Provide a preliminary quantitative Human Health Risk Assessment for each stage of the project. This assessment should be informed by Health Canada's Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA) Version 2.0 (2012). At minimum this assessment will address the following:</p> <ul style="list-style-type: none"> a. risks associated with human use of the area (e.g. the cabins at the project boundary or for traditional activities such as hunting, trapping, harvesting) potentially impacted by the project; b. risks associated with consumption of country foods (e.g., fish, caribou, migratory birds, and other animals exposed to environmental contaminants from the project in the air, water, or soil) harvested through traditional hunting, fishing, and gathering activities; and c. risks associated with consumption of surface and ground well water used for drinking potentially impacted by the project. <p>Insufficient Response: The preliminary quantitative risk assessment presented in response to R267 does not contain a quantitative assessment of human health. The assessment should include quantitative analysis on human health from the following: project related air quality effects, drinking water assessment including potential effects from atmospheric deposition, consumption of country foods (including waterfowl), and soil ingestion and inhalation. The proponent notes that soil (and by proxy vegetation) are two environmental media through which people and animals can be exposed to contaminants. However the frequency of proposed soil monitoring for control and exposure sites during the operations phase does not seem sufficient to properly monitor adverse effects.</p>
R269	<p>A shortage of rental housing capacity in Whitehorse was brought up at one of the meetings in the consultation record. However, the proponent states in its proposal that Whitehorse is understood to have the capacity to absorb an in-migration of workers, which is likely to happen during the construction phase of the project.</p>	<p>R2-120. Provide additional information to support the assumption that there is sufficient rental housing capacity in Whitehorse. Provide an understanding of the current rental housing capacity in Whitehorse and projections that consider likely demands and in particular demand from other proposed mining developments such as the Coffee Gold mine (Goldcorp Inc.) and the Casino mine (CMC Inc.)</p>

ARR No. 1 Request	Issue	Information Request and Rationale
		<p>Insufficient Response: The proponent does not adequately address worker influx in its response. Worker influx is driven by project demand for employees with specialized skill sets who do not exist in the local labour market. Unless the proponent has a viable plan to meet project requirements for specialized labour by providing specialized training to local employees (at a scale not currently described in the proposal), there will be an influx of skilled workers in Whitehorse during the construction phase. In its response the proponent does not address the demand side of the housing/rental equation and does not provide any additional information to support the assumption that there is sufficient rental housing capacity in Whitehorse. The proponent has provided a cumulative effects assessment that is not in accordance with Section 42 (1) (d) of YESAA which requires consideration of projects for which proposals have been submitted and/or activities that are likely to be carried out.</p>
R72, R271	<p>In order to assess effects from project waste, YESAB requires further information on where the following types of waste will be disposed of: beverage containers and other recyclables, steel/copper/rubber, tires, batteries, antifreeze (and used containers), solvents (and used containers), and all other forms of hazardous waste.</p>	<p>Insufficient Response: The proponent has identified specific waste streams that will not be disposed of on-site but has not provided any details about where the final disposal facilities will be located.</p> <p>R2-121. Provide a waste management plan that identifies predicted waste streams (e.g. (rubber, special waste, and solid wastes) and includes details on anticipated volumes and disposal methods. Where the disposal plan is to utilize facilities in Yukon, demonstrate that there is capacity for the additional waste.</p>
16.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT		
R272, R273	<p>Most, if not all of the extreme weather event discussion involves impacts to operations of the Project (e.g., reduction of activities, minimize traffic, damage to infrastructure). There is no information with respect to potential impacts on the environment (e.g., to water quality in nearby streams).</p> <p>Return periods associated with design 24-hour precipitation events (Table 16-5) and likelihood of flooding from infrastructure (Table 16-6) appear to be calculated with respect to historical and not projected future climate.</p>	<p>R2-122. Incorporate climate change information to re-assess the return periods associated with design 24-hour precipitation events and likelihood of flooding from infrastructure.</p> <p>Insufficient response: Proponent has not provided the requested information. Climate change information should be addressed as part of the sensitivity analysis conducted for the updated water balance model.</p>

ARR No. 1 Request	Issue	Information Request and Rationale
	<p>Although some general information on climate change is provided (including associated temperature and precipitation maps over the region associated with various emission scenarios and future time periods), there is no information or analyses regarding how these projections will be reflected in changes to extreme 24-hour precipitation and associated flooding events. It is therefore difficult to discern if there will be significant future changes to hydrological flow regimes in watercourses around the Project area affecting water conveyance and storage systems or surrounding infrastructure.</p>	<p>R2-123. Given this information, re-assess whether there will be significant future changes to hydrological flow regimes in watercourses around the Project area affecting water conveyance and storage systems or surrounding infrastructure.</p> <p>Insufficient response: Proponent has not provided the requested information.</p>
17.0 MALFUNCTIONS, ACCIDENTS, AND UNPLANNED CLOSURE		
R274	<p>In Accidents and Malfunctions a discussion of the impacts on fish and fish habitat and the associated affects to Commercial, Recreational or Aboriginal (CRA) Fisheries that would result from a catastrophic failure of the water management ponds on Genoa Creek should be provided. The expectations for this analysis would be a robust assessment of potential impacts and risks to CRA Fisheries that would include modelling of wave inundation and erosional forces associated with an event that occurred during a dry or wet year in combination with a dry (piping) or wet (precipitation) event. This assessment would include discussion of how far the inundation wave would travel, how far erosional forces would extend, the range of potential effects.</p>	<p>Insufficient response: Proponent has provided a qualitative response focused on commercial, recreational, or aboriginal (CRA) fisheries. In addition to CRA fisheries, the questions asked for information on impacts on fish and fish habitat.</p> <p>With respect to potential hydrologic/hydraulic impacts, there is potential, at least in Geona Creek, to result in an impact to stream morphology which could have a subsequent impact on fish and fish habitat. For instance, failure of the WMPs could result in (i) release of sediment downstream, (ii) erosion of sections of Geona Creek, (iii) sediment deposition in sections of Geona Creek, and (iv) change in stream morphology as a result of the erosion/sedimentation and alteration of natural erosion/sedimentation processes.</p> <p>In addition to the above, the stated reliance on a beaver pond to offset potential impacts is questionable.</p> <p>R2-124. Provide an assessment of catastrophic failure of the water management ponds on Genoa Creek. This may be included in the response to R2-45 which requests an assessment of impacts associated with the Project on erosion, stream morphology and riparian vegetation of all affected drainages from projected downstream flow changes during all Project phases.</p> <p>R2-125. The statement in the last paragraph that reads “impacts to Geona Creek CRA fisheries would be limited to areas downstream of the Robert Campbell Highway</p>

<i>ARR No. 1 Request</i>	<i>Issue</i>	<i>Information Request and Rationale</i>
		to the confluence with Finlayson River” is confusing. Geona Creek is not traversed by RCH. Please clarify.
R275	<p>Section 17.4 references the additional cycle of boom and bust that would occur in the event of unplanned closure and recognizes the negative effect this may have on employees. Several mitigation measures have been provided for this effect. However, the proposal does not mention the risk of this event to local contractors and businesses. There is also no detail on how BMC will ensure that the mitigation measures proposed for employees will be carried out.</p> <p>While it describes benefits/enhancement measures associated with upskilling of the workforce, the proponent has not provided any specific mitigation measures that would be implemented in the event that a temporary or unplanned closure takes place.</p>	<p>R2-126. Provide additional information on the risks of temporary or permanent unscheduled closure of the Project focusing on socio-economic effects to employees, contractors, and businesses, and others who have been impacted economically. Include details and description of adverse effects; on how these effects will be mitigated and how they will be financed.</p> <p>Insufficient Response: The response fails to identify effects and mitigations to employees and contractors if there is unscheduled closure.</p>
18.0 CONCEPTUAL MANAGEMENT PLANS		
No information required		
19.0 SUMMARY AND CONCLUSIONS		
No information required		