Water Resources Division
Resource Management Directorate
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Your file - Votre référence
2AM-MRY1325
Our file - Notre référence
GCDocs#104453106

July 22, 2022

Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
E-mail: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada's (CIRNAC) Reclamation Cost Estimate in support of the Annual Security Review for Baffinland Iron Mines Corporation's Updated 2022 Work Plan for the Mary River Project, Water Licence 2AM-MRY1325 Amendment No. 1

Dear Mr. Dwyer,

Thank you for the invitation to participate in the 2022 Annual Security Review (ASR) concerning the Mary River Project, operated by Baffinland Iron Mines Corporation (BIMC). Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) examined BIMC's 2022 Work Plan submission and updates to the reclamation security estimates for the Mary River Project, pursuant to CIRNAC's responsibilities under Part C and Schedule C of the Water Licence 2AM-MRY1325 – Amendment No. 1.

Revised Estimate for the 2022 Work Plan

CIRNAC retained the support of SNC-Lavalin Group Inc. to develop a reclamation cost estimate for the Mary River Project using the RECLAIM 7.0 model. This estimate is intended to evaluate the revised scope of BIMC's 2022 Work Plan and is provided as a separate document in Attachment 1 of this submission. This submission includes a reconciled 2021 global cost estimate and a 2022 marginal cost estimate. The 2022 global estimate was derived from these models.

Documents and files provided by BIMC that were considered in this review include;

- Updated 2022 Work Plan, dated November 1, 2021, which includes:
  - Appendix A: 2022 Work Plan Site Layouts

  - Appendix B: 2022 Marginal Closure And Reclamation Financial Security Estimate
  - Appendix C: Interim Closure And Reclamation Plan
  - Appendix D: Emergency Response Plan
  - Appendix E: Spill Contingency Plan
  - Appendix F: 2021 Work Plan Addendum
- Revised 2022 Marginal Closure and Reclamation Financial Security Estimate (Rev2) dated June 13, 2022
- Disturbed Area Analysis
- Equipment Inventory Audit

SNC-Lavalin completed the review of these document and based on that review, updated the RECLAIM estimate for 2022. The report contained a summary of findings, issues and discrepancies, comments and clarification questions for BIMC's consideration.

CIRNAC submitted this report to the Nunavut Water Board on December 30, 2021. In response to the issues identified in CIRNAC's initial report, BIMC revised the 2022 Marginal Closure and Reclamation Financial Security Estimate (Rev2) which included the updated Estimate Breakdown Structure (EBS), Disturbed Area Analysis, Equipment Inventory Audit and other supporting documentation and provided these updates to CIRNAC on June 13, 2022.

This memorandum provides CIRNAC's updated RECLAIM cost estimate based on the original and updated document submissions from BIMC. CIRNAC's submission also tracks the issues and discrepancies, comments and responses between CIRNAC and BIMC. The updated Summary of 2022 Global Estimate (RECLAIM) and a comparison of BIMC 2022 Security Estimate is provided as a table in Attachment 1. A table summarizing the issues/discrepancies, recommendations from CIRNAC and responses provided by BIMC are provided as Attachment 2.

Cost Breakdown

CIRNAC's global reclamation cost estimate for the 2022 Work Plan is $109,297,153. This review considers the 'global' security which includes the financial liabilities, both land and fresh water for undertakings and related activities covered under the existing water licence 2AM-MRY1325. The difference between what is currently held in Security and the 2022 estimates constitutes a reduction of $3,782 in Security held by the Crown.

Table 1-1: CIRNAC 2022 Global Estimate Cost Breakdown

	Security Currently Posted under 2AM-MRY1325	2021 Reconciled Global Estimate	2022 Work Plan Marginal Estimate	2022 Global Estimate
Total Cost	$123,787,500	$104,678,386	$4,618,767	$109,297,153
IOL Liability	$120,999,500	$101,888,908	$4,618,767	$106,507,675
Crown Liability	$2,788,000	$2,789,479	$0	$2,784,218

There was a $2,304,445 difference between the BIMC and CIRNAC estimates for the 2021 Reconciled Global estimate. This is due to multiple factors, the most likely being the following:

- The RECLAIM model includes chemicals and contaminate soil securities as direct costs, and indirect costs are calculated as a percentage of direct cost;
- The RECLAIM model includes bonding and insurance as an indirect cost, calculated as 2% of the total direct costs; and
- The unresolved Tranche 1 and 2 issue discuss in Line #12 of the BIMC Comment Response Tracker of 2022 ASR Submission table in Attachment.

CIRNAC reviewed the 23 previously identified issues/discrepancies from the December 30, 2021 submission as well as BIMC's responses to these items. The results of the review are summarised below:

- 12 were either resolved, closed or new information was carried forward into RECLAIM;
- 10 are to be considered in an updated closure plan; and,
- 1 remains open (clarification on unit rates was not received).

Recommendations

Consistent with CIRNAC's initial review there remain outstanding values of missing security associated with the management of contaminated soils, water treatment requirements and estimated costs for cover over the Waste Rock Facility (WRF) that in are not detailed in BIMC's submission.

The 10 issues identified to be considered in an updated closure plan generally covered these missed or under funded securities. BIMC agreed that the Waste Rock Management and Closure Plan requires adaptive management to ensure final closure objectives are met. CIRNAC agrees adaptive management is critical when planning for closure. While a contingency of 20% was recommended to capture some of these costs, CIRNAC suggests these closure costs have the potential to be significantly higher in a worst case scenario. A detailed review of the updated closure plan and costing will be required prior to acceptance.

Waste Rock

It is understood that changes to waste rock placement during operations to support closure are being considered by BIMC. CIRNAC's review of the EBS could not identify costs for final cover placement. As a contingency CIRNAC recommends BIMC include a security amount for placement of a final cover over the PAG rock and an additional amount for regrading.

Contaminated Soil Management

The revised 2022 Marginal Closure and Reclamation Financial Security Estimate submission by BIMC captures closure costs for contaminated soil management in the Run-of-Mill (ROM), Milne Port Ore Stockpile Areas and the Crusher Pad. It is unclear if these costs include consolidation and regrading. CIRNAC agrees with the principles behind the contaminated soil management plan as described in the updated ASR. Therefore, CIRNAC is concerned with uncertainties in assumptions used by BIMC over total volumes and recommends additional studies to refine the assumptions used in the EBS.

Closure costs for contaminated soils are based on disturbed areas. BIMC's cover design includes a 0.5 m of "clean" soil or PAG rock but it is unclear if the cover will prevent ML/ARD. PAG rock would not likely meet BIMC's criteria for "clean" soil as it is usually enriched with base metals associated with the minerals being mined. Furthermore, there are other areas of the mine that are impacted by site-related metals from aerial dispersion, tracking of trucks, etc. There were no studies cited in BIMC's workplan that justify 0.5m of cover would be sufficient therefore, CIRNAC recommends an adaptive risk-management approach to justify the coverage proposed. A post closure risk assessment based on land use should be completed and updated throughout the mine life cycle to better secure closure costs. In the absence of this data and risk evaluations, CIRNAC recommends considering securities for the entire area as provided in the Disturbed Area Analysis.

Interim Closure and Reclamation Plan and Unit Rates

CIRNAC's estimate was calculated based on the current Interim Closure and Reclamation Plan (ICRP) timelines and strategies, as discussed during the 2021 ASR Teleconference. CIRNAC restates that it is of the opinion that the ICRP requires an update and a formal review by parties and the Nunavut Water Board. The ICRP should include specific strategies to close the waste rock pile, timelines for water treatment post closure, and an increase of duration for Interim Care and Maintenance and Post-Closure Monitoring to 5 and 25 years, respectively.

Although our estimate represents a slight reduction in CIRNAC's overall security quantum. CIRNAC is of the opinion that the ICRP must be updated to address the outstanding concerns of unidentified origins and migration of acid rock drainage, waste rock cover and a lack of clarity on water treatment to ensure that the security accurately reflects the liability at the site.

If there are any questions or concerns, please contact me at (867) 975-4282 or lauren.perrin@rcaanc-cirnac.gc.ca or Andrew Keim, A/Manager of Water Resources, at (867) 975-4550 or andrew.keim@rcaanc-cirnac.gc.ca.

Sincerely,

Lauren Perrin, Water Management Specialist

CC:

Assol Kubeisinova, Technical Advisor, Nunavut Water Board
Lou Kamermans, Senior Director - Sustainable Development, Baffinland Iron Mines Corporation
Jared Ottenhof, Director Major Projects, Qikiqtani Inuit Association

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Attachment 1

Updated Summary of 2022 Global Estimate (RECLAIM) and Comparison to BIMC 2022 Security Estimate

Table 1-2: Summary of 2022 Marginal Estimate (RECLAIM)

Cost Item	Security Estimate using SNC-Lavalin Recommended Unit Rates	Security Estimate using BIMC Rates as per 2022 Work Plan Estimate
Direct Costs		
Open pit	$0	See 2022 EBS for cost breakdown by activity.
Quarries	$0	
Underground Mine		
Tailings Facility		
Rock Pile		
Buildings and Equipment	$987,093	
Mine Site	$1,235,895	
Milne Port	$397,873	
Tote Road	$386,194	
Baffinland Owned Equipment	$1,615,602	
Chemicals and Contaminated Soil Management	$480,437	
Surface and Groundwater Management		
Interim Care and Maintenance		
Subtotal Direct Costs	**$4,116,001**	**$3,641,590**
Indirect Costs		
Mobilization/Demobilization	-$1,064,505	See Table 9.2 for cost breakdown by activity.
Post-Closure Monitoring and Maintenance	$7,307	
Engineering (3.9%)	$160,524	
Project Management (9.4%)	$386,904	
Health and Safety Plans/Monitoring, QA/QC and Engagement Costs (0%)		
Bonding/Insurance (2%)	$82,320	
Contingency (20%)	$823,200	
Market Price Factor Adjustment (2.6%)	$107,016	
Subtotal Indirect Costs	**$502,766**	**$713,691**
GRAND TOTAL	**$4,618,767**	**$4,496,533**

Table 1-3: Summary of 2021 Reconciled Global Estimate (RECLAIM)

Cost Item	Security Estimate using SNC-Lavalin Recommended Unit Rates	Security Estimate using BIMC Rates as per 2022 and 2021 Work Plan Estimate and 2021 Addendum
Direct Costs		
Open pit	$5,926,125	
Mary River Mine Pit/ Quarries	$5,926,125	
Underground Mine	$0	
Tailings Facility	$0	
Rock Pile	$588,550	
Buildings and Equipment	$23,160,418	
Mine Site	$10,076,701	
Milne Port	$9,615,958	
Tote Road	-$2,107,197	
Project Wide	$724,684	
BIMC Owned Equipment	$4,850,271	
Chemicals and Contaminated Soil Management	$6,806,196	Total Based on Global Estimate Security for 2021 (as presented in the BIMC 2022 Work Plan) plus total reductions from Tranche 1 and Tranche 2 of the 2021 Work Plan Addendum.
Surface and Groundwater Management	$1,247,071	
Interim Care and Maintenance	$3,423,145	
Subtotal Direct Costs	**$41,151,505**	
Indirect Costs		
Mobilization/Demobilization	$43,502,261	
Post-Closure Monitoring and Maintenance	$4,428,200	
Engineering (3.9%)	$1,604,909	
Project Management (9.4%)	$3,868,241	
Health and Safety Plans/Monitoring, QA/QC and Engagement Costs (0%)	$0	
Bonding/Insurance (2%)	$823,030	
Contingency (20%)	$8,230,301	
Market Price Factor Adjustment (2.6%)	$1,069,939	
Subtotal Indirect Costs	**$63,526,882**	
GRAND TOTAL	**$104,678,386**	**$102,373,941**

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Table 1-4: Summary of 2022 Global Estimate (RECLAIM) and Comparison to BIMC 2022 Security Estimate

		2021 Reconciled Global Estimate			2022 Marginal Estimate			2022 Global Estimate (2021 Reconciled Global + 2022 Marginal)		
		Total	IOL Liability	Crown Liability	Total	IOL Liability	Crown Liability	Total	IOL Liability	Crown Liability
CAPITAL COSTS										
OPEN PIT	Mary River Mine Pit	$5,926,125	$5,926,125	$0	$0	$0	$0	$5,926,125	$5,926,125	$0
BUILDINGS AND EQUIPMENT	Mine Waste Rock Pile	$588,550	$588,550	$0	$0	$0	$0	$588,550	$588,550	$0
	Mine Site	$10,076,701	$10,076,701	$0	$1,235,895	$1,235,895	$0	$11,312,596	$11,312,596	$0
	Milne Port	$9,615,958	$9,982,428	-$366,470	$397,873	$397,873	$0	$10,013,832	$10,380,301	-$366,470
	Tote Road	-$2,107,197	-$3,458,212	$1,351,015	$386,194	$386,194	$0	-$1,721,003	-$3,072,018	$1,351,015
	Project Wide	$724,684	$528,632	$196,053	$0	$0	$0	$724,684	$528,632	$196,053
	BIMC Owned	$4,850,271	$4,850,271	$0	$1,615,602	$1,615,602	$0	$6,465,874	$6,465,874	$0
CHEMICALS ANC CONTAMINATED SOIL MANAGEMENT		$6,806,196	$6,650,904	$155,291	$480,437	$480,437	$0	$7,286,633	$7,131,341	$155,291
SURFACE AND GROUND WATER MANAGEMENT		$1,247,071	$1,218,301	$28,770	$0	$0	$0	$1,247,071	$1,218,301	$28,770
INTERIM CARE AND MAINTENANCE		$3,423,145	$3,344,171	$78,973	$0	$0	$0	$3,423,145	$3,344,171	$78,973
SUB-TOTAL		$41,151,505	$39,707,872	$1,443,633	$4,116,001	$4,116,001	$0	$45,267,506	$43,823,873	$1,443,633
PERCENT OF SUB-TOTAL			97.13%	2.87%		100%	0%		97%	3%
INDIRECT COSTS										
MOBILIZATION/DEMOBILIZATION		$43,502,261	$42,736,163	$766,098	-$1,064,505	-$1,064,505	$0	$42,437,756	$41,671,658	$766,098
POST-CLOSURE MONITORING AND MAINTENANCE		$4,428,200	$4,301,159	$127,041	$7,307	$7,307	$0	$4,435,507	$4,308,466	$127,041
ENGINEERING	3.90%	$1,604,909	$1,558,865	$46,043	$160,524	$160,524	$0	$1,765,433	$1,719,389	$46,043
PROJECT MANAGEMENT	9.40%	$3,868,241	$3,757,265	$110,976	$386,904	$386,904	$0	$4,255,146	$4,144,169	$110,976
BONDING/INSURANCE	2%	$823,030	$794,157	$28,873	$82,320	$82,320	$0	$905,350	$876,477	$23,612
CONTINGENCY	20%	$8,230,301	$7,994,181	$236,119	$823,200	$823,200	$0	$9,053,501	$8,817,382	$236,119
INFLATION	2.6%	$1,069,939	$1,039,243	$30,696	$107,016	$107,016	$0	$1,176,955	$1,146,259	$30,696
SUBTOTAL		**$63,526,881**	**$62,181,035**	**$1,345,846**	**$502,766**	**$502,766**	**$0**	**$64,029,648**	**$62,683,802**	**$1,340,585**
TOTAL COST (direct and indirect)		**$104,678,386**	**$101,888,908**	**$2,789,479**	**$4,618,767**	**$4,618,767**	**$0**	**$109,297,153**	**$106,507,675**	**$2,784,218**
Total estimated Security for 2022 as per BIMC 2022 Work Plan Table 9.3 (1)		**$102,373,941**	**$100,056,075**	**$2,317,866**	**$4,496,533**	**$4,493,130**	**$3,403**	**$106,870,474**	**$104,549,205**	**$2,317,866**

(1) Taken from Table 9.3 on page 26 of the 2022 Work Plan.

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Attachment 2

Recommendations from CIRNAC and responses provided by BIMC

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BIMC Comment Response Tracker of 2022 ASR Submission

#	Issue/ Discrepancy	Description	Recommendation/Request to BIMC	BIMC Response	Updated Responses	BIMC Response Dated February 3 Adequacy	CIRNAC's Review Revision 2
1	**Contaminated Soils in Ore Storage Areas**	The ICRP mentions assessment and removal of contaminated soils will occur at closure. We are assuming this requires comparison of soil bulk chemistry to background conditions specific to the area of the mine (i.e., Milne Port, Tote Road and Mine Area). We also assume removal would include onsite landfilling.	Based on corporate experience at mine closure projects, we expect the residual soils under the ore storage areas will contain metal concentrations greater than background conditions. BIMC is requested to provide information as to where these items are captured in the estimate. Should they not be present, CIRNAC requests that additional studies be initiated to confirm these areas are chemically stable and not leaching to nearby water bodies and/or are posing a risk to human health or ecological terrestrial receptors. Following that costs for mitigation of potential impacts should be included in the annual security review.	Costs for monitoring, including any required instrumentation, are included in the Closure & Post Closure Monitoring costs. Details of the monitoring programs included in this allocation are outlined in Section 9 of the ICRP (Rev. 5, Oct 2018). A pre-closure inspection for potentially impacted soils will be completed at the entire site. Any contaminated soils, snow or ice packs, or overburden will be flagged. The extent of the contamination will be assessed, and the material removed for treatment at a site-landfarm or containerized for shipment to a licenced off-site facility. Geotechnical engineering monitoring is outlined in Section 9.4 of the ICRP, will also be conducted which includes stability, erosion and permafrost analyses and monitoring.	➢ Requesting more information on where the costs for baseline soil and groundwater studies in expansion areas as well ongoing testing of temporary use areas such as crusher and ore storage area are reflected in the estimate.	➢ Not adequate	➢ BIMC increased securities to account for the placement of a 0.5 m cover of "clean" material over relocated contaminated soil from the Crusher Pad, ROM and Milne Port Stockpile. It was assumed that 200 mm was the vertical extent of contaminated soils in these areas. Unit rates of \$4.02/m^3 and haul distance of 1 km were applied to the Milne Port Stockpile whereas \$9.9/m^3 and 5 km were applied to the Crusher Pad . The cover material for the ROM and Milne Port Stockpile is to be sourced from existing laydown areas and NAG waste rock is for the Crusher Pad. ➢ It is unclear to CIRNAC if the unit rates for cover placement include a unit rate for consolidation of the contaminated soils into the 1.0 m deep landform. Should \$1.5/m2 be added to the total cost for management of contaminated soils? ➢ CIRNAC noted there were minor discrepancies between the contaminated soil areas provide by BIMC

#	Issue/ Discrepancy	Description	Recommendation/Request to BIMC	BIMC Response	Updated Responses	BIMC Response Dated February 3 Adequacy	CIRNAC's Review Revision 2
							in table 4-10 for the Milne Port Stockpile and ROM compared to the Disturbed Area Analysis. However the Crusher Pad area in table 4-10 was reported at approximately half that provided in the Disturbed Area Analysis. RECLAIM WAS updated with the areas provided in Table 4-10. These discrepancies need to be addressed in a future update. ➢ BIMC defines clean or not contaminated as metal concentrations being similar to background or less than CCME agricultural land (AL) use standards. It is unclear on what basis BIMC is establishing that the waste rock meets this "clean" criteria.. ➢ The remediation plan calls for consolidation of the contaminated soil in these areas to create a 1 m thick landform to reduce cover costs. It is not clear if (or where) the cost for consolidation is captured in the security costs. ➢ It is unclear if BIMC factored in the potential for acid generation or metal leaching from the residual ore in contaminated soils and whether a simple soil cover is adequate for the protection of the environment post closure. Please include in the updated closure plan.

#	Issue/ Discrepancy	Description	Recommendation/Request to BIMC	BIMC Response	Updated Responses	BIMC Response Dated February 3 Adequacy	CIRNAC's Review Revision 2
							➢ We noted there are other areas of the mine that are known to contain metal concentrations greater than background conditions or AL standards. Such as the near field samples around the WRF and along Tote Road. BIMC has not provided a cost to address these contaminated soils. In the absence of data. CIRNAC assumed all disturbed areas contain some level of soil contamination above AL or background concentration due to dusting or trafficking on mine wastes around the Site. The cost for management of these soils is not captured. CIRNAC recommends an adaptive risk-management approach. A post closure risk assessment based on the end land uses should be completed and updated throughout the mine life cycle to better secure closure costs.

#	Issue/ Discrepancy	Description	Recommendation/Request to BIMC	BIMC Response	Updated Responses	BIMC Response Dated February 3 Adequacy	CIRNAC's Review Revision 2
2	**Expanding the groundwater monitoring and sampling program.**	Some piezometers were installed near the landfill at the Mine Site and a commitment was made to expand the program. In the ICRP, restoration is described as "The renewing, repairing, cleaning-up, remediation or other management of soil, groundwater or sediment so that its functions and qualities are comparable to those of its original, unaltered state." The ICRP also states the requirement for monitoring of surface and groundwater to ensure discharge criteria are met. The effects assessment in the ICRP did not consider groundwater transport as a point or non-point source.	BIMC should include costs to monitor groundwater where ML/ARD effects to receiving water bodies and ecological receptors are possible. These areas would include the mine workings, WRF, select water storage ponds, ore storage areas and crusher area.	Baffinland agrees that future updates to the ICRP should respect any updates to the Waste Rock Management Plan and associated monitoring. The current waste rock management plan maintains a final closure strategy of freezing waste rock in permafrost to mitigate the generation of ARD, and has revised the waste placement strategy accordingly with the objective of freezing material in place to mitigate ARD. Baffinland has integrated adaptive management into the Waste Rock Management Plan to further demonstrate a commitment to ensuring the final closure objectives are met.	➢ CIRNAC's concern regarding the residual mine waste in the ancillary areas that may contain Metal Leeching or Acid Rock Drainage soils that contain metals above the soil guidelines and may impact receiving water environments at closure. ➢ How are the soils being managed in these areas such that at closure impacts to the receiving waters doesn't occur? ➢ Where is the cost for the WR stormwater facility described in the FW Supply, Sewage and Waste Water Management Plan?	➢ Adequate GW monitoring costs in operational budget ➢ Not adequate for soil management	➢ Not addressed in Rev 02 ➢ Some contaminated soil is being considered but there is no mention of ML/ARD consideration into the cover or landform design ➢ To be considered in the updated closure plan
3	**Water Treatment**	Runoff from the WRF shows impacts from ML/ARD. Ongoing water treatment was recommended during operations until the pond water meets the water quality objectives. Post closure water quality was not predicted as part of the water quality model. This remains as a large uncertainty for the review team.	Include contingency for water treatment as per the closure plan until geochemical modelling and groundwater and surface water monitoring and sampling suggest otherwise.	In 2021, Baffinland increased the allocation for water treatment based on the volumes of water discharged from the MS-08 (Waste Rock Facility) discharge point. Based on discharges since 2014 as detailed in Table 1, the average volume of water discharged from MS-08 was 47,759 m3. Accordingly, Baffinland increased the Closure and Post Closure Monitoring Cost to account for three (3) years of treatment, for a total cost of approximately $137,000, or an increase of $69,000.	➢ CIRNAC is requesting Baffinland to share Table 1 of these discharge results. ➢ Can Baffinland provide a rationale for the three years post closure water treatment? ➢ What is the plan for residual contaminated soils in the Milne Port Ore Stockpile Facility or Mine Site Crusher Area and temporary ore storage areas (ROM stockpile) at closure?	➢ Not adequate	➢ Not addressed in Rev 02 ➢ Some contaminated soil is being considered but there is no mention of ML/ARD consideration into the cover or landform design ➢ To be considered in the updated closure plan
4	**MS-08 Liner Observations**	There were no observations recorded in the geotechnical inspection report. Some iron staining was observed in sediments downgradient of the WRF treatment plant and MS- 08.	Include observations if possible and incorporate into future monitoring events. Include costs for seepage or groundwater sampling in this area, if determined to be feasible.	Any observations related to the MS-08 liner will be documented in Baffinland's geotechnical inspection reports. Regarding the increase for monitoring, under the 2021 Work	➢ Request Baffinland to include cost for Installing groundwater wells and sampling in the active zone down-gradient of the storage pond to show loss to the environment.	➢ Adequate – costs are covered in the operational budget ➢ Not adequate for long term water treatment	➢ Not addressed in Rev 02 ➢ To be considered in the updated closure plan

#	Issue/ Discrepancy	Description	Recommendation/Request to BIMC	BIMC Response	Updated Responses	BIMC Response Dated February 3 Adequacy	CIRNAC's Review Revision 2
		The liner for pond MS-08 capturing runoff from the WRF is an important item. Some observations about its integrity would have been reassuring, the photos appear to indicate liner is under stress (See Figure 27).		Plan, Baffinland increased the Closure and Post Closure Monitoring Cost to account for three (3) years of treatment, for a total cost of approximately $137,000, or an increase of $69,000.			
5	**Expansion of the mine site landfill (2021-10, 2022-1) and landfarm (2019-18)**	The landfarm is lined but the landfill is not. It is unclear how water is being managed at landfill. Red staining and seepage observed in the geotechnical inspection report can indicate water quality issues that may require mitigation.	Do the result of the preliminary groundwater monitoring program suggest impacts to Sheardown Lake are possible? How will water management occur at this proposed landfill area?	The results of the groundwater monitoring program are included in the Type A Annual Report for Baffinland each year. Baffinland acknowledges that there are other areas of the mine that require water treatment on an as needed basis, including the Milne Port Landfarm (MP-04). While many or all of these sources will be eliminated in closure, the total average discharge from the Milne Port Landfarm (MP-04), Milne Port Contaminated Snow Containment (MP-04a) and the Mine Site Hazardous Waste Berm 7 (MS-HWB-07) and Milne Port Tank Farm (MP-03), were combined and added to the Closure and Post Closure Monitoring estimate as a conservative measure.	➢ Does Baffinland have a plan for metal contaminated soil at closure? If so, where are these costs located?	➢ Not adequate	➢ Not fully addressed in Rev 02 ➢ Not all areas of suspected contaminated soils are addressed in the new revision ➢ To be considered in the updated closure plan
6	**New Ore Stockpile Area (2022-2) & Run of Mine Stockpile (2019-23)**	Expansion of the crude ore stockpile area where visible iron staining in ephemeral channel is noted directly adjacent to the Mary River. Located near the Explosive Magazine storage area. Discharges to Mary River with iron staining visible in satellite imagery.	How will water management occur at this proposed storage area? Will it report to the proposed sediment pond to the northwest? Will this new pond be lined? Ore stockpile areas can be long term sources of contamination post closure. What is BIMC plan to ensure chemical stability here post closure?	The details for how water will be managed in the proposed storage area was outlined in the approved Modification Request No. 13, and supporting attachments included with the submission (Water Management Plan). Appendix C.1.1 of the 2020 Type A Water Licence Report includes the Construction Summary Report and As-Built for the Run of Mine Stockpile Area. The report details the monitoring and management of water in	➢ Could Baffinland tell us where these costs are located in the EBS as well if costs were allocated for these facilities in the closure plan?	➢ Not adequate	➢ Partially address (see Issue #1). ➢ Contaminated soil from this area is being consolidated and covered but there is no mention of ML/ARD consideration into the cover or landform design ➢ To be considered in the updated closure plan

#	Issue/ Discrepancy	Description	Recommendation/Request to BIMC	BIMC Response	Updated Responses	BIMC Response Dated February 3 Adequacy	CIRNAC's Review Revision 2
				accordance with the approved design. As detailed in the ICRP, a pre- closure inspection for potentially impacted soils will be completed at the entire site. Any contaminated soils, snow or ice packs, or overburden will be flagged. The extent of the contamination will be assessed, and the material removed for treatment at a site-landfarm or containerized for shipment to a licenced off-site facility.			
7	**Damaged liners and culverts**	Damaged liners (MP-05 settling pond and HBW-1) and culverts (CV-114D) were documented in the geotechnical inspection report with a recommendation to repair them as soon as practically possible.	BIMC should consider allocating costs for additional repairs.	Baffinland committed to addressing the damaged liners and culverts as outlined in the 2021 geotechnical inspection reports.	➢ CIRNAC would like clarification what section of the revised workplan this information can be found.	➢ Adequate	➢ No Additional Comment
8	**CIRNAC awaiting disturbed area calculation**	CIRNAC is awaiting receipt of results of BIMCs disturbed area calculation based on satellite imagery.	BIMC to complete assessment and provide results to CIRNAC for inclusion into security estimate.	Baffinland has included the results of the disturbed area calculation based on satellite imagery in the 2022 Work Plan, Rev. 1 submitted on December 31, 2021.	➢ Request Baffinland provide Disturbed Areas Analysis supporting documentation to confirm analysis results.	➢ Not Resolved- did not receive data requested from follow up.	➢ Received and carried into Reclaim
9	**Phase 2 Equipment Mobilization**	Costs remain in the 2022 EBS for Phase 2 Equipment mobilization/ demobilization. These costs are summarized in section 5.4.1 above.	Phase 2 items will continue to be included within this year's estimate with an understanding that these costs represent only demobilization costs. Once Phase 2 approval is received these items will have to have decommissioning costs carried as well within the EBS and therefore Reclaim models.	For the Phase 2 modules onsite, the costs are captured under the global and Phase 2 estimate which includes removal and demobilization of the equipment.	➢ Resolved	➢ Adequate.	➢ No Additional Comment.

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10	**Phase 2 Equipment Demobilizatio n**	Costs for Demobilization included in Table 3-6 of the 2018 Marginal Closure and Reclamation Financial Security Estimate are not included in the EBS. These costs are summarized in section 5.4.1 above	BIMC to confirm whether the Phase 2 line items from the 2018 Work Plan have been revised to what is currently in the EBS for Phase 2, or if they should be inserted into the EBS as separate, additional line items.	The Phase 2 line items originally in the 2018 Work Plan referenced were removed from the estimate following the ASR process in 2018. The EBS has been updated to reflect what is currently onsite. Baffinland agrees with CIRNAC that the Phase 2 modules are not to be commissioned unless, or until, the Phase 2 amendment application is approved by the NWB and the Minister of Northern Affairs.	➢ Resolved	➢ Adequate.	➢ No Additional Comment.
11	**BIMC Owned Equipment numbers and associated security**	Small discrepancies were noted between the 2021 Addendum and 2022 EBS for BIMC owned equipment.	Review 2022 EBS compared to the 2021 Work Plan Addendum Table 8.2 to ensure all BIMC owned equipment has been accounted for (i.e., security in place or removed for mobilized, deferred, or demobilized equipment, respectively). See Section 5.4.2 for a list of noted discrepancies.	Baffinland has updated the numbers associated with the BIM Owned Equipment and associated security in the 2022 Work Plan, Rev. 1 submitted on December 31, 2021. Rev 1 submitted includes the outcomes of the 2021 equipment inventory audit conducted by Ernst and Young.	➢ Could Baffinland provide Ernst and Young equipment inventory report?	➢ Adequate.	➢ Received and carried into RECLAIM.
12	**2021 Addendum Tranche 1 and Tranche 2 cost reductions do not match 2022 EBS values.**	The 2022 EBS does not include indirects outlined in the 2021 Addendum resulting in a missing cost reduction of $(3,612,000) in the EBS. Similarly, the 2022 EBS allocates a cost reduction $265,850 more than the 2021 Addendum for Tranche 2.	BIMC should review and confirm the EBS to include line items matching the 2021 Addendum summary table including the addition of cost reductions to indirect items and verifying the cost reduction associated with the demobilization of 3rd party equipment (Tranche 2).	Baffinland has updated the line items matching the 2021 Addendum summary table in the 2022 Work Plan, Rev. 1 submitted on December 31, 2021.	➢ CIRNAC is requesting the inventory audit to see how Baffinland updated the Tranches.	➢ Marginal	➢ Tranche 1 indirects calculated in Table 9.2 of the 2021 Work Plan Addendum still do not match the updated 2022 EBS. However indirects are calculated independent from the EBS for the 2021 Reconciled Global RECLAIM. ➢ The updated 2022 EBS still allocation a $265,850 greater cost reduction for Tranche 2 than the values presented in Table 9.3 of the 2021 Work Plan Addendum.

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13	**Column G Table 9.3 of the BIMC 2022 Work Plan appears to be calculated incorrectly.**	In Table 9.3 of the 2022 Work Plan, the total in Column G does not equal a summation of columns C, D, E & F. Note that this error is in addition to the Column "C" issue mentioned above, not a result of it.	Correct column "G" of Table 9.3 in the 2022 Work Plan.	An error on column F (Subtotal Type A) was found on Table 5.2 of the 2022 Work Plan. The Subtotal Type A for 2022 Marginal Estimate Including 2021 Reconciliation was mistakenly listed as $3,533,688. However, the total value should have been listed as $3,961,444. The Subtotal Type A for Total 'Global' Estimated Security for 2022 is correct.	➢ Resolved	➢ Adequate.	➢ No Additional Comment.
14	**Several items in the 2022 EBS are missing from the text of the 2022 Work Plan**	Details of difference is discussed above in this Section 5.4.	Revise 2022 Work Plan and associated appendices to include missing items.	Baffinland submitted a Rev 1, 2022 Work Plan on December 31, 2021 to include the remaining items for the disturbed areas analysis, outcomes of the 2021 equipment audit and integration of the 2021 Work Plan.	➢ Request Baffinland to provide line by line the missing items rather than lumped together.	➢ Not received, but equipment audit should makes request redundant.	➢ Received and carried into RECLAIM.
15	**Table 8.1 of the 2022 Work Plan lists fuel as a volume, while the 2022 EBS lists fuel as a lump sum $62,000.**	It is unclear how BIMC has calculated the lump sum cost of $62,000 based on the fuel volumes presented in Table 8.1.	Provide rationale for calculation of $62,000 fuel cost in Section 8.1 of 2022 Work Plan.	The lump sum of $62,000 was updated in the December 31 submission (2022 Work Plan, Rev 1). The 2022 Estimate allocates an additional $217,000 to account for the demobilization of fuel stored on Site, and the mobilization of fuel required for the marginal increase in reclamation activities captured in the 2022 Estimate. The additional $217,000 allocation for fuel mobilization is based on the cost of mobilizing 100% of the fuel required (543,000 L) for marginal reclamation and closure activities, including direct activities, power generation, and heat production. The marginal increase in reclamation activities in 2022 are estimated to require an additional 254,000 L of Type-1 fuel. Marginal increases in camp	➢ Clarify the calculation for fuel. Current total in the December update of the Work Plan is $217,000 in total, not in addition to the original $62,000. 254,000L (Marginal increase rec act) + 289,000L (2,498 person-days) = 543,000L @ $0.40/L = $217,200. BIMC to confirm if original $62,000 is included in this calculation.	➢ Adequate.	➢ No Additional Comment.

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				operation during reclamation is estimated to require an additional 2,498 person-days on-site. Each person-day on site is assumed to consume 116 L of Type-1 fuel for heat and power generation. This totals 289,000 L of Type 1 fuel required to heat and power the camp. Fuel mobilization rate is assumed to be $0.40/L.			
16	**BIMC included 20% Contingency**	BIMC considers 20% Contingency on direct costs and indirect costs associated with contaminated soils treatment and post closure monitoring. Contingency for the project was increased as a result of ARD/ML issues encountered with the waste rock piles. It would be preferable to include the uncertainties associated with the Waste Rock Pile and the hilltop outcrop where exploitation is taking place as a direct cost rather than a contingency amount. As noted, the marginal difference in the contingency amount is significantly lower than those a mine that may experience such issue in closure may have.	It is recommended that the Waste Rock Pile and hilltop outcrop closure costs be calculated directly by BIMC and be included in the next updated ICRP.	Baffinland agrees that future updates to the ICRP should respect any updates to the Waste Rock Management Plan. The current waste rock management plan and ICRP maintains a final closure strategy of freezing waste rock in permafrost to mitigate the generation of ARD, and has revised the waste placement strategy accordingly with the objective of freezing material in place to mitigate ARD. Baffinland has integrated adaptive management into the Waste Rock Management Plan to further demonstrate a commitment to ensuring the final closure objectives are met.	➢ CIRNAC considers this to be resolved for the activities completed to date.	➢ Not addressed in response	➢ To be considered in the update closure plan.

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17	**ICRP Rev.5, has not been updated.**	Closure cost should be based on other reclamation concepts (as a cover) until the Baffinland mine could validate that they could manage ARD and metals leaching with their waste rock management plan and considering the updated thermal model.	The ICRP should be updated according to the updated Waste Rock Management Plan approved by NWB, this should include an update of the costs associated with mitigating potential water quality issues until there is certainty that these would not be a concern in the future.	Baffinland agrees that future updates to the ICRP should respect any updates to the Waste Rock Management Plan. The current waste rock management plan maintains a final closure strategy of freezing waste rock in permafrost to mitigate the generation of ARD, and has revised the waste placement strategy accordingly with the objective of freezing material in place to mitigate ARD. Baffinland has integrated adaptive management into the Waste Rock Management Plan to further demonstrate a commitment to ensuring the final closure objectives are met.	➢ Update ICRP to be approved by parties	➢ Not adequate	➢ To be considered in the updated closure plan
18	**BIMC estimate considers 3 years for Closure and 15 years for Post-Closure monitoring.**	According to CIRNAC guidance for duration of interim care & maintenance and post- closure monitoring in the mine site closure & reclamation plan cost estimate. CIRNAC recommended to include 5 years for Closure and 25 years for Post-Closure monitoring.	Interim care and maintenance should be increased to 5 years, and post-closure cost to 25 years.	Future iterations of the ICRP will evaluate the need for increased Closure and Post Closure Monitoring. Baffinland maintains that the duration of closure activities (3 years) is adequate given the total person-hours required to execute the closure and assumed crew sizes, and that the post closure monitoring phase is sufficient given that there are no significant adverse residual effects identified in the FEIS for VECs or VSECs associated with the Project.	➢ Request Baffinland to demonstrate that 3 years is sufficient time to prepare the site for and execute closure works through a detailed list of activities and timelines for establishing this.	➢ Not adequate	➢ To be considered in the update closure plan
19	**Long term criteria for permafrost conditions.**	Review long term design criteria of BIMC according to state of the art and other mine sites in permafrost conditions, and/or regarding ARD characterization.	Update these items in the ICRP and include in the cost estimate.	The ICRP is an iterative document that will evolve throughout the life of mine, based on reclamation research studies, results of on-going monitoring, development of new/novel mitigation measures and feedback from Inuit and intervenors. No additional	➢ Update ICRP	➢ Adequate, ongoing studies	➢ No Additional Comment

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				adjustments to reclamation security are required at this time based on the currently understanding of the project effects and desired reclamation objectives.			
20	**Studies and instrumentation**	Cost for studies and instrumentation not in place yet or needed at the end of mine operations at Baffinland site should be added to the security estimate.	Include cost for studies and instrumentation at the end of mine operations.	Costs for monitoring, including any required instrumentation, are included in the Closure & Post Closure Monitoring costs. Details of the monitoring programs included in this allocation are outlined in Section 9 of the ICRP (Rev. 5, Oct 2018). Geotechnical engineering monitoring is outlined in Section 9.4 of the ICRP, which includes stability, erosion and permafrost analyses and monitoring.	➢ Interim Care and Reclamation Plan predates the Waste Rock Management plan and needs to be updated to reflect instrumentation/ monitoring. Additional areas of contamination as outlined above should be included as well.	➢ Not adequate	➢ To be considered in the update closure plan
21	**Engineering Fees**	Engineering Fees does not describe which costs have been considered to calculate the fees. The 2022 Estimate includes an engineering, design and execution planning indirect cost allowance of **$39,000 or 3.9% of the total direct costs, which is the same as last year. The 2022 Work Plan lists four Issued for Construction drawings and six Layout Drawings associated with work in 2022.**	BIMC to confirm the 3.9% is still relevant for Engineering Fees given the level of effort described in the 2022 Work Plan. The percent allocation for engineering services for 2022 appears lower than expected given the number of drawings being produced.	Given that the complexity of the reclamation activities has not meaningfully increased with the scope of work proposed in the 2022 Work Plan, only the scale of the activities, Baffinland does not believe an increase to the percentage applied for engineering fees is warranted. As outlined in the 2014 Complete Project Financial Security Assessment, limited additional site characterization will be required to develop any engineering specifications and drawings required for contracting, due to the relatively straightforward nature of the reclamation program and the level of information already available. The reclamation program will be predominantly an earthworks	➢ CIRNAC recommends that BIMC provide the source or rationale for deciding on 3.9% engineering fees	➢ Adequate	➢ No Additional Comment

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				exercise with a simple demolition contract, and therefore a relatively simple engineering scope. Further, engineering fees percentages as provided by various provincial engineering associations cite that fees are reduced as the cost (scale) of the project increases. Baffinland has not sought a reduction in engineering fees despite an increase in the scale of the project, and therefore the current estimate is conservative.			
22	**Inflation**	BIMC calculates inflation for direct and indirect costs applying a percentage of approximately 2.9%. The Consumer Price Index for Iqaluit, NU (September 2021) is 2.6%.	BIMC to review inflation adjustment and confirm which month of the CPI reporting is being followed to set inflation rate.	Data for Iqaluit, Nunavut are on a September 2021 base, as listed in the Consumer Price Index by geography, all-items, monthly, percentage change, not seasonally adjusted, Canada, provinces, Whitehorse, Yellowknife and Iqaluit (available at: https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000402&cubeTimeFrame.startMonth=09&cubeTimeFrame.startYear=2021&referencePeriods=20210901%2C20210901)	➢ Clarify where the 3.2% is located	➢ Adequate.	➢ No Additional Comment
23	**2020 Arbitration Outcome unit rates.**	As discussed in Section 5.3, the 2020 Arbitration Outcome rates differ from those developed by SNC- Lavalin Inc.	Assumptions and basis for the key Arbitration Outcome unit rates list in Table 5-1 should be provided for review and verification.	It should be noted that the result of the 2019 Work Plan Arbitration, conducted under the Arbitration Act (Nunavut) and binding under the terms of the Commercial Lease Q13C301 with the QIA, found in favour of the Baffinland methodology to use site-specific contractor cost data in supporting the development of unit rates. The Final Award accepted Baffinland's unit rates, and accordingly they have been	➢ Explain what units you are using to calculate	➢ Information provided for Culvert removal is ok. Presented as unit rate per m of culvert. Need to make sure that the units of measured are accurately reflected (so not per culvert but length of culvert). ➢ Light Diels tank – unit rate too low. Does not include decontamination of the tank and disposal of the sludge as this can be expensive.	➢ No Additional information received from BIMC on these items. These comments remain open.

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				utilized in the reconciliation of the 2019, 2020, 2021 estimates, as well as the development of the 2022 Work Plan, with inflation applied to account for changes in market conditions since the last unit rate update.		➢ Bridge- BIMC rate too low. This should include disposal and scrap metal removal plus removal of abutments grading and contouring. For all this the unit rate is too low ➢ Incinerator- BIMC unit cost too low. The building is similar to others used in other sites greater then 3 m which probably requires additional cots. (so for every 3 m of building height should assume another floor. ➢ Piping: very high costs still. Only for large diameter pipe removal would it be this expensive.	