



Water Resources Division
Resource Management Directorate
Nunavut Regional Office
P.O. Box 100
Iqaluit, NU, X0A 0H0

Your file - Votre référence
2AM-BRP1831
Our file - Notre référence
GCDOCS#115502819

June 30, 2023

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 Review of the 2022 Annual Report for Sabina Gold and Silver Corp, Back River Project, Type A Water Licence No. 2AM-BRP1831

Dear Richard,

Thank you for the April 13, 2023 invitation to review the 2022 Annual Report on the Back River Project property, submitted by Sabina Gold and Silver Corporation's, for Type A Water Licence No. 2AM-BRP1831.

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) examined the application pursuant to its mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relations and Northern Affairs Act*. Please find CIRNAC comments and recommendations in the attached Technical Memorandum.

If there are any questions or concerns, please contact me at (867) 975-4550 or Andrew.Keim@canada.ca

Sincerely,

Andrew Keim
Regional Manager
Water Resources, Nunavut Regional Office
Crown-Indigenous Relations and Northern Affairs Canada



Technical Review Memorandum

Date: June 30, 2023

To: Richard Dwyer, Manager of Licensing, Nunavut Water Board

From: Andrew Keim, Regional Manager , CIRNAC

Subject: **Crown-Indigenous Relations and Northern Affairs Canada's Review of the 2022 Annual Report for Sabina Gold and Silver Corp. Back River Project, Type A Water Licence No. 2AM-BRP1831**

Region: ☒ Kitikmeot ☐ Kivalliq ☐ Qikiqtani

A. BACKGROUND

The Back River Project (the project) is located in the Kitikmeot region of Nunavut. It is situated approximately 400 km southwest of Cambridge Bay, 95 km southeast of the southern end of Bathurst Inlet (Kingaok) and 520 km northeast of Yellowknife, Northwest Territories. The Project is located predominantly within the Queen Maud Gulf Watershed.

The project is currently being acquired by B2Gold Limited however Sabina Gold and Silver Corporation (Sabina) has completed the annual report for 2022. The project continues to operate under the previously issued Type A Water Licence no. 2AM-BRP1831. The Licence allows the Licensee to alter, divert or otherwise use water or deposit waste in support of this mining activity.

The project remains comprised of two main areas; the Maine Laydown Area (MLA) situated along the western shore of southern Bathurst Inlet and the Goose Lake property (Goose), south of the MLA, where the gold deposits are located. These areas are connected seasonally by an approximately 160 km long winter ice road. The majority of annual resupply is brought in by water to the MLA and necessary materials are transferred via winter ice road to the Goose property.

The MLA consists of a terminal barge, laydown area, camp facility, fuel storage, power plant and maintenance facilities. In 2022, Sabina completed the installation of a 10 million fuel tank at the for use in hauling operations for the ice road.

The Goose property includes the mine site for open and underground mining of four deposits, ore stockpiles, a processing plant, tailings and waste rock storage/disposal, all-weather air strip, camp facility, fuel storage, power plant, and other associated mining facilities. In 2022 the Goose property saw a number of development activities including road expansion, pad completion, the extension of the portal down approximately 1500 meters, and the pre-stripping of the Echo pit.



The project is reported to be 27 years lifespan, with four years of mobilization and construction, 10 years of operation, eight years of reclamation and closure, and five years of post-closure monitoring (Sabina, 2015).

Sabina applied to the Nunavut Water Board (NWB) for and was issued a Type “A” Licence under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. The Water Licence 2AM-BRP1831 was issued on September 21, 2018 and amended on August 31, 2021.

The Water Licence outlines the specific terms and conditions for the proponent respecting the authorization to use water or deposit waste for the project. Part B, Item 2 of Water Licence requires that the proponent files an annual report on their previous year’s activities by March 31st to the NWB. Schedule B of Water Licence 2AM-BRP1831 specifies the information required in the annual report including;

- Information related to the dikes, dams and structures constructed to withhold water or waste;
- A summary report of Water use, Winter Ice Road activities, dewatering activities, and any updates to the Water and Load Balance results;
- Summaries of geochemical monitoring results, ore stockpile quantities, seepage and runoff monitoring, and waste disposal;
- A list of unauthorized discharges and a summary of follow-up actions taken;
- A summary of Modifications and/or major maintenance work carried out on all Water and Waste-related structures and facilities;
- Monitoring program results and interpretation;
- A summary of any progressive Closure and Reclamation work undertaken;
- An updated estimate of the current restoration liability
- A summary of any studies requested by the Board that relate to Water use, Waste disposal or Reclamation, and a brief description of any future studies planned;
- Any revisions to Management Plans, reports or manuals;
- A summary of actions taken to address concerns or deficiencies listed in the inspection reports and/or compliance reports filed by an Inspector;
- A summary of public consultation/participation, describing consultation with local organizations and residents of the nearby communities, if any were conducted;
- Any other details on Water use requested by the Board by the 1st November of the year being reported.

Sabina in accordance with the Type A Water Licence No. 2AM-BRP1831 provided the NWB their 2022 Annual report on April 13, 2022.

The annual report includes the following appendices:

- Appendix A Annual Report Form



- Appendix B Waste Disposal
- Appendix C Monitoring Activity Overview by Station
- Appendix D Water Quality Analytical Results
- Appendix E Back River Project 2022 Aquatic Baseline Report
- Appendix F Back River Project Engagement Record

Of note in the submission is the absence of any details regarding construction activities related to water retention structures or culverts that were to have been installed during the past year. Sabina notes in the annual report that they will report on these items as per submitted Construction Summary Report's pursuant under Part D, Item 11, and Schedule D, Item 1. While these requirements exist the Licensee is also required to report on these activities in the Annual Report.

CIRNAC has reviewed the 2022 annual report and provides the following comments and recommendations. A summary of the subjects of recommendations can be found in Table 1. Documents reviewed as part of this submission can be found in Table 2 of Section B. Detailed technical review comments can be found in Section C.

Table 1: Summary of Recommendations

Recommendation Number	Subject
R-1	Surface Water Quality- Goose Lake Hydrodynamic and Water Quality Model
R-2	Surface Water Quality- Goose Lake Hydrodynamic and Water Quality Modeling
R-3	Surface Water Quality- Water Management Plan Revisions
R-4	Acid Rock Drainage / Metal Leaching – Waste Rock
R-5	Borrow and Source Materials – Source Locations
R-6	Acid Rock Drainage / Metal Leaching – Classification criteria for NPAG Material.
R-7	Monitoring
R-8	Landfill and Waste Management Plan
R-9	Landfill and Waste Management Plan – Approvals
R-10	Landfill and Waste Management Plan
R-11	Waste Management Plans – Waste oil



B. DOCUMENTS REVIEWED AND REFERENCED

The following table (Table 2) provides a list of the documents reviewed under the submission and reference during the review.

Table 2: Documents Reviewed and Referenced

Document Title	Author, File No., Rev., Date
Sabina 2022 Annual Report and attached Appendixes A to E	Sabina Gold and Silver Corp, March 2022
Back River Project Tailings Management Plan	Sabina Gold and Silver Corp, April 2022
Back River Project Waste Rock Management	Sabina Gold and Silver Corp, April 2022
Back River Project 2021 Annual Report for Water Licence 2AM-BRP1831.	Sabina Gold and Silver Corp, April 2021
The Back River Project Final Environmental Impact Statement Addendum. 2017	Sabina Gold and Silver Corp, February 2017
The Back River Project Landfill & Waste Management Plan	Sabina Gold and Silver Corp, August 2022



C. RESULTS OF REVIEW

1. Surface Water Quality- Goose Lake Hydrodynamic and Water Quality Model

Comment:

Upon review of the water quality monitoring data presented in the Back River Project - 2022 Aquatic Baseline Report for Goose Lake West Bay (Table C-1) Goose Lake Central Basin (Table C-2), Goose Lake SE Basin (Table C-3), Goose Lake Tail (Table C-4), Propeller Lake (Table C-5), and Reference Lake B (Table C-6), it is apparent that pH values in all of these water bodies sampled in 2022 were consistently reported to be below a pH of 6.5, with average values of 6.3 at Goose Lake West Bay, 6.3 at Goose Lake Central Basin, 6.4 at Goose Lake SE Basin, 6.15 at Goose Tail, 6.3 at Propeller Lake and 6.5 at Reference Lake B.

As reported, these pH values are generally below the CCME Guideline (chronic) range for the protection of freshwater aquatic life of 6.5-9.0 and the Health Canada Aesthetic Guideline range of 7.0-10.5. This indicates that the pH of the water in these water bodies are indicative of a naturally low level of acidity.

Similarly, the low degree of hardness (as CaCO₃) consistently measured in these water bodies, with average values of 29 mg/L at Goose Lake West Bay, 17.3 mg/L at Goose Lake Central Basin, 12 mg/L at Goose Lake SE Basin, 14 mg/L at Propeller Lake and 16.6 mg/L at Reference Lake B are indicative of naturally very soft water, which typically ranges from 0-60 mg/L. (Health Canada Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Hardness, 2022).

The combination of chronically low pH water, combined with the very soft waters that are characteristic of the freshwater bodies in the Back River project area, indicate that these waters have a low buffering capacity. This means that these waters, and the resident aquatic resources, are exceptionally vulnerable to the introduction of contaminants such as mine-related wastewater.

Reference:

Sabina 2022 Annual Report, Section 1.3; Appendix E Back River Project - 2022 Aquatic Baseline Report – Appendix C, Tables C-1, C-2, C-3, C-4, C-5, C-6, C-7

Recommendation:

(R-01) CIRNAC recommends that the Licensee update the Goose Lake Hydrodynamic and Water Quality Model by incorporating the results of the 2022 field program reported in the Back River Project - 2022 Aquatic Baseline Report. The updated Hydrodynamic Model should be made available for review prior to submission of the 2023 Annual Report to allow for review to be completed and recommendations on Aquatic effects developed.



2. Surface Water Quality- Goose Lake Hydrodynamic and Water Quality Modeling

Comment:

In the 2022 Annual Report, Sabina has made a number of revisions to the Modeling done. CIRNAC recognizes these modifications based on feedback from intervenors. The following further issues have been identified;

- The modelling time period has been increased to 67 years (Sections 2.2, 3.2), this addresses one of the deficiencies of the previous model that ended with the end of operations. Various sensitivity analyses were run to evaluate effects of changes to meteorological conditions, ice cover, and inflow quantity and quality for a 10-year period – extending five years into post-closure. A longer ice cover period was also evaluated. However, modelling 67 years into the future should also consider the possible effect of climate change. Presently, their hydrological inputs are the past 10 years repeated into the future.
- Selenium concentrations – in Section 9.0, the predicted 95th percentile concentrations of iron and phosphorous are slightly above the water quality guideline values but there is no mention of selenium. In the Appendix B timeseries for constituents, concentrations of selenium for PN04 are well above the water quality benchmark value and slightly over for PN05. In Appendix C, the concentrations of selenium at GLTL are over the benchmark value.
- Phosphorous concentrations – in Section 9.0, the 95th percentile concentrations of most constituents are predicted to remain below water quality benchmarks (Table 1) at the edge of mixing zones, with the exception of phosphorus. The predicted 95th percentile concentration of phosphorus at two other assessment locations (i.e., central basin and tail of Goose Lake) are also predicted to be above the benchmark. The conservative model approach adopted (e.g., exclusion of biological uptake during open-water conditions) likely contributed to the exceedances of the phosphorus benchmark.

Reference:

Hydrodynamic and Water Quality modelling of Goose Lake, August 2022

Recommendation:

(R-02) CIRNAC recommends that the as follows;

- The Licensee is to include a discussion of climate change effects on the forecasts provided in further Annual reports. This includes an evaluation of various scenarios.
- As Selenium can be more toxic than iron or phosphorous, it is recommended that risks associated with Selenium exceedances should be discussed and addressed in the aquatic effects management plan and included in the next annual report.
- It is recommended that the Licensee attempt to quantify what the phosphorous uptake could be over the summer and indicate whether elevated levels of phosphorus may contribute to a change in the lake's trophic status over time. This is to be reported on in the next Annual Report.



3. Surface Water Quality- Water Management Plan Revisions

Comment:

The April 2022 Water Management Plan has been substantially revised from the October 2020 Water Management Plan that is approved under the Water Licence. Revisions identified within the document have been presented without complying with Part B item 16 that explicitly requires the submission of a revisions list detailing where significant content changes are made.

Compliance with Part B item 16 is necessary for implementation of Part B item 12 that affects the Board's process for review and approval of the proposed revisions to the plan.

Relevant Water Licence Conditions are copied below for reference, with bold font added to highlight key requirements.

2. **The Licensee shall file an Annual Report** with the Board no later than March 31st in the year following the calendar year being reported. The Annual Report shall be developed in accordance with Schedule B of the Licence.
12. The Licensee shall, for all Plans submitted under this Licence, implement the Plan as **approved** by the Board in writing. **Any changes to the plans deemed significant shall be reviewed by the Board to determine the process for the Board's review and approval of the amendment to the plan(s).** Reflecting the scale and scope of the future changes to an approved plan, the Board may subsequently process the changes as solely an amendment to the plan, as a Modification under Part G of the Licence or as an Amendment to the Licence.
13. **The Board has approved the following Plans for implementation** under the relevant sections in the Licence: (the list of Plans includes item q. Water Management Plan (October 2020)).
16. The Licensee shall review the Plans referred to in this Licence, as required by changes in operation and/or technology and modify the Plans accordingly. **Revisions to the Plans are to be submitted** in the form of an Addendum to be **included with the Annual Report** required by Part B, Item 2, **complete with a revisions list detailing where significant content changes are made.**

Water Licence Part B item 16 above is addressed by Section 2.20 of the 2022 Annual Report, titled "WHERE APPLICABLE, REVISIONS AS ADDENDA, WITH AN INDICATION OF WHERE CHANGES HAVE BEEN MADE, FOR PLANS, REPORTS, AND MANUALS" with relevant parts copied below.

The section states that Sabina submitted revisions to the NWB in 2022 for several plans including the Water Management Plan updated April 2022. The description of updates is



“All sections of this plan were updated for submission to the NWB as a Supporting Document for Type A Water License Amendment Application.”

2.20 WHERE APPLICABLE, REVISIONS AS ADDENDA, WITH AN INDICATION OF WHERE CHANGES HAVE BEEN MADE, FOR PLANS, REPORTS, AND MANUALS			
In addition to updates to the Hydrodynamic Model and Water and Load Balance Model Reports submitted to the NWB in August of 2022, Sabina submitted revisions to the following plans to the NWB in 2022:			
Plan	Current Update Date	NWB Approval	Updates
Water Management Plan	April 2022	Pending	All sections of this plan were updated for submission to the NWB as a Supporting Document for Type A Water Licence Amendment Application.

The 2022 Annual Report does not include a revisions list detailing where significant content changes are made.

The revised April 2022 **Water Management Plan (WMP)** includes a revision log, copied below, which states that there were revisions were to all pages of all sections.

Revision Log				
Version	Date	Section	Page	Revision
0	November 2015	All	All	Supporting Document for Final Environmental Impact Statement; submitted to Nunavut Impact Review Board (IIRB).
1	October 2017	All	All	Supporting Document for Type A Water Licence Application; submitted to Nunavut Water Board (IWB).
2	June 2020	All	All	Updated to reflect the 2020 Modification Package changes, and as a Supporting Document; submitted to the Nunavut Planning Commission (IPC) and IIRB.
3	October 2020	All	All	Submitted as a Supporting Document for the Type A Water Licence Amendment Application to the IWB.
4	April 2022	All	All	Supporting Document for Type A Water Licence Amendment Application; submitted to Nunavut Water Board (NWB)

The 2022 WMP does not include a revisions list detailing where significant content changes are made.

In comparing the 2020 and 2022 WMP documents one can see that revisions were made to all pages of all sections. There are minor revisions to all page headers and footers that include a persistent error of the wrong date in page footers beginning with Section 6.



Other changes are potentially significant and should be identified as such. Manual comparison of summary tables in the 2020 and 2022 WMP documents indicate that there have been changes to the proposed infrastructure, for example;

- The 2022 WMP adds Echo Pit infrastructure and has removed (or makes no mention of) the TSF WRSA.
- The Plant Site Pond is re-named (or re-purposed) as the Ore Stockpile Pond.
- Four diversion berms previously identified as medium or high risk infrastructure have been reclassified as low risk infrastructure.
- There have been numerous revisions to facility catchment areas.
- Four of the water management pumps proposed in the approved 2020 WMP are missing in the 2022 update.

Reference:

Nunavut Water Board Water Licence No: 2AM-BRP1831 (Amendment No.1) Issued August 31, 2021, Expiry December 31, 2031. Part B: General Conditions.

Sabina Back River Project Annual Report for Water Licence 2AM-BRP1831, March 2023. Section 2.20, revisions to plans.

Sabina Back River Project Water Management Plan, October 2020. Full report, with emphasis on summary tables 6.3-2 (Level of Risk for Each Item of Goose Infrastructure) and 6.4-1 (Goose Property Pond Capacity and Pumping Rate Summary).

Sabina Back River Project Water Management Plan, April 2022. Full report, with emphasis on summary tables 6.3-2 (Level of Risk for Each Item of Goose Infrastructure) and 6.4-1 (Goose Property Pond Capacity and Pumping Rate Summary).

Recommendation:

(R-03) CIRNAC recommends that plans that are provided to the NWB with out a revision list to track significant change should not be consider for review.

4. Acid Rock Drainage / Metal Leaching – Waste Rock

Comment:

Section 2.6a and b of the annual report state that no waste rock was generated to date and therefore no testing of waste rock has been done. Section 2.8 states that 358,043 m³ of NPAG rock was generated from the Echo Pit and underground decline and was used as construction material in lieu of being placed on waste rock storage area.

Reference:

Sabina 2022 Annual Report, Section 2.6a, 2.6b, 2.8; Sabina Back River Project Waste Rock Management Plan 2022, Sections 6.1, 7.1 & 7.2



Recommendation:

(R-04) CIRNAC recommends that Licensee provide clarification as to why the waste rock generated from Echo Pit and underground decline are not reported as waste rock in Section 2.6. Provide the rationale and backup data which confirms that the waste rock used in construction is NPAG, in accordance with section 7.2 of the Sabina Back River Project Waste Rock Management Plan.

5. Borrow and Source Materials – Source Locations

Comment:

Geochemical analysis related to roads and quarries does not provide volume of material quarried or excavated from roads (such as from cut and fill areas, or road leveling), or location of quarries or road excavations. It is not indicated if geochemical characterization was completed as pre-development characterization program, or as operational monitoring. A summary of some results parameters is provided in the text of the annual report, however there are no lab certificates or full data of the rock analysis, or specific locations of where the samples were collected from. There is no indication of where the material was used in construction.

Reference:

Sabina 2022 Annual Report, Section 2.6c,

Sabina Back River Project Borrow Pits and Quarry Management Plan (2020), Sections 5, 7, 8 and 10

Recommendation:

(R-05) CIRNAC recommends that the Licensee:

- Provide information of source location and end use location for waste rock used in construction as well as volumes of rock excavated from quarries and roads, as per Sabina Back River Project Borrow Pits and Quarry Management Plan, Section 10 requirements.
- Provide lab certificates of data, and particulars of which component of the Quarry Management Plan the geochemical analysis was completed for (Preliminary characterization or monitoring).
- Provide locations of geochemical analysis samples reported in the annual report. Ideally a map or figure showing both the location of the quarried material and the location of the samples will be provided.

6. Acid Rock Drainage / Metal Leaching – Classification criteria for NPAG Material.

Comment:

The 2022 annual report Section 2.6 c provides ARD classification criteria as NPAG being NPR value of greater than 3, or low sulphur samples with total sulphur less than 0.16 wt. %. Sabina Back River Project Borrow Pits and Quarry Management Plan (2020), Section 8, evaluation criteria is listed as NPR greater than 3, or low sulphur (total sulphur content



less than 0.15%). Sample ID 28 presented in Table 2.6-1 has a reported total Sulphur value of 0.15% and is classified as NPAG – Low Sulphur.

Reference:

Sabina 2022 Annual Report, Section 2.6c,

Sabina Back River Project Borrow Pits and Quarry Management Plan (2020), Section 8

Recommendation:

(R-06) CIRNAC recommends that the Licensee confirm classification criteria as NPAG is in accordance with the Sabina Back River Project Borrow Pits and Quarry Management Plan (2020), Section 8, in particular with respect to the low sulphur metric of total sulphur content less than 0.15% and adjust any classifications of samples as required. Alternatively if the low sulphur criteria has changed, was this change submitted or approved by the board and regulators.

7. Monitoring

Comment:

There is no information on Monitoring Activity, Appendix C is empty.

Reference:

Sabina 2022 Annual Report, Appendix C, Monitoring Activity Overview by Station

Recommendation:

(R-07) CIRNAC recommends that Sabina confirms that there is no Monitoring Activity to report.

8. Landfill and Waste Management Plan

Comment:

Section 2.9 of the Annual Report references Tables 1 and 2 in Appendix B. Appendix B does not contain any table numbering scheme, and there is a further third table apparent in Appendix B.

Reference:

Sabina 2022 Annual Report, Section 2.9 and Appendix B

Recommendation:

(R-08) CIRNAC recommends that the Licensee provide appropriate numbering and table titles in Appendix B of Annual report.



9. Landfill and Waste Management Plan – Approvals

Comment:

Section 2.20 of the annual report references revisions to the Landfill and Waste Management Plan were submitted in August 2022. There is no reference to responses to this plan received from CIRNAC and KIA, or of follow-up actions by Sabina.

Reference:

Sabina 2022 Annual Report, Section 2.20; September 21, 2022 letter re. CIRNAC review of Landfill & Waste Management Plan; September 16, 2022 letter re. Kitikmeot Inuit Association (KIA) review of Landfill and Waste Management Plan

Recommendation:

(R-09) CIRNAC recommends that the Licensee provide clarification on Section 2.20 reference that responses were received and feedback is pending and include a detailed explanation of how the comments received have been incorporated into the plan to date.

10. Landfill and Waste Management Plan

Comment:

The CIRNAC review reiterated the requirement for submission of a design and construction report 60 days prior to construction of a landfill. Section 2.9 of annual report indicates landfill will be constructed in the future, however the timing is unclear. We present this comment to flag that pre-development reporting will be required for this element, and that with a 60-day window for review it should be well in advance of the planned construction season so as to avoid potential construction delays.

Reference:

Sabina 2022 Annual Report, Section 2.9, September 21, 2022 letter re. CIRNAC review of Landfill & Waste Management Plan

Recommendation:

(R-10) CIRNAC recommends that the Licensee provide an approximate timeframe for development and a proposed workplan for the coming year that includes milestones for submission of plans to be reviewed.

11. Waste Management Plans – Waste oil

Comment:

Appendix B, second table includes a column itemizing “waste oil to furnace”. This is not referenced in Section 2.9 of the annual report or any other location within the 2022 Annual Report.

Reference:

Sabina 2022 Annual Report, Section 2.9 and Appendix B



Recommendation:

(R-11) CIRNAC recommends that the Licensee provide clarity related to this item and explain why it is included in Section 2.9 of the annual report. Sabina is to provide information on what this item represents and whether it is included according to a specific plan that has been reviewed.