



**BACK RIVER PROJECT**  
**Responses to 2021 Annual Report Comments**

**August 19, 2022**

# BACK RIVER PROJECT

## Responses to 2021 Annual Report Comments

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# 1. Introduction

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Sabina Gold & Silver Corp. (Sabina), submitted its 2021 Annual Report to the Nunavut Impact Review Board (NIRB) on 4 April 2022, as required by the Back River Gold Mine Project Certificate No. 007. Interested Parties were then requested by the NIRB to provide comments on the 2021 Annual Report

On or 30 June 2022, the NIRB received comments from the following interested parties:

- Kitikmeot Inuit Association (KIA) = 49 comments
- Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) = 19 comments
- Government of Nunavut (GN) = 9 comments
- Environment and Climate Change Canada = 2 comment
- Fisheries and Oceans Canada (DFO) = 7 comments
- Transport Canada (TC) = 3 comments

Section 2 provides responses to the comments received deferred in the original 4 April 2022 submission.

## 2. Responses to Comments

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### 2.1 RESPONSE TO KITIKMEOT INUIT ASSOCIATION

**KIA-NIRB-11: Ecosystem/vegetation losses in 2021 and lack of trend analyses.**

**References:**

Sabina, Back River Project 2021 Annual Report (March 31, 2022)•Project Certificate Condition No. 32 Table 4.5.9-1, Figure 4.5.9-1•Appendix D. Vegetation Monitoring Program -Technical Memorandum (March 31, 2022) o Section 4.1, Section 3.0, Section 2.0Sabina, Back River Vegetation Monitoring Plan (January 2020)•Section 5.2.3; Table 5-1Sabina, Back River Project, Wildlife Mitigation and Monitoring Program Plan (Version 10), October 2019•Section 3.2.1Sabina, Back River Project, Responses to 2020 Annual Report Comments (July 6, 2021)•Response to Kitikmeot Inuit Association, KIA-27

**Summary:**

Habitat loss due to expansion of the Project footprint in 2021 has not been compared to 2020 data. One of the dominant vegetation associations (undifferentiated tundra) is missing from the summary table showing cumulative habitat loss in 2021. Sabina still considers analysis of trends “not applicable” despite multiple years of vegetation monitoring data available.

**Detailed Review Comment**

PC Condition No. 32 requires annual reporting of the current Project footprint, including the loss or alteration of vegetation associated with Project activities. Table 4.5.9-1 and Figure 4.5.9-1 show the cumulative habitat loss at the Goose Property and MLA Property as of 2021. It would be informative to also show, numerically and graphically/spatially, the difference in habitat loss between 2020 and 2021, such that specific areas of new disturbance can be identified. Based on the 2020 Vegetation Monitoring Plan (VMP), Table 5-1, one of the objectives of footprint monitoring is to show a “spatial comparison of the previous footprint to the current year’s footprint.”

It is also unclear why footprint monitoring results are directly discussed under PC Condition No. 32 rather than as part of the Vegetation Monitoring Program report (Appendix D of the 2021 Annual Report), which excluded footprint monitoring as an activity conducted in 2021 (Section 3.0). In addition, the KIA notes that ‘Undifferentiated Tundra’ (TEM code TU) is not included in Table 4.5.9-1, despite being one of the dominant vegetation associations in the LSA, and within which vegetation monitoring plots have been established (Section 4.1, Vegetation Monitoring Program Report, Appendix D of the 2021 Annual Report). It is unclear whether the ecosystem classification changed in 2021. There are additional discrepancies between Table 4.5.9-1 and results presented for both vegetation and wildlife monitoring: •2021 Vegetation Monitoring Program report, Section 2.0, Page 2 -Sabina states that wetland ecosystems comprise 8% of the LSA. However, the sum of W(x) TEM codes in Table 4.5.9-1 adds up to 9.1%, and there would be an even greater proportion of wetlands if marine wetland ecosystems were included. •2021 Pre-Construction WMMP Report, Section 3.2.1 -Table 3.2-1 shows that, including 2021 construction, the total footprint development at the MLA site is 25 ha, representing 3.8% of the total MLA PDA. However, Table 4.5.9-1 shows that MLA habitat loss is 30.7 ha total, and thus would represent 4.7% of the total MLA PDA. In addition, if the 2021 habitat loss was in fact 12.7 ha (30.7 ha total minus 18.0 ha in pre-2021) rather than 7.0 ha, as shown in Table 3.2-1, then the MLA site has increased by 71% from pre-2021. Under PC Condition No. 32, Sabina states that [analysis of] trends are not applicable, and on-going annual vegetation monitoring will continue. Although 2021 represents the

first year of implementation of the updated 2020 VMP, information in the VMP implies that vegetation monitoring for the Project began in 2018. Section 5.2.3 (Data Analysis) of the VMP states that “data analysis will focus on evaluating trends and determining if there are statistical differences in plant species composition and abundance as a function of distance from the Mine and from construction through closures.” How many years of monitoring data are needed before trends can be evaluated? Sabina could conduct a power analysis to determine these values based on their monitoring plan (sample sizes and strata). The KIA has made a similar comment about the lack of trend analysis in review comment KIA-TC-04. The KIA also previously submitted a comment on the low sample sizes and distance bins for each site (especially MLA) during review of the 2020 Annual Report (KIA-27). It is unclear how Sabina will meet their statistical objectives for the Vegetation Monitoring Program with their limited plot selection.

**Recommendation/Request:**

The KIA recommends/requests the following:

- Please present ecosystem/vegetation loss in 2021 compared to 2020, as specified in the 2020 VMP. Please update Table 4.5.9-1 and Figure 4.5.9-1 to show the quantitative and spatial data, respectively.
- Please explain why the ‘undifferentiated tundra’ vegetation association is missing from Table 4.5.9-1. Please also explain and correct the inconsistencies noted between Table 4.5.9-1 and habitat loss information within the Vegetation Monitoring Program and WMMP reports.
- Please complete a trend analysis for vegetation monitoring data from 2018 to 2021 or provide science-or statistics-based rationale for when trend analyses will be possible.

**Importance of Issue:**

Moderate

**Sabina Response:**

Please see the updated Table 4.5.9-1 showing the vegetation losses in 2021 as compared to 2020:

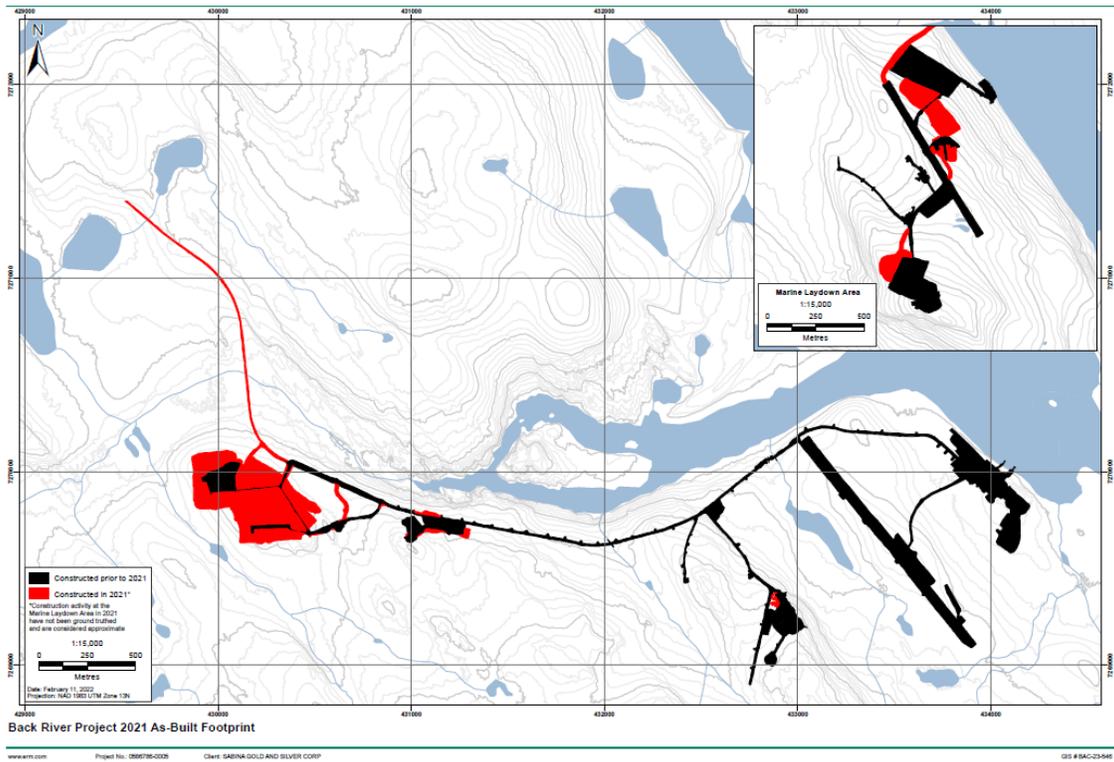
**Table 4.5.9-1. Ecosystem/Vegetation Losses Associated with Current (2021) Footprint for the Goose Property and the Marine Laydown Area**

ECOSYSTEM TYPE	TEM CODE	LSA		Goose Property			MLA Property		
				2021			2021		
		Area (ha)	% of Total LSA	Area (ha)	% of Total LSA	Change from 2020 (ha)	Area (ha)	% of Total LSA	Change from 2020 (ha)
<b>Non-vegetated Ecosystems</b>									
Lake	LA	18,140.9	12.5	<0.1	<0.1	0.0	-	-	-
Mine Camp	DR	10	<0.1	5.5	<0.1	0.0	-	-	-
Pond	PD	6,436.1	4.5	<0.1	<0.1	0.0	-	-	-
River	RI	329	0.2	-	-	-	-	-	-
Road surface	DZ	3.2	<0.1	-	-	-	-	-	-
Saltwater	MW	6,170.1	4.3	-	-	-	5.8	0.1	0.0
<i>Subtotal</i>		<i>31,089.3</i>	<i>21.5</i>	<i>5.5</i>	<i>&lt;0.1</i>	<i>0.0</i>	<i>5.8</i>	<i>0.1</i>	<i>0.0</i>
<b>Sparsely Vegetated Ecosystems</b>									
Bedrock outcrop	BR	3,428.8	2.4	1.4	<0.1	1.1	-	-	-
Bedrock-lichen veneer	BL	6,882.8	4.8	0.4	<0.1	0.0	-	-	-
Blockfield	TB	195.5	0.1	-	-	-	-	-	-
Cliff	BC	10.9	<0.1	-	-	-	-	-	-
Exposed soil	ES	176.7	0.1	-	-	-	-	-	-
Marine beach	MB	59.5	<0.1	-	-	-	0.3	<0.1	0.0
Old beach heads	MH	476.1	0.3	-	-	-	3.1	<0.1	0.6
Saline shallow open water	WO	55.8	<0.1	-	-	-	-	-	-
Shallow open water	WO	81.1	0.1	-	-	-	-	-	-
Sparsely vegetated esker	EC	659.5	0.5	-	-	-	-	-	-
Talus	BC	4.5	<0.1	-	-	-	-	-	-
<i>Subtotal</i>		<i>12,031.2</i>	<i>8.3</i>	<i>1.8</i>	<i>&lt;0.1</i>	<i>1.1</i>	<i>3.4</i>	<i>&lt;0.1</i>	<i>0.6</i>

**Table 4.5.9-1. Ecosystem/Vegetation Losses Associated with Current (2021) Footprint for the Goose Property and the Marine Laydown Area**

ECOSYSTEM TYPE	TEM CODE	LSA		Goose Property			MLA Property		
				2021			2021		
		Area (ha)	% of Total LSA	Area (ha)	% of Total LSA	Change from 2020 (ha)	Area (ha)	% of Total LSA	Change from 2020 (ha)
<b>Vegetated Ecosystems</b>									
Cottongrass-sedge fen	WC	3,467.7	2.4	0.3	<0.1	0.0	-	-	-
Disturbed Vegetation	DV	0.7	<0.1	-	-	-	-	-	-
Dry-sparse tundra	TH	23,458.2	16.2	6.9	<0.1	4.7	-	-	-
Dwarf shrub esker	EH	629.7	0.4	-	-	-	-	-	-
Estuary marsh	ME	4.22	0.7	-	-	-	-	-	-
Low bench floodplain	RL	36.5	<0.1	-	-	-	-	-	-
Marine dwarf shrub tundra	MT	5,444.7	3.8	-	-	-	14.8	<0.1	4.4
Marine riparian shrub	MR	439.4	0.3	-	-	-	3.9	<0.1	1.2
Marine shrubby tundra	MS	1,830.2	1.3	-	-	-	0.5	<0.1	0.1
Mesic dwarf-shrub tundra	TL	41,722.4	28.9	34.4	<0.1	12.1	-	-	-
Mid bench floodplain	RM	3.8	<0.1	-	-	-	-	-	-
Raised bog complex	WB	4,224.6	2.9	1.0	<0.1	0.1	0.1	<0.1	0.0
Saline fen	MF	993.1	0.1	-	-	-	1.8	<0.1	0.5
Saline marsh	MM	252	0.2	-	-	-	<0.01	<0.1	0.0
Shrubby esker	EW	220.8	0.2	-	-	-	-	-	-
Shrubby tundra	TS	11,853.9	8.2	3.7	<0.1	0.4	-	-	-
Tussock meadow	WT	64.4	<0.1	0.0	<0.1	0.0	-	-	-
Undifferentiated fen	WF	2,582.0	1.8	0.8	<0.1	0.2	-	-	-
Water sedge marsh	WA	2,396.0	1.7	0.1	<0.1	0.0	0.2	<0.1	0.0
Willow riparian	RW	1,441.9	1	0.0	<0.1	0.0	-	-	-
Willow-sedge fen	WS	418.3	0.3	0.0	<0.1	0.0	-	-	-
<i>Subtotal</i>		<b>101,484.6</b>	<b>70.2</b>	<b>47.3</b>	<b>&lt;0.1</b>	<b>17.5</b>	<b>21.4</b>	<b>&lt;0.1</b>	<b>6.2</b>
<b>Grand Total</b>		<b>144,605.1</b>	<b>100</b>	<b>54.6</b>	<b>0.0</b>	<b>18.6</b>	<b>30.7</b>	<b>&lt;0.1</b>	<b>12.5</b>

An updated figure 4.5.9-1 is provided below.



The vegetation association undifferentiated tundra is not reported in the vegetation summary table in the annual report, but is rather a generic term used to describe vegetation plot location in the vegetation monitoring field program. This term will be re-evaluated for the 2022 annual report and plots will be updated to the specific vegetation association to which it belongs.

Vegetation trend analysis will be completed every three years.

**KIA-NIRB-12: Vegetation Monitoring Plan -triggers for adaptive management****References:**

Sabina, Back River Project 2021 Annual Report (March 31, 2022)•Project Certificate Condition No. 34•Appendix D. Vegetation Monitoring Program -Technical Memorandum (March 31, 2022)Sabina, Back River Vegetation Monitoring Plan (January 2020)•Tables 5.1-1, 5.2-2, 5.3-1, 5.4-1, 5.5-1

**Summary:**

Details on the triggers for implementing adaptive management (e.g., EIS predictions) should be directly included in the VMP and referred to during annual reporting. There is no discussion of how the 2021 vegetation monitoring results should/could inform adaptive management in the Vegetation Monitoring Program report.

**Detailed Review Comment**

The Terms or Conditions (TCs) of PC Condition No. 34 include: c. Details on the triggers for implementing adaptive management options if effects to vegetation are observed, including potential impacts from dust deposition; and, d. Discussion of how the findings from monitoring efforts would be used to inform reclamation planning.

However, the 2020 VMP does not outline the quantitative thresholds for triggering adaptive management. Rather, the “Criteria” for each vegetation monitoring component (Footprint, Vegetation, Non-native Plant, Lichen, Winter Ice Road [WIR]) refer to exceeding the predictions of the EIS. It would be much easier to track performance and effectiveness of mitigation measures if the EIS predictions and trigger thresholds were provided in the VMP and reiterated during annual reporting of the monitoring results. The 2021 Vegetation Monitoring Program report (Appendix D of the 2021 Annual Report) does not refer to the EIS predictions at all.

Furthermore, despite Sabina’s assertion in the ‘Next Steps’ section under PC Condition No. 34, the Vegetation Monitoring Program report does not provide a discussion about how the 2021 monitoring results will inform adaptive management strategies and reclamation planning, despite some results of lichen monitoring showing “undesirable change” since baseline (see review comment KIA-NIRB-18). Sabina needs to provide a more fulsome discussion of the vegetation monitoring results and potential mitigation and management options.

**Recommendation/Request:**

The KIA recommends/requests the following:

- Please include the monitoring trigger thresholds (e.g., EIS predictions) in the VMP and other VEC monitoring plans, as applicable, such that exceedances can be readily identified.
- Please provide a more fulsome discussion of the 2021 vegetation monitoring results and how the results will inform adaptive management strategies (see also KIA-NIRB-19).

**Importance of Issue:**

Moderate

**Sabina Response:**

In future annual reports, Sabina will quantify vegetation losses as compared to predicted vegetation losses in the FEIS, FEIS predictions will be used as thresholds. This would include both losses by ecosystem class and losses of special landscape features within the Potential Development Area.

The project is not yet in operations and information collected during this pre-operational and construction phase can be used to inform potential hypothetical adaptive management triggers/thresholds and what those adaptive management measures could be. Consequently these will be developed in the near future in consultation with the KIA and other intervenors.

**KIA-NIRB-14: Pre-Construction vs. Construction activities and monitoring****References:**

Sabina, Back River Project 2021 Annual Report (March 31, 2022)• Project Certificate Conditions No. 34, No. 54, No. 56• Appendix D. Vegetation Monitoring Program -Technical Memorandum (March 31, 2022)Sabina, Back River Vegetation Monitoring Plan (January 2020)• Section 5, Table 5-1Sabina, Back River Project, Wildlife Mitigation and Monitoring Program Plan (Version 10), October 2019• Table 6.2-1Sabina, Back River Project, Final Environmental Impact Statement, Volume 1: Main Volume• Executive Summary, Table 1 • Section 1.4.1Sabina, Back River Project, Responses to 2018 Annual Report Comments• Response to Kitikmeot Inuit Association, KIA-1

**Summary:**

The Proponent still considers the Back River Project to be in the Pre-Construction phase, which was not defined. However, in 2021, Sabina completed drilling and blasting activities, methods that will likely be used during the Construction phase. In addition, Sabina conducted monitoring activities for vegetation and birds that are planned for the Construction phase as per the VMP and WMMP, respectively. As a result of the Project being categorized as being in Pre-Construction, fewer monitoring and reporting commitments are being upheld.

**Detailed Review Comment**

Sabina considers the Back River Project to still be in the Pre-Construction phase (and thus fewer monitoring and reporting requirements from the Project Certificate No. 007 apply). It remained unclear as to what is defined as occurring within the Pre-Construction phase, as this phase was not referred to during project certification.

However, there are examples in the 2021 Annual Report where Sabina is already undertaking monitoring that is planned for the Construction phase, including:

- Vegetation monitoring (2020 VMP, Table 5-1) –the monitoring schedule/sampling frequency for all components of the vegetation monitoring program (footprint, WIR, vegetation, non-native plants, lichen) is either annually or every three years “during Construction and Operation”.
- Pre-clearing nest surveys (2019 WMMP, Table 6.2-1) –for all bird VECs (raptors, waterbirds, upland birds, marine birds), pre-clearing surveys for nests would be conducted in the spring if triggered during the “Mobilization and Construction” phase, and not the “Baseline/Pre-Construction” phase.

Although no ground clearing was required during the bird breeding season in 2021, and therefore no pre-clearing surveys were required (2021 Annual Report for PC Conditions No. 54 and No. 56), pre-clearing nest surveys were conducted in 2020. In Section 1.2 of the 2021 Pre-Construction WMMP Report, Sabina explains that the 2021 Goose Site Earthworks included drilling and blasting at the portal box cut and development of the bulk-sample underground workings; and drilling, blasting and pad construction at the new permanent fuel tank pad. It is unclear how drilling and blasting activities can still be considered Pre-Construction rather than Construction.

During review of the Back River 2018 Annual Report, the KIA previously submitted a technical comment critiquing Sabina’s argument that the Project is still in the Pre-Construction phase (KIA-1). Comment KIA-1 was focused on sensitive landform mitigation and monitoring, and the issues still apply for this 2021 Annual Report (see review comment KIA-NIRB-02).

Sabina's response to the 2018 Annual Report comment KIA-1 defined the contentious Project phases as: •Construction -full mobilization of all materials and personnel on site wherein the site is occupied year-round to initiate construction of all core mine infrastructure. • Mobilization -the time period where some mobilization and development works [i.e., Pre-Construction including site preparation and staging of materials and equipment in advance of construction (NIRB Decision S. 3.4] can be undertaken consistent with the appropriate permits/licenses on a seasonal basis. Regardless of the semantics and technicalities of these definitions (e.g., year-round vs. seasonal occupation) for identifying the Project phase, the construction activities that occurred in 2021 could impact terrestrial environment VECs in the same way.

In addition, by claiming that the Project is still within the Pre-Construction phase, despite undertaking activities that are similar to those that will be used during Construction (e.g., drilling and blasting), Sabina does not appear to be following the precautionary principle that they claim to subscribe to in Section 1.4.1 of Vol. 1 of the FEIS.

**Recommendation/Request:**

The KIA recommends/requests the following:

- Please provide a definition of "Pre-Construction", how the activities conducted at the site during "Pre-Construction" differ from activities to be conducted during "Mobilization" and "Construction," and a timeline for when the "Mobilization and Construction" phase will begin. In the previous response supplied, the term Pre-Construction was used to provide an example of something that could occur during Mobilization, but still no clear definition was provided for where Pre-Construction activities end, and Construction activities begin.
- A clear list of activities that would be considered to fall within Pre-Construction, the extent of those activities, and how NIRB Project Certificate conditions do or do not apply to each (e.g., in a table format) would help provide clarity for all parties involved and would provide a clear means by which to compare Project activities to compliance requirements of the Project Certificate.

**Importance of Issue:**

Low

**Sabina Response:**

Sabina has completed activities related to preparation, mobilization and exploration but has not commenced any mining activities which will produce the majority of dust effects anticipated from the Project. Vegetation monitoring activities have followed the required monitoring schedule outlined in the Vegetation Monitoring Program.

**KIA-NIRB-15: Vegetation monitoring -missing results from planned methods****References:**

Sabina, Back River Project 2021 Annual Report (March 31, 2022)•Project Certificate Condition No. 34•Appendix D. Vegetation Monitoring Program -Technical Memorandum (March 31, 2022)o Section 4.1, Section 5.1, Appendix D, Appendix C Sabina, Back River Vegetation Monitoring Plan (January 2020)•Section 5, Table 5-1Sabina, Back River Project, Responses to 2019 Annual Report Comments (June 29, 2020)•Response to Kitikmeot Inuit Association, KIA-27

**Summary:**

The vegetation monitoring program appears to not be collecting or reporting on 70% of the planned monitoring parameters, including relative abundance of vascular and non-vascular species; plant vigour/health; dominant structural stage, moisture regime, and nutrient regime; wildlife sign; and disturbance class.

**Detailed Review Comment**

Within the Methods proposed for Vegetation Monitoring (Section 4.1 in the 2021 Vegetation Monitoring Program report), information to be collected at each plot includes:•Plant species composition (richness) and relative abundance (percent cover) of vascular plant and non-vascular species;•Average heights of plant species observed;•Vigour class or overall plant health of vascular plant species;•Relative abundance (percent cover) of surface substrate materials;

- Dominant structural stage, moisture regime, and nutrient regime;•Wildlife sign (e.g., fecal pellets, browsing/grazing, beds, digging) observations, if present; and
- Disturbance class (note: this parameter is not listed on p. 7 among the others, but the disturbance class scoring system is provided on p. 8).

However, the Results in Section 5.1 only describe three parameters (highlighted in bold in the list above): average vegetation height, average surface substrate percentage, and average species richness. As such, seven out of 10 (70%) of the proposed vegetation monitoring parameters are not accounted for. With respect to wildlife sign, there are very limited incidental observations in Appendix D of the Vegetation Monitoring Program report; however, these are “site conditions” notes for the lichen monitoring component, and the lichen sampling plots were specifically located adjacent to (rather than within) the vegetation monitoring plots (Section 4.3, p. 9). Furthermore, the results for average surface substrate percentage (Table 5) only shows seven “vegetation associations” and does not include three types listed in Section 4.1, pp. 7-8: fungi, water, and decaying wood. It is unclear whether none of these vegetation associations were found, or if they were not assessed as per the VMP.

In addition, Section 7 (Quality Assurance and Quality Control) of the 2020 VMP states that “photographs will be utilized to facilitate inter-annual comparisons through the qualitative examination of species vigour/health, species present, ground cover, and observable (anthropogenic) disturbance or general changes in vegetation cover.”

This statement implies that plant vigour, disturbance, and other monitoring parameters should be analyzed by comparing photos between years. There is no discussion of photo comparisons within the 2021 Vegetation Monitoring Program report; Appendix C simply shows representative plot photographs of vegetation types without further analysis.

In summary, although Sabina has developed a Vegetation Monitoring Plan to comply with PC Condition No. 34, they do not appear to be following their VMP as written.

Note that the KIA previously submitted a similar comment during review of the Back River 2019 Annual Report (KIA-27). Sabina’s response about missing vigour class information was that “vegetation vigour... was only included in the monitoring results as part of the disturbance level.” This rationale is inadequate for the 2021 Vegetation Monitoring Program report as there is no discussion of disturbance class either. In addition, Sabina’s response to KIA-27 explained that moisture and nutrient regime information were collected but not discussed because “there were no apparent changes resulting from use of the WIR”.

Similarly, decayed wood (as a surface substrate material) was not included in the summary tables as no observations were made of decayed wood while collecting plot data. As the “missing” data appear to be a recurring issue, it would be more transparent if Sabina presented all monitoring results (including not-detected and no-change data) in the annual report to demonstrate that the VMP was followed.

**Recommendation/Request:**

The KIA recommends/requests the following:

- Please explain why the majority of the proposed vegetation monitoring parameters are not discussed in the results section of the 2021 Vegetation Monitoring Program report.
- Please clarify whether data have been collected for the missing parameters since the vegetation monitoring program began in 2018. If the data were collected but not reported in annual reports because Sabina deemed that no apparent changes have occurred, please present the 3-year monitoring results (2018-2021) to support this claim for monitoring/reporting transparency.
- Please include not-detected and no-change monitoring results in future Vegetation Monitoring Program reports to allow for greater transparency in Sabina’s methods and analyses; this is a request that has been repeated among reviews by the KIA to date and is still not being done.
- Please explain how Sabina considers themselves compliant with Project Certificate Condition No. 34 if the vegetation monitoring program is not following the approved VMP (e.g., lack of inter-annual comparisons via photo analysis).

**Importance of Issue:**

Moderate

**Sabina Response:**

The following tables summarize the missing parameters that were collected in the field but not included in the 2021 Vegetation Monitoring Report. The parameters had not been included in previous reports but are included here for reference. Annual construction of the WIR has not occurred therefore, annual photo monitoring is not required under the VMP.

**Table KIA-NIRB-15-1: Abundance of Vascular and Non-Vascular species by Project Area, Vegetation Type and Distance from PDA Boundary**

Vegetation Type and Distance from PDA Boundary	Abundance of Vascular and Non-Vascular Species											
	0 m		150 m		500 m		1 km		5 km		10-20 km	
	Vascular	Non-Vascular	Vascular	Non-Vascular	Vascular	Non-Vascular	Vascular	Non-Vascular	Vascular	Non-Vascular	Vascular	Non-Vascular
Goose Property												
Dry Sparse Tundra (TH)	7	7	14	13	9	12	6	5	6	11	13	12
Mesic Dwarf Tundra (TL)	11	14	n/d	n/d	n/d	n/d	5	7	n/d	n/d	n/d	n/d
Undifferentiated Tundra (TU)	15	14	14	11	11	9	10	15	11	13	13	10
MLA												
Dry Sparse Tundra (TH)	13	7	n/d	n/d								
Mesic Dwarf Tundra (TL)	n/d	n/d	18	11	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
Undifferentiated Tundra (TU)	21	8	n/d	n/d								
TOTALS	26	19	26	21	11	13	11	18	14	15	14	15

**Table KIA-NIRB-15-2: Average Vigour of Observed Species by Project Area, Vegetation Type and Distance from PDA Boundary**

Vegetation Type	Average Vigour <sup>(a)</sup>					
	0 m	150 m	500 m	1 km	5 km	10-20 km
Goose Property						
Dry Sparse Tundra (TH)	3.8	3.6	4.0	3.3	4.0	3.9
Mesic Dwarf Tundra (TL)	3.9	n/d	n/d	4.0	n/d	n/d
Undifferentiated Tundra (TU)	4.0	4.0	4.0	4.0	3.9	4.0
MLA						
Dry Sparse Tundra (TH)	4.0	n/d	n/d	n/d	n/d	n/d
Mesic Dwarf Tundra (TL)	n/d	3.9	n/d	n/d	n/d	n/d
Undifferentiated Tundra (TU)	4.0	n/d	n/d	n/d	n/d	n/d

(a) Average vigour is calculated by assessing the vigour each species and averaging across plots based on the scale: poor=1, fair=2, good=3, excellent=4

Table KIA-NIRB-15-3: Summary of Structural Stage, Moisture Regime and Nutrient Regime

Project Area	Plot name	Distance from Mine (KM)	Vegetation type	Structural Stage	Moisture Regime	Nutrient Regime
Goose Property	SG21-00-01	0	Dry-sparse tundra	Dwarf Shrub	Xeric	Poor
	SG21-00-02	0	Mesic dwarf-shrub tundra	Dwarf Shrub	Submesic	Poor
	SG21-00-03	0	Undifferentiated tundra	Dwarf Shrub	Submesic	Poor
	SG21-00-04	0	Undifferentiated tundra	Dwarf Shrub	Subxeric	Poor
	SG21-00-05	0	Undifferentiated tundra	Dwarf Shrub	Submesic	Poor
	SG21-00-06	0	Mesic dwarf-shrub tundra	Sparse/bryoid	Submesic	Poor
	SG21-10K-04	15	Dry-sparse tundra	Dwarf Shrub	Subxeric	Very Poor
	SG21-150-01	0.15	Undifferentiated tundra	Dwarf Shrub	Submesic	Poor
	SG21-150-02	0.15	Undifferentiated tundra	Bryoid	Submesic	Very Poor
	SG21-150-03	0.15	Undifferentiated tundra	Dwarf Shrub	Subxeric	Poor
	SG21-150-04	0.15	Dry-sparse tundra	Dwarf Shrub	Xeric	Poor
	SG21-150-05	0.15	Dry-sparse tundra	Sparse/bryoid	Xeric	Very Poor
	SG21-15K-01	15	Dry-sparse tundra	Dwarf Shrub	Xeric	Very Poor
	SG21-15K-02	15	Undifferentiated tundra	Dwarf Shrub	Subxeric	Poor
	SG21-15K-03	15	Undifferentiated tundra	Dwarf Shrub	Subxeric	Poor
	SG21-15K-05	15	Dry-sparse tundra	Sparse/bryoid	Xeric	Poor
	SG21-1K-01	1	Mesic dwarf-shrub tundra	Dwarf Shrub	Submesic	Poor
	SG21-1K-02	1	Undifferentiated tundra	Sparse/bryoid	Subxeric	Poor
	SG21-1K-03	1	Undifferentiated tundra	Dwarf Shrub	Subxeric	Poor
	SG21-1K-04	1	Dry-sparse tundra	Sparse/bryoid	Xeric	Very Poor
	SG21-1K-05	1	Undifferentiated tundra	Sparse/bryoid	Submesic	Poor
	SG21-500-01	0.5	Undifferentiated tundra	Bryoid	Subxeric	Poor
	SG21-500-02	0.5	Undifferentiated tundra	Dwarf Shrub	Subxeric	Poor
	SG21-500-03	0.5	Dry-sparse tundra	Dwarf Shrub	Xeric	Very Poor
	SG21-500-04	0.5	Dry-sparse tundra	Dwarf Shrub	Xeric	Very Poor
	SG21-500-05	0.5	Undifferentiated tundra	Sparse/bryoid	Submesic	Poor
	SG21-5K-01	5	Undifferentiated tundra	Dwarf Shrub	Subxeric	Poor
	SG21-5K-02	5	Undifferentiated tundra	Sparse/bryoid	Subxeric	Poor
	SG21-5K-03	5	Dry-sparse tundra	Sparse/bryoid	Xeric	Poor
	SG21-5K-04	5	Undifferentiated tundra	Dwarf Shrub	Subxeric	Poor
SG21-5K-05	5	Undifferentiated tundra	Dwarf Shrub	Subxeric	Poor	
MLA	SM21-00-01	0	Undifferentiated tundra	Dwarf Shrub	Submesic	Poor
	SM21-00-02	0	Undifferentiated tundra	Dwarf Shrub	Submesic	Poor
	SM21-00-03	0	Undifferentiated tundra	Dwarf Shrub	Submesic	Poor
	SM21-00-04	0	Dry-sparse tundra	Dwarf Shrub	Subxeric	Poor
	SM21-00-05	0	Dry-sparse tundra	Dwarf Shrub	Subxeric	Poor
	SM21-150-01	0.15	Mesic dwarf-shrub tundra	Dwarf Shrub	Submesic	Poor
	SM21-150-02	0.15	Mesic dwarf-shrub tundra	Dwarf Shrub	Mesic	Poor
	SM21-150-03	0.15	Mesic dwarf-shrub tundra	Dwarf Shrub	Submesic	Poor
	SM21-150-04	0.15	Mesic dwarf-shrub tundra	Dwarf Shrub	Mesic	Poor

**KIA-NIRB-17: Non-native plant species in the Tundra****References:**

Sabina, Back River Project 2021 Annual Report (March 31, 2022)•Project Certificate Condition No. 55•Appendix D. Vegetation Monitoring Program -Technical Memorandum (March 31, 2022) o Section 5.2

**Summary:**

Information about vegetation species that are considered native in the territory as a whole, but may be considered locally or regionally non-native, should be included in the VMP and annual report for non-native plant monitoring.

**Detailed Review Comment**

In Section 5.2 of the 2021 Vegetation Monitoring Program report, Sabina states that “Common fireweed (*Chamerion angustifolium*) although not an invasive weed, can be considered non-native in the Tundra...”

There is no source reference for this information. According to the CESSC’s Wild Species 2015 data, common fireweed is considered Native but Unrankable (SU) in Nunavut. If Sabina has gathered TK or local knowledge about common fireweed and other species that could be considered regionally or locally non-native, it would be useful to include this information in the VMP and annual report.

**Recommendation/Request:**

The KIA recommends/requests the following:

- Please provide the source(s) of information for why common fireweed may be considered non-native in the Tundra.
- If additional local/regional information is available for non-native species, please include another list of species within the VMP and annual vegetation monitoring report.

**Importance of Issue:**

Low

**Sabina Response:**

Local knowledge was provided to Sabina during field programs that *Chamerion angustifolium* (common fireweed) may be considered non-native in Nunavut by some community members, however the source of this knowledge cannot be confirmed. Sabina thanks the KIA for the comment that common fireweed is considered native in Nunavut. Going forward, populations of common fireweed will not be tracked as an invasive weed. If further IQ information regarding this species, or other species, is collected it will be included in future annual reports.

## KIA-NIRB-18: Lichen monitoring data collection, analysis and discussion

### References:

Sabina, Back River Project 2021 Annual Report (March 31, 2022)•Project Certificate Condition No. 34•Appendix D. Vegetation Monitoring Program -Technical Memorandum (March 31, 2022) o Appendix D, Appendix E; Section 4.3.2; Section 5.3Sabina, Back River Vegetation Monitoring Plan (January 2020)•Table 5.4-1

### Summary:

The results of lichen monitoring are briefly outlined in Section 5.3 of the 2021 Vegetation Monitoring Program report. There are cross-references to three appendices of the report showing field and laboratory data, but limited discussion about the results themselves. There are some monitoring results that may be concerning; therefore, Sabina needs to provide a more detailed analysis and discussion in comparison to the predictions of the EIS.

### Detailed Review Comment

Appendix E shows the Lichen Chemistry Graphs for parameters considered toxic to caribou, compared to baseline results. From a visual review of the figures, 9/19 elements analyzed were found to have potentially significantly higher levels at 0 m from the Goose Property in 2021 than the baseline data, including arsenic, barium, cadmium, chromium, lead, molybdenum, strontium, vanadium, and zinc. At the MLA site, 5/19 elements analyzed were found to have potentially significantly higher levels at 0 m from the Project in 2021 compared to baseline, including cadmium, manganese, mercury, uranium, and zinc. (Note: boron was also detected at both sites but there are no baseline data for comparison.) It is unknown whether the 2021 levels are statistically significantly higher than baseline, as there are no statistics presented. It is also unclear whether the 2021 levels are biologically significant (e.g., acutely or chronically harmful to caribou if they forage on the lichen) because Sabina does not provide further analysis or discussion. Table 5.4-1 in the VMP provides an overview for the lichen monitoring program, including:

- Goal–The Mine will not result in a significant increase in contaminant uptake in vegetation.
- Criteria –Increase in metal concentration in lichen within the LSA and concentrations beyond the predictions of the EIS.As discussed in review comment KIA-TC-12, the EIS predictions are not included in either the VMP or the 2021 Vegetation Monitoring Program report.

Without more detailed reporting, it is unclear whether the lichen sampling results in 2021 constituted “a significant increase in contaminant uptake” and a need for mitigation measures to be undertaken. The omission of a more fulsome discussion of the monitoring results may imply that Sabina is not in full compliance with PC Condition No. 34 (regarding the VMP).

As part of the data analyses (Section 4.3.2), Sabina calculated the relative percent difference (RPD) for each analyzed parameter for duplicate lichen samples to assess homogeneity. A lower RPD indicates higher sample homogeneity, while a RPD of 30% or greater was “considered notable”. The results in Section 5.3 show that the incidence of RPDs greater than 30% was generally high in the lichen duplicates. However, Sabina does not provide an explanation for the implications of these results. Why would duplicate lichen samples be so heterogeneous? What does this mean with respect to evaluating monitoring results and comparing with EIS predictions? Are there field collection and/or lab analysis issues? Furthermore, Sabina states in Section 5.3 that weather conditions at time of sampling and surface substrate percentages were recorded, shown in Appendix D. However, while Table 9 (Lichen Sampling Plot Information) in Appendix D has a column for weather and site conditions, the information was incompletely and non-systematically recorded -there is some weather information (e.g., rain, wind,

qualitative temperature, dryness), some incidental observations and comments, and some location notes, while other plots are missing information entirely. It would be better if Sabina provides their field staff with more detailed instructions about the data to record at each lichen monitoring plot.

**Recommendation/Request:**

The KIA recommends/requests the following:

- Please provide a statistical analysis of the 2021 lichen sampling results and a discussion of the biological implications for caribou that may ingest lichen containing these levels of metals.
- Please provide a comparison of the 2021 lichen sampling results with the predictions of the EIS and provide rationale for whether mitigation measures are needed.
- Please explain the implications of the RPDs found for duplicate lichen samples in 2021 with respect to interpretation of monitoring results. Please also indicate if corrective actions need to be taken for field and/or lab work.
- Please provide more specific instructions to field staff such that environmental data are collected systematically and allow for future analyses.

**Importance of Issue:**

HIGH

**Sabina Response:**

- Results of lichen sampling will be compared to predicted values in the FEIS, which are based on CCME guidelines and 95% concentrations reported during baseline studies in the Country Foods Local Study Area.
- The FEIS predicted that dust would not have an effect on wildlife or human use of lichen or country foods within the Country Foods Local Study Area (10 km around goose, 3.5 km around MLA, and 1 km around the Winter Ice Road). Since metals in plants can come from several sources – pre-existing metals in mineralized soil (common on mine sites), dust, discharge water, etc. – adaptive management was not proposed in the FEIS in response to vegetation sampling. Instead, mitigation and adaptive management is located in the management plans for specific environmental media – e.g., Mitigation measures for dust are discussed in the dust management plan in response to direct dust measurements.
- High variability in metal concentrations in lichen samples is a common feature of this type of sampling program and should be expected. Dust deposition and metal uptake are influenced a variety of factors, such as micro-site wind conditions, soil conditions, air patterns, etc. It is difficult to discern the cause and implications of the variability of duplicate samples. However, the incidence of RPDs greater than 30% has been observed in similar frequency at another project location in the NWT in two different sampling years.

Future lichen sampling programs will have more stringent protocol on collecting environment data.

**KIA-NIRB-36: Effluent discharge from TSF**

**References:**

Appendix K Section 5.2.7 Tailings Storage Facility Operations

**Summary:**

No specific criteria for effluent discharges are provided for TSF.

**Detailed Review Comment**

“Tailings water from the TSF supernatant pond will be recycled and reused in the Process Plant as reclaim water, with no planned discharge from the TSF during Operations. Should a controlled discharge be required during Operations, all effluent will meet relevant regulations or site-specific water quality objectives.” No clarification is given regarding the specific criteria that effluent and discharges will need to comply with (this information may be included in missing Management Plans).

**Recommendation/Request:**

Provide clarification on which water quality criteria will be used to identify exceedances in discharges (i.e., MDMER or more stringent).

**Importance of Issue:**

High

**Sabina Response:**

Sabina will comply with notification requirements and the effluent discharge limits regulated under the Type A Water licence, which are as stringent or more stringent than Metal and Diamond Mining Effluent Regulations. The text in Appendix K will be updated to clarify that Water Licence discharge limits will apply to discharges to Goose Lake. See also response to CIRNAC #16 for additional clarification regarding the terms discharge limits and water quality objectives.

**KIA-NIRB-40: Goose Property Groundwater Inflows****References:**

Water Management Plan, Table 5.1-1, Amendment Type A Water Licence Application for Sabina Gold & Silver Corp. Back River Project (NWB File No. 2AM-BRP1831 Attachment 2-Appendix B-WaterMgmtPlan-IMLE).

**Summary:**

Ground water flows indicated in annual report do not correspond to SRK groundwater model.

**Detailed Review Comment**

Table 5.1-1 indicates groundwater inflows ranging from 0 m<sup>3</sup>/day to 75 m<sup>3</sup>/day at Umwelt Underground, between 70 m<sup>3</sup>/day to 190 m<sup>3</sup>/day at Llama Open Pit, and between 0 m<sup>3</sup>/day to 410 m<sup>3</sup>/day at Llama Underground. The estimates above mentioned seem different from the results of the Groundwater model developed by SRK as part of the hydrogeological baseline study in support of the Back River Project. The Hydrogeological Characterization and Modelling Report for the Project (October 2015) indicates that:

- Umwelt Underground groundwater inflow ranges between 0 m<sup>3</sup>/day and 596 m<sup>3</sup>/day; •Llama underground groundwater inflow ranges between 0 m<sup>3</sup>/day and 350 m<sup>3</sup>/day;
- Llama open pit groundwater inflow ranges between 0 m<sup>3</sup>/day and 120 m<sup>3</sup>/day; inflow rates for the water balance model.

**Recommendation/Request:**

KIA's consultant cannot comment on the updated groundwater inflow rates at this time. Once the updated groundwater model report will be made available, they will review the rationale of using different ground water inflow rates for the water balance model.

**Importance of Issue:**

High

**Sabina Response:**

Sabina looks forward to receiving any review comments you may have on the updated groundwater model information appended to the water and load balance report to be provided to NWB at the end of August.

**KIA-NIRB-42: Water consumption from Goose Lake**

**References:**

Water Management Plan, Table 7.3-1, Amendment Type A Water Licence Application for Sabina Gold & Silver Corp. Back River Project (NWB File No. 2AM-BRP1831 Attachment 2-Appendix B-WaterMgmtPlan-IMLE).

**Summary:**

Total amount of Goose Lake water consumption maybe inaccurate.

**Detailed Review Comment**

Text: “During the life of the Project, water consumption requirements from Goose Lake include 1,500 m<sup>3</sup>/day of freshwater year-round and an additional 400 m<sup>3</sup>/day during the open water season for a total of 1,900 m<sup>3</sup>/day” Table: Total Water Use: Goose Lake: 608,700 m<sup>3</sup>/year. Table should indicate: 584,300 m<sup>3</sup>/year if open water season is from July until September.

**Recommendation/Request:**

The total amount on the table is not consistent with the text. Please clarify how many days are considered during open water season (July-September) and what the correct total volume is.

**Importance of Issue:**

Moderate

**Sabina Response:**

The 608,700 m<sup>3</sup>/year included in the water license amendment is considered a not to exceed volume. A target withdrawal rate from Goose Lake of 1,500 m<sup>3</sup>/day year-around plus an additional 400 m<sup>3</sup>/day during the open water season was considered for water balance modeling purposes to provide some modeling contingency.

**KIA-NIRB-43: Inflows to Primary Pond****References:**

Water Management Plan, Table 8.1-1, Amendment Type A Water Licence Application for Sabina Gold & Silver Corp. Back River Project (NWB File No. 2AM-BRP1831 Attachment 2-Appendix B-WaterMgmtPlan-IMLE).

**Summary:**

Inflows to Primary Pond are not presented.

**Detailed Review Comment**

The Echo Open Pit will commence during the Construction Phase (-2). Inflows pumped to Primary Pond is not indicated.

**Recommendation/Request:**

Please add in Table 8.1-1: “, and inflows are pumped to the Primary Pond. “

**Importance of Issue:**

Moderate

**Sabina Response:**

Reference to pumping from Echo Pit to Primary Pond is included in the third bullet within the Mine Year -2 line which says “*Contact water in Echo Open Pit and Ore Stockpile Pond are pumped to the Primary Pond via Echo WRSA Pond.*”

**KIA-NIRB-44: Saline Water Pond storage capacity.**

**References:**

Water Management Plan, 8.2.7 Saline Water Pond, Amendment Type A Water Licence Application for Sabina Gold & Silver Corp. Back River Project (NWB File No. 2AM-BRP1831 Attachment 2-Appendix B-WaterMgmtPlan-IMLE).

**Summary:**

Alternate Saline Water storage to SWP.

**Detailed Review Comment**

Text: “In the event of insufficient storage within the SWP before the Goose Main Reservoir is available, saline water can be transferred to the Llama TF once active in Year 6, or Umwelt Underground around Year 10 and Year 12, when the void spaces within the underground will be available.”

**Recommendation/Request:**

Please provide an alternative if there is insufficient storage within the SWP before Goose Main Reservoir is complete.

**Importance of Issue:**

High

**Sabina Response:**

As stated in the Water Management Plan, 8.2.7 Saline Water Pond, “*saline water can be transferred to the Llama TF once active in Year 6, or Umwelt Underground around Year 10 and Year 12, when the void spaces within the underground will be available*” if insufficient storage within the SWP before the Goose Main Reservoir is available.

KIA-NIRB-46: Treatment of water within Llama and Umwelt Lakes.

**References:**

Water Management Plan, 7.4.2 Goose Property Water Treatment Plant, Amendment Type A Water Licence Application for Sabina Gold & Silver Corp. Back River Project (NWB File No. 2AM-BRP1831 Attachment 2-Appendix B-WaterMgmtPlan-IMLE).

**Summary:**

Basis of the assumption for water treatment of water within Llama and Umwelt Lakes.

**Detailed Review Comment**

Text: “it is assumed that 50% of the water within Llama and Umwelt Lakes will required to be treated for TSS before discharging to the Goose Lake”

**Recommendation/Request:**

Please provide the rationale for assuming that 50% of the water within Llama and Umwelt Lakes will require to be treated.

**Importance of Issue:**

Low

**Sabina Response:**

The value of 50% was selected as a reasonable and conservative assumption that up to half of the water may require treatment; however, Sabina will have the ability to treat up to 100% of the water so that concentrations of TSS in the discharge will remain below the discharge limit for TSS.

**KIA-NIRB-47: Groundwater inflows from active layer or taliks below Llama and Umwelt Lakes.**

**References:**

Water Management Plan, 8.1.1 Lake Dewatering, Amendment Type A Water Licence Application for Sabina Gold & Silver Corp. Back River Project (NWB File No. 2AM-BRP1831 Attachment 2-Appendix B-WaterMgmtPlan-IMLE).

**Summary:**

Consideration of groundwater inflows from active layer or taliks below Llama and Umwelt Lakes into Llama during dewatering.

**Detailed Review Comment**

Text: “Llama Lake, which has a natural capacity of 0.96 M-m<sup>3</sup>, will be dewatered.....Umwelt Lake, which has a natural capacity of 0.24 M-m<sup>3</sup>, will be dewatered in Year -1.”

**Recommendation/Request:**

Please clarify if groundwater/water inflows from the shallow active layer or from taliks below Llama Lake and Umwelt Lake have been considered when considering dewatering volumes. To prevent groundwater/water inflow from the shallow active layer, the construction of diversion berms around Llama Lake during Phase 1 might be explored. Based on Figure A-06 and Figure A-07, diversion berms will be constructed around the Llama pit only during Phase 2.

**Importance of Issue:**

High

**Sabina Response:**

The storage capacities of Llama Lake and Umwelt Lake are based on bathymetric survey of the lakes and do not account for potential inflows from the shallow active layer or from taliks below the lakes. It is anticipated that these potential inflows are minute relative to the bathymetric volumes (i.e. it is expected that the shallow active layer, or at least portions of it, are perched), together with other inflows and outflows, such as direct precipitation, runoff and evaporation, will depend on actual conditions at site during the dewatering of the lakes and will define the actual total volume of water to be removed from the lakes. The dewatering systems (including the treatment system that may be required for the second phase of dewatering) will be designed including contingency factors to account for potentially higher volumes to be dewatered. This uncertainty is accounted for in the not to exceed dewatering volumes of 1,400,000 m<sup>3</sup> included in Part E Item 4 of the amended water license. A dewatering plan will be submitted 60 days prior to initiation of dewatering as per Part E Item 14 of the amended water license.

**KIA-NIRB-48: Sequence of dewatering of Llama and Umwelt Lakes****References:**

Water Management Plan, 8.1.1 Lake Dewatering, Amendment Type A Water Licence Application for Sabina Gold & Silver Corp. Back River Project (NWB File No. 2AM-BRP1831 Attachment 2-Appendix B-WaterMgmtPlan-IMLE)

**Summary:**

Clarification on the sequence of dewatering of Llama and Umwelt Lakes.

**Detailed Review Comment**

Text: “Effluent will be discharged to Umwelt Lake and ultimately flow into Goose Lake.....Umwelt Lake, which has a natural capacity of 0.24 M-m<sup>3</sup>, will be dewatered in Year -1. Similar to Llama Lake, it is assumed that only 50% of the lake water volume will be suitable for direct discharge.”

**Recommendation/Request:**

Approximately 0.48 M-m<sup>3</sup> will be discharged from Llama Lake to Umwelt Lake. This will increase the volume of water to be dewatered from Umwelt Lake to 0.72 M-m<sup>3</sup>. Please clarify the development sequence for dewatering management activities at Llama and Umwelt Lakes to avoid duplicates in treating water at the Water Treatment Plant.

**Importance of Issue:**

Moderate

**Sabina Response:**

The dewatering of Llama Lake and Umwelt Lake are scheduled to occur in sequence; Llama Lake followed by Umwelt Lake. The water from Llama Lake dewatering will be pumped to Umwelt Lake, from where it will be overflow towards Goose Lake through the natural outlet of Umwelt Lake.

In the event that dewatering schedule requires to advance the dewatering of Llama Lake and Umwelt Lake concurrently, the water from Llama Lake dewatering will be discharged directly downstream of Umwelt Lake.

A dewatering plan with details on schedule of dewatering of each lake will be submitted 60 days prior to initiation of dewatering as per Part E Item 14 of the amended water license.

**KIA-NIRB-49(a): Diversion berms around Saline Water Pond (SWP)**

**References:**

Water Management Plan, 8.1.1 Lake Dewatering, Amendment Type A Water Licence Application for Sabina Gold & Silver Corp. Back River Project (NWB File No. 2AM-BRP1831 Attachment 2-Appendix B-WaterMgmtPlan-IMLE).

**Summary:**

No diversion berms are around east side of SWP.

**Detailed Review Comment**

Text: “Saline Water Pond to be constructed around the existing extents of Umwelt Lake.”

**Recommendation/Request:**

Figure A-07 shows that the Saline Water Pond (SWP) will be completed with a SWP containment dam along the south portion. SWP Diversion Berms will be placed on the North and West side of the SWP to avoid freshwater inflow into the SWP.

No containment or diversion structures will be constructed on the East side of the SWP.

The potential of saline water seepage into the Umwelt Pit should be discussed and the risks quantified by the proponent. Should they be required, mitigation measures should be proposed.

**Importance of Issue:**

Moderate

**Sabina Response:**

The SWP is proposed as a temporary repository of saline water during the earlier years of mine operations. In year 3 saline water in the SWP will be sent to reverse osmosis unit for treatment, with treated water pumped to site contact water facilities. This will allow to maintain low volumes of saline water stored in the SWP throughout most of the mine operations. The Umwelt Pit will be developed in permafrost and the saline water management strategy described above will reduce the risk of generating a talik underneath the SWP that may potentially results in seepage of saline water to Umwelt Pit.

Mitigation measures may include installation of a thermistor string along the road between the SWP and the Umwelt Pit to monitor potential formation of talik. If the data from the thermistor string show that talik may be forming and some seepage may occur, the treatment of saline water through reverse osmosis may be initiated earlier with treated water temporary pumped to the Primary Pond until Umwelt Pit becomes available to receive water.

## 2.2 RESPONSE TO CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA

### CIRNAC-#6: Hydrogeology and Groundwater Quantity and Quality - Geotechnical Characterization Program

#### References:

- Back River PC T&C #18: Hydrogeology and Groundwater Quantity and Quality - Geotechnical Characterization Program
- Back River Project 2021 Annual Report, Pages 4-41 to 4-42

#### Issue/Rationale:

Reporting requirements for PC T&C #18 state that Sabina shall provide the results of an infill geotechnical characterization program, along with associated mitigation measures, in the annual report to the NIRB.

Sabina stated that geotechnical investigations were undertaken in 2021, but the results are not provided in the 2021 Annual Report to the NIRB.

#### Recommendation:

CIRNAC recommends that in the 2022 Annual Report Sabina:

- Provide the results of the geotechnical investigations undertaken in 2021, including a summary of all geotechnical work completed to date and any interpretations arising from the available data. Where available, this should include depth and extent of geologic units, stratigraphy, hydraulic head data, thermal data, duration/depth/direction of active flow zones, distribution of baseline chemical parameters such as arsenic.
- Provide a conceptual model of groundwater flow, including potential source zones and receptors.
- Provide results of continued (or resumed) monitoring work, including water levels/vibrating piezometer data, thermistor monitoring, data available from the Westbay monitoring well, and water samples from the active zone, in order to improve the monitoring dataset and demonstrate annual variability.

#### Sabina Response:

- It is a direct requirement of the NWB Water Licence to provide the third party geotechnical inspections in the NWB annual report; it is not a direct requirement of the NIRB Project Certificate. CIRNAC reviews the NWB annual report and subsequently the third party geotechnical inspection report, therefore Sabina does not feel it is necessary to include it within the NIRB annual report.
- Sabina looks forward to receiving any review comments you may have on the updated groundwater model information appended to the water and load balance report to be provided to NWB at the end of August.
- No additional monitoring data for 2021. As construction progresses and operations are initiated Sabina will implement monitoring commitments as outlined in the Type A water licence and report as required to the NIRB and NWB. Sabina acknowledges KIA's comment and highlights that Project Certificate Term and Condition (T&C) #18 was specifically related to tailing

## RESPONSES TO 2021 ANNUAL REPORT COMMENTS

deposition in the Tailings Storage Facility (TSF) and an infill geotechnical program associated with the western ridge adjacent to this facility. Should Sabina elect to develop the TSF for the purpose of tailings storage, Sabina will implement this infill geotechnical program in compliance with T&C #18.

**CIRNAC-#7: Hydrological Features and Hydrogeology -Thermal Monitoring****References:**

- Back River PC T&C #20: Hydrological Features and Hydrogeology
- Back River Project 2021 Annual Report, Pages 4-40
- Back River Project 2020 Annual Report, Pages 4-45
- FEIS Addendum-Vol 6-Pt 1-IA2E Freshwater Environment, Pages 6-4 and 6-11
- NIRB Final Hearing Report Back River Gold Mine Project, Section 4.6 – Hydrological Features and Hydrogeology

**Issue/Rationale:**

In the 2021 Annual Report, Sabina indicated that a thermal monitoring plan is in preparation. CIRNAC notes that though the plan is in preparation, there are deficiencies in the thermal modelling that has been completed to date, and care should be taken to ensure the adequacy of the thermal baseline data.

Under Tailings Management Plan of the 2021 Annual Report, Sabina indicated that Tailings Storage Facility (TSF) Design is based on Sabina’s 2017(a) submission, F-4.

Sabina’s FEIS Addendum, Volume 6, Part 1 includes a discussion on the Hydrological features and hydrogeology in Section 6.1 Surface Hydrology page 8. This discussion highlights the NIRB’s views:

“In considering the views of the Proponent and those of parties throughout the assessment of the Project and as outlined above, the Board has concluded that due to the limited baseline available in the FEIS [FHR-NIRB-4.6(A)] and the probability of taliks forming under the pits or the Tailings Impoundment Area [FHR-NIRB-4.6(B)], the Board is not confident that the proposed mitigation measures in conjunction with a commitment from Sabina to collect additional baseline data would sufficiently mitigate the project-specific impacts. The Board appreciates Sabina’s commitments to collect additional baseline data, however, views this data as necessary at the environmental assessment stage to provide the required assurance that negative impacts to hydrogeology and hydrological features would be adequately mitigated [FHR-NIRB-4.6(A)].”

Sabina has highlighted two aspects to which it has responded: the limited baseline data, and the potential for Taliks to be formed under the pits or the Tailings Impoundment Area.

For the limited baseline data, Sabina indicated “Sabina believes a sufficient level of hydrological and hydrogeological baseline data was collected and provided during the environmental assessment phase.”

CIRNAC notes that, though there seems to be baseline data between 2007 and 2014, hydrological and hydrogeological processes are not static and can vary widely from season to season, year to year, and decade to decade. For this reason, data collected between 2007 and 2014 is insufficient to adequately characterize the baseline hydrological characteristics.

For the potential to create taliks, Sabina stated “Sabina completed additional thermal modelling and submitted a Technical Comment to NRCAN regarding through taliks beneath open pits (F-INAC-TC-8), and Sabina has shown through thermal modelling that no through talik will exist under the TSF (FEIS Appendix V2-7G, Appendix G). Sabina believes this appropriately addresses the Board’s concerns.”

## RESPONSES TO 2021 ANNUAL REPORT COMMENTS

As noted in the FEIS Addendum (Volume 6, page 6-8), which refers to the FEIS Final Hearing document, NRCan's response to this modelling noted that "Natural Resources Canada is of the view that the results of this analysis support the development of appropriate groundwater models and assessments of the effects of the project on water quality and quantity". CIRNAC notes that even though the results of the analysis are adequate, it is expected that they are to be used to support the development of groundwater models for further assessment, including extension of the model domain to -900 metres, and work to model and evaluate total metals concentrations in groundwater prior to and during operations. The groundwater model results and further assessments appear to not have been completed, even though the comment is noted by Sabina as being addressed.

### **Recommendation:**

CIRNAC recommends that Sabina:

- a) Explain the rationale for discontinuing Hydrology Baseline Reports beyond the year 2014.
- b) Resume the Hydrology Baseline Reports where construction has not started.
- c) Provide a discussion of hydrology data collection in future annual reports.
- d) Conduct further groundwater modelling based on the results of the analysis and discuss the preparation of a resulting plan to fully address NRCan's comment.

### **Sabina Response:**

- Baseline was deemed sufficient "adequate" during FEIS process. Additional hydrology data will be collected as needed, and as part of operations, during construction, and will be reported in future annual reports. Sabina looks forward to receiving any review comments you may have on the updated groundwater model information appended to the water and load balance report to be provided to NWB at the end of August.

**CIRNAC-#8: Aquatic Effects Monitoring Plan****References:**

- Back River PC T&C #21: Groundwater and Surface Water Quality, Sediment Quality and Freshwater Aquatic Environment Aquatic Effects Monitoring Plan
- Back River Project 2021 Annual Report, Pages 4-46 to 4-47
- Back River Project 2020 Annual Report, Pages 62 - 63
- Sabina's Responses to 2020 Annual Report Comments

**Issue/Rationale:**

Project Certificate T&C #21 requires an Aquatic Effects Monitoring Plan (AEMP) to include “sufficient sampling and monitoring programs to appropriately characterize the receiving environment to ensure that adequate data is available to assess impact predictions made within the Final Environmental Impact Statement.” Reporting requirements for Project Certificate T&C #21 state that Sabina should provide results of the AEMP program “annually thereafter or as may otherwise be required by the NIRB.”

In the 2021 Annual Report, Sabina notes that the status of the PC is compliant and makes the following statements:

- “Additional baseline data collection was conducted in 2021 to address commitments made in response to technical comments on the Aquatic Baseline Synthesis Report by Kitikmeot Inuit Association (KIA), Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), and Environment and Climate Change (ECCC), and to support the next update to the Aquatic Effects Management Plan.”
- “Sabina is currently updating the AEMP based on commitments made with respect to submissions received during the Technical and Public Hearing process for the Type A Water Licence Application and according to the terms and conditions of the Type A Water Licence. Updates were also made to re-align the AEMP with recent changes to the Metal and Diamond Mining Effluent Regulations (MDMER), to update the Project description according to the 2019 Modification Package, to incorporate recommendations from the aquatic baseline synthesis report, and to refine details of the sampling design and Response Framework.”

The results of the 2021 data were not included in the 2021 Annual Report. The AEMP was also not included in the 2021 Annual Report. CIRNAC notes that the updated plan, as well as the results of the AEMP, are required to evaluate whether the impact predictions in the FEIS are still valid.

**Recommendation:**

CIRNAC recommends that Sabina:

- Provide the summarized results of the 2021 data collection in the next annual report.
- Provide any updated AEMP reports in any future annual report.

**Sabina Response:**

- Sabina clarifies the timeline for additional Aquatic data collection and updated AEMP will be provided with the next annual report to the Type A Water Licence. Please see response to KIA-NIRB-33.

## **CIRNAC-#9: Vegetation Monitoring Plan**

### **References:**

- Back River PC T&C #34: Vegetation – Vegetation Monitoring Plan
- Back River Project 2021 Annual Report, Pages 4-73 to 4-74
- Back River Project 2021 Annual Report, Appendix F
- Sabina’s Responses to 2020 Annual Report Comments Pages 30-37
- Back River Project FEIS Addendum, Volume 5, Page 5-20

### **Issue/Rationale:**

In response to comments received on the Back River Project 2020 Annual Report, Sabina committed to amending the January 2020 Vegetation Monitoring Plan. An updated or amended Vegetation Monitoring Plan was not included in the 2021 Annual Report and the Vegetation Monitoring Program on the 2021 monitoring activities refers to the January 2020 Vegetation Monitoring Plan.

Further, in the Vegetation Monitoring Program (Appendix F of the 2021 Annual Report) results, “Totals” are reported in Table 4 and 5; however, it is unclear what these totals represent. For example, the totals for 150 m in Table 4 are the same as the numbers reported for Undifferentiated Tundra in the same table.

### **Recommendation:**

CIRNAC recommends that Sabina:

- a) Provide a timeline for submitting the updated Vegetation Monitoring Plan to the NIRB.
- b) Clarify what the “Totals” in Tables 4 and 5 of the Vegetation Monitoring Program represent and how they are being used in the vegetation monitoring.

### **Sabina Response:**

- An amended monitoring schedule to include closure and post-closure sampling schedules will be included in the 2022 Annual Report.
- The totals in Tables 4 and 5 represent the overall average height of each vegetation strata (Table 4) and overall average surface substrate percentage (Table 5) within the distance from PDA boundary.

**CIRNAC-#14: Tailings Management Plan - Seepage Risks****References:**

- Back River Project 2021 Annual Report, Appendix K
- Project Certificate Term and Condition # 18

**Issue/Rationale:**

Project Certificate T&C #18 requires Sabina to implement an infill geotechnical program to determine the extent of the fractured bedrock contact zone and apply proposed mitigation measures, as necessary. The program should include permeability testing, seepage analysis, and planning for thermal monitoring of the western ridge, where appropriate. Page 4-41 of the 2021 Annual Monitoring Report only discusses the area of the TSF and not the open pits.

It is unclear if there are any plans to identify and mitigate seepage risks related to tailings deposition into the backfilled open pits. CIRNAC notes that this may be a potential concern for groundwater impacts and is also important from a safety perspective for the underground workings located directly below the pits.

**Recommendation:**

CIRNAC recommends that Sabina provide details on what measures are proposed to identify and mitigate seepage risks associated with geological discontinuities in the open pit prior to tailings disposition, and details on mitigation measures should seepage into the underground workings occur during operations.

**Sabina Response:**

Sabina acknowledges CIRNAC's comment and highlights that Project Certificate Term and Condition (T&C) #18 was specifically related to tailing deposition in the Tailings Storage Facility (TSF) and an infill geotechnical program associated with the western ridge adjacent to this facility. Should Sabina elect to develop the TSF for the purpose of tailings storage, Sabina will implement this infill geotechnical program in compliance with T&C #18.

Specific to the open pits, Sabina highlights that the majority of open pits are within permafrost, which will limit groundwater connection between the open pit and underground areas. Nevertheless, Sabina recognizes that there is a likelihood that flow in the mines could be dominated by enhanced permeability zones (i.e., specific fractures or features; EPZs), and that the mines could intercept such flow conduits. This uncertainty exists for all mining projects conducted in fractured rock and is never completely alleviated until structural geology and hydrogeology data is regularly collected from mining areas during Operations. The influx of water into an open pit or underground is a normal and well understood phenomenon and is regularly managed by standard operating procedures (SOPs) in operating mines.

Sabina is aware of the uncertainty related to EPZs and will safely and appropriately manage potential groundwater inflows. Actions to be taken when high permeability formations are encountered may include proactive control measures such as:

- Mapping of pit walls during open pit development to identify potential EPZs;
- Collection and interpretation of groundwater pressure and inflow data;
- Use of surface and underground exploration information for identifying enhanced permeability that may be intercepted; and
- Advance cover and probe drilling (i.e., exploration drainage holes).

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Mitigation measures that may be adopted to manage increased flows include:

- Modification and/or adjustment of the mine plan to avoid areas of concern, or to use mined out underground stopes to provide surge capacity;
- Additional sump capacity to handle higher than predicted inflows;
- Pre-grouting of highly conductive structures prior to intersection with the mine workings; and
- Isolation of mining sections with bulkheads to control or minimize mine inflow.

**CIRNAC-#15: Tailings Management Plan - Tailings Deposition Timelines, Management of Parameters of Concern and Wildlife Entrapment in Reflooded Pits.**

**References:**

- Back River Project 2021 Annual Report, Appendix K

**Issue/Rationale:**

Tailings are planned to be deposited in the mined out open pits. Preliminary timing is given for tailing deposition for each pit. Should resources be higher than expected, there may be delays with tailings deposition. Section 5.1.2 notes that Sabina commits to testing a mixture of tailings and water treatment plant sludge to evaluate the potential for remobilization of arsenic from this material. There is no reference to analysis of other parameters.

**Recommendation:**

CIRNAC recommends that Sabina provide clarification on the following items in the Tailings Management Plan:

- a) The sensitivity of timing of deposition of tailings into the mined out pits and plans should any pit have higher than anticipated mineral resources.
- b) Whether there are any other parameters of concern or justification on why only the potential for arsenic remobilization will be evaluated.

**Sabina Response:**

Sabina acknowledges CIRNAC's comments and provides a response below in two parts:

- a) The timing of tailings deposition in the mined out open pits has been developed using conservative assumptions (e.g., tailings density, solids content) to create a robust deposition plan with suitable capacity contingencies in place. These assumptions will be confirmed during Operations (Section 7 of Tailings Management Plan), and tailings deposition planning will be modified, as appropriate, to account for changes in these assumptions, operational objectives, and potential updates in anticipated mineral resources. Sabina highlights that, as noted in the contingency strategies in Section 8 of the Tailings Management Plan, should the total volume of tailings be greater than expected, Sabina could utilize the previously permitted Tailings Storage Facility (TSF) to accommodate a greater tailings volume.
- b) The evaluation of the potential arsenic remobilization stemmed from a commitment Sabina made during the Final Environmental Impact Statement Information Request and Technical Comment phases in 2016. Information Request F-KIA-IR-26, and Technical Comment F-KIA-TC-10 from the Kitikmeot Inuit Associated (KIA) question if the predicted arsenic load in tailings, neutral-pH mobile element, could be potentially underestimated by conservatively assuming acidic conditions in water quality predictions associated with PAG rock exposed in pit walls. Sabina highlighted that the mobility of arsenic in oxidized systems is not applicable for tailings which will be deposited directly into the mine out open pits, where they will remain flooded throughout Operations, Closure, and beyond Post-Closure. In this system, there will be no opportunity for oxidation of the sulphide minerals and formation of secondary iron oxyhydroxides. Therefore, acidity contributed by the pit walls is not expected to enhance or limit arsenic loadings from the submerged tailings. While Sabina is confident that acidic conditions will be present in flooded Tailings Facilities, Sabina intends to complete additional characterization of trace element release from the tailings through the operational water quality monitoring programs, which will provide the most direct indication of leaching conditions under field conditions.

## **CIRNAC-#16: Tailings Management Plan - Discharge Water Quality Objectives**

### **References:**

- Back River Project 2021 Annual Report, Appendix K, P5-11

### **Issue/Rationale:**

Section 5.3.1 notes that water treatment is not required for the open pits in the closure phase to meet discharge water quality objectives (WQOs) and refers to the water management plan for more details.

The water management plan states that “Pit lake water quality monitoring will be conducted to ensure it meets discharge criteria prior to pit overtopping and passive discharge. In the unlikely event that the water in any of the pit lakes is not suitable for discharge, the pit lake would be batch-treated to address any remaining water quality impairments. Five years of post-closure water quality monitoring will continue for each open pit to ensure that WQOs are met.”

It is unclear what Sabina’s target WQOs are for Tailings management.

### **Recommendation:**

CIRNAC recommends that Sabina provide clarification on the WQOs for discharge from the open pits where tailings have been deposited in the Tailings Management Plan.

### **Sabina Response:**

Sabina acknowledges that the text in the Tailings Management Plan may have resulted in some confusion. **Water quality objectives (WQOs)** are values that are met in the receiving water body for the protection of uses of the receiving water (e.g., water quality objectives for the protection of aquatic life in Goose Lake); meeting of WQOs in Goose Lake are managed through Sabina’s Aquatic Effects Monitoring Program (e.g., the AEMP Response Framework).

**Discharge limits** are concentrations or values that are regulatory requirements which must be met in the effluent prior to discharge to Goose Lake; compliance with discharge limits is managed through regulatory instruments like the Water Licence or Metal and Diamond Mining Regulations (MDMER).

The Tailing Management Plan will be updated to clarify that while Sabina will monitor water quality monitoring within the pits, water quality will be required to meet discharge limits specified in the Water Licence and MDMER for all relevant discharges to Goose Lake. The requirement to update the Plan is triggered under the Type A water licence and will occur with the next change in operation and/or technology.

## 2.3 RESPONSE TO GOVERNMENT OF NUNAVUT

GN AR-#08: Vegetation Monitoring

### Terms and Conditions:

#### NIRB Project Certificate No. 007 Terms and Conditions # 32, 34, and 35

### References:

Sabina (2021). Back River Project Responses to 2020 Annual Report Comments. Jul. 2021. •Sabina (2022). Sabina Back River Project 2021 Annual Report. Mar. 2022. •Sabina (2020). Back River Project Vegetation Monitoring Program [Golder 2022]. Included as Appendix D in 2021 Back River Annual Report.

### Concerns:

The GN has previously commented that Winter Ice Road (WIR) plot locations should be monitored in all years, even when no ice road has been constructed. WIR plot data collected for years where the WIR is not constructed would allow for year over year comparisons of impacts and would allow for an assessment of recovery rates for damaged areas within the different disturbance classifications described within the Sabina 2019 Vegetation Monitoring Program (Golder 2020). These data could also be used to support Sabina’s conclusions for progressive remediation. Additionally, the maps in the vegetation monitoring report, Figures 1 & 2, (pp. 290-291), showing 2021 Vegetation Monitoring Locations depict the “Winter Ice Road As Built”, but Section 1.2 of the Annual Report -2021 Project Activities (pg. 352) states, “No Winter Ice Road (WIR) was constructed between the MLA and the Goose Site during 2021”. Clarification is needed to understand if the map and the text are in conflict, or if the map is using a past version of the WIR as a geographic reference.

### Suggestions and Recommendation:

The GN again recommends that the basic photographic monitoring of the WIR should be included for all years, including those years where no WIR is constructed. This additional data creates a continuous data set, supports year-to-year comparison, and allows for assessment of regrowth and recovery of damaged vegetation along the WIR. If the WIR is to be used as a reference on a map when no WIR was constructed in the reporting year, please make this clear either in the text, the map, or both.

### Additional Comments:

The GN notes that there have been general improvements in the reporting and format of the Vegetation Monitoring Program, as well with the reporting of vegetation losses per TC 32. The GN appreciates the additional clarity and detail.

### Sabina Response:

Photographic monitoring of the WIR has been conducted by Sabina during 2022 field programs and results will be presented in the 2022 Annual Report. Photographic monitoring will continue in future years until it can be determined that effects from the WIR are not causing sustained damage to vegetation or that vegetation is able to recover from the effects.