Appendix C. Goose Property Water Availability Memo

TECHNICAL MEMORANDUM

DATE 13 March 2020 **Project No.** 18114181-057-TM-Rev0

TO Merle Keefe, EIT
Sabina Gold & Silver Corp.

CC Catherine Paul, Matthew Pickard (Sabina) and Dionne Filiatrault (Golder)

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HYDROLOGICAL ASSESSMENT OF EFFECTS FROM INCREASED GOOSE LAKE AND BIG LAKE WITHDRAWALS

1.0 INTRODUCTION

Sabina Gold & Silver Corp. (Sabina) requested Nuqsana Golder Engineering and Environment Inc. (Nuqsana Golder) review the potential for additional water withdrawal availability at the Back River Project (the Project). The nature of this request was to complete hydrologic modeling for Goose Lake and Big Lake to consider increased total water withdrawals above those proposed in the FEIS (Final Environmental Impact Statement). To assess the effects from increased Goose Lake and Big Lake water withdrawals, the following assessment tasks were completed and are presented in the subsequent sections:

- Review and summary of relevant sections of the FEIS and received information
- Description of methods used to update the daily time-step hydrologic model received from ERM
- Presentation of hydrologic indices results from the daily time-step model at the assessment nodes
- Summary and conclusions for the Project Modifications

This assessment determined that 1500 m³/day of year-round water withdrawal with an additional 400 m³/day during the months of June to October from Goose Lake and 750 m³/day of year-round water withdrawal from Big Lake would not change the resulting surface water hydrology Valued Ecosystem Component (VEC) magnitude category for effects to hydrological indicators (streamflows and lake volumes) at assessed waterbodies from the FEIS (Sabina 2015). Furthermore, all hydrological indicators had a low magnitude category for effects and predicted changes remained within acceptable environmental guidelines at the Local Study Area (LSA) boundaries.

2.0 SUMMARY OF FEIS AND RECEIVED INFORMATION

The FEIS was prepared to determine the environmental and social effects of the Project (Sabina 2015). The data from the FEIS hydrology baseline programs were the main inputs into the modeling analysis of the Project components (e.g., water withdrawal, water diversion, water storage, drainage modifications, and dewatering). It is through this modeling that the Project effects on surface water hydrology were established. The FEIS provides an assessment of predicted effects to streamflows, water levels, and lake volumes for planned Project activities but does not include a determination of a maximum allowable withdrawal from the Project waterbodies.

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Details on the Hydrology Baseline Program, including all information collected at the monitoring stations, are found in the FEIS (Volume 6 Appendices 6-1A through 6-1D) (Sabina 2015). The modeling of effects on surface hydrology is described in Volume 6, Section 1.5 and Volume 6 Appendices 6-1E and 6-1F, using the following methods:

- Water Balance Model – The model was developed using monthly streamflow data in GoldSim and was used to determine the effects of the Project components on streamflows.
- Spreadsheet Model (Daily Time-Step Model) – This model, originally completed by Environmental Resources Management (ERM) during the FEIS, was used to refine the effects that the Project components had on lake volumes and outflows. Daily Time-Step data were inserted into the spreadsheet to improve the effects assessment of the water withdrawal. This spreadsheet accounted for sub-monthly characteristics such as lake outlet opening in May that could not be modeled with a monthly timestep.

The water withdrawal schedule from Goose Lake and Big Lake, as reported in the FEIS, is summarized in Table 1.

Table 1: FEIS Water Withdrawal from Goose Lake and Big Lake (Volume 6, Section 1.4.2.1)

Assessed Lake	Location	Annual Withdrawal (m^3/day)	Additional June to October Withdrawal (m^3/day)
Goose Lake	Within LSA	900 (For Mill Operation and Other Industrial Uses)	400 (For Dust Suppression)
Big Lake	Within LSA	350 (For Domestic Uses)	N/A

Surface water hydrology VEC in the FEIS analysis that affect fish/aquatic habitat include streamflows and lake volumes. The magnitude of the effects on VECs surface water hydrology are ranked on a four-point scale (Negligible, Low, Moderate, and High) in the FEIS as shown in Table 2.

Table 2: FEIS Surface Water Hydrology VEC Indicators and Magnitude Categories (Volume 6, Section 1.5.1)

VEC	Indicator	Magnitude	Description
Surface Water Hydrology	Streamflow	Negligible	The change in streamflow is not detectable (i.e., less than 1% of baseline flow)
		Low	The change in streamflow is less than 10% of baseline flow
		Moderate	The change in streamflow is between 10% and 50% of baseline flow
		High	The change in streamflow is greater than 50% of baseline flow
	Lake Volumes	Negligible	The change in lake volume is not detectable (i.e., less than 1% of baseline volume)
		Low	The change in lake volume is less than 10% of baseline volume
		Moderate	The change in lake volume is between 10% and 50% of baseline volume
		High	The change in lake volume is greater than 50% of baseline volume

According to the FEIS analysis (Volume 6, Section 1.5.1), lake and streamflow reduction magnitudes are determined from an environmental standpoint and the Department of Fisheries and Oceans Canada (DFO) fish habitat guidelines and protocols. In agreement with the DFO (2013) guidelines, a variation of 10% from baseline streamflow conditions was assumed to be within the natural variability of the riverine system, and therefore have low magnitude effects. For winter conditions, the DFO (2010) protocol provides guidance that the reduction in the volume of waterbodies should not exceed 10% of the available water volume after adjusting for the maximum predicted ice thickness. These DFO protocols and guidelines are in place to provide guidance on minimizing the effects to fish and fish habitat through oxygen depletion, loss of overwintering habitat and/or reductions in littoral habitat from changes in water levels or streamflows. In the FEIS Addendum Appendix V6-6G (Sabina 2017a), predicted changes in water levels were assigned a level of risk for spawning habitat loss as shown in Table 3. For the FEIS analysis, the winter months are defined as the months of October to May.

Table 3: Under-Ice Water Withdrawal Risk Level Framework for Spawning Shoal Habitat for Fall-Spawning Fish[(a)]

Risk of Spawning Habitat Loss	Change in Water Elevation Under Ice (m)	Rationale
Nil or negligible	Less than 0.22	The reduction in water level lies within the average change in ice thickness (i.e., within normal variation)
Low	0.22 to less than 0.42	The reduction in water level remains within 1 SD of the average
Medium	0.42 to 0.80	The reduction in water level remains between 1 and 2 SD of the average
High	Greater than 0.80	The reduction in water level is beyond 2 SD of average and there is less than a 5% chance for this occurring naturally

a) includes coregonid species, such as Lake Whitefish (*Coregonus clupeaformis*), and Lake Trout (*Salvelinus namaycush*); SD = standard deviation

In addition to the FEIS and the FEIS Addendum, the 2017 Back River Project Water Management Plan that was submitted as part of the Type A Water Licence Application (Sabina 2017b) was also reviewed to check assumptions made in the Daily Time-Step Model that was completed for the FEIS. The reported average annual runoff and the 1-in-20-year dry annual runoff in the 2017 Back River Project Water Management Plan were consistent with the values used in the FEIS assessment.

3.0 HYDROLOGICAL ASSESSMENT FOR PROJECT MODIFICATIONS

Golder reviewed the ERM Daily Time-Step Model, which calculated the predicted effects on lake volumes and streamflows at locations affected by water withdrawal from Goose Lake and Big Lake. The ERM Daily Time Step Model was described in Volume 6: Appendices 6-1E and 6-1F of the FEIS (Sabina 2015).

Golder updated the ERM Daily Time-Step Model results using an iterative approach at the lake outflow nodes (river and lake nodes), and the river nodes. The iterative method involved revising the water withdrawals for Big Lake and Goose Lake, and compiling the predicted effects to streamflows and lake volumes. Withdrawals were limited based on the following criteria: (1) to avoid a volume reduction of greater than 10% of the available water volume under the maximum predicted ice thickness (DFO 2010); (2) to remain within nil or negligible reduction in water levels (<0.22 m) (Sabina 2017a); and (3) to have low or moderate changes to streamflows (reductions not greater than 10% to 50%) at outflows of lakes directly affected by withdrawals (DFO 2013; Sabina 2015) and to have low changes to streamflows (reductions less than 10%) at and downstream of the LSA boundary. The predicted changes in hydrologic indices (i.e., streamflows, water levels, and volumes) due to the withdrawals at Goose Lake and Big

Lake were then evaluated against the magnitude categories for the effects to fish and fish habitat presented in the FEIS.

The selected increased withdrawals assessed in this study include:

- 1500 m³/day of year-round water withdrawal for mill operation and other industrial uses, with an additional 400 m³/day for dust suppression during the months of June to October (5 months total) from Goose Lake.
- 750 m³/day of year-round water withdrawal for domestic or mill operation and other industrial uses from Big Lake.

Overall, Golder used the same methods and approach as in the FEIS to assess the hydrologic effects at, and downstream of, Goose Lake and Big Lake due to the Project withdrawals. The hydrological regime for baseline and Project cases were analyzed for the following nodes:

- Goose Lake Outflow (PN03)
- Propeller Lake Outflow (PN02)
- Ellice River (PN01)
- Big Lake Outflow (PN14)
- LSA Boundary (PN05)

The modified Daily Time-Step Model applied the following assumptions to calculate the predicted effects from the Project:

- All disturbed Project areas are not assumed to contribute runoff to Goose Lake or Big Lake, therefore resulting in a decrease to the natural watershed area contributing to Goose Lake and Big Lake.
- According to the 2011 bathymetry survey (Rescan 2012), the volume of Goose Lake is 10.7 Mm^3 when full and the volume is 5.4 Mm^3 below 2.0 m of ice.
- According to the 2012 bathymetry survey (Rescan 2012), the volume of Big Lake is 12.1 Mm^3 when full and the volume is 5.0 Mm^3 below 2.0 m of ice.
- The Goose Property Airstrip Extension modification was included in the disturbed catchment area and reduced the natural watershed area by 0.18 km^2. Minor potential changes in drainage area associated with the other 2020 Project modifications were not considered in the assessment. The airstrip extension did not measurably reduce the total Goose Lake natural watershed area; therefore, 11% natural catchment area disturbance (same as in FEIS) was used in Golder's analysis.
- Lake outflow channels were assumed to be frozen to bottom in winter; therefore, no streamflow from the lakes was modeled as occurring in the winter.
- If the outflows from the lakes were below the flow threshold of 30% of the mean annual baseline discharge, then the flow was considered negligible in calculations of number of days flowing.

3.1 Goose and Propeller Lake Results

3.1.1 Goose Lake Outflow

The natural catchment area of Goose Lake Outflow node (PN03) is 95 km^2 and the effects of the planned withdrawals for average and dry conditions are shown in Table 4. The assessment considers that 11% of the natural catchment is disturbed and that contact water from disturbed catchment areas does not contribute to runoff into Goose Lake.

Table 4: Predicted Hydrologic Indices at Goose Lake Outflow (PN03) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Condition
Goose Lake	Mean annual lake outflow	Baseline (m^3/s)	0.45	0.23
		Modified Project Affected (m^3/s)	0.38	0.18
		Flow Reduction (m^3/s)	0.07	0.05
		Flow Reduction (% of Baseline Flow)	15.6%	21.7%
	Date at onset of lake outflow	Baseline	24-May	25-May
		Modified Project Affected	30-May	3-Jun
		Delayed Onset (days)	6	9
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Modified Project Affected	24-Oct	13-Oct
		Accelerated Ceasing (days)	3	6
	Total number of flow days	Baseline	156	147
		Modified Project Affected	147	132
		Reduction of Flow Days (days)	9	15
	Decrease of minimum lake level in winter	Reduction from Baseline (m)	0.10	0.10
	Maximum winter withdrawal	(% of under ice volume)	6.1%	6.5%

Goose Lake Outflow (PN03) is predicted to have a reduction in mean annual flow of 15.6% during average conditions and 21.7% during dry conditions, due to the 11% reduction in catchment area and updated water withdrawals from Goose Lake, resulting in moderate changes in streamflows. Withdrawal during the winter months will result in a water level that is below the elevation necessary for lake outflow. During average conditions, the onset of flow above the flow threshold of 30% of the baseline mean annual discharge (consistent with approach used in the FEIS [Sabina 2015]) is predicted to be delayed by 6 days and cease 3 days earlier, therefore, the extent of the open-water season is expected to be decreased by 9 days from baseline conditions. During 1-in-20-year dry conditions, the onset of flow is predicted be delayed by 9 days and the flow is estimated to cease 6 days earlier, therefore, the extent of the open-water season is expected to be decreased by 15 days from baseline conditions. The decrease in lake elevation in the winter, compared to the baseline condition, is 0.10 m and the maximum winter withdrawal (% of under ice volume) is 6.1% during average conditions and 6.5% during dry conditions, which are within DFO (2010) protocol. All results above are compared to baseline conditions.

The baseline and the Project affected flows at Goose Lake Outflow (PN03) are shown in Figure 1 (adapted from Sabina [2015]), based on an average hydrograph distribution presented in the FEIS.

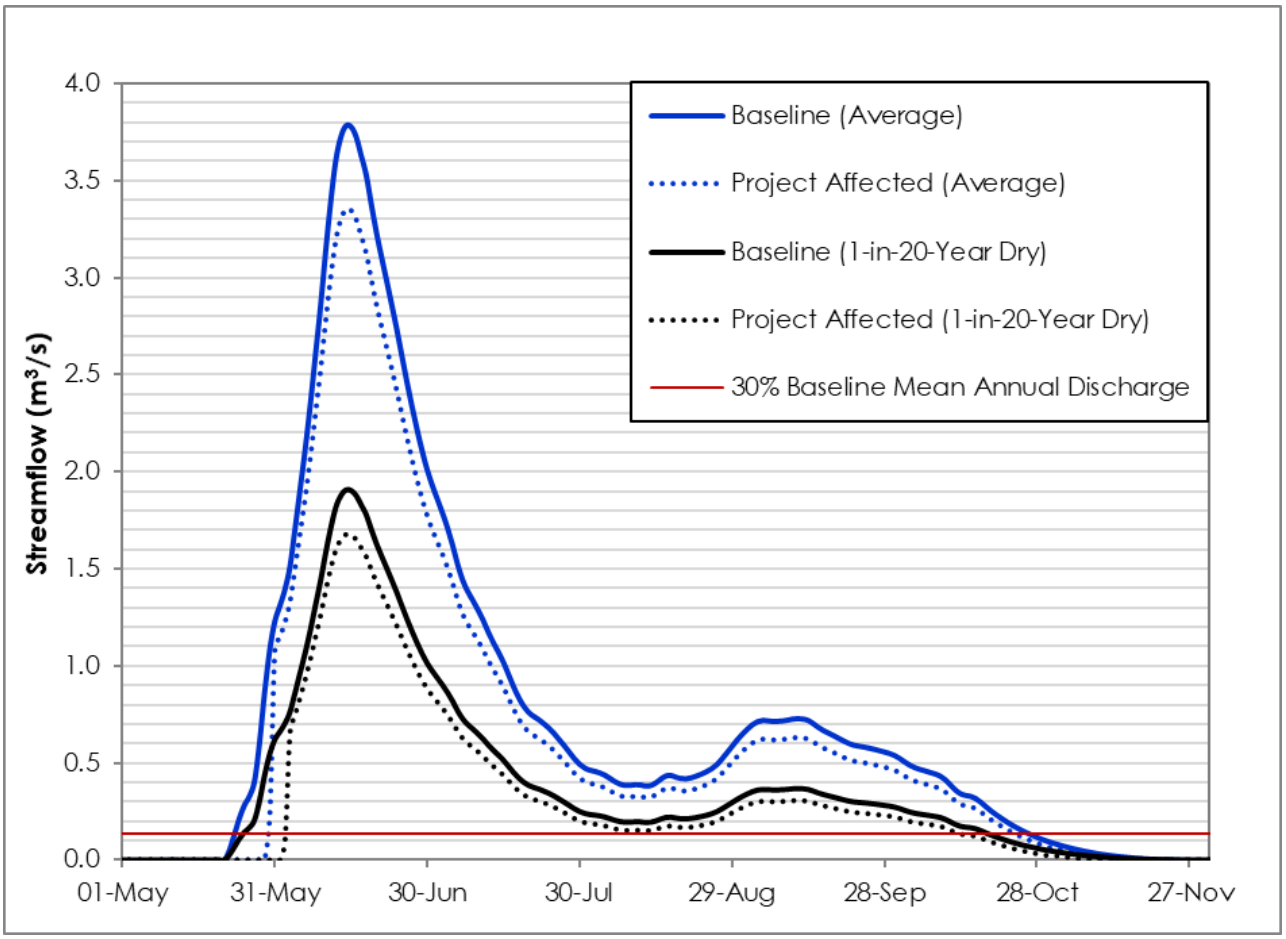

Figure 1: Baseline and The Project Affected Flows at Goose Lake Outflow (PN03)

3.1.2 Propeller Lake Outflow

The catchment area of Propeller Lake Outflow node (PN02) is 205 km^2, which is approximately twice that of the Goose Lake Outflow. Therefore, effects of the Project on Propeller Lake Outflow flows and water levels are reduced compared to the effects at Goose Lake Outflow. The effects of the planned withdrawals for average and dry conditions are shown in Table 5.

Table 5: Predicted Hydrologic Indices at Propeller Lake Outflow (PN02) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Condition
Propeller Lake	Mean annual lake outflow	Baseline (m^3/s)	0.97	0.49
		Modified Project Affected (m^3/s)	0.90	0.44
		Flow Reduction (m^3/s)	0.07	0.05
		Flow Reduction (% of Baseline Flow)	7.2%	10.2%
	Date at onset of lake outflow	Baseline	24-May	25-May
		Modified Project Affected	25-May	28-May
		Delayed Onset (days)	1	3
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Modified Project Affected	26-Oct	17-Oct
		Accelerated Ceasing (days)	1	2
	Total number of flow days	Baseline	156	147
		Modified Project Affected	154	142
		Reduction of Flow Days (days)	2	5
	Decrease of minimum lake level in winter	Reduction from Baseline (m)	0.00	0.00
	Maximum winter withdrawal	(% of under ice volume)	N/A	N/A

Propeller Lake Outflow (PN02) is predicted to have a reduction in mean annual flow of 7.2% during average conditions and 10.2% during dry conditions, due to the upstream Project effects, resulting in low magnitude changes to streamflows at the LSA boundary and within guidelines for changes to streamflows (DFO 2013). The reduced streamflows from the upstream Goose Lake Outflow are expected to delay the onset of flow and cease the flow earlier at Propeller Lake Outflow. During average conditions, the delay is predicted to be 1 day and the flow is estimated to cease 1 day earlier, therefore, the extent of the open-water season is expected to be decreased by 2 days from baseline conditions. During 1-in-20-year dry conditions, the onset of flow is predicted to be delayed 3 days and the flow is estimated to cease 2 days earlier, therefore, the extent of the open water season is expected to be decreased by 5 days from baseline conditions. Due to no water withdrawal in Propeller Lake and no lake outflow during winter, the decrease in Propeller Lake elevation due to withdrawals in upstream Goose Lake is expected to be negligible. All results above are compared to baseline conditions.

The baseline and the Project affected flows at Propeller Lake Outflow (PN02) are shown in Figure 2 (adapted from Sabina [2015]), based on an average hydrograph distribution presented in the FEIS.

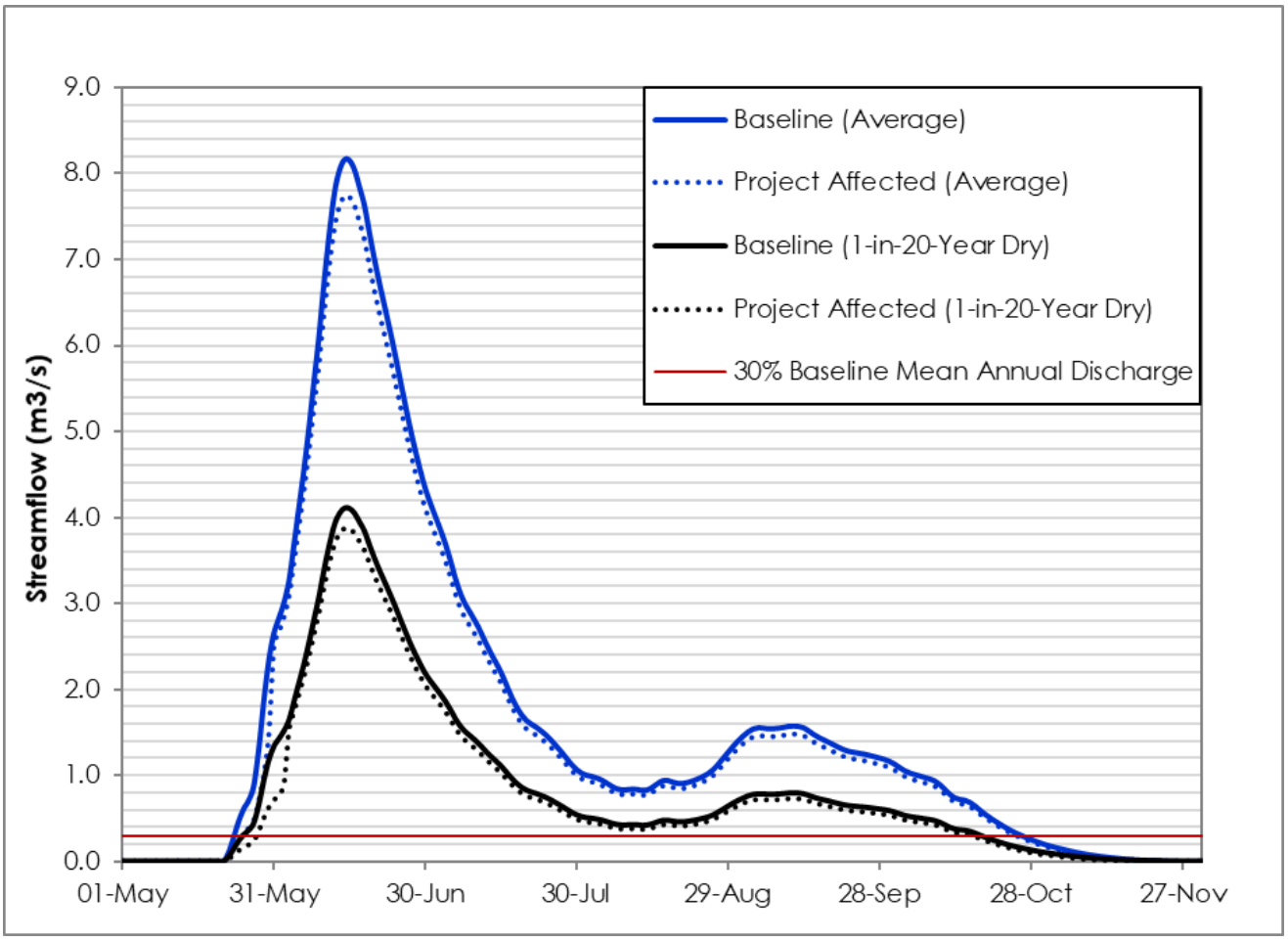

Figure 2: Baseline and The Project Affected Flows at Propeller Lake Outflow (PN02)

3.1.3 Ellice River and Regional Study Area Boundary

The catchment area of Ellice River node (PN01) is 6,655 km^2, which is approximately 70 times larger than the Goose Lake Outflow catchment area. The effects of the planned withdrawals for average and dry conditions are shown in Table 6.

Table 6: Predicted Hydrologic Indices at Ellice River (PN01) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Condition
Ellice River	Mean annual flow	Baseline (m^3/s)	31.44	15.83
		Modified Project Affected (m^3/s)	31.38	15.78
		Flow Reduction (m^3/s)	0.07	0.05
		Flow Reduction (% of Baseline Flow)	0.2%	0.3%
	Date at onset of flow	Baseline	24-May	25-May
		Modified Project Affected	24-May	25-May
		Delayed Onset (days)	0	0
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Modified Project Affected	27-Oct	19-Oct
		Accelerated Ceasing (days)	0	0
	Total number of flow days	Baseline	156	147
		Modified Project Affected	156	147
		Reduction of Flow Days (days)	0	0

No water is withdrawn from Ellice River and the catchment area is substantially larger than Goose Lake Outflow, therefore, the predicted effect of the Project on Ellice River mean annual flow is negligible (0.2%). The effects of the withdrawals and the reduction of the natural watershed area within the overall Ellice River (PN01) watershed are negligible; therefore, flows are expected to be within 1% of baseline flows. The onset and cease of flow are predicted to be similar to baseline conditions. All results above are compared to baseline conditions. As the predicted changes to hydrologic indices from baseline values are negligible, the Ellice River hydrograph is not shown.

3.2 Big Lake Results

3.2.1 Big Lake Outflow

The catchment area of Big Lake Outflow node (PN14) is 37 km^2 and the results of the planned withdrawals for average and dry conditions are shown in Table 7. No large-scale disturbance to the natural drainage conditions is expected in the Big Lake watershed.

Table 7: Predicted Hydrologic Indices at Big Lake Outflow (PN14) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Conditions
Big Lake	Mean annual lake outflow	Baseline (m^3/s)	0.175	0.088
		Modified Project Affected (m^3/s)	0.166	0.079
		Flow Reduction (m^3/s)	0.009	0.009
		Flow Reduction (% of Baseline Flow)	5.1%	10.2%
	Date at onset of lake outflow	Baseline	24-May	25-May
		Modified Project Affected	31-May	3-Jun
		Delayed Onset (days)	7	9
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Modified Project Affected	25-Oct	17-Oct
		Accelerated Ceasing (days)	2	2
	Total number of flows days	Baseline	156	147
		Modified Project Affected	147	136
		Reduction of Flow Days (days)	9	11
	Decrease of minimum lake level in winter	Reduction from Baseline (m)	0.04	0.04
	Maximum winter withdrawal	(% of under ice volume)	3.3%	3.4%

Big Lake Outflow (PN14) is predicted to have a reduction in mean annual flow of 5.1% during average conditions and 10.2% during dry conditions, due to the water withdrawal from Big Lake compared to baseline conditions. During average conditions, the onset of flow, above the flow threshold of 30% of the baseline mean annual discharge, is expected to be delayed by 7 days and cease 2 days earlier, therefore, the extent of the open water season is estimated to be decreased by 9 days from baseline conditions. During 1-in-20-year dry conditions, the onset of flow is predicted to be delayed by 9 days and cease 2 days earlier, therefore, the extent of the open water season is expected to be decreased by 11 days from baseline conditions. The decrease in lake elevation in the winter, compared to the baseline condition, is 0.04 m and the maximum winter withdrawal (% of under ice volume) is 3.3% during average conditions and 3.4% during dry conditions, therefore, complying with the DFO (2010) protocol. All results above are compared to baseline conditions.

The baseline and the Project affected flows at Big Lake Outflow (PN14) are shown in Figure 3 (adapted from Sabina [2015]), based on an average hydrograph distribution presented in the FEIS.

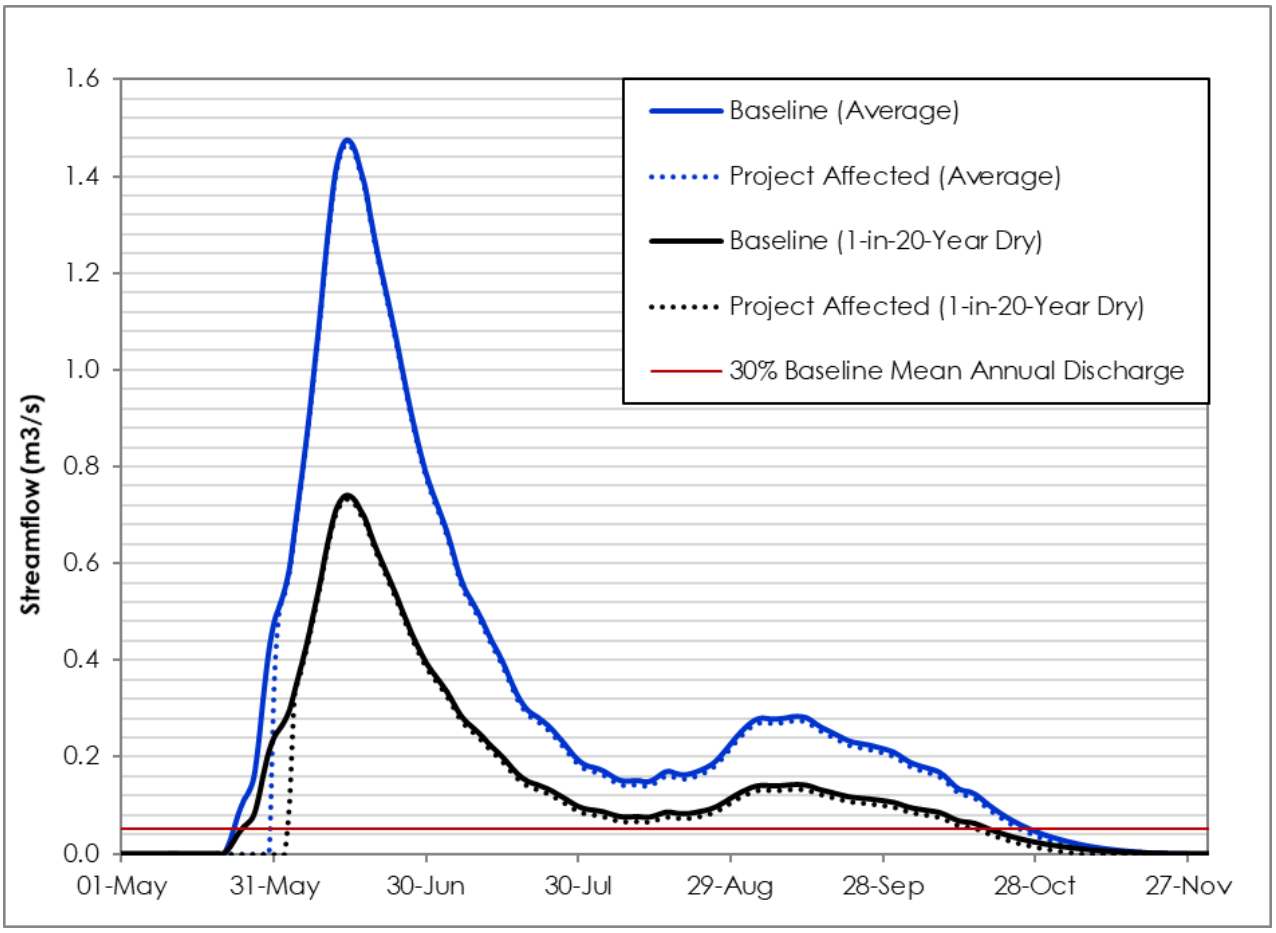

Figure 3: Baseline and The Project Affected Flows at Big Lake Outflow (PN14)

3.2.2 PN05 and LSA Boundary

The catchment area of the LSA Outflow node (PN05) downstream of Big Lake is 158.5 km^2 which is approximately four times larger than the catchment area of Big Lake Outflow. The results of the proposed withdrawals are shown in Table 8.

Table 8: Predicted Hydrologic Indices at LSA Outflow (PN05) for Baseline and Modified Project Conditions

Lake	Parameter		Average Condition	1-in-20 Year Dry Conditions
BL-H2	Mean annual flow	Baseline (m^3/s)	0.749	0.377
		Project Affected (m^3/s)	0.740	0.368
		Flow Reduction (m^3/s)	0.009	0.009
		Flow Reduction (% of Baseline Flow)	1.2%	2.4%
	Date at onset of flow	Baseline	24-May	25-May
		Project Affected	24-May	27-May
		Delayed Onset (days)	0	2
	Date at flow ceasing	Baseline	27-Oct	19-Oct
		Project Affected	27-Oct	19-Oct
		Accelerated Ceasing (days)	0	0
	Total number of flow days	Baseline	156	147
		Project Affected	156	145
		Reduction of Flow Days (days)	0	2

No water is withdrawn downstream of Big Lake, and the LSA Outflow catchment area is substantially larger than Big Lake Outflow; therefore, the effects of the upstream withdrawals on the LSA Outflow flows and water levels are reduced compared to the effects at Big Lake Outflow. The reduction in mean annual flow at the LSA boundary, compared to baseline conditions, is 1.2% during average conditions and 2.4% during dry conditions. Due to the water withdrawal from Big Lake, during average conditions, the onset of flow is not estimated to be delayed and the flow is not predicted to cease earlier, therefore, the extent of the open-water season is not expected to change from baseline conditions. During 1-in-20-year dry conditions, the onset of flow is expected to be delayed by 2 days and the flow is not expected to cease earlier, therefore, the extent of the open-water season is predicted to decrease by 2 days from baseline conditions. All results above are compared to baseline conditions. As the predicted changes to hydrologic indices from baseline value are negligible, the LSA Boundary (PN05) hydrograph is not shown.

4.0 SUMMARY OF INCREASED WITHDRAWALS AT GOOSE AND BIG LAKES

Golder used methods consistent with the FEIS to model and predict the hydrological effects at, and downstream of, Goose Lake and Big Lake due to increased lake water withdrawals required for the 2020 Project modifications. The Daily Time-Step Models were used iteratively to increase withdrawals above the FEIS values, while predicted changes to hydrological indices (i.e., streamflows, lake levels, and lake volumes) remained within acceptable environmental guidelines at the LSA boundaries.

At Goose Lake, 1500 m³/day of year-round water withdrawal for mill operation and other industrial uses, with an additional 400 m³/day for dust suppression during the months of June to October, from Goose Lake (PN03) was assessed. The results of the study for Goose Lake (PN03) and the downstream nodes are the following:

- The mean annual discharge will be reduced below baseline conditions by 15.6% during average conditions, and by 21.7% during dry conditions, at Goose Lake Outflow (PN03). Downstream of Goose Lake at the LSA boundary (Propeller Lake Outflow, PN02), the mean annual discharges are predicted to be reduced below baseline conditions by 7.2% for average and 10.2% for dry conditions. Negligible changes to streamflows are predicted downstream at the RSA boundary (Ellice River, PN01).
- The decrease in the under-ice Goose Lake water level, compared to the baseline condition, is predicted to be 0.10 m, and the Goose Lake winter withdrawal (% of under ice volume) is predicted to be less than 6.5% for both average and dry conditions.
- Winter withdrawal protocols (DFO 2010) and guidelines (Sabina 2017a) related to lake water levels and withdrawal volumes are met at Goose Lake and all downstream waterbodies.
- The predicted changes in streamflows at Goose Lake Outflow (reductions of 15.6% for average conditions and 21.7% for dry conditions from baseline values) exceed guidelines of a 10% reduction in streamflows (DFO 2013). These predicted changes result in a moderate reduction in streamflows at Goose Lake Outflow and a low reduction in streamflows at the LSA boundary. These results are consistent with the magnitude of changes predicted in the FEIS and represent small incremental changes, as the reduction in average streamflows from baseline conditions at Goose Lake Outflow were 13.3% for average conditions and 17.4% for dry conditions from baseline values in the FEIS.
- The surface water hydrology VEC magnitude of effects to indicators (streamflows and lake volumes) did not change from the FEIS. The VEC magnitude category for Goose Lake is moderate for streamflows and low for lake volumes. At assessment nodes downstream of Goose Lake, all indicators have a low magnitude of effects.

At Big Lake, 750 m³/day of year-round water withdrawal for domestic or mill operation use and other industrial uses from Big Lake (PN14) was assessed. The results of the study for Big Lake (PN14) and the downstream nodes are the following:

- The mean annual discharge reductions below baseline conditions are within 10% for both average and dry conditions at Big Lake Outflow (PN14). Downstream of Big Lake at the LSA boundary (PN05), the mean annual discharge is within 3% of baseline conditions for both average and dry conditions.
- The decrease in the under-ice Big Lake water level, compared to the baseline condition, is 0.04 m and the Big Lake winter withdrawal (% of under ice volume) is less than 3.4% for both average and dry conditions.
- Winter withdrawal protocols (DFO 2010) and guidelines (Sabina 2017a) related to lake water levels, and guidelines for reduction in streamflows (DFO 2013), are met at, and downstream of, Big Lake.

- The surface water hydrology VEC magnitude of effects to indicators (streamflows and lake volumes) did not change from the FEIS. The VEC magnitude category for Big Lake and downstream assessment nodes is low for streamflows and lake volumes.

CLOSURE

We trust that this report provides the information required by Sabina Gold & Silver Corp. at this time. If there are any questions or require further detail, please contact the undersigned.

Yours truly,

GOLDER ASSOCIATES LTD.

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PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 13 MARCH 2020
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REFERENCES

DFO (Fisheries and Oceans Canada). 2010. DFO Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut. Prepared June 20, 2010. 3 pp.

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