ATTACHMENT

Supplemental Water Quality Modelling

SPRINGPOLE GOLD PROJECT

FIRST MINING GOLD CORP.

PROJECT NO.: ONS2104
JUNE 2025

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1.0 Purpose of Submission

First Mining Gold Corporation (FMG) proposes to develop an open pit mine with supporting facilities known as the Springpole Gold Project (Project). The Project is located in a remote area of northwestern Ontario, in unorganized territory within the District of Kenora, approximately 110 kilometres (km) northeast of the Municipality of Red Lake and 145 km north of the Municipality of Sioux Lookout.

The purpose of this memorandum is to supplement the modelling approach presented in the final Environmental Impact Statement / Environmental Assessment (final EIS/EA), demonstrating that predicted water quality in the receiving environment adjacent to the Co-Disposal Facility (CDF) is conservatively estimated in the final EIS/EA, not underestimated, and does not result in significant adverse effects.

The supplemental modelling completed provides additional insight into potential surface water–seepage interactions, including establishing a gradient of expected water quality from the seepage-surface water interface and comparison to water quality guidelines. The results of these analyses support the conclusions of the effects assessment presented in the final EIS/EA, and confirm that all predicted concentrations remain below water quality guidelines for the protection of aquatic life. As such, the water quality of both Birch Lake and Springpole Lake is protected.

2.0 Final EIS/EA Model

As detailed in the final EIS/EA, the surface water quality model was developed using a mass-balance approach in GoldSim to simulate water flow, as well as the transport and concentration of chemical species, over the life of the Project at specific points of interest, or 'nodes', adjacent to Project infrastructure or along the discharge flow pathway in the receiving environment. The model calculated the concentrations of water quality parameters (mg/L) in site discharge, bypass seepage, and the surface water receiving environment at each assessment node for all Project phases. The node-based modeling approach is an industry-standard method for predicting water quality changes across a study area. It is commonly used to support effects assessments and the regulatory approvals process for proposed mining projects in Ontario (e.g., see Table 2-1). This approach provides a structured framework for evaluating potential water quality changes at key locations while maintaining a defensible balance between complexity and practicality. This modelling approach in the final EIS/EA is the same as what was presented in the draft EIS/EA submission.

Several key assumptions within the final EIS/EA mass balance water quality model demonstrate its conservative approach such that water quality in the receiving environment has not been underestimated:

- **Maximum build-out scenario:** The model assumed that operations occur based on the final year of mining, when contact water concentrations (including seepage quality) are at their highest. In reality, these conditions develop progressively over time, meaning that actual effects in earlier years will be lower than those predicted by the model.
- **Seepage quality is equivalent to tailings pore water quality**: The model assumed that fugitive seepage quality is equivalent to pore water quality. In practice, attenuation mechanisms such as adsorption, dispersion and dilution reduce concentrations both within the CDF and along the groundwater flow path prior to entering the receiving environment.

- **No dilution in the lake water volume:** Water quality predictions for the receiving environment are based on a mass balance results for the inflows to Birch Lake and Springpole Lake. That is, the model incorporates monthly flows from upstream nodes, catchment inputs, and bypass (or, 'fugitive') seepage and **did not** account for dilution within the lake volumes of Birch Lake and Springpole Lake, both of which are large waterbodies capable of providing substantial assimilative capacity. This represents a significant conservative assumption. For nodes located within these basins, this approach has resulted in a notable overestimation of predicted concentrations. An example mass balance calculation for arsenic and selenium illustrating this conservatism, is provided in Table 2-2.

As presented in Section 6.6, Section 6.7 and Appendix N-2 of the final EIS/EA, the GoldSim mass balance model, which use pore water quality to represent seepage quality, indicated that water quality in Birch Lake will remain below Water Quality Guidelines for the Protection of Aquatic Life (WQG PAL). WQG PAL are based on rigorous studies to specifically safeguard the most sensitive life stages of aquatic species for periods of indefinite exposure. Furthermore, the incremental increase in water quality due to seepage are so small, such that it is unlikely to be measurable / discernable from natural variation in the system (Table 2-2). This high level of protection is attributed to the effective design and deposition strategy of the CDF for the long term management of mine rock and tailings, and the highly favourable geotechnical and hydrogeological foundation conditions at the CDF location.

Seepage and lake water quality monitoring programs, including specific adaptive management triggers, will be finalized through the provincial approvals process. This is consistent with standard practice, where site-specific monitoring requirements and response measures are developed prior to construction and operation based on detailed designs and additional consultation input during permitting. As part of this process, water quality threshold triggers will be established for both seepage and lake conditions. These thresholds will form the basis of the adaptive management framework, supporting timely and effective response if monitoring results approach or if seepage quality is trending higher than concentration as predicted in the effects assessment.

Table 2-1: **Summary of Fugitive Seepage Modelling Approaches in Comparable Approved Projects**

Project Name	**Modelled Fugitive Seepage Volume (m^3/day)**	**% Seepage Volume Relative to Receiver Inflows**	**Receiver Type**	**Assessment Approach**
Magino Gold Mine EA	Total: 482 m^3/day	0.6%	Lake, Creek	In the receiver, benchmarked to WQG PAL
	Otto Lake: 156 m^3/day	Average Annual Post Closure: 36,510 m^3/day 0.43%		
	McVeigh Creek: 140 m^3/day	Simulated Annual Stream Flow – Changes to Annual Stream Flow in Post Closure Change: 6052 m^3/day 2.3%		
	Spring Lake: 82 m^3/day	Average Annual Post Closure: 2,710 m^3/day 3.0%		
	Waterbody 8: 68 m^3/day	Average Annual Post Closure: 20,070 m^3/day 0.34%		
	WQCP: 33 m^3/day	Seepage+Runoff Post Closure: 5,995 m^3/day 0.55%		
	Waterbody 9: 3 m^3/day	Average Annual Post Closure: 10,980 m^3/day 0.027%		
Marathon Palladium	Subwatershed 105: 41,018 m^3/year Therefore: 112.4 m^3/day	Mean Annual Flow: 0.683 m^3/s Therefore: 59,011 m^3/day 0.19%	Lake, River	In the receiver, benchmarked to WQG PAL
	Subwatershed 106: 133,791 m^3/year Therefore: 366 m^3/day	Mean Annual Flow: 0.157 m^3/s Therefore: 13,565 m^3/day 2.7%		
Hardrock	Goldfield Creek Tributary: 360 m^3/day	< 5% of Mean Annual Flow in Post-Closure	Lake	In the receiver, benchmarked to WQG PAL
	Kenogamisis Lake (Southwest Arm): 196 m^3/day	Mean Annual Flow in Post-Closure: 10.56 m^3/s Therefore: 912, 384 m^3/day 0.02%		

Table 2-2a: Example Mass-Balance Calculation, Seepage Effects to Birch Lake, Arsenic Concentrations in Post-Closure

Node 7, Birch Lake	Natural Catchment Runoff		CDF Facility		CDF Cover Runoff and Shallow Toe Seepage		Total Inflows to Node 7	Predicted Concentration (of Inflows), presented as Node 7 Water Quality in the EIS/EA	WQG PAL
	Flow	[As]	Seepage Bypass	Pore water quality [As]	Flow	[As]			
	L/s	mg/L	L/s	mg/L	L/s	mg/L	L/s	mg/L	mg/L
January	48.56	0.0012	1.57	0.0121	1.42	0.0035	51.56	0.0016	0.005
February	40.95	0.0012	1.57	0.0121	1.42	0.0035	43.95	0.0016	
March	36.03	0.0012	1.57	0.0121	1.42	0.0035	39.03	0.0017	
April	51.96	0.0009	1.57	0.0121	1.42	0.0035	54.96	0.0013	
May	150.10	0.0009	4.72	0.0121	4.27	0.0035	159.09	0.0013	
June	153.40	0.0009	4.72	0.0121	4.27	0.0035	162.39	0.0013	
July	113.50	0.0010	4.72	0.0121	4.27	0.0035	122.49	0.0015	
August	82.22	0.0010	3.15	0.0121	2.85	0.0035	88.22	0.0015	
September	78.86	0.0010	3.15	0.0121	2.85	0.0035	84.86	0.0015	
October	80.62	0.0010	3.15	0.0121	2.85	0.0035	86.62	0.0015	
November	77.73	0.0010	1.57	0.0121	1.42	0.0035	80.73	0.0013	
December	60.89	0.0010	1.57	0.0121	1.42	0.0035	63.89	0.0014	

[As]: Concentration of arsenic

WQG PAL: Water Quality Guideline for the Protection of Aquatic Life

Table 2-2b: Example Mass-Balance Calculation as per Final EA/EIS, Seepage Effects to Birch Lake, Selenium Concentrations in Post-Closure

Node 7, Birch Lake	**Natural Catchment Runoff**		**CDF Facility**		**CDF Cover Runoff and Shallow Toe Seepage**		**Total Inflows to Node 7**	**Predicted Concentration (of Inflows), presented as Node 7 Water Quality in the EIS**	**WQG PAL**
	Flow	**[Se]**	**Seepage Bypass**	**Pore water quality [Se]**	**Flow**	**[Se]**			
	L/s	**mg/L**	**L/s**	**mg/L**	**L/s**	**mg/L**	**L/s**	**mg/L**	mg/L
January	48.56	0.00011	1.57	0.00120	1.42	0.00037	51.56	0.00015	0.1 (PWQO) 0.002 (BC WQG)
February	40.95	0.00011	1.57	0.00120	1.42	0.00037	43.95	0.00016	
March	36.03	0.00011	1.57	0.00120	1.42	0.00037	39.03	0.00016	
April	51.96	0.00008	1.57	0.00120	1.42	0.00037	54.96	0.00012	
May	150.10	0.00008	4.72	0.00120	4.27	0.00037	159.09	0.00012	
June	153.40	0.00008	4.72	0.00120	4.27	0.00037	162.39	0.00012	
July	113.50	0.00009	4.72	0.00120	4.27	0.00037	122.49	0.00014	
August	82.22	0.00009	3.15	0.00120	2.85	0.00037	88.22	0.00013	
September	78.86	0.00009	3.15	0.00120	2.85	0.00037	84.86	0.00014	
October	80.62	0.00008	3.15	0.00120	2.85	0.00037	86.62	0.00013	
November	77.73	0.00008	1.57	0.00120	1.42	0.00037	80.73	0.00010	
December	60.89	0.00008	1.57	0.00120	1.42	0.00037	63.89	0.00011	

[Se]: Concentration of selenium

WQG PAL: Water Quality Guideline for the Protection of Aquatic Life

PWQO: Provincial Water Quality Objective

BC WQG: British Columbia Water Quality Guideline

3.0 Benchmark Seepage Quality to Water Quality Guidelines

This section responds to the request from the Impact Assessment Agency of Canada (IAAC) to evaluate seepage quality relative to water quality guideline values. Note, the seepage concentrations source term values used in the final EIS/EA, based on tailings pore water quality (Section 2.0), are below the limits set out in the Metal and Diamond Mining Effluent Regulations (MDMER) and are not considered deleterious to aquatic organisms (Table 3-1).

It is important to note that fugitive seepage generally should not be conceptualized as a point source or end-of-pipe discharge, such as a pipeline outlet. Instead, seepage enters the receiving environment diffusely over a broad area, without the focused discharge characteristics typical of regulated outfalls and corresponding potentially 'deleterious' substances. As a result, the estimated seepage concentrations presented in the final EIS/EA (here reproduced in Table 3-1), overestimate exposure conditions that would be experienced by aquatic life in the natural environment.

To further address the IAAC question and more specifically characterize how seepage interacts with receiving water, two supplemental and complimentary modelling exercises have been conducted:

1. Numerical mixing modelling has been conducted and is presented in Section 4.0. This modelling simulates the dispersion of seepage at the interface with ambient surface water, providing a more realistic basis for evaluating potential effects and actual expected exposure concentration for aquatic organisms and fish.
2. Rather than relying on tailings porewater chemistry to represent groundwater quality, an updated mass balance was conducted to account for natural attenuation processes that occur along the flow path between a seepage source and the property boundary, in this case, the receiving water shoreline. These processes include dilution, dispersion, and biodegradation, and should be considered when evaluating the potential for off-site effects and exposure concentrations in surrounding waterbodies. Results of this mass balance are presented in Table 3-1 and Table 3-2 and show that in the Project case, seepage quality is expected to be materially lower for most parameters than what was used to assess potential effects at the nodes in the final EIS/EA (i.e., the final EIS/EA is very conservative). Where seepage quality is the same (e.g. zinc), this reflects elevated values in the existing baseline conditions.

Table 3-1: Comparison of Tailings Pore Water Quality Source Term Use in Final EIS/EA Modelling versus Expected Seepage Quality

Parameter	MDMER Criteria (Max Authorized Monthly Mean Concentration)[3]	Seepage Concentrations as per final EIS/EA (Tailings Pore Water Quality)		Expected Seepage Quality	
		Table 3-9 of Appendix N-2			
		Operations (1)	Long-Term Study State (2)	Operations	Long-term Steady State (2)
		Base Case	Base Case	Base Case	Base Case
Sulphate	-	2200	27	1112	26
Aluminum	-	0.64	0.58	0.34	0.31
Antimony	-	0.55	0.012	0.27	0.0062
Arsenic	0.1	0.000024	0.0121	0.00002	0.0073
Beryllium	-	1.7E-08	1.7E-08	0.000000017	0.0000077
Boron	-	0.33	0.035	0.17	0.025
Cadmium	-	0.00011	0.000028	0.000061	0.000021
Chromium	-	0.0043	0.0051	0.00242	0.0028
Cobalt	-	0.057	0.000696	0.029	0.00065
Copper	0.1	0.00077	0.0026	0.00077	0.0026
Iron	-	0.000048	0.000044	0.000048	0.000044
Lead	0.08	0.00000044	0.00018	0.00000044	0.00013
Mercury	-	0.00014	0.000049	0.000073	0.000028
Molybdenum	-	0.030	0.0045	0.017	0.0045
Nickel	0.25	0.0038	0.00295	0.0027	0.0023
Phosphorus	-	0.0054	0.16	0.0054	0.096
Selenium	-	0.036	0.0012	0.018	0.00072
Silver	-	0.00052	0.00013	0.00027	0.000069
Thallium	-	0.0044	0.00016	0.0022	0.000084
Tungsten	-	0.030	0.0024	0.017	0.0024
Uranium	-	0.093	0.0022	0.047	0.0015
Vanadium	-	0.0000027	0.0093	0.000003	0.0051
Zinc	0.4	0.0028	0.010	0.0028	0.010

all units are mg/L

1 Operations seepage predictions represent average and maximum monthly concentrations for Year 10 of mining (maximum extent of mine operations; see Appendix K-2 of the final EIS/EA).

2 Final closure represents the future condition post closure condition with loading sources from the covered tailings and mine rock (see Appendix K-2 of the final EIS/EA)

3 Metal and Diamond Mine Effluent Regulations (MDMER) criteria here listed equivalent to Schedule 4, Table 1, maximum authorized monthly mean concentrations

Table 3-2: Expected Seepage Quality Relative to Baseline Birch Lake Quality and Water Quality Guidelines

Parameter	Water Quality Guidelines for the Protection of Aquatic Life	Average Baseline Birch Lake Quality	Expected Seepage Quality Operations (1)	Expected Seepage Quality Initial Closure	Expected Seepage Quality Long-term Steady State (2)
Sulphate	-	1.2	1112	1112	26
Aluminum	0.8	0.015	0.34	0.34	0.31
Antimony	0.02	0.00010	0.28	0.28	0.0062
Arsenic	0.005	0.0011	0.00002	0.00002	0.0073
Beryllium	0.011	0.000065	0.000000017	0.000000017	0.0000077
Boron	1.5	0.015	0.17	0.17	0.025
Cadmium	0.0001	0.000012	0.000061	0.000061	0.000021
Chromium	0.0089	0.00051	0.0024	0.00241	0.0028
Cobalt	0.00078	0.0001	0.029	0.029	0.00065
Copper	0.005	0.00072	0.00077	0.00077	0.0026
Iron	1	0.064	0.000048	0.000048	0.000044
Lead	0.009	0.000077	0.00000044	0.00000044	0.00013
Mercury	0.000026	0.0000036	0.000073	0.000073	0.000028
Molybdenum	0.073	0.00014	0.017	0.017	0.0045
Nickel	0.025	0.00037	0.0027	0.0027	0.0023
Phosphorus	0.02	0.033	0.0054	0.0054	0.096
Selenium	0.1	0.00026	0.018	0.0180	0.00072
Silver	0.0001	0.000016	0.00027	0.00027	0.000069
Thallium	0.00025	0.000012	0.0022	0.0022	0.000084
Uranium	0.015	0.000024	0.047	0.047	0.0015
Vanadium	0.12	0.00027	0.0000030	0.0000030	0.0051
Zinc	0.023	0.0021	0.0028	0.0028	0.010

Notes:

All units are mg/L.

1. Operations seepage predictions represent average and maximum monthly concentrations for Year 10 of mining (maximum extent of mine operations; see Appendix K-2 in the final EIS/EA).
2. Corresponds to the 'Final Closure' phase presented in the final EIS/EA, which represents the long term steady state conditions where loading sources are the covered tailings and mine rock (see Appendix K-2 in the final EIS/EA)
3. Correspond to guidelines identified in Table 3-3 of Appendix N-2 of the EIS/EA. Where applicable, guideline values are calculated here using average baseline hardness and average pH (7.64).

4.0 Supplemental Seepage Mixing Modelling

Supplemental modelling was carried out to provide additional insight into potential interactions between bypass seepage from the CDF and the adjacent surface water environment, with a focus on estimating shoreline water quality at locations where limited seepage is expected to emerge. A two-dimensional Gaussian plume model was developed, and key findings are summarized in this section.

The model represents the vertical (depth) dimension in the water column and simulates the advection and dispersion of seepage from the CDF driven by ambient currents, at the location where seepage is expected to enter the lake. Birch Lake, specifically the area near Node 7 and the adjacent shoreline, was selected for modelling, as it corresponds to the highest predicted seepage rates during both operations and long-term closure, representing a conservative worst-case scenario for potential effects.

The modelling focused on a targeted set of parameters, including:

- Metals as per MDMER Schedule 4, Table 1 (arsenic, copper, lead, nickel, zinc);
- Constituents with elevated concentrations in the final EIS/EA source terms (e.g., seepage and tailings pore water) relative to short-term (acute) water quality guidelines (e.g., antimony); and
- Parameters identified during engagement with government agencies and Indigenous communities as being of interest (e.g., selenium, arsenic, mercury).

This modelling approach provides a conservative, yet practical, basis for understanding potential water quality outcomes.

Model results demonstrate that seepage is rapidly dispersed and mixed upon entering the receiving environment. For the parameters assessed, the maximum predicted concentrations at the shoreline, where seepage is predicted to emerge, are presented in Table 4-1.

Modelling results indicated that overall changes in surface water concentrations are very small - generally less than 6%. These minor changes are not expected to be measurable relative to natural seasonal variability in water quality and remain below applicable water quality guidelines for the protection of aquatic life. This is consistent with findings as presented in the final EIS/EA.

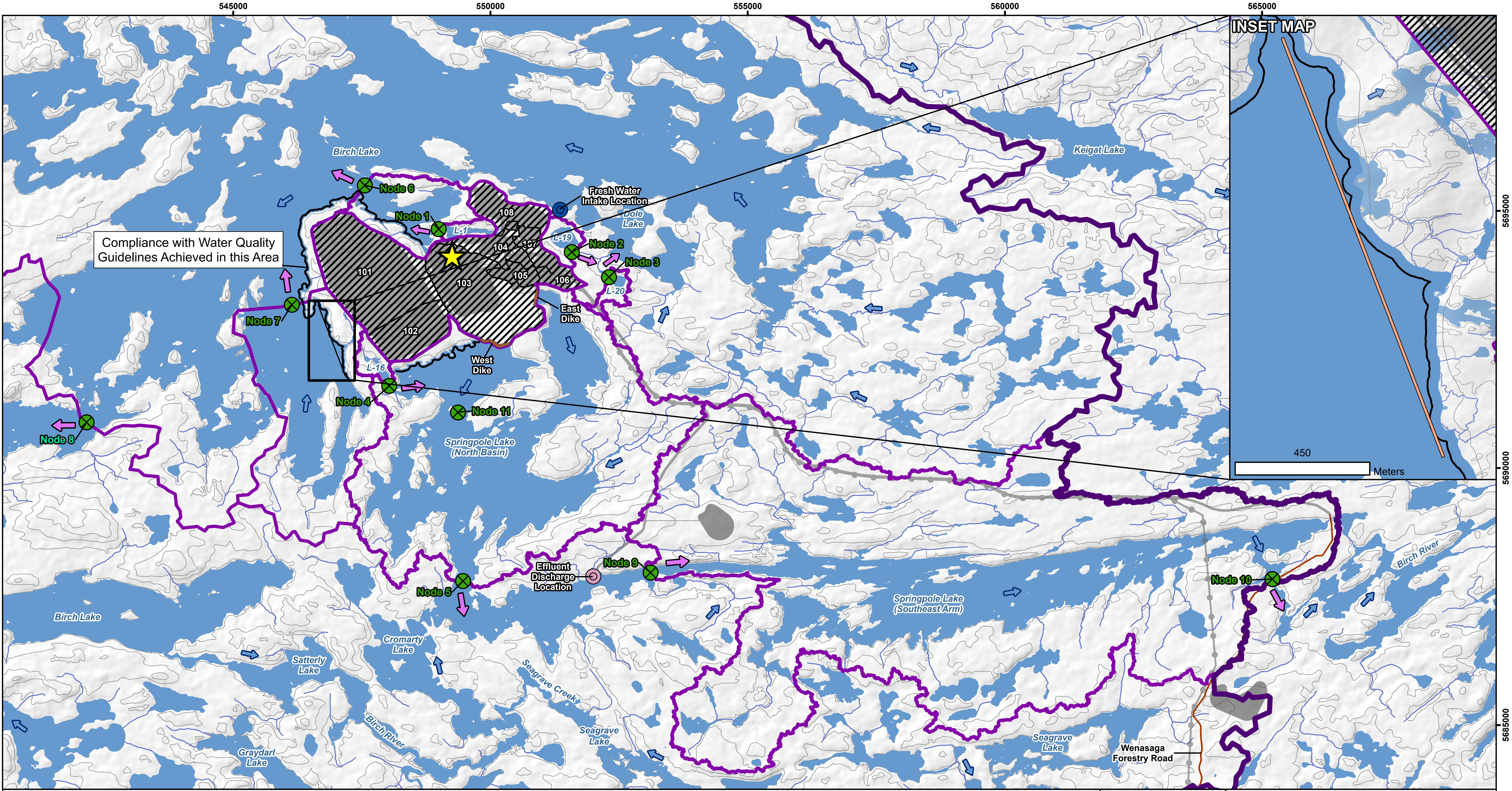
Table 4-1: Predicted Concentrations at the Shoreline of Receiver

Contaminant	Water Quality Guidelines for the Protection of Aquatic Life	Predicted Concentrations (at the Shoreline, from Supplemental Modelling)	
		Operations	Post-Closure
Total Ammonia	1.8	0.038	0.0285
Total Antimony	0.02	0.00077	0.00051
Total Arsenic	0.005	0.0011	0.0011
Total Copper	0.005	0.0007024	0.000703
Total Cyanide	0.005	0.0014	0.00105
Total Lead	0.009	0.000032	0.0000321
Total Nickel	0.025	0.000252	0.000251
Total Selenium	0.002 (0.1)	0.00011	0.0000894
Total Uranium	0.015	0.00064	0.000019
Total Mercury	0.000026	0.0000026	0.00000252

Notes:

All units are mg/L

1. Concentrations in each phase were calculated as the average of the predicted monthly concentrations for hydrological Node 7 (FMG, 2024, Appendix N).



LEGEND

- ★ PROJECT LOCATION
- ◉ FRESH WATER INTAKE LOCATION
- ◎ EFFLUENT DISCHARGE LOCATION
- ▬ PROPOSED MINE FEATURE
- ▬ REPRESENTATIVE AREA USED IN MODEL
- — COMPLIANCE WITH WATER QUALITY GUIDELINES ACHIEVED IN THIS AREA
- — EXISTING ROAD
- — CONTOUR (10 M INTERVALS)
- — WATERCOURSE
- ▬ WATERBODY
- ⇨ FLOW DIRECTION
- ⇨ WATERSHED OUTLET FLOW DIRECTION
- ⊗ MODEL NODES (LABELLED WITH ID)
- ▭ WATERSHED TO SPRINGPOLE LAKE OULET (NODE 10)*
- ▭ SUBWATERSHED*
- ▨ PROJECT WATERSHEDS (LABELLED WITH ID)
- ▬ DIKE

0 1 2 4 6 8 10 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Watershed delineations based on data provided by Aquaspheara, data obtained through the Ontario Flow Assessment Tool (OFAT) and LiDAR provided by First Mining Gold, 2020.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- 230 kV transmission line provided by First Mining Gold, April 2024.

* Natural/undisturbed watershed areas, excluding the Project footprint

Datum: NAD83
Projection: UTM Zone 15N

N W E S

FIRST MINING GOLD

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SPRINGPOLE GOLD PROJECT

Supplemental Seepage Mixing Model

PROJECT Nº: ONS2104

FIGURE: 1

SCALE: 1:70,000

DATE: June 2025

5.0 Conclusions

The modelling presented in support of the final EIS/EA, as well as supplemental modelling presented here, demonstrates that predicted water quality in the receiving environment, Birch Lake and Springpole Lake, has been conservatively estimated using standard, defensible methods consistent with regulatory expectations in Ontario including in other mining EAs.

The supplemental modelling, including predicted concentrations at the shoreline where seepage is expected to enter the receiving environment, has served to provide another approach confirming the conclusions in the final EIS/EA. Potential seepage effects are mitigated and protective of aquatic resources with surface water quality at the point of discharge remaining below relevant Water Quality Guidelines for the Protection of Aquatic Life (WQG PAL), with the incremental changes in water quality from seepage inputs expected to be indistinguishable from natural variability. Site-specific monitoring programs, including adaptive management thresholds and response actions, will be implemented through all phases of the Project to ensure ongoing protection of the receiving environment. Collectively, these findings confirm that the modelling approach is robust and precautionary, and that the Project will maintain compliance and achieve environmental protection standards throughout its life cycle.

Sincerely,

WSP Canda Inc.

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