Impact Assessment Agency of Canada | Agence d'évaluation d'impact du Canada

Newfoundland and Labrador Satellite Office
301-10 Barter's Hill
St. John's NL A1C 6M1

Bureau satellite de Terre-Neuve-et-Labrador
301-10 Barter's Hill
St. John's T.-N.-L. A1C 6M1

February 10, 2021

Sent by E-mail

Tara Oak
Manager, Environmental Assessment
Marathon Gold Corporation
PO Box 4006, Pearlgate PO
Mount Pearl NL A1N 0A1
Email: toakl@marathon-gold.com

Dear Ms. Oak,

SUBJECT: Valentine Gold Project – Information Requirements

The Impact Assessment Agency of Canada (Agency) has completed its technical review of the Environmental Impact Statement (EIS) and associated EIS Summary for the proposed Valentine Gold Project. The Agency has determined that additional information is required, as per the information requirements (IRs) attached.

With the issuance of these IRs, the federal timeline within which the Minister of Environment and Climate Change must make a decision is paused as of February 10, 2021. Once Marathon Gold Corporation has submitted responses, the Agency will determine if the information provided is complete and the timeline for the environmental assessment will resume. For further information, please consult the Agency document on Information Requests and Timelines: Information Requests and Timelines - Canada.ca

The responses to IRs may be in a format of your choice; however, the format must be such that the responses to individual IRs can be easily identified. You may wish to discuss certain IRs with the Agency or other government experts, as necessary, to obtain clarification or additional information, prior to submission of the responses. Working directly with government experts in this manner will help to ensure that IRs are responded to satisfactorily. The Agency can assist in arranging meetings with government experts, at your request.

The IRs and your responses will be made public on the Canadian Impact Assessment Registry Internet site: Valentine Gold Project - Canada.ca (iaac-aeic.gc.ca).

Please confirm receipt of this message and contact me if you require further information.

Sincerely,

<Original signed by>

Brent Keeping
Project Manager, Impact Assessment Agency, Newfoundland and Labrador Satellite Office,
Atlantic Region

Cc: Jerry Pulchan - Environment and Climate Change Canada
Tonya Warren - Fisheries and Oceans Canada
Walker Smith - Natural Resources Canada
Jason Flanagan - Transport Canada
Dae Young Lee - Health Canada
Eric Watton – Environment, Climate Change and Municipal Affairs
Joanne Sweeney – Environment, Climate Change and Municipal Affairs
Blair Adams - Fisheries, Forestry and Agriculture
Kirsten Miller - Fisheries, Forestry and Agriculture

Attachment:

Attachment 1 - Information Requirements for the Valentine Gold Project.

Valentine Gold Project
Information Requirements from Environmental Impact Statement Review:
February 10, 2021

INTRODUCTION

The Impact Assessment Agency of Canada (the Agency) has completed its technical review of the Environmental Impact Statement (EIS) and associated EIS Summary for the proposed Valentine Gold Project. The Agency also received submissions from government experts, the public and Indigenous groups and has analyzed their comments. The Agency determined that additional information is required, as per the information requirements (IRs) below.

ACRONYMS AND SHORT FORMS

Agency	Impact Assessment Agency of Canada
CPAWS	Canadian Parks and Wilderness Society
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
FFA	Fisheries, Forestry and Agriculture (Newfoundland and Labrador Wildlife Division)
km	Kilometre
m	metre
MFN	Miawpukek First Nation
NRCan	Natural Resources Canada
Pub	Public
QFN	Qalipu First Nation

ATTACHMENT 1: INFORMATION REQUIREMENTS AND REQUIRED CLARIFICATIONS FOR THE VALENTINE GOLD PROJECT

Information Requirements

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
Project Setting and Baseline Conditions					
IR-01	Pub-07.05 (Dal)	Section 7.1	9.1.3.1 Spatial Boundaries	The EIS Guidelines state that the EIS will present information in sufficient detail to enable the identification of how the project could affect the Valued Components and the analysis of those effects. In the EIS, the spatial boundaries are given as the following: - Project Area + 20 m - Local Assessment Area + 1 km buffer from mine site or 500 m buffer from access road - Regional Assessment Area + 35 km around the Project Area The reasoning behind the spatial boundaries, which become the basis for habitat availability and loss of habitat, is unclear. This information is needed to determine significance of effects on Valued Components.	Provide the ecological rationale for the spatial boundaries of the Project Area, Local Assessment Area and Regional Assessment Area and their applicability to each Valued Component.
Atmospheric Environment					
IR-02	CPAWS-10 Pub-07.10 (Dal)	Section 7.2.1	EIS Chapter 5 – Atmospheric Environment. Section 5.5.3 Atmospheric emissions, noise	The EIS guidelines require information in the EIS on changes to the atmospheric environment including changes in ambient noise levels and any indirect effects to wildlife caused by increased disturbance. Section 5.5.3 of the EIS explains changes in sound quality related to the Project. This section generally refers to sound from construction and indicates that sound emissions will result from blasting during construction. However, appendix 5H lists sound sources and blasting is not included. It is not clear from the EIS whether blasting is included in the acoustic evaluation. This information is needed to determine significance of effects on wildlife (e.g. migratory birds, caribou and species at risk [SAR].	a. Confirm whether blasting was included in the acoustic evaluation or provide a rationale as to why it was not. b. If blasting was not included in the acoustic evaluation, revise the environmental effects assessment on wildlife (e.g. migratory birds, caribou and SAR) to consider the effects of blasting and update the proposed mitigation, follow-up and conclusions as appropriate.
Riparian, Wetland and Terrestrial Environments					
IR-03		Section 7.1 and 7.1.5	Baseline Study Appendix, Attachment 7-D Appendix A Ecological Land	The EIS Guidelines state that the EIS will present information in sufficient detail to enable the identification of how the project could affect the Valued Components and the analysis of those effects. The EIS Guidelines also require the delineation of drainage basins, at appropriate scales (water bodies and watercourses), including wetlands, boundaries of the watershed and subwatersheds, overlaid by key project components.	Provide mapping for the following: a. Ecological Land Classification maps of the Project Area and Local Assessment Area at a scale where ecotypes and habitats can be interpreted. Include all boundaries such as the Project Area and Local Assessment Area boundaries and infrastructure design.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
			Classification – Mineral Claims Block – Page 1 of 8	Mapping provides spatial relationships between ecotypes, infrastructure and habitats. The following requires mapping associated with the description: a. The EIS provided Ecological Land Classification maps in the Baseline Study. The scale of the map makes it difficult to decipher the land classifications in the main impacted area. b. The EIS provides a description of the percent of wetland areas affected. A map is important to understand where these habitats are in relation to the surrounding area. This information is needed to determine significance of effects on Valued Components.	b. wetlands affected directly and indirectly by project activities, wetland types and size, fish habitat, Species at Risk habitat, Caribou habitat, waterfowl habitat/stopover, and breeding bird habitat overlaid with Ecological Land Classification and boundary lines (at a minimum the Project Area and the Local Assessment Area).
Groundwater and Geochemistry					
NA		Section 7.1 and 7.2	Chapters 6, 8 and 10	The EIS guidelines require baseline information in sufficient detail to enable the identification of how the Project could affect the Valued Components, along with an analysis of those effects/changes according to section 7.2 of the EIS Guidelines. This information is needed to fully evaluate changes in groundwater and their effect on surface water and subsequently fish and fish habitat.	The Agency and NRCan have determined that there are a number of information gaps in the baseline information and deficiencies in the Proponent's analysis related to the following: - Ground water modelling methods and assumptions - Waste rock management plan and mitigations - Baseline sampling and testing distribution related to groundwater and mine waste geochemistry - Groundwater - Surface water interactions - Metal leaching and acid rock drainage occurrence, mitigations, and predictions of effluent quality - Monitoring and follow-up programs The following IRs 04 to 26 are related to these information gaps. Once these IRs have been addressed, the proponent must incorporate the information provided to update the assessment of effects on fish and fish habitat and migratory birds (waterfowl) where necessary.
IR-04		Section 7.1.2	Section 9.2.2.7 Soil Quality Baseline Study Appendix 4, Attachment 4-C, Section 4.4.3 (Sediment Quality) Baseline Study Appendix 4, Attachment 4-C,	The EIS Guidelines require the baseline geochemical concentrations of contaminants of concern in soils and sediment within the local, regional and downstream receiving environments. In the EIS, it states that soils from Test Pits were analysed; however, the data was not provided in the Baseline Study Appendix 3, Attachment 3-D as referenced in the report. Data is missing for the following: - sediments analysed from any surface water body; and - soil and sediment data collected from regional or downstream receiving environments.	Provide baseline data results for geochemical concentration of contaminants of concern for the soil and sediments from regional or downstream receiving environments, including the test pit and surface water bodies.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
			Appendix D.4 (Sediment Data)	This information is needed to assess the potential effects on Indigenous health and for follow-up and monitoring programs.	
IR-05		Section 7.1.2	Section 5.3.1.1 of Appendix 7A (Water Quantity and Water Quality Modelling Report: Leprechaun Complex and Processing Plant and TMF Complex). Section 5.3.3.1 of Appendix 7B (Water Quantity and Water Quality Modelling Report: Marathon Complex)	The EIS Guidelines require information on geochemical characterization of leaching potential, including, but not limited to, contaminants of concern from waste rock, pit walls and tailings. Section 5.3.1.1 of Appendix 7A and section 5.3.1.1 of Appendix 7B of the EIS state that leaching rates are obtained from neutral drainage, because none of the geochemical tests have developed acidic leachate. However, some of the groundwater samples (MW2, MW7 in Appendix I of BSA 3-D) have acidic pH. This information is needed to determine significance of effects on fish and fish habitat.	Provide a rationale as to why the geochemical tests using a neutral pH is considered conservative versus using the acidic pH found in some of the groundwater locations.
IR-06		Section 7.1.5	Baseline Studies Appendices Attachment 3-D Hydrogeology Baseline Report (2020)(Gemtec), Section 4.1	The EIS Guidelines require the inclusion of all groundwater monitoring wells, including their location, in respect to the Project Area. The EIS states that over 1000 boreholes have been drilled throughout the project site. Each borehole drilled represents a preferential flow path for surface contamination to directly reach groundwater should the holes remain and not be properly decommissioned.	a. Provide a map identifying all boreholes that will be removed with the creation of the open pit and all remaining boreholes in the Project Area. b. Provide an assessment of potential effects from the remaining boreholes that may be vulnerable due to surface infrastructure to providing a direct pathway for surface contaminants to reach groundwater.
IR-07	MW-49 Pub-06.02 Pub-07.12 MFN-17	Section 9.2	Section 6.4, Table 6.4 Section 6.9.2	The EIS guidelines require an outline of monitoring plans that includes the following: - description of the characteristics of the monitoring program where foreseeable (e.g. location of interventions, planned protocols, list of measured parameters, analytical methods employed, schedule, human and financial resources required); - description of the proponent's intervention mechanisms in the event of the observation of non-compliance with the legal and environmental requirements or with the obligations imposed on contractors by the environmental provisions of their contracts; - plans to engage Indigenous groups in monitoring, where appropriate. The EIS states that groundwater monitoring locations will be maintained until the water levels and water quality have stabilized post-closure. However, there is no mention of groundwater quality meeting any provincial or federal regulatory objectives, including the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life.	a. Provide an outline of a groundwater monitoring program that will include: - a list of parameters to be measured - analytical measures to be employed b. Clarify if Indigenous groups will be engaged, consulted or directly involved in the design and execution of the groundwater monitoring plan

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				Section 6.9.2 of the EIS states that a detail groundwater monitoring program will be implemented for main project components to confirm potential changes in groundwater associated with project activities. However, no details are provided. Further, this section also does not indicate if Indigenous groups will be involved in the design or execution of the monitoring plans.	
IR-08	NRCan-01	Section 7.1 Section 7.1.5 Project Setting and Baseline Conditions – Groundwater and Surface Water	Baseline Study Appendices 3, Attachment 3-D, Hydrogeology Baseline Report, Section 4.4	The EIS Guidelines state that the EIS will present information in sufficient detail to enable the identification of how the project could affect the Valued Components and the analysis of those effects. In particular, Section 7.1.5 require temporal changes in groundwater flow (e.g. seasonal and long term changes in water levels). Adequate groundwater level information, both in terms of spatial and temporal distribution, is required to understand groundwater flow quantity and timing in terms of seepage towards, or loss of flow from, surface water bodies. These changes are a component of the assessment of changes to fish and fish habitat and the aquatic species. A complete seasonal cycle of groundwater elevation change was only monitored in open exploration holes, which may dampen temporal variability. Monitoring from October to March in hydrogeological monitoring wells resulted in 3m of seasonal variability in the absence of potential summer seasonal lows. Additionally, groundwater level information is spatially limited to the area within, and between the open pits. There is very limited information down gradient of the waste rock storage facilities and tailings management facility (TMF).	a. Provide groundwater elevation data from hydrogeological monitoring wells for a complete 12-month period. Incorporate this information into the conceptual model of groundwater flow, and the assessment of impacts from the project. b. Provide information on groundwater elevation down gradient of the waste rock storage facilities, and the Tailings Management Facility.
IR-09	NRCan-02 MW-48	7.1.5 Project Setting and Baseline Conditions – Groundwater and Surface Water	Baseline Study Appendices 3, Attachment 3-D, Hydrogeology Baseline Report, Sections 4.2, 4.3, 4.4 Chapter 2, Appendix 2C Prefeasibility Geotechnical Report, Sections 5.6, 7.2, and 7.4	The EIS Guidelines require the inclusion of a delineation and characterization of groundwater - surface water interactions. Natural Resources Canada has noted that in the EIS the Valentine Lake Thrust Fault, and other mapped faults fracture and shear zones are not well characterized. However, complimentary data indicates the potential for the fault zone to be a zone of increased hydraulic conductivity (e.g., lower rock quality designation (Section 4.2)), or a structural control on groundwater flow direction (the presence of artesian conditions in bedrock (Section 4.4)). One packer test was completed within the fault zone (Baseline Report Section 4.3) and it indicated that the fault zone has lower rock quality and a higher hydraulic conductivity (Appendix 2C, Prefeasibility Geotechnical Report, Section 5.6). During pit dewatering, faulting that has enhanced hydraulic conductivity may reduce water levels within connected waterbodies impacting fish and fish habitat. Conversely, if there are clay gouge along fault planes, faulting may lower hydraulic conductivity and may direct drawdown related to open pit dewatering much further in one direction relative to another. Both fault types may influence the degree to which open pit dewatering influences groundwater – surface water interactions.	c. Provide more information on the results of the packer test completed within the fault and the relationship between rock quality and hydraulic conductivity within the context of the conceptual model of groundwater flow. d. Discuss the location and orientation of mapped fault, fracture and shear zones including the potential for these zones to hydraulically connect the open pits to surface water features. e. In the numerical assessment of the fault, provide maps indicating the drawdown and seepage flow paths under the various fault scenarios for both the water table and at depth within the bedrock.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
IR-10	NRCan-03	7.1.5 Project Setting and Baseline Conditions – Groundwater and Surface Waterou	Baseline Study Appendices 3, Attachment 3-D, Hydrogeology Baseline Report, Sections 2.3, Chapter 6, Appendix 6A, Sections 2.2.1, 3.3, and 4.1 (Table 4-1).	The EIS Guidelines state that the EIS will present information in sufficient detail to enable the identification of how the project could affect the Valued Components and the analysis of those effects. In geological settings such as that of the Project, overburden can be the main unit through which seepage from mine facilities is transported, and is the unit through which groundwater is connected to surface water. The thickness and composition of the overburden is critical in understanding groundwater flow quantities, direction, and timing. No overburden has been described beyond 3m depth. If a higher hydraulic conductivity contact aquifer were present at the bedrock overburden interface this would not be apparent from logging. Additionally, it is stated that sands and gravels are present in the Victoria River Valley (Section 2.3 of BSA 3D). The presence of these materials would increase connectivity between the river and groundwater, and provide a more direct pathway for seepage from the tailings management facility to the river. Section 3.3 of Appendix 6A states the maximum thickness of the overburden varies from 10m (Section 3.3 of Appendix 6A) to over 17m (Section 2.2.1 of Appendix 6A). It is not clear which statement was applied within the numerical model, nor is it clear which assumptions were made in modelling the overburden thickness throughout the site. Representation of the overburden thickness and composition affects the assessment of changes to groundwater quantity and groundwater – surface water interaction. These changes should be integrated into the assessment of changes to surface water and fish habitat.	a. Provide a map of the simulated overburden thickness, including control points used. b. Provide information on the simulated maximum and minimum overburden thickness, and any assumptions used in the generation of the overburden thickness map. c. Provide information on the potential for increased hydraulic conductivity at the base of the till unit, and its impact on groundwater flow. d. Provide a map of the presumed extent of sand and gravel within the Victoria River valley. Provide information on the impacts of this unit on groundwater – surface water interactions, and if necessary update the groundwater model to reflect the presence of this unit. Parameterization as needed.
IR-11	NRCan-05	7.1.5 Project Setting and Baseline Conditions – Groundwater and Surface Water 7.2.2 Changes to Groundwater and Surface Water	Chapter 6, Appendix 6A, Sections 4.3.3, 4.3.4, Tables 5-1, 5-2, and 5-3, and Figures 4.1, 5.2 and 5.4	The EIS Guidelines require the delineation and characterization of groundwater - surface water interactions. Boundary conditions within the groundwater flow model are user specified, and control the degree to which groundwater may interact with surface water. In the EIS, the Victoria River has been assigned a general head boundary condition. While this condition is reasonable for lakes with large catchment areas (such as Valentine Lake and the Victoria Lake Reservoir), groundwater drawdown in the vicinity of smaller lakes (such as the Middle, East and West Ponds, and Frozen Ear Lake), or in the upper reaches of the Victoria River, may result in lowering of the surface water levels. As shown on both Figures 5.2 and 5.4 of Appendix 6A, the assignment of these boundary conditions limits drawdown near these features during both operations and closure. The potential for these waterbodies to sustain the simulated flux to groundwater should be evaluated. In Section 4.5.4 it is noted that 2nd order or greater streams have been assigned a river boundary condition. Unlike a general head boundary, groundwater drawdown may occur below these features. However, the assumption that there is sufficient surface water flow to sustain continued flux to the groundwater remains. This assumption should be validated using water balances for these streams.	a. Update the following information: -Figure 4.1 of Appendix 6A so that the type, elevation, and location of all boundary conditions (General Head, River, and Drain) are clearly visible, including those at the boundary of the model. -Tables 5-1 and 5-2 of Appendix 6A to include the boundary condition type for each surface water feature listed. Include the Victoria River reach that is within the groundwater model. b. Complete a water balance for all surface water features for which a general head or river boundary has been applied. The water balances must be completed for baseline, operations and closure conditions. Compare the simulated flux to groundwater to available water, and update model boundaries accordingly.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				In both cases, it is critical that these boundary conditions be applied only in cases where sufficient surface water flow is available to counter the loss of surface water to groundwater. Dewatering of surface water features and loss of fish habitat is possible with pit dewatering, and should be properly represented within the groundwater model. Although distant from the mine infrastructure, the northwest (abutting the northern reaches of Long Lake) and northeast (abutting Red Cross Lake) model boundaries appear to be set as no flow boundaries. These boundaries should be specified to reflect the lake elevation to ensure regional groundwater flow is represented.	
IR-12	NRCan-06	Section 7.1.5	Appendix 6A, Section 4.4, Tables 4-2 and 4-3, and Figures 4-3 and 4-4	The EIS Guidelines require the delineation and characterization of groundwater - surface water interactions. Without a reasonable calibration of the groundwater model, any forecasted changes to groundwater quantity, or groundwater-surface interaction are not reliable. These results are then transferred to the assessment of surface water flow, and subsequently fish and fish habitat. Although it was stated in the EIS that calibration to baseflow was conducted, no results have been provided. Simulated baseflow may be sensitive to parameters such as river conductance, recharge, and the hydraulic conductivity of the overburden. Given that the calibrated value of river conductance is a factor of 26 times greater than the host overburden (a much higher conductance factor than is typical), calibration to baseflow should be presented and justified. Calibration to water levels was conducted primarily using data from long open exploration holes (96% of data). An open hole can connect several hydrostratigraphic units (HSUs) such that groundwater elevations are representative of several units. As a result, differentiation of the water levels in the various HSUs is difficult. While several methods are available to integrate this type of data into a calibration process, the method chosen should be discussed, as should its implications on calibration. Calibration to water levels is evaluated by comparing simulated to observed groundwater elevation values at the various observation points (Shown on Figure 4-3 and summarized in Table 4-2). Results show that the modelled groundwater levels tend to be higher than observed at low elevations, and lower than observed at high elevations. These results indicate that the model may underrepresent the observed magnitude of hydraulic gradients. Magnitude of error should be discussed in both a spatial and geological sense, and its implications on model performance should be discussed.	a. Discuss the calibration of the groundwater model to baseflow. Provide a rationale for the river conductance factor derived from the calibration. b. Describe the methodology for specifying the exploration holes as observation wells in the groundwater model. If each hole is assigned to a single HSU, include this unit in Table 4-2, and colour the data by HSU on Figure 4-3. Discuss the number of observation points in each HSU. c. Discuss calibration to water levels in terms of HSU and spatial location. reevaluate the calibration to ensure hydraulic gradients are properly represented. d. Review and update the hydrostratigraphic conceptualization and its effect on calibrated hydraulic conductivity and anisotropy values. e. Provide details on the presentation of two overburden units on Figure 4-4, which are not included in Table 4-3. f. Discuss calibrated recharge relative to site water balance data.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				Although automated calibration can efficiently generate parameter sets that minimize errors, the solution is non-unique, meaning that other possible parameter combinations may yield the same result. As such, it is important that results are evaluated to ensure that they align with observations and the conceptual model. In Section 4.4.3 it is stated that the calibrated hydraulic conductivity is generally less than that observed in the single well tests. This result does not seem to be consistent with the accepted observation that hydraulic conductivity increases with scale (e.g. Schulze-Makuch et al., 1999). Although it is noted that bedding in the bedrock units follows the near vertical dip of the units, the calibrated anisotropy value results in a higher hydraulic conductivity across the bedding planes. This result is inconsistent with typical conceptualization. As discussed in NRCan-04 these results may indicate that the modelled hydrostratigraphy is not aligned with observations. As shown on Figure 4-4, recharge is the most sensitive parameter in the calibration. The calibrated recharge value is validated against an assumed range for all of Newfoundland. However, sufficient water balance data is presented in Baseline Study Appendix 3C Section 4.1 that would allow calibrated recharge to be compared to a local annual water surplus. Given that hydraulic conductivity parameters are outside of the assumed range, calibrated recharge warrants this level of comparison. *Reference: Schulze-Makuch, D., Carlson, D. A., Cherkauer, D. S. & Malik, P. Scale Dependency of Hydraulic Conductivity in Heterogeneous Media. Groundwater 37, 904–919 (1999).*	
IR-13	NRCan-07	Section 7.1.5	Appendix 6A, Section 5.2.1.2	The EIS Guidelines require information on groundwater flow patterns and rates. The effect of the Valentine Lake Thrust Fault on groundwater flow was assessed through a sensitivity analysis. The results of this analysis were evaluated in terms of groundwater inflow to the open pit under operational conditions. While this mode of analysis is required for water management purposes, it neglects to account for related changes in groundwater elevations. An increased hydraulic conductivity in the fault zone more than doubles the groundwater inflow to the open pits. As stated in Section 5.2.1.2 of Appendix 6A, the simulated fault plane connects the pits to Victoria Lake. Given this connection, simulations which include the fault are likely to result in changes to groundwater-surface water flux rates for Victoria Lake and the small lakes proximal to the pits. Expanded evaluation of the fault scenarios is required.	f. Provide groundwater elevation maps for baseline conditions for both fault scenarios. Discuss the effect of the fault scenarios on model calibration and groundwater flow in both overburden and bedrock under baseline conditions. g. Provide groundwater elevation and drawdown maps for both fault scenarios in both operations and closure. Groundwater drawdown information should be provided for both the water table and within the bedrock at the depth of maximum drawdown. h. Provide tables summarizing the changes in baseflow to surface water bodies for both fault scenarios under both operations and closure. i. Complete particle tracking for both fault scenarios under both operations (from the Low Grade Ore Stockpile and Waste Rock Pile) and closure (from the Low Grade Ore Stockpile, Waste Rock Pile, and backfilled tailings).

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
IR-14	NRCan-08	Section 7.1.5	Appendix 6A, Sections 5.2.2 and 5.3.2, Tables 5-3 and 5-6. And Figures 5-2 and 5-4	The EIS Guidelines require the delineation and characterization of groundwater - surface water interactions. Baseflow, or groundwater discharge to surface water, can be the main sustaining flow for surface water bodies during periods of low precipitation. This flow can be critical to fish, fish habitat and other aquatic species. Changes to baseflow, or changes to the flux between groundwater and a surface water body is one of the key outputs from the groundwater model, and feeds the assessment of effects to other Valued Components. To assess model results, groundwater drawdown can be compared to simulated changes in groundwater discharge to surface water. Maps on Figures 5-2 and 5-4 of Appendix 6A of the EIS show simulated groundwater drawdown under operations and closure conditions. However, it does not appear that all of the waterbodies listed in Tables 5-3 and 5-6 of Appendix 6A of the EIS are shown on the map (e.g., VR4). It is also apparent that not all of the water bodies in the model have been included in Tables 5-3 and 5-6 of Appendix 6A of the EIS. Specifically, the reach of the Victoria River that falls within the model domain is not reported. Results in Table 5-3 and 5-6 of Appendix 6A of the EIS both indicate that waterbodies NT1 and NT2 receive more groundwater discharge in operations and closure relative to baseline conditions. This table appears to be inconsistent with the drawdown shown on Figures 5-2 and 5-4 of Appendix 6A of the EIS, as well as the discussion within the text. Additionally, waterbody ST3 appears to lose between 500 and 1000 m^3/day of groundwater discharge in operations and closure. This water body is outside of the zone of influence of the pits, and within an area of increased groundwater elevations due to the presence of the tailings management facility. These results should be evaluated against expected outcomes.	a. Update maps provided in Table 5-3 and 5-6 of Appendix 6A of the EIS to ensure that all waterbodies are clearly labelled. b. Where the results shown in Table 5-3 and 5-6 of Appendix 6A of the EIS appear to be inconsistent with the water table drawdown or expected results, correct values that are reported, and discuss any rationale for the discrepancy. c. Provide simulated changes to groundwater-surface water exchange rates for the reach of the Victoria River that is within the model domain under both operations and closure conditions. Discuss these results in comparison to a water balance for this reach of the river, and ensure sufficient surface flow is available to maintain any flux to groundwater.
IR-15	NRCan-09	Section 7.2.2	Appendix 6A, Sections 5.2.1.3 and 5.3.1.2, Tables 5-4, 5-6, and 5-7.	The EIS guidelines require information on surface and seepage water quality from the waste rock dumps, tailings/waste rock impoundment facility, stockpiles and other infrastructure during operation and post-closure. The quantity of groundwater seepage that originates from waste rock storage facilities and discharges to surface water bodies is used to assess water quality within these waterbodies. Implementation of these facilities and their seepage collection infrastructure within the groundwater model has implications on these assessment results. As reported in Section 5.2.1.3 of the EIS, during operations, recharge was applied to the waste rock pile at a rate of 82% of precipitation (indicating that the remaining 18% does not infiltrate the pile and runs off). However, results in Table 5-4 are presented as percentage of total infiltration, and sum to 82%. These results appear to suggest that 18% of the applied recharge is not accounted for within the	a. Provide the recharge value applied to the waste rock facilities in both operations and closure, and the method used to derive this value. Present the results in a table (like Tables 5-4 and 5-7 of the EIS), either as percent of recharge or flux value. Discuss any discrepancies between recharge applied and total seepage that was accounted for. b. Include the results for the closure scenario without ditches in the assessment of the seepage of the waste rock facility. c. Include an assessment of the travel time for seepage from the facilities to the discharge points. Include a discussion of the parameterization of this assessment.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				table. During closure, as reported in Section 5.3.1.2 of the EIS, recharge rates for the facilities were changed to a post-closure value, which is meant to reflect changes in grading and vegetation. This value is not provided. In review of the results in Table 5-7, again presented as a percentage of total infiltration, the total for the Leprechaun facility appears to be 50%, while the total for the Marathon facility appears to be 82%. These discrepancies should be clarified such that all applied recharge to the facilities is accounted for, and that the value of recharge applied is clear within the report. Results presented in Tables 5-4 and 5-7 of the EIS indicated that the majority of the seepage from the waste rock facilities is captured by the ditch network and seepage collection ponds. These features limit the amount of seepage received by the natural environment. As stated in section 5.2.1.3 of the EIS ditches were specified as 25m wide, aligned with the model grid size. Based on results shown in Table 5-6, these ditches appear to capture a large quantity of groundwater. The setting of 25m wide ditches may over-represent the zone of influence of the seepage collection system, and model results may underestimate the quantity of groundwater seepage that bypasses these systems. The timing of the arrival of seepage at the various groundwater discharge points has implications for the ability to monitor and mitigate the effects of this seepage. Results from the model should include travel time from the facilities to the discharge points.	
IR-16	NRCan-10	Section 7.2.2	Appendix 6A, Sections 5.2.1.4 and 5.3.1.2	The EIS guidelines require information on surface and seepage water quality from the waste rock dumps, tailings/waste rock impoundment facility, stockpiles and other infrastructure during operation and post-closure. Similar to seepage from waste rock facilities, the quantity of groundwater seepage that originates from the tailings management facility (TMF) and discharges to surface waterbodies is important to the assessment of water quality, as it affects the assessment of fish and fish habitat. As discussed in Appendix 6A of the EIS, a contaminant transport approach using MT3D was implemented to generate an attenuation factor for seepage from the TMF prior to discharge to the Victoria River. To review the assessment of TMF seepage, the details of the parameterization of the MT3D model should be provided. Results of the model including the quantity of seepage, point of discharge (i.e. Victoria River or its tributaries) and travel time should be provided.	Provide details of the MT3D model set-up, including parameterization. Discuss the results of the MT3D model in terms of seepage quantity, seepage discharge points, and travel time.
IR-17	NRCan-11	Section 7.2.2	EIS Chapter 2, Section 2.6.3.3, Appendix 6A, Figure 5-4	The EIS guidelines require information on surface and seepage water quality from the waste rock dumps, tailings/waste rock impoundment facility, stockpiles and other infrastructure during operation and post-closure. The EIS states that following the exhaustion of the Leprechaun Pit in year 9, tailings will be backfilled within the pit. These tailings represent a potential source of mining impacted groundwater seepage, which may affect fish and fish	a. Complete particle tracking for the backfilled tailings within the Leprechaun open pit, and report on any discharge points for seepage. Integrate this volume of groundwater seepage into the assessment of the potential effects on fish and fish habitat down gradient of the open pit.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				habitat should hydraulic containment within the open pit be lost upon pit flooding. While Figure 5-4 of the EIS demonstrates that some degree of water table drawdown around the open pit is maintained during the post closure period, this shallow 2D assessment is not sufficient to assess hydraulic containment. As such, the potential effect of backfilled tailings within the open pit is missing.	b. Assess the sensitivity of the model results to the post-closure pit elevation and the presence of the fault.
IR-18	NRCan-13	Section 7.1.2	Baseline Study Appendix 5 Attachment 5-B Section 3.1.1, 4.1.1, and 4.3.1 and Appendix A	The EIS Guidelines require the proponent to complete a geochemical characterization of waste rock, ore, low grade ore, and overburden in order to predict metal leaching and acid rock drainage. It also refers the proponent to the MEND (2009)[1]. Geochemical samples collected from ore, low grade ore, and waste rock were presented on two plan views (ESI - Appendix A Figures A.4 and A.7) and four cross sections (EIS - Appendix A Figures A.5, A.6, A.8, A.9). These figures do not meet the guidance provided in MEND (2009), and do not adequately present the spatial distribution of all ore, low grade ore, and waste rock samples collected as part of this study. The mine rock sample interval length ranged from 1.0-1.5m, which is shorter than that recommended in the MEND (2009)[2] guidance document. Additionally, short sample intervals can be skewed by potential mineralogical heterogeneity across a geological unit and thus may not be representative of the overall composition of the geological unit. MEND (2009) provides a recommended minimum sampling frequency per waste rock lithology, where the final sample number must be determined based on site-specific conditions, study objectives, and the overall tonnage of each lithology to be mined. Tonnage estimates by waste rock lithology were not provided in baseline study appendix (BSA)-5 to demonstrate that the number of samples collected per lithology are sufficient for each of the main waste rock lithologies to be mined. The approximate proportions of some waste rock lithologies are stated in BSA-5; however this does not reflect the overall tonnage of material.	a. Provide images (e.g. cross sections or block model images) that show the location of all ore, low grade ore, and waste rock samples from both Leprechaun and Marathon deposits. Also, provide maps of overburden sample locations from both deposits. b. Describe sample heterogeneity with respect to mineralogy and sample observations in the field to justify the short sample interval utilized in this study. Include an evaluation of exploration assay data to support this discussion. c. Provide tonnage estimates for each waste rock, low grade ore, and ore lithology from both the Leprechaun and Marathon deposits, and quantitative justification for the number of samples collected to date. Include a plan to address data gaps.
IR-19	NRCan-14 MFN-08 ECCC-24	Section 7.2.2	Baseline Study Appendix 5 Attachment 5-A and 5-B	The EIS Guidelines require the proponent to complete a geochemical characterization of potential construction material in order to predict acid rock drainage and metal leaching (ARD/ML). A geochemical characterization study must be completed for all construction materials to evaluate their suitability related to ARD/ML. The potential use of waste rock, overburden, and/or quarry material was not discussed in BSA-5, nor was the suitability of waste rock and overburden materials for construction use. Section 6.3.5.3 of the EIS states that the overburden at the Leprechaun and Marathon pits has the potential to leach a number of parameters including aluminum, arsenic, cadmium, copper, fluoride, iron, manganese, lead, selenium	a. Provide a geochemical characterization of the ARD/ML potential of all materials planned to be used for construction purposes. Include quarries, if applicable. b. Explain how covering the waste rock pile with overburden that is leaching up to ten metals parameters would result in a reduction of metals leaching when covering waste rock.

[1] MEND, 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. Mining Environment Neutral Drainage Program, Natural Resources Canada. December 2009.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				and zinc. It goes on to state that the waste rock pile will be covered by growth medium / overburden during rehabilitation, further reducing the risk of acid rock drainage and metals leaching. Table 6.4 in Section 6.4 of the EIS states that progressive rehabilitation will be implemented involving placement of a soil cover and vegetation. However, it is not explained how this will improve conditions at the site if overburden which is leaching metals is used. Section 6.3.5.4 of the EIS states that groundwater mass loadings were calculated based on the geochemical source terms for the ore stockpiles, waste rock piles, and tailings management facility seepage; however, groundwater mass loadings were not calculated for overburden. Section 6.3.5.3 of the EIS states that investigations of acid rock drainage and metals leachate will continue and will include field and laboratory kinetic testing and additional sampling to develop an ARD model. Section 6.0 of BSA 5A states that "Tailings from Leprechaun deposits, are expected to be non-PAG and have excess of NP. This excess of NP can be used to offset ARD potential of tailings from Marathon if ores from Marathon and Leprechaun deposit are processed at the same time and mixed. Therefore, the mixed tailings are not expected to show ARD potential, unless Marathon ore is processed separately from Leprechaun ore and resulting solids are left exposed after the closure. Section 5.2.2 of BSA 5A states that "approximately 14% of the waste rock from the Marathon pit is conservatively estimated to be PAG. Blending PAG and non-PAG rock with excess of neutralization potential and/or encapsulation of PAG waste by non-PAG rock is recommended to neutralize acidity potentially generated in PAG pockets."	c. Clarify if overburden which is metals leaching will be used for the soil cover. Update the effects analysis and mitigation measures, as appropriate, if overburden leaching metals is proposed to be used on site. d. Given that multiple metals parameters have the potential to leach from overburden, provide a groundwater mass loading for overburden stockpiles or provide a rationale why the overburden was excluded from this analysis. e. Update the analysis of the acid rock drainage and metals leachate investigations if more recent data is available. f. With regard to plans to manage ARD for this project, confirm that mitigation measures (e.g. blending to maintain Neutralization Potential Ratios) to avoid ARD generation will be employed when waste rock is used in onsite infrastructure (e.g. road beds).
IR-20	NRCan-15	Section 7.1.2	Baseline Study Appendix 5 Attachment 5-B Appendix B and C	The EIS Guidelines require the proponent to complete a geochemical characterization of the expected mine materials in order to predict acid rock drainage and metal leaching (ARD/ML). As indicated in the EIS Guidelines, the MEND (2009)[3] guidance document recommends presenting geochemical test results in tabulates with descriptive statistics, as well as in scatter plots and time series graphs. A complete set of tabulated static test results grouped by lithology and including sample descriptions was not provided for all samples tested. Further, statistics provided in Appendix B Tables of the EIS present results that do not follow basic principles. For example, the Appendix B Tables provide average concentrations that are outside of the minimum and maximum range. Without a complete set of tabulated data, it is not possible to complete the ARD/ML review in terms of evaluating the variability in sample chemistry across each lithology, nor to confirm the validity of the statistical distribution of results.	a. Present updated versions of Appendix Table B-5 and B-17 with the correct statistical calculations recommended in the MEND guidance. b. Provide a complete set of tables for each static test completed for waste rock, low grade ore, and ore by rock type. c. Provide updated statistics in Appendix Tables B-6, B-7, B-18 and B-19 that provide corrected average concentrations and enable the confirmation of the validity of the statistical distribution of results. d. Provide tables and time series graphs for each humidity cell, subaqueous column, and ageing tests for all tested parameters.

[3] MEND, 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. Mining Environment Neutral Drainage Program, Natural Resources Canada. December 2009.

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				Additionally, a complete set of tabulated kinetic test results for each humidity cell, subaqueous column, and ageing test was not provided in Appendix B, and time series graphs were only provided for select parameters in Appendix C. As such, the long-term evolution and change in leachate quality cannot be evaluated for all parameters.	
IR-21	NRCan-16	Section 7.2.2	Baseline Study Appendix 5 Attachment 5-B Section 3.1.2, 3.2.2, 3.2.3, 4.0, 5.0 Chapter 7 Appendix 7A and 7B	The EIS Guidelines require the proponent to evaluate the longer term rates of acid generation and metal leaching, estimates of the potential time to onset of acid rock drainage or metal leaching (ARD/ML), and the quantity and quality of leachate from samples of tailings, waste rock, and ore. These leachate compositions are then used in the water quality model to evaluate the quality of effluent to be released from the site into receiving waters. The EIS Guidelines refer to the MEND (2009)[4] guidance document. The guidance document indicates that samples selected for kinetic testing must be conservatively representative of the lithology they represent, taking into consideration mineralogy, ARD potential, metal/metalloid content, and leaching potential, and documented in the MEND (2009) guidance document. Composite samples were developed to represent low-grade ore, waste rock, and tailings, and were subjected to laboratory static tests, mineralogy, and humidity cell tests to evaluate long-term ARD/ML potential and timing to onset of ARD. A detailed quantitative rationale was not provided to demonstrate that the composite samples are conservatively representative of the overall chemical composition of their respective waste rock lithologies for ARD/ML parameters of concern. Therefore, it is not possible to determine whether the humidity cell test results are a conservative representation of weathering rates for the tested material, and thus appropriately conservative for use as source terms for the water quality models to evaluate the potential future effluent quality related to ARD /ML and neutral mine drainage (NMD). This information is important for decision making regarding management of waste rock, low grade ore, and exposed pit walls, as well as water management and treatment. All composite samples are non-acid generating based on neutralization potential ratio (NPR) values less than 2 (Table 5-2 and Appendix Table B-8), despite approximately 14% of waste rock at Marathon having been classified as potentially acid generating (PAG) based on samples tested and reported to date. This does not meet the MEND (2009) guidance to design a kinetic test program that includes material that will produce problematic drainage chemistry in terms of ARD/ML, even if this material is a lower anticipated waste volume than other units. Further, the timing to onset of acidic conditions was estimated based on mineral depletion calculations using sulphate and alkalinity production rates associated with the dissolution of soluble secondary salts rather than sulphate production from sulphide mineral oxidation. Due to the absence of any evidence of active	a. Provide a quantitative rationale for the targeted chemistry of each composite sample used for kinetic testing with respect to the lithology that they represent and percentile rankings for all parameters of interest with respect to ARD-NMD/ML. b. Provide a detailed plan to test potentially acid generating samples from those lithologies identified as containing potentially acid generating material, including static, mineralogy, and kinetic tests. c. Provide rationale for the methods used to determine the lag time to acidic conditions, and a discussion around the sensitivity of the water quality model to the assumptions related to this assumed lag time. d. Provide rationale for assumptions in the water quality model related to the metal load associated with acidic drainage. Complete a sensitivity analysis related to the assumed metal load for potentially acid generating material, including but not limited to the ore, low grade ore, and waste rock piles, and the pit walls. e. Discuss the sensitivity of water quality model predictions in relation to the conservatism of the source terms.

[4] MEND, 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. Mining Environment Neutral Drainage Program, Natural Resources Canada. December 2009.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				sulphide mineral oxidation in the tests completed to date, these time estimates are not considered reasonable to support assumptions in the water quality model related to the timing of ARD for low grade ore and waste rock, nor decisions related to waste rock management. Lastly, the metal leaching potential under acidic conditions has not been captured in the humidity cell tests completed on non-acid generating samples to date, which has implications for the source terms and assumptions that were made in the water quality models (Chapter 7 Appendix 7A and 7B) to represent acidic drainage quality from the pit walls and waste rock piles. Therefore, it is not possible to confirm that humidity cell test leachate on potentially acid generating samples would maintain leachate concentrations below MDMER limits. A complete understanding of the risk and extent of ARD and metal loading is required to appropriately manage PAG waste and exposed PAG rock in the pit walls, as well as water management and treatment planning. Therefore, the potential development of ARD in pockets of the waste rock pile or the pit walls has not been sufficiently evaluated to support the assumptions made in the water quality model related to the maintenance of neutral contact water in the ponds below the waste rock and low grade ore stockpiles and captured pit wall runoff.	
IR-22	NRCan-17 MW-45	Section 7.2.2	Baseline Study Appendix 5 Attachment 5-A and 5-B	The EIS Guidelines require the proponent to evaluate the effects of imperfect segregation of waste rock. The proponent proposes the development of an ARD block model to identify the location of discrete acid generating pockets of waste rock material and the sequence in which it will be mined. The objective of this is to support the management of potentially acid generating (PAG) waste rock through blending or encapsulation. The success of this approach is dependent in part on the effectiveness of locating and segregating this material. A detailed summary of the ARD block model evaluation was not provided, including an approach to PAG rock segregation.	a. Provide a detailed approach to locate and segregate waste rock for the management of acid generating rock. This can be in the form of an ARD/ML Management Plan. b. Provide a detailed summary of the ARD block model evaluation. c. Provide images presenting the distribution of acid generating waste rock.
IR-23	NRCan-18	Section 7.2.2	Baseline Study Appendix 5 Attachment 5-A and 5-B Section 2.0 Project Description Chapter 7 Appendix 7A and 7B	The EIS Guidelines require the proponent to evaluate the pit water chemistry during operation and post-closure, and pit closure management measures (e.g. flooding). This will include geochemical modelling of pit water quality in the post-closure period. In the geochemical baseline study, four samples were collected and tested from the gabbro unit at the Marathon Pit, suggesting it is a nominal unit in terms of overall tonnage. However, it appears to constitute a portion of the exposed pit wall based on cross-sections provided in Appendix A, and Figure 2.7-a of the Project Description, and is considered to represent 12% of the pit rubble and walls in the water quality model. This sample count is not considered sufficient to capture the potential variability of this unit with respect to ARD/ML, particularly considering that one of the four samples was classified as potentially acid generating (PAG). Additionally, a composite sample was not generated and tested for this unit, so the long-term ARD/ML potential is not known. NRCan considers this to be a significant	a. Provide a detailed plan to address the data gap in the program on how to allow for the conservative evaluation of the ARD/ML potential of the gabbro waste rock unit, low grade ore, and ore, including plans for additional sample collection, static and kinetic tests. b. Provide proportions of exposed gabbro, low grade ore, and ore for each year of operation, and the final pit shell. c. Complete an evaluation of the pit water chemistry during operations, pit filling, and post-closure, and the potential for the development of acidic drainage. This must include timing to onset of ARD and acidic loading rates from new humidity cell tests on PAG material from the gabbro, low grade

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				data gap with respect to evaluating the quality of pit water discharge during operations and long-term pit lake water quality. Further, the low grade ore and ore at the Marathon Pit are assigned 5% of the area of the pit rubble and walls in the water quality model. Based on the same cross sections, this value appears to underrepresent the likely exposed surface area of these units. In total, 50% and 67% of samples of low grade ore and ore, respectively, have been classified as PAG. PAG samples of low grade ore and ore were not subjected to kinetic testing, and as such the long-term ARD/ML potential of these units is not known, nor their potential impacts to pit water quality during operations and long-term closure. The potential for Marathon Pit water to be acidic with an elevated metal load has not been sufficiently evaluated for operations, closure, and post-closure phases of the Project.	ore, and ore as well as the exposed pit shell proportions during the life of the mine.
IR-24	NRCan-19 MFN-16	Section 7.2.2	Baseline Study Appendix 5 Attachment 5-A and 5-B and Project Description and Chapter 7 Appendix 7A and 7B	The EIS Guidelines require the proponent to evaluate the longer term rates of acid generation and metal leaching, and estimates of the potential time to onset of acid rock drainage or metal leaching. Of the low grade ore, approximately 10% from the Leprechaun Pit and 50% from the Marathon Pit have been classified as potentially acid generating. Per NRCan-16, all tested composite samples, including low grade ore, are non-potentially acid generating. As such, the long-term ARD potential of problematic low grade ore and ore cannot be evaluated, nor the associated metal load. The Proponent has assumed that the Low Grade Ore stockpile will not be acidic during the tie in which it is stockpiled. This is not a reasonably conservative assumption for the sake of assessing potential for ARD/ML (and downstream impacts to fish and fish habitat/water quality) Low grade ore will be stockpiled adjacent to both pits for blending with higher grade ore or processing towards the end of mine life. At the Marathon Pit, the lag time to generation of ARD is considered to be within the expected residency time of material in the low grade ore stockpile. The timing to onset of acidic conditions was determined based on non-acid generating kinetic tests per NRCan-16 and NRCan does not consider this a reasonably conservative estimate of timing to ARD/ML production in the low grade ore stockpile. Further, the reactivity of the material in the stockpile depends in part on the sequence in which material is mined.	a. Provide an evaluation of the sequencing of low grade ore from the Marathon Pit and the ARD/ML potential of material during the life of the mine. b. Evaluate the sensitivity of the water quality model predictions to the sequencing of low grade ore in the stockpile at the Marathon Pit during the life of the mine. c. Provide mitigation options for the management and treatment of ARD/ML generated from the low grade ore stockpiles. Describe the preventative measures that would be taken to reduce ARD/ML from the low grade ore stockpile, the monitoring plan and if the stockpile and effluent will be hydrologically segregated to ensure the effluent can be monitored and treated prior to ARD/ML onset.
IR-25	NRCan-20	Section 7.2.2	Baseline Study Appendix 5 Attachment 5-A and 5-B and	Section 7.2.2 of the EIS Guidelines require the proponent to complete a geochemical characterization of tailings in order to predict metal leaching and acid rock drainage (ARD/ML). Insufficient information was provided on the origin of the tailings samples analyzed to understand whether they are representative of the anticipated thickened tailings composition to be managed on the property. Previous testing of tailings demonstrate that it could be potentially acid generating. Any deviation from the	a. Provide additional information on the source of the contaminated neutral drainage tailings samples, including the head ore composition used to generate these samples relative to the anticipated average ore feed to the plant, and the metallurgical process and cyanide destruction method used to generate these samples relative to the anticipated process to be used during mine operations.

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			Chapter 7 Appendix 7A and 7B	head ore composition or methods used to generate these samples could result in a different ARD potential and concentrations of cyanide species and associated nitrogen by-products from cyanide degradation, which has implications for tailings runoff, seepage quality and water treatment design.	b. Complete an analysis of the sensitivity of the water quality model to the generation of ARD/ML from the low grade ore stockpiles.
IR-26	NRCan-21	Section 7.1	Chapter 7 and Baseline hydrology and surface water quality monitoring program (Appendix D Local water quality tables)	Section 7.1 of the EIS Guidelines states that the EIS will present information in sufficient detail to enable the identification of how the project could affect the VCs and the analysis of those effects. Baseline water quality has been monitored at the site since 2011. Upon review of table 7.24 of Chapter 7 of the EIS, the baseline concentrations for a number of elements (including chromium) are high compared to the regional water quality monitoring stations. Currently, the proponent derived local baseline concentrations by pooling all water quality monitoring stations together and calculated a 75th percentile value as baseline water quality. Upon review of Appendix D of the baseline document, high chromium levels appear to have occurred predominantly in 2011 and have often been below the detection limit of 1ppb ever since. The variability in metal concentration depends on many factors and it is likely not appropriate to use baseline metal data in streams to derive a baseline for Valentine and Victoria Lakes.	a. Set baseline metal concentrations for Valentine Lake, Victoria Lake and Victoria River based only on measurements in the given water bodies that will receive effluent discharge. Discuss the baseline water quality for chromium in comparison to the Canadian Water Quality guideline for the protection of aquatic life of 1pbb for hexavalent chromium and 8ppb for trivalent chromium. b. Assess the need to include chromium as a contaminant of potential concern in the EIS given its toxicity to fish and fish habitat.
Surface Water/Fish and Fish Habitat					
IR-27		Section 7.4	EIS Section 8.5.1.2 Residual Effects, Page 8.62	The EIS Guidelines require that the EIS includes information on mitigation measures including measures to eliminate, reduce or control the adverse environmental effects of a designated project, as well as restitution for damage to the environment through replacement, restoration, compensation or other means The EIS states that "*The Fish Habitat Offsetting Plan will take into account input from consultation and engagement, and will be developed and implemented in consultation with DFO and in consideration of the "Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the Fisheries Act" (DFO 2019)*." However, the Fish and Fish Habitat Offsetting plan has not been included in the EIS. This information is needed to assess residual effects after mitigation and the significance of effects on fish and fish habitat.	Provide a conceptual level Fish Habitat Offsetting Plan based on discussions with DFO.
IR-28	DFO - 01	Section 7.3.1	EIS Page 8.22, Section 8.2.2.1, Fish Habitat	The EIS Guidelines require that the EIS describes the effects of changes to the aquatic environment on fish and their habitat. In Table 8.4 under the notes, the EIS states that iron floc is present. As iron floc could have potential impacts to fish and fish habitat, more information is required to help determine this.	Provide additional information on the iron floc including the quantity, source, frequency (ongoing issue or single event) and determine if there is a potential effect on fish and fish habitat.
IR-29	DFO - 03	Section 7.1.6	EIS Page 8.39, Section 8.2.2.4, Fish Community	The EIS guidelines require that the proponent provide a description of habitat and maps, at a suitable scale, indicating the surface area of potential or confirmed fish	Provide habitat information for Arctic Char within the Local Assessment Area.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				habitat for spawning, rearing, nursery, feeding, overwintering, migration routes, etc. Arctic Char are known to occur in the Victoria River Watershed and Victoria Lake reservoir. In addition, the EIS states that based on the habitat preferences of Arctic Char in Victoria Lake Reservoir, it is presumed they have the potential to occur in Valentine Lake as well. DFO indicated that there is no habitat information provided on this species. While no char were caught during the baseline surveys, habitat information can be an indicator of the potential for a species to be present in a certain area even if that species has not been identified during fishing surveys. Habitat information will provide an indication of where they may occur and enable a review of potential effects and mitigations. This baseline information is necessary for DFO to accurately assess residual effects after mitigation, and advise on the significance of the effects on fish and fish habitat.	
IR-30	ECCC-17	Section 7.3.1	EIS Chapter 8: Fish and Fish Habitat Page 8.72	The EIS Guidelines require information on the effects of changes to the aquatic environment on fish and their habitat. The EIS states that "*Pit lakes are expected to become stratified following closure, and waters in the bottom layers may become anoxic and may contain high concentrations of dissolved trace metals. If the pit lake turns over, the pit lake water that discharges may affect fish health and survival by reducing levels of dissolved oxygen and introducing elevated concentrations of metals (Jennings et al. 2008).*" ECCC indicated that it is unclear if the potential risk associated with pit lake turnover on fish and fish habitat has been modelled or otherwise evaluated. This information is needed to determine significance of effects on fish and fish habitat.	Provide information on any modelling or evaluation that has been done on the risk of lake water turnover. If no modelling or evaluation has been completed, provide a rationale for why it has not.
IR-31	ECCC-18	Section 7.3.1	Appendix 7C – Assimilative Capacity Assessment Report page 6.2	The EIS Guidelines require information on the effects of changes to the aquatic environment on fish and their habitat. During the post-closure period of the decommissioning, rehabilitation and closure phase, some Canadian Water Quality Guidelines - Freshwater Aquatic Life (CWQG-FAL) exceedances are predicted in the Victoria River and Victoria Lake Reservoir for aluminum, copper, zinc, and fluoride associated with the Marathon and Leprechaun waste rock piles. However, the EIS does not evaluate the magnitude and duration of the potential effects on fish and fish habitat resulting from these exceedances. The Assimilative Capacity Assessment Report in Appendix 7C of the EIS states that "*Mitigation measures should be considered, such as maintaining perimeter ditching during closure / post-closure to convey seepage to a passive wetland treatment system.*" The migration measures to explain how these effects will be mitigated are	a. Assess the magnitude and duration of potential effects on Fish and Fish Habitat resulting from predicted post-closure exceedances of the Canadian Water Quality Guidelines - Freshwater Aquatic Life guidelines from the Marathon and Leprechaun waste rock piles. b. Describe the mitigation measures to explain how these effects will be mitigated.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				not described in the EIS for the decommissioning, rehabilitation and closure phase of the mine. This information is needed to assess residual effects after mitigation, and the significance of the effects on fish and fish habitat.	
IR-32		Section 7.3.1	Section 7.3.5.2 Analytical Assessment Techniques for Change in Surface Water Quality Sections 5.1.1, 5.1.2, 5.3, and 6.0 of BSA 5A (Acid Rock Drainage /Metal Leaching. And BSA 3D (Hydrogeology Baseline Report)	The EIS Guidelines require information on the effects of changes to the aquatic environment on fish and their habitat. Section 7.3.5.2 of the EIS refers to the analytical assessment techniques for change in surface water quality. Sections 5.1.1, 5.1.2, 5.3 and 6.0 of Baseline Study Appendix (BSA) 5A (Acid Rock Drainage/Metal Leaching) state that the elevated values of aluminum in the shake flask extraction tests may be due to very-fine-grained/colloidal detrital alumino-silicate mixture rather than being reflective of dissolved aluminum. However, Section 4.3.2.2 of BSA 3C states that aluminum concentrations were found to exceed the Canadian Water Quality Guidelines for Freshwater Aquatic Life (CWQG-FAL) in all surface water quality monitoring stations at least once except for three locations. Table 4.37 in Section 4.3.2.2 of BSA 3C provides a summary of metals analysis at surface water quality monitoring stations. This table indicates that aluminum exceeded the Canadian Water Quality Guidelines for Freshwater Aquatic Life in 221 samples out of a total of 619. In addition, Section 4.7.2 of BSA 3D states that dissolved aluminum exceeded the pH dependent Canadian Water Quality Guidelines for Freshwater Aquatic Life in MW7 in October 2019 and February 2020. This information is needed to determine significance of effects on fish and fish habitat.	Given that the shake flask extraction tests may be reflective of the potential for elevated concentrations of aluminum from mining activities. Revise the effects analysis based on the potential increase in aluminum concentrations. Describe the effect of increasing aluminum concentrations with respect to the CWQG-FAL and fish and fish habitat given the already elevated concentrations of aluminum from existing groundwater and surface water monitoring. Provide information on mitigation to reduce any effects, if applicable.
IR-33		Section 7.1.5	Section 7.2.2.3 of the EIS	The EIS Guidelines require information in the EIS on the delineation of drainage basins, at appropriate scales (water bodies and watercourses), including intermittent streams, flood risk areas and wetlands, boundaries of the watershed and subwatersheds, overlaid by key project components. Table 7.16 in section 7.2.2.3 of the EIS, has elevation at headwaters as a lower value than the elevation at outlet. Normally, it would be expected to be the opposite. Table 7.17 in section 7.2.2.3 of the EIS provides predevelopment watershed areas and does not provide an elevation at headwater or outlet for WS23. Figure 7-11 in Section 7.2.2.3 of the EIS does not illustrate the location of WS23.	a. Confirm the elevation of watersheds at headwaters and outlets and revise if there is an error in Table 7.16. b. Provide an elevation of the headwaters and outlet for WS23 or provide a rationale for why one was not given. c. Provide the location of WS23 on Figure 7-11.
IR-34		Section 7.3.1	Section 5.2 of Appendix 7C (Assimilative Capacity Assessment Report) Section 6.0 of Appendix 7C	The EIS Guidelines require information on the effects of changes to the aquatic environment on fish and their habitat. Tables 5-4, 5-5, 5-6 and 5-7 in section 5.2 of Appendix 7C provide the results of the CORMIX modelling. Based on the tables it is unclear if the CORMIX modelling results are calculated for the distance of the outfall at the Ultimate Receivers (Victoria Lake Reservoir, Victoria River and Valentine Lake) or from the final discharge points. If the results presented are for the ultimate receiver rather than	a. Clarify when and where each parameter will reach a concentration below the Canadian Water Quality Guidelines for Freshwater Aquatic Life for the relevant phases of the Project. b. Assess the effects of pH dependent metal parameters on fish and fish habitat.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
			Section 7.5.5.2 of the EIS	the final discharge points the length of contaminated water is significantly further than the 100 to 200 metres presented in the tables which may have resulted in an underestimation on potential effects on fish and fish habitat. Results for pH have not been provided in the tables and therefore no consideration has been given for metals parameters that have guidelines that are pH dependent as to how far the mixing zone may extend should the pH in the tributary fall. Consideration has not been given to how long it might take for effluent to travel from the final discharge point to the ultimate receiving waters. This information is needed to determine significance of effects on fish and fish habitat.	
IR-35		Section 7.2.2	Section 7.5.1.1 of the EIS (Water Quantity and Water Quality Model Results)	The EIS Guidelines require information on changes to hydrological and hydrometric conditions. Table 7.34 and 7.35 in section 7.5.1.1 (Water Quantity and Water Quality Model Results) of the EIS provide the Marathon and Leprechaun forecasted sedimentation pond outflows. The December predicted outflow during closure (year 13 to 17) for MA-SP-05 and LP-SP-05 is an order of magnitude larger (531 compared with 0-59 cubic metres per day).	Clarify if there is an error with the value for December predicted outflow during closure or provide an explanation as to why the flows in December are so much higher than other predicted flows during closure.
IR-36	MW-30 MFN-10 MFN-11 MFN-12	Section 7.3.1	Section 7.5.2.3 of the EIS	The EIS Guidelines require information on the effects of changes to the aquatic environment on fish and their habitat. Section 7.5.2.3 (Change in Surface Water Quality – Residual Effects) of the EIS states that additional water quality treatment will be required for LP-FDP-05 but does not specify what that treatment would be. In addition, this section calculates the dilution for receiving water environments (Victoria Lake Reservoir, Valentine Lake and Victoria River); however, it is unclear if the cumulative effects of multiple discharge points on fish and fish habitat within one receiving water body was considered. MFN has indicated use of much of the LAA and have expressed concerned with the management of mine effluent and water quality in the area. This information is needed to determine significance of effects on fish and fish habitat.	a. Provide information on the water quality treatments that would be implemented for LP-FDP-05 and how long they would be in place (construction, operation, closure). b. Clarify if the cumulative effects of multiple final discharge points discharging into the same receiving water body was considered for fish and fish habitat. If this was not done, assess the cumulative effects on fish and fish habitat from multiple final discharge points discharging into the same receiving water body. c. Indicate whether monitoring and reporting of water quality would take place at each final discharge point or provide a rationale for why it would not take place.
IR-37		Section 7.2.2	Section 6.2 of Appendix 2A (Water Management Plan)	The EIS Guidelines require information on changes to hydrological and hydrometric conditions. Table 6.2 of Section 6.2 of Appendix 2A (Water Management Plan) provides monthly average flows/outflows to/from sediment ponds for Leprechaun. The annual values for LP-FDP-02 appear disproportionately high. This information is needed to determine significance of effects on fish and fish habitat.	Clarify if the annual values for LP-FDP-02 are accurate and update the effects analysis on fish and fish habitat.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
IR-38	ECCC-01 ECCC-02	Section 7.2.2	Attachment 3-C of Baseline Study Appendix 3: Water Resources [BSA.3]: Section 3.2.2	The EIS Guidelines require information on changes to hydrological and hydrometric conditions. Section 3.2.2 of BSA 3C provides the estimation of the mean annual flow (MAF) and monthly mean flows (MMF) is critical for water quality and low flow assessments. However, the original (1999) and updated (2014) Regional Flow Frequency Analysis (RFFA) reports note that the edges of the four identified homogeneous regions are approximate. The project is located at the edge of the Northeastern region, within a few kilometres of the Northwestern and Southwestern regions. The Water Survey of Canada (WSC) stations used to develop the Northeastern region equations are further from the project location than the nearest WSC stations in the Northwestern and Southwestern regions. The proponent only presents MAF and MMF estimates using the Northeastern region equations. In addition, continuous level data was collected at the project location for up to 7 years (2012-2019) and transformed to continuous streamflow data via an acceptable rating curve. However, this data does not appear to be used to validate any of the baseline estimates. *approx. 1 year of data at station HS2 is anomalously high (suspected beaver dam). This information is needed to determine predicted effects on changes to surface water and the significance of effects on fish and fish habitat.	a. Provide additional rationale for only using the Northeastern region RFFA. Consider using the streamflow field data to validate this choice. b. Validate the baseline water balance, baseflow index estimates or RRFA using the continuous level data.
IR-39	ECCC-03	Section 7.2.2	Chapter 7 of EIS (Surface Water Resources), section 7.5.1.3 and Table 7.36	The EIS Guidelines require information on changes to hydrological and hydrometric conditions. Table 7.36 and section 7.5.1.3 of the EIS assess the project effects on the watershed flows by comparing to the expected mean annual flow (MAF). The estimates of 50% MAF for the summer environmental flows and 33% MAF for the winter environmental flows, taken from Zadeh (2012), are appropriate estimates for baseline natural conditions. However, these baseline values must be compared to expected low flows in the summer and winter months, respectively, as the expected MAF does not adequately capture the potential for low flows in a non-natural system. It is critical to understand what is happening in the low flows based on seasonal flow and not just annual flow. This information is needed to determine significance of effects on fish and fish habitat.	Provide a comparison of the value of the baseline environmental flows to the expected project flows from the associated months (winter: October to March and summer: April to September) for all watersheds.
IR-40	ECCC-04 Agency-47 MFN-13, MFN-14	Section 7.2.2	Chapter 7 of EIS, section 7.5.1.3 (Residual Effects) and 7.5.1.4 (Summary of Residual Effects on Change in Surface Water Quantity)	The EIS Guidelines require information on changes to hydrological and hydrometric conditions. Water will be pumped from Valentine Lake to help fill Marathon Pit at closure over approx. 8 years. The proponent states that “For Valentine Lake, the proposed pumping rate corresponds to 21% of expected MAF. […] The closure MAF is projected to be 59% and 164% greater than the pre-development summer and winter environmental flows, respectively.”	a. Provide an explanation for the apparent discrepancy between the expected MAF for Valentine Lake and the effects to Valentine Lake at the edge of the LAA (section 7.5.1.4). b. Compare the value of the baseline environmental flows to the expected flows from the associated months (winter: October to March and summer: April to September) for Valentine Lake.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
	5(1)(a)(i) Fish and Fish Habitat 5(1)(a)(ii) Aquatic Species			Further in the same document, the proponent states that the effects to Valentine Lake at the edge of the Local Assessment Area (LAA) is under 10% (section 7.5.1.4). The proponent assesses the project effects on the Valentine Lake environmental flows by comparing to the expected mean annual flow (MAF). The expected MAF does not adequately describe the potential for project effects on low flows (see previous IR, ECCC-MSC-3). Some watercourses have considerable losses in flows, for example WS-6 or VIC-16, which will see a reduction to 65% of the summer environmental flow, calculated as 50% of its MAF and 41% of the winter environmental flow, calculated as 30% of MAF. The EIS does not include mitigation measures for the loss in flow to these waterbodies. This information is needed to determine significance of effects on fish and fish habitat.	c. Assess whether the pumping of Valentine Lake during the closure phase has the potential to affect the lake level, particularly during low water periods. Determine if this would impact the dilution for effluent discharged into Victoria Lake Reservoir and Valentine Lake. d. If the lake level is affected provide an assessment of the potential effects to fish and fish habitat including information on mitigation measures to protect fish and fish habitat for all watercourses that have more than a 10% change in their MAF.
IR-41	ECCC-12 NRCan-22 Pub-07.11	Section 7.1.5	Chapter 4: Assessment of Effects to Surface Water Appendix 7C – Assimilative Capacity Assessment Report	The EIS guidelines require a sediment quality analysis for key sites likely to receive mine effluents. Sediment quality is an important aspect of a healthy ecosystem especially in supporting fish health in the receiving environment. The proponent has conducted baseline sediment studies but has not modelled or predicted impacts to sediments nor is any monitoring program planned to evaluate sediment quality. While water quality modelling and monitoring programs give good information related to the health of the aquatic environment, continuous loadings of elevated contaminants of potential concern (COPCs) may be deposited to sediments over time which may then act as an ongoing source of contamination in the benthic environment which can affect fish health. COPCs in sediments in streams and rivers can be remobilized over time or during high flow events to create risks to downstream aquatic receptors. Section 4.4.2 of the EIS BSA4-C provides sediment quality for 3 locations in Victoria and Valentine Lakes. However, these locations do not directly correlate to discharge locations. This information is needed to determine significance of effects on fish and fish habitat.	a. Provide time series plots (construction, operation, closure and post-closure) of Al, As, AG, Cd, Cr, Cu, Fe, Mn, Hg, Se, U, Zn, NO2, Cyanide, UN-NH3, SO4, F in sediments of Victoria Lake Reservoir, Valentine Lake and Victoria River. Provide an evaluation of sediment quality and assess the potential environmental effects to fish and fish habitat as a result of any sediment contamination, if applicable. Indicate whether a monitoring program to evaluate changes in sediment quality will be established. b. Provide predicted contaminated sediment conditions for each of the nine Final Discharge Points locations.
IR-42	ECCC-13	Section 7.3.1	Appendix 7C – Assimilative Capacity Assessment Report (page 1.2)	The EIS Guidelines require information on the effects of changes to the aquatic environment on fish and their habitat. The EIS quotes CCME (2003) which defines the mixing zone as, “an area contiguous with a point source (effluent) where the effluent mixes with ambient water and where concentrations of some substances may not comply with water quality guidelines or objectives.” The EIS concludes that in almost all cases where Final Discharge Points (FDPs) are located in small tributaries, the effluent mixing zone extends the length of the tributary and into the ultimate downstream lake / river receivers.	Provide supporting data/information that bioconcentration or accumulation of toxic substances that are harmful to fish and fish habitat are not expected to reach toxic or harmful levels in water or sediments within the mixing zones.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				The EIS continues to quote CCME (2003) by stating that "Conditions within the mixing zone should not result in bioconcentration of POPC [pollutants of potential concern] to levels that are harmful to organisms, aquatic-dependent wildlife, or human health. Also, accumulation of toxic substances in water or sediment to toxic levels should not occur in the mixing zone" (Canadian Council of Ministers of the Environment (CCME). 2003. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Guidance on the Site-Specific Application of water quality guidelines in Canada: Procedures for deriving numerical water quality objectives. In: Canadian Environmental Quality Guidelines. Winnipeg.) The EIS does not provide information on whether the mixing zone could result in conditions with harmful concentrations of POPC that is harmful to fish and fish habitat. This information is needed to determine significance of effects on fish and fish habitat.	
IR-43	ECCC-14	Section 7.1.5	Chapter 8, Fish and Fish Habitat, page 8.36	The EIS guidelines require a sediment quality analysis for key sites likely to receive mine effluents. When evaluating sediment quality, Probable Effect Levels (PELs) represents the lower limit of the range of chemical concentrations that is usually or always associated with adverse biological effects and are less conservative than Interim Sediment Quality Guidelines (ISQGs). The EIS compares sediment concentrations to PELs and not ISQGs. This information is needed to determine significance of effects on fish and fish habitat.	Provide the rationale for using PELS, which are considered to be less conservative, to compare sediment and not ISQGs.
IR-44	ECCC-19 Pub—07.11	Section 9	Appendix 7A , page iii	The EIS Guidelines require a follow-up program that is designed to verify the accuracy of the effects assessment and to determine the effectiveness of the measures implemented to mitigate the adverse effects of the project. The Water Quantity and Water Quality Report in Appendix 7A of the EIS states that "*In post closure, Cu is predicted to exceed the MDMER limit due to an elevated concentration of this metal in TMF toe seepage. Therefore, a mitigation such as passive treatment of seepage should be considered.*" ECCC indicated that when or if a mine has achieved Recognized Closed Mine (RCM) status under the MDMER, any effluent from the facility will be subject to Section 36(3) of the Fisheries Act, which prohibits the deposit of deleterious substances into waters frequented by fish, or to any place, under any conditions, where it may enter water frequented by fish. All reasonable efforts must be made to prevent such a deposit of deleterious substances.	Provide information on any proposed follow-up programs to assess the effectiveness of mitigation measures proposed to address the seepage of metals and other contaminants at levels above MDMER from the Tailings Management Facility.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				It is unclear whether a follow-up program will be carried out to assess the effectiveness of mitigation measures proposed to prevent the deposit of deleterious substances. This information is needed to assess residual effects after mitigation and	
IR-45	ECCC-20	Section 7.1	Baseline Study Appendix 3: Water Resources (BSA.3)	The EIS Guidelines state that the EIS will present information in sufficient detail to enable the identification of how the project could affect the VCs and the analysis of those effects. In addition to the extensive water quality dataset available from other sources, the proponent has added 1 water quality sampling location for each of the 3 ultimate receiving environments; (VICRV – Victoria River, VIC01 – Victoria Lake, VAL01 – Valentine Lake). Data from these 3 locations was available for a 4 month period in 2019 only. Given the importance of these 3 ultimate receiving environments during all phases of the project, Environment and Climate Change Canada is of the view that the data collected at these locations is not adequate to characterize the background water quality conditions (including seasonal variations) in these areas. Additional water quality datasets should be used to characterize the background water quality conditions in these areas. This information is needed to determine significance of effects on fish and fish habitat.	Use other water quality datasets (in addition to those from the 1 water quality sampling location for each of the 3 ultimate receiving environments) to characterize the background water quality conditions (including seasonal variations) in these areas.
IR-46	ECCC-21	Section 7.1	Baseline Study Appendix 3: Water Resources (BSA.3) Attachment 3C	The EIS Guidelines state that the EIS will present information in sufficient detail to enable the identification of how the project could affect the VCs and the analysis of those effects. The proponent has stated that the Study Area for the 2019 field study includes the watersheds potentially affected by development of the Leprechaun, Sprite, Marathon, and Victory Deposits. The following ponds and streams within the Study Area were sampled as part of the 2019 surveys: -Lakes - Victoria Lake and Valentine Lake -Ponds – VALP2, VICP2, VALP3, L1, M7, M2, V1 -Streams – Outlet of VALP2, Outlet of VICP2, Outlet of VALP3, C001, Outlet of M1, Outlet of M2, inlet and outlet of V1 The EIS does not include a characterization of sediments in the Victoria River. This information is needed to determine significance of effects on fish and fish habitat.	Provide rationale for why the sediment of the Victoria River, which has been identified as one of the 3 ultimate receiving environments, has not been characterized in the baseline study or provide information on the characterization of the Victoria River. Update the effects assessment of fish and fish habitat as applicable.
IR-47	ECCC-22	7.3.1	Chapter 7, Surface Water Resources 7.5.2.4	The EIS Guidelines require information on the effects of changes to the aquatic environment on fish and their habitat.	Provide clarification for which watercourses are predicted to have irreversible effects and describe any planned mitigation and monitoring for each.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
			Water Quantity and Water Quality Modelling Reports (7A and 7B)	The EIS describes in the following text that water quality is irreversible in some watercourses. The Summary of Residual Effects on Change in Surface Water Quality in Chapter 7 states that "*Effects will be continuous and both short term (large storms, one-off events) and long term (seepage from waste rock piles and TMF) in duration. Effects on water quality for most of the watercourses / waterbodies assessed are considered reversible as conditions will return to baseline conditions once Project discharges cease. Irreversible effects may occur as a result of seepage from mine infrastructure (TMF and waste rock piles)".* It is for this reason presumably that effects are labelled as both "I/R" (irreversible/reversible) in Table 7.50: Project Residual Effects on Surface Water. In the Water Quantity and Water Quality Modelling Reports (7A and 7B), there are a number of locations where the modelled parameters decline during closure and stabilize in post-closure above CWQG-FAL (presumably irreversible). These are represented graphically in Appendix E. It is unclear which watercourses have reversible/irreversible residual effects. This information is needed to determine significance of effects on fish and fish habitat.	
IR-48	ECCC-23	7.3.1	Appendix 2A, WATER MANAGEMENT PLAN (Stantec)	The EIS Guidelines require information on the effects of changes to the aquatic environment on fish and their habitat. The EIS describes the following seepage scenarios associated with the tailings management facility: - Seepage through the dam will be low relative to average daily discharge rates at the final discharge points (FDP). - Some groundwater is predicted to seep from the TMF and travel to the Victoria River and tributaries. - Some seepage through and under the dams at the Tailings Management Facility can be anticipated. It is expected that the majority of the seepage from the dams can be collected in ditches and conveyed to small sumps and, if necessary, pumped back into the tailings management facility. The remainder would be lost to the groundwater flow regime. It is unclear if the seepage scenarios described above are accounted for in the water quality model. This information is needed to determine significance of effects on fish and fish habitat.	Provide information on all seepage scenarios that were included in the water quality model or a rationale for excluding some scenarios that have not been included in the model. Update the effects assessment on fish and fish habitat as appropriate.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
Migratory Birds					
IR-49	ECCC-07	Section 2.2.	EIS Chapter 2 – Project Description. Section 2.11 - Alternative Means of Carrying out the Project	The EIS Guidelines require that the proponent will identify and consider the environmental effects of alternative means of carrying out the project that are technically and economically feasible. This includes energy sources to power the project site. The EIS does not include alternative lighting design and/or measures, which are a potential mitigation measure to reduce potential impacts of light attraction on migratory birds and species at risk. Alternative lighting designs should be assessed in the Alternative Means of Carrying Out the Project (Section 2.11 in the EIS) as an alternative lighting source. This information is needed to identify the potential environmental effects of the alternative means under consideration for lighting design.	Provide and assessment for alternative lighting design and/or measures in the "Alternative Means of Carrying out the Project" Section 2.11.
IR-50	ECCC-08-CWS-02	Section 7.1.7	Section 10.2 – Existing Conditions for Avifauna	The EIS Guidelines require information on birds and their habitats that are found or are likely to be found in the study area. This description may be based on existing sources, but supporting evidence is required to demonstrate that the data used are representative of the avifauna and habitats found in the study area. The existing data must be supplemented by surveys designed using Environment and Climate Change Canada guidance. The EIS does not show the distribution of most avifauna field survey locations in relation to current habitats in the project assessment area and proposed project infrastructure, nor are detailed results of bird surveys provided. No bird surveys have been conducted along the access road despite access road upgrades being proposed for the Project. The EIS proposes such surveys as part of the project follow-up program. This information is needed to understand baseline conditions, review the effects analysis and subsequently determine significance of effects on migratory birds.	a. Provide a detailed description of all avifauna surveys (including proposed surveys along the access road) that have been conducted for the Project to date, including maps showing each survey location (e.g. each point count location) in relation to proposed infrastructure and current habitat types. b. Provide tables presenting detailed survey results (i.e. data for each point count survey location for each survey date). Data should include date and time of survey, species, number of individuals, sex and age (adult, juvenile) if known, and breeding evidence (possible, probable or confirmed). Weather conditions (e.g. wind, precipitation) that may have influenced survey results should be identified.
IR-51		Section 7.1.7	Section 10.2.1.1 - Table 10.1 – Avifauna Field Surveys Conducted During Baseline Field Programs BSA.7, Attachment 7-H Section 3.4	The EIS Guidelines require information on birds and their habitats that are found or are likely to be found in the study area. This description may be based on existing sources, but supporting evidence is required to demonstrate that the data used are representative of the avifauna and habitats found in the study area. The existing data must be supplemented by surveys designed using Environment and Climate Change Canada guidance. Table 10.1 in the EIS and the associated Baseline Study [Appendix 7 Attachment 7-H (Forest Songbird Survey (2019), Section 3.4] indicate that only one crepuscular bird survey was completed on June 28, 2019. The moon illumination for this day was 21.3% and the moonrise was at 2:24am. The optimal time for the survey would be a minimum of 50% illumination and would be after the moon has risen. Given the Common Nighthawk was observed in 2011, a negative observation in 2019 is uncertain given how the surveys were completed.	a. Provide a rationale for deviating from the standard crepuscular protocol of 2-3 point counts within at least 50% moon illumination and after moonrise. b. Given there was a Common Nighthawk observed incidentally in 2011, provide the rationale for confidence in a negative observation in 2019. Given the uncertainty of presence in the Project Area, provide an assessment of potential effects on Common Nighthawk.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				This information is needed for baseline data for the effects analysis on migratory birds and Species at Risk.	
IR-52		Section 7.1.7	Section 10.2.3.1 Forest Breeding Bird Survey Results: Passerines, Raptors and SAR	The EIS Guidelines require information on birds and their habitats that are found or are likely to be found in the study area. This description may be based on existing sources, but supporting evidence is required to demonstrate that the data used are representative of the avifauna and habitats found in the study area. The existing data must be supplemented by surveys designed using Environment and Climate Change Canada guidance. Forest breeding songbird surveys were conducted in June 2011 (one survey) and June 2019 (one survey) within the Project Area and Local Assessment Area to determine species biodiversity, distribution and relative abundance of avifauna (including Species at Risk). The standard point count methodology of 2-3 point counts 10 days apart in the same location was not used. In the Baseline Study Appendix 7 Attachment 7-H (Forest Songbird Survey (2019)), the 2011 and 2019 point count do not cover the Project Area but focus on the infrastructure area only. This information is needed to provide confidence that the conducted surveys accurately represents baseline conditions. Adequate spatial coverage of bird survey points is needed to determine significance of effects on migratory birds.	a. Provide a rationale for deviating from the standard point count methodology of 2-3 point counts 10 days apart in the same location. The two surveys were completed eight years apart and were not completed at the same location as infrastructure changed between 2011 and 2019. b. Provide rationale for how the method used will provide a full account of the species diversity. Spatially, the surveys were clustered around the proposed infrastructure area and not throughout the Project Area.
IR-53	ECCC-09-CWS-03 MFN-42 Pub-06.04 Pub-07.09 (Dal)	Section 7.4 and 9	Section 10.2 – Existing Conditions for Avifauna Section 10.3-Assessment Criteria and Methods Section 10.4-Mitigation and Management Measures Section 10.5-Assessment of Environmental Effects on Avifauna	The EIS Guidelines require the EIS to identify and describe mitigation measures to avoid, or lessen potential adverse effects on species and/or critical habitat listed under the *Species at Risk Act*. These measures will be consistent with any applicable recovery strategy and action plans. 1. Olive-sided Flycatchers were observed in the Project Area during 2011 and 2019 breeding bird surveys. In 2019, 6 individuals were associated with the wetland complex in the area of the Northern Waste Rock Pile. The wetlands that cannot be avoided and for those where direct and indirect effects cannot be entirely minimized, conservation allowances for affected wetland habitat for landbird species at risk (SAR) would be an important element to consider to satisfy the requirement to minimize effects to wetland-associated landbird SAR in the Project Area as per S. 79 of the *Species at Risk Act*. 2. Habitat alterations related to mine construction and operation may result in the creation of habitat for migratory bird SAR (for example, Bank Swallows). Landbird SAR may nest in the Project Area, including on project infrastructure. ECCC recommends the implementation of a migratory bird monitoring program throughout the lifespan of the Project to observe migratory bird SAR use of the Project Area. The EIS Guidelines indicate that the goal of a monitoring program is to ensure that proper measures and controls are in place in order to decrease the potential for environmental degradation during all phases of project development.	1. a. Clarify why avoidance is not possible in instances where habitat for landbird SAR is encountered. b. Confirm and describe whether and how conservation allowances can be implemented in cases where loss of wetland habitat for land bird SAR is unavoidable. 2. a. Provide information on migratory bird monitoring programs planned for the lifespan of the Project to observe migratory bird SAR use of the Project Area. b. Provide management practices and mitigation measures that will be implemented to reduce the potential for migratory birds including SAR from nesting in areas with ongoing construction activities and project infrastructure (e.g., tailing area, buildings and storage facilities, construction vehicles, equipment, stockpiles, excavations). c. Provide additional information on the measures to be implemented to ensure no significant effects in the event that a migratory bird including SAR is found nesting in modified habitats, active construction area or on project infrastructure.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				Management practices and mitigation measures to reduce the potential for migratory birds and species at risk to nest in the Project Area have not been proposed in the EIS. Additional information on these mitigation measures, including the process to follow in the event that a migratory bird including a SAR is found to be nesting in the Project Area, is required. This information is needed for a complete assessment of effects on species at risk and determination of significance.	
IR-54	ECCC-10-CWS-04 MFN-41	Section 7.3.2	Section 10.4-Avifauna Mitigation and Management Measures Section 10.5-Assessment of Environmental Effects on Avifauna Section 10.9-Follow-up and Monitoring	The EIS Guidelines require information on the deposit of harmful substances in waters that are frequented by migratory birds. In Section 10.5.2.2 of the EIS, the Proponent states that "*A change in mortality risk may result from possible ingestion and/or absorption of water in the tailings and/or polishing ponds, with potential exceedances in POPC as outlined under the Metal and Diamond Mining Effluent Regulations, specifically for total cyanide, unionized ammonia (product of cyanide decomposition) and Copper (added as catalysis during cyanide destruction or leached from the ore). Wildlife, including avifauna, have been reported drinking from ponds associated with tailings management facilities (Eisler and Wiemeyer 2004; Donato et al. 2007) and could also be exposed by ingesting aquatic flora and fauna within the TMF.*" The proponent proposes to monitor avifauna use of these project features and implement adaptive management measures (e.g., deterrents and/or exclusionary measures) as required. Mitigation measures to mitigate the potential risks to migratory birds using the tailings and/or polishing ponds are not clearly outlined in the EIS. This information is needed for a complete assessment of effects on migratory birds including species at risk (SAR).	Provide any plans or mitigation measures to deter migratory birds including SAR from tailings management facilities and settling ponds, including beneficial management practices and/or the development of an avifauna management and follow-up monitoring plan. Provide adaptive management measures in the event that adverse effects to migratory birds are expected.
IR-55		Section 7.1.7	Section 10.2.1.2 Avifauna Habitat Assessment	The EIS Guidelines require information on migratory birds and their habitats that are found or are likely to be found in the study area. This description may be based on existing sources, but supporting evidence is required to demonstrate that the data used are representative of the avifauna and habitats found in the study area. Section 10.2.1.2 of the EIS, states the following: *Given the number of avifauna species that occur on the Island of Newfoundland, it is not practical to assess habitat use for each in detail. Therefore, representative species from each of the main groups of birds have been selected and considered further with respect to habitat use within the Project Area. In terms of spatial overlap with the Project Area, habitat use by avifauna during breeding is a key focus. Representative species were selected from the following bird groups: passerines, waterfowl (swimming gamebirds, such as duck and goose species), raptors, upland gamebirds and SAR.* It is not clear how Lincoln's Sparrow and Yellow-bellied Flycatcher are representative of all passerine habitats. Also, the potentially and known Species at Risk (SAR) described in the EIS are known to have different habitats. Information for each SAR is required. This information is needed for a complete assessment of effects on SAR.	a. Provide a rationale for how the Lincoln's Sparrow and Yellow-bellied Flycatcher encompass a representation of all passerines. b. Provide information on the habitat of each SAR bird. Update the effects assessment and mitigation measures for bird SAR as applicable.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
IR-56		Section 7.2.3	Section 10.2.4 Avifauna Habitat Assessment Section 9.2.2.1 Vegetation and Wetland Communities	The EIS Guidelines require information on changes to the habitat of migratory and non-migratory birds, including wetlands frequented by birds (types of cover, ecological unit of the area in terms of quality, quantity, diversity, distribution and functions). Section 10.2.4 of the EIS (Avifauna Habitat Assessment), 12 habitat types were identified within the Project Area and Local Assessment Area (LAA) (Table 10.4). Approximately 75% of the Project Area consists of upland, 20% consists of lowland and 4% is open water. Within the LAA, approximately 69% consists of upland, 14% is lowland and 22% is open water. In the EIS, Section 9.2.2.1 (Vegetation and Wetland Communities), it indicates that the percentage of wetland within the Project Area and LAA is likely over 30%, rather than 22.4%, as indicated by the results of the ecological land classification (ELC). The addition comes from the inclusion of alder thickets (6.5% of the Project Area) and Riparian thickets (0.4% of the Project Area) that are likely wetlands, as well as much of the balsam fir forest and the black spruce forest. It is not clear how the proponent determined the potential changes to wetlands habitat for birds, considering the EIS provides contradictory information. This information is needed for a complete assessment of effects on migratory birds and their habitat.	Update the assessment on migratory birds that utilize wetland habitat to take into account the 30% wetland in the LAA or provide a rationale for why the 20% wetland/lowland habitat number was used for evaluating avifauna habitat when the EIS states that wetlands are likely over 30% (as stated in section 9.2.2.1).
IR-57	MFN-42	Section 7.1.7	Section 10.5.1.2 Residual Effects	The EIS Guidelines require information on birds and their habitats that are found or are likely to be found in the study area. This description may be based on existing sources, but supporting evidence is required to demonstrate that the data used are representative of the avifauna and habitats found in the study area. Section 10.5.1.2 of the EIS (Residual Effects) states that, "avifauna species within the Local Assessment Area (LAA) are generally not limited by habitat within their breeding range, that is, habitats are not at maximum capacity and therefore loss of high and moderate value habitat is likely to cause displacement of avifauna using these areas. Additional habitat of varying quality will be made available as a result of Project rehabilitation activities." The EIS also states in relation to species at risk (SAR) that "[a]vifauna potentially displaced by development of the Project are likely to find breeding habitat elsewhere within the LAA or RAA [regional assessment area]." Displaced birds may try to establish in adjacent areas; however, the proponent did not justify their conclusion with evidence from monitoring studies or scientific literature. The adjacent habitats may be at near maximum occupancy of breeding territories and forage capacity and therefore unable to support displaced birds. This information is needed for a complete assessment of effects on migratory birds and their habitat.	Provide a rationale for the assertion that displaced wildlife are likely to find breeding habitat elsewhere. Include, if available, information sources that indicate that the habitats (wetlands and forested) are not at maximum capacity and displacement of avifauna does not disrupt breeding pairs in adjacent areas.

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Species at Risk					
IR-58	Pub-07.06 (Dal) QFN MFN -38	Section 7.1.8	Section 12.2.2.3	The EIS Guidelines state that the EIS will present information in sufficient detail to enable the identification of how the project could affect the VCs and the analysis of those effects. Specifically, the EIS Guidelines require an assessment of the potential adverse effects of the project on species at risk listed under the *Species at Risk Act* (SARA) and, where appropriate, its critical habitat; i.e. direct and indirect effects on the survival or recovery of species listed under the SARA, including the American Marten. The American Marten (Newfoundland population; SARA Schedule 1 Threatened) is a species of cultural importance to Indigenous groups. The EIS acknowledges a "moderate adverse impact" to the American Marten due to habitat loss, sensory disturbances and potential increases in mortality events. However, section 12.5.1.3 of the EIS states that this impact is not significant. The EIS also reports that only a small percentage of suitable American Marten habitat in the Regional Assessment Area (RAA) will be lost from proposed project activities. However, the majority of reported known sightings (from within 5 km of the proposed project) occur in a distinct core occupancy area near to the south shore of Red Indian lake. Additional information is needed regarding American Marten occupancy within the rest of the RAA, and justification for the statement that there is 'ample habitat elsewhere.' The mitigation measures proposed for the American Marten do not reference specific monitoring or reporting of American Marten observations or road mortality. Also, mitigation does not refer to the proposed critical habitat for American Marten that can be found in the Project Area that the EIS acknowledges could be affected by the Project. This information is needed for baseline data for the effects analysis on American Marten.	a. Provide rationale for the determination of 'not significant' for the acknowledged moderate, adverse, mid- to long-term impacts to American Marten. b. Provide additional information on American Marten occupancy and suitable habitat within the RAA. c. Provide information on the mitigation measures for American Marten for critical habitat in the Project Area. Include specific mitigation and monitoring for observations or road mortalities.
Caribou					
IR-59	FFA	EIS Guidelines Section 7.1 and 7.3.3.1	EIS - Baseline Study Appendix 2: Woodland Caribou (BSA 2)	The EIS Guidelines state that the EIS will present information in sufficient detail to enable the identification of how the project could affect the VCs and the analysis of those effects. Specifically, the EIS Guidelines require an assessment of the potential adverse effects on caribou that could be caused by all project activities. There are significant gaps in information on caribou use of the project area as well as well as baseline information on population size as a whole and for Buchans caribou in particular. The Baseline Caribou Study (Appendix 2 of the EIS) needs to adequately: - Represent the extent of use of the project area by caribou and relate it to the degree of risk posed by project components.	Work with Newfoundland and Labrador Wildlife Division to provide an adequate description of caribou use of, and movement through, the project area and provide estimates for caribou populations potentially affected by the Project.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				- Provide a comprehensive assessment of risk posed by the project as a whole to caribou migration and subsequently to caribou populations. For example, it needs to discuss implications for the Buchans caribou herd if they are unable to travel between calving and wintering grounds. - Provide standardized analyses and summaries of data collected for all baseline studies. Baseline data that meets scientific standards is needed to understand current conditions and to assess the potential significance of effects of the project on caribou.	
IR-60	FFA	EIS Guidelines 7.3.3.1	EIS – Chapter 11	The EIS Guidelines require an assessment of the potential adverse effects on caribou that could be caused by all project activities. The analysis of migration patterns of Buchan's caribou through the project area presented in the EIS (Section 11.2.2.1 page 11.31, also figures 11-12, and 11-13) indicate that there was 'only one distinct population level path identified'. Similarly, the caribou component study indicates heavy use of the project area by migrating caribou during spring and fall. Residual impacts for Buchans caribou are considered to be of a 'high' magnitude. The EIS needs to present detailed or effective mitigations related to key project components for all affected caribou. The potential impacts on caribou population, if caribou are unable to migrate to their calving grounds, need to be considered, even though calf mortality may be substantial in this case. The assessment of (indirect) habitat loss is based on a very conservative level of anticipated avoidance (500 m) and will likely underestimate impacts on caribou during construction and operation phases of the development. The EIS needs to discuss the risks to caribou migration due to specific project components (pit, road, waste rock pile) based on caribou movement through the project area as well as effective mitigation measures for caribou, in particular migrating caribou, based on best practices and degree of obstruction posed by specific project components to migration during construction and operation. For example, the impact of the waste rock pile, directly in the path of a migratory corridor, is a major concern that needs to be evaluated or discussed. The EIS needs to include a discussion of combined project impacts from disturbance, habitat loss, mortality, and potential changes in migration stemming from project development caribou. The EIS only indirectly addresses the effects of noise, lights and dust on caribou. All aspects of human activity (noise and light) are key disturbance stimuli for caribou and should be considered together. Moderating mining activity during critical periods (e.g. migration) may be an important tool for mitigation of the mine's effects, and should be measured and quantified. This information is needed to assess the significance of potential effects and for follow-up and monitoring programs.	a. Provide a comprehensive assessment of potential effects of the project as a whole (i.e. all project components) on caribou migration, calving and subsequently to caribou populations for all phases of the project. Include at a minimum the effects of dust, noise and vibrations on caribou. This must include impacts resulting from stress as well as habitat degradation. b. Provide an assessment of effects and risks for predicted caribou avoidance zones using distances consistent with scientific literature. This must include an assessment of the amount of direct and indirect caribou habitat loss resulting from avoidance at an appropriate distance(s) consistent with scientific literature. c. Describe in detail proposed measures that will be used to mitigate for predicted effects on caribou. This is to include, but not be limited, to targeted mitigations which address permeability of the migratory pathway to caribou and is also to address how the effects of noise, light and particulate will be mitigated during the different phases of the project. Describe in detail any associated monitoring and follow-up and monitoring programs. d. Provide an assessment and discussion of combined project impacts from disturbance, habitat loss, mortality, and potential changes in migration stemming from project development (past, present and future) on affected caribou.

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Indigenous Peoples					
IR-61	MFN	Part 2, Section 5 and Section 7.3.4.	3.4.2 Indigenous Engagement: Methodology and Approach 3.4.4.4 Land and Resource Use Information Exchange 17.2.1 Existing Conditions for Indigenous Groups - Methods 17.2.3.3 MFN Current Use of Lands and Resources for Traditional Purposes 17.9 Follow up and monitoring	The EIS Guidelines direct the proponent to engage with Qalipu First Nation and Miawpukek First Nation (MFN) to obtain their views on, among other things, "physical and cultural heritage, including any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. […] pursuant to paragraph 5(1)(c) of CEAA 2012." The EIS Guidelines requires baseline information of current use of lands and resources for traditional purposes, and specific aspects should be considered. Additionally, the EIS guidelines also require the assessment of impacts to Indigenous people's health based on effects of changes to the environment. The EIS states "Marathon Gold invited each group to share Indigenous Knowledge […]and has taken into account relevant Indigenous knowledge". The Agency understands that MFN has not provided Indigenous Knowledge to date. MFN has indicated there is land and resource use in the Project Area. The Agency understands that the proponent is working with MFN to determine their land use in the Project Area. The EIS indicates that the proponent is prepared to support a land and resource use study to enhance an understanding of Indigenous land and resource use in the Project Area and relevant Indigenous knowledge. Should this study proceed, results will be used to inform the development of monitoring and follow-up programs and to guide proponent's future engagement. The documentation and incorporation of Indigenous Knowledge is critical in the development and evaluation of all components of the EIS, as well as in the proper assessment of the impacts the Project may have on Indigenous interests and health.	Describe the process that the proponent will undertake to gather and incorporate MFN's Indigenous Knowledge, including current use of lands and resources in the Project Area. Describe how this information would be used by the proponent to mitigate potential effects, if applicable and to develop follow-up and monitoring programs. If there is a determination of MFN use of the area, provide an assessment of how the project might impact Indigenous peoples' health and the measures proposed to mitigate them.
Accidents and Malfunctions					
IR-62	ECCC-26	Section 7.6.1	EIS Section 21.5.1.2 and BSA 1. Attachment 1-A. BSA 3. 3-C.	The EIS guidelines state the plausible worst-case scenario and their effects should be identified and evaluated. Section 21.5.1.2 of the EIS gives a lower value for an extreme rain estimate than used elsewhere in the EIS. It states: "*The EDF [Environmental Design Flood] is defined as the most severe flood (i.e., largest design runoff event) that can be stored and does not result in an unscheduled discharge of water to the environment (Golder 2020; BSA.1. Attachment 1-A). The 100-year, 24-hour event (75 mm of rain) was selected as the EDF, which is on top of the 25-year return period wet hydrological conditions (Golder 2020b).*" The above-mentioned 75 mm value is much lower than extreme values from Intensity-Duration-Frequency (IDF) data presented elsewhere in the EIS, including 130 mm from Stephenville (Attachment 3-C of Baseline Study Appendix 3: Water Resources).	Update the effects analysis for surface water quantity taking into account the Environmental Design Flood values for a 100-year, 6-hour, 12-hour, and 24-hour or provide the rationale for using the 75 mm as the Environmental Design Flood value when the Intensity Duration Frequency values for a 100-year, 6-hour, 12-hour, and 24-hour event are above 75 mm.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				This information is needed for assessing the effects of an accident or malfunction and determining significance.	
IR-63	ECCC-27	Section 7.6.1	EIS 21.5.1.4 and BSA 1. Attachment 1-A.	The EIS guidelines state the plausible worst-case scenario and their effects should be identified and evaluated. Section 21.5.1.4. identified two scenarios for the dam breach and inundation assessment that involve flood-induced conditions of the tailing management facility dams by piping and overtopping failure modes, with the probable maximum flood level, obtained by routing the probable maximum precipitation (PMP). Baseline Study Appendix (BSA) 1, 1-A, 4.2.2 Breach Outflow Modelling states that: "*24-hr Probable Maximum Precipitation (PMP) depth used for the Stephenville Environment and Climate Change Canada (ECCC) meteorological station (ID: 8403800) is 309 mm (Golder 2020b)*". That PMP value is based on relatively few years of older data and is lower than updated PMP estimates available from the ECCC Engineering Climate Datasets (described in Annex C) at the same location and nearby the Project Area. This includes Stephenville: 377 mm, Burnt Pond: 354 mm, and Buchans: 450 mm. Accurate PMP values are essential for assessing the effects of an accident or malfunction and determining significance.	In consideration of the available data, update the effects assessment by using PMP estimates based on updated/longer periods of record, including for stations closer to the project site or provide a rationale for using the older data that is lower than updated PMP estimates.
IR-64	ECCC-28	Section 7.6.1	Section 21.5.1.2 Section 22.3.1.1	The EIS guidelines state the plausible worst-case scenario and their effects should be identified and evaluated. Section 21.5.1.2 of the EIS states that "*[t]he accumulation of water in the tailing management facility has been modelled for the mean and 25-year wet annual precipitation conditions. Treatment and discharge will occur for eight months a year during operation (avoiding discharges during winter months). The TMF has been sized to store the excess water during the non-discharge period, including appropriate design precipitation events*." Modelling was done for the monthly data for the wettest year based on Buchans data, but individual months could be more extreme, e.g. based on Buchans long-duration intensity-duration-frequency (IDF) results, a 5-year (recurrence interval) 30-day duration extreme rainfall amount is 225 mm). This EIS does not include an assessment of extreme rain events occurring at the time of snow melt/run-off nor does it indicate what would be the expected frequency for use of the spillway to remove untreated excess water during extreme events. This information is needed for assessing the effects of an accident or malfunction and determining significance.	a. Update the modelling to include return-period estimates of extreme monthly values (e.g. 30-day durations) or provide a rationale to explain how the current model is sufficient. b. Assess the effects of extreme rain events occurring at time of snow melt/run-off. c. Indicate the expected frequency for use of the spillway to remove untreated excess water during extreme events.
IR-65	MW-51	Section 7.5 and 7.6.1	Section 21.5.1.1 (p. 21.13), Table 21.5	The EIS guidelines state the proponent will conduct a qualitative analysis of the risks of accidents and malfunctions across all phases of the project and identify the probability of potential accidents and malfunctions related to the project. Where significant adverse effects are identified, the EIS will set out the probability (likelihood) that they will occur, and describe the degree of scientific uncertainty	a. Conduct a qualitative analysis of the risks of accidents and malfunctions occurring across all phases of the project.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				related to the data and methods used within the framework of this environmental analysis. The EIS describes several accident and malfunction scenarios that could occur throughout the Project. However, the EIS does not provide a qualitative analysis of the risks of the accidents and malfunction scenarios occurring across all phases of the project. The EIS (Table 21.5) describes accident and malfunction scenarios (e.g. Tailings management facility malfunction and fire/explosion) that could result in significant adverse environmental effects on various Valued Components (e.g. Surface water, fish and fish habitat, and Caribou). The EIS also notes that these are unlikely to occur. The EIS is not clear on how the likelihood of the worst-case scenarios of these accident and malfunction scenarios occuring has been identified. This information is needed to accurately assess residual effects after mitigation and identify follow-up monitoring requirements.	b. Describe how it has been determined that it is unlikely for Tailings Management Facility (TMF) malfunction and fire/explosion to occur based on the worst case scenarios identified in the EIS for each.
IR-66		Section 7.6.1	Section 21.5.1.3 (p. 21.16)	The EIS guidelines state the proponent will present preliminary emergency response measures. In the event of a tailings dam failure or other tailings management facility failure, the Metal and Diamond Mining Effluent Regulations tailings/effluent emergency response plan and associated development of remedial action and monitoring is a key component of the proponent's proposed mitigation. Limited detail is provided on this plan in the EIS. This information is essential for identifying key mitigation measures.	Provide an outline of how the Metal and Diamond Mining Effluent Regulations tailings/effluent emergency response plan would be developed, reviewed, and implemented in the event of a tailings management facility failure.
IR-67		Section 7.6.1	Section 21.5.1.4 (p. 21.18)	The EIS guidelines state the proponent will present emergency response procedures that would be put in place if an accident and malfunction does occur. The proponent describes cleaning up deposited tailings solids in the event of a dam failure. Depending on the specific failure scenario and conditions, it is unclear if this mitigation measure would be consistently effective. In addition, the proponent does not provide the magnitude of effects for areas where solids may not be remediated. This information is essential for identifying key mitigation measures and follow-up monitoring for potential accidents or malfunctions, as well as determining significance.	Provide detail on the anticipated effectiveness of cleaning up or remediating tailings solids resulting from dam failure. Include an assessment that provides the magnitude of effects for areas where it is not feasible to clean up or remediate tailings solids.
IR-68		Section 7.6.1	Section 21.5.1.4 (p. 21.20)	The EIS guidelines state that the proponent will provide the potential consequences of the accident or malfunction scenarios. The assessments from a tailings management facility failure on fish and fish habitat focuses on water quality, including sediment deposition, but does not discuss potential changes to flow/drainage patterns, channels, and physical habitat as a result of a large volume of tailings being accidentally released.	Provide detail on the potential changes to flow/drainage patterns, channels, and physical habitat for fish and fish habitat as a result of a large volume of tailings being accidentally released and associated mitigation and follow-up monitoring as a result of any changes.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				This information is needed for assessing the effects of an accident or malfunction and determining significance for fish and fish habitat.	
IR-69		Section 7.6.1	Section 21.5.4.3 (p. 21.43)	The EIS guidelines state the proponent will present preliminary emergency response measures. Section 21.5.4.3 of the EIS provides a high-level overview of emergency response measures as they relate to the water management system, but there is limited detail provided on how any failure of the water management system would be detected and dealt with, measures that would be in place to ensure ongoing proper functioning of the water management system, and notification procedures in the event of an accident or malfunction. This information is essential for identifying key mitigation measures and follow-up monitoring for potential accidents or malfunctions, as well as determining significance.	Describe how any failure of the water management system would be detected and dealt with, measures that would be in place to ensure ongoing proper functioning of the water management system, and notification procedures in the event of an accident or malfunction.
IR-70		Section 7.6.1	Section 21.5.4.4 (p. 21.43)	The EIS guidelines state the proponent will identify the accident and malfunction events that would potentially result in an adverse environmental effect as defined in section 5 of CEAA 2012. However, there is no discussion of effects of an accidental release of contact water on migratory birds and species at risk, and Indigenous use of lands and health. This information is needed for assessing the effects of an accident or malfunction and determining significance.	Provide an assessment of the potential residual adverse effects of an accidental release of contact water on migratory birds and species at risk and on Indigenous use of lands and health. Provide measures to mitigate adverse effects of contact water on the Valued Components above and applicable follow-up monitoring.
IR-71	MW-52	Section 7.6.1	Section 21.5.4.4	The EIS guidelines state the proponent will identify the magnitude of an accident and/or malfunction, including the quantity, mechanism, rate, form and characteristics of the contaminants and other materials likely to be released into the environment. The EIS guidelines further state the plausible worst-case scenario and their effects should be identified and evaluated. According to the EIS, the average range of diesel fuel spills was estimated at 12,000 litres spilling into the river within an hour. The EIS also assumed that 47 kg of sodium cyanide and 108.70 kg of ammonium nitrate could be spilled into the river within an hour (based on 25 kg of cyanide, 25 kg of nitrate, and 83.75 kg of ammonia). There is no evidence to support the assumption that these releases provide a worst-case scenario. This information is required to ensure the worst-case scenario has been considered in the effects analysis.	Provide a rationale for the assumptions used to determine volumes of diesel fuel, cyanide, nitrate and ammonia spills and evaluate whether these volumes represent a potential worst-case scenario. If not, provide an assessment of the above contaminants for a worst-case scenario.
Effects of the Environment on the Project					
IR-72	ECCC-29	Section 7.1.1	EIS Chapter 22 – Effects of the Environment on the Project.	The EIS Guidelines require historical records of relevant meteorological information (e.g. total precipitation [rain and snow]; mean, maximum and minimum temperatures; and typical wind speed and direction). The EIS only provides climate data from the Buchans station. However, the Burnt Pond station is closer to the mine site than the Buchans location. The Burnt Pond 1981-2010 climate normals indicate it has a wetter climate, with a mean annual	Update the existing climate data to incorporate the Burnt Pond climate station in addition to the Buchans data to inform the description of climate used for the Project effects assessment. Consider the additional data and discuss any anticipated changes to the prediction of effects of the environment on the Project.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
			Section 22.3.1.1 Existing Conditions; Page 22.6	precipitation of 1434 mm, about 200 mm greater than the Buchans location. The 1971-2000 normals show a similar difference. Accurate representative climate data is required for an assessment of potential effects of the environment on the project.	
IR-73		Section 7.6.2	Chapter 22 – Effects of the Environment on the Project Section 22.3.1.1 – Weather and Climate	The EIS Guidelines ask for the EIS to take into account how local conditions and natural hazards, such as severe and/or extreme weather conditions and external events could adversely affect the project and how this in turn could result in effects to the environment. There is discussion in the EIS of climate and extreme precipitation events, but there is little information on flood risk in the Project Area, including the likelihood of extreme flood events. This information is needed for a complete assessment of effects of the environment on the Project.	Provide information on the risk of flooding in the area, including the risk of major flood events and describe how flooding could adversely affect the project and how this in turn could result in effects to the environment. Provide any proposed mitigation measures that would be used to mitigate adverse effects of the environment on the Project.
IR-74		Section 7.6.2	Chapter 22 – Effects of the Environment on the Project Section 22.3.2.3 – Geological Hazards	The EIS Guidelines require the EIS to take into account how local conditions and natural hazards, such as severe and/or extreme weather conditions (e.g. flooding, drought, ice jams, landslides, avalanches, erosion, subsidence, fire, outflow conditions and seismic events) could adversely affect the project and how this in turn could result in effects to the environment. The EIS states that the probability of landslides, rockfalls, subsidence, and other geological hazards is generally low, but provides limited justification or source material to corroborate this claim. The proponent also states these risks would largely be evaluated and mitigated during detailed design and engineering through a geotechnical assessment. Justification for why the probability of geological hazards is low and information on how the geotechnical assessment could be used to mitigate risk is needed for a complete assessment of effects of the environment on the Project.	a. Provide rationale as to why the risks of landslides, slope stability, and other geological hazards would be low. b. While full detailed design is not available at this stage, provide information on how the geotechnical assessment could be used to mitigate the risk of any effects of the environment on the project.
IR-75	ECCC-06	Section 7.6.2	Section 21.4.1.4 Watercourse Crossing Failure; Section 21.5.4.2 Project Design and Safety Measures to Reduce Environmental Effects	The EIS Guidelines require the EIS to take into account how local conditions and natural hazards, such as severe and/or extreme weather conditions (e.g. flooding, drought, ice jams, landslides, avalanches, erosion, subsidence, fire, outflow conditions and seismic events), could adversely affect the project and how this in turn could result in effects to the environment. In Chapter 22 of the EIS, the proponent indicates that climate and climate change can have impacts on the Project with potential to cause adverse effects to the environment through accidents or malfunctions. As such, the proponent provides projections of future changes in a number of climate change related parameters over the lifetime of the Project (Section 22.3.1). In the three quotes below, the proponent indicates that climate change will be (or is) considered in project design. *21.4.1.4 Watercourse Crossing Failure (p.21.9)*	Describe climate change information and methods used to apply the climate projections to relevant project design considerations.

IR Number	External Reviewer ID (as applicable)	Reference to EIS Guidelines	Reference to EIS	Context and Rationale	Specific Question/ Information Requirement
				"With watercourse crossings designed to address the appropriate design precipitation events including climate change parameters" *21.5.4.2 Project Design and Safety Measures to Reduce Environmental Effects (p.21.42)* "consideration of climate change-associated precipitation events and associated flow" "The design of the sedimentation ponds accounts for climate change" It is not clear what climate change information and methods were used to consider climate change in the design applications described. This information is needed for a complete assessment of effects of the environment on the Project.	
Cumulative Effects					
IR-76	FFA CPAWS-18	Section 7.6.3. Cumulative effects assessment	EIS - Section 20 Cumulative Effects Assessment EIS - Section 20.9.4.1 (Change in Habitat)	The EIS Guidelines require the proponent to identify and assess the project's cumulative effects and advise the proponent to consult with federal departments, including the Agency for guidance documents. The Agency's Technical Guidance document on Assessing Cumulative Effects under the *Canadian Environmental Assessment Act, 2012* (March, 2018) identifies methodological options for analysis of cumulative effects, including quantitative models and spatial analysis. The EIS Guidelines requires the proponent to describe the mitigation measures that are technically and economically feasible. The proponent shall assess the effectiveness of the measures applied to mitigate the cumulative effects. In cases where measures exist that are beyond the scope of the proponent's responsibility that could be effectively applied to mitigate these effects, the proponent will identify these effects and the parties that have the authority to act. In such cases, the EIS will summarize the discussions that took place with the other parties in order to implement the necessary measures over the long term. The level of analysis, as presented, does not support the conclusion that effects would be not significant. Lack of spatial consideration impedes the assessment of cumulative impacts. This information is needed to determine significance of cumulative environmental effects on all Valued Components.	Provide and update the assessment of potential cumulative environmental effects on all Valued Components. Include (not exclusive) the following: - the spatial extent of effects from activities (e.g. noise and light) and associated cumulative effects of creating multiple zones of avoidance in the Project Area; - the spatial range of populations of species, recognizing that effects on individuals from the same population in different areas would result in cumulative effects to the species; and - that species would be affected by multiple activities (e.g. noise from traffic, and drilling). Include consideration of various noise sources occurring at the same time and associated cumulative effects on wildlife. Update the proposed mitigation and follow-up measures based on the updated analysis and update predictions regarding the significance of effects accordingly.