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

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May 21, 2021

Tara Oak
Marathon Gold Corporation

Email: toak@marathon-gold.com

SUBJECT: Outcome of conformity review of responses to Round 1 Information Requirements for the proposed Valentine Gold Project

Dear Tara Oak:

On May 3, 2021, the Impact Assessment Agency of Canada (the Agency) received Marathon Gold's responses to Information Requirements (IRs) issued by the Agency on February 10, 2021. The Agency developed the IRs based on a review by the Agency, other federal authorities, Indigenous groups and the public of the Valentine Gold Project: Environmental Impact Statement (EIS) and associated EIS Summary. The Agency requires acceptable responses to IRs in order to complete its review of the EIS and to proceed with the preparation of its Environmental Assessment Report.

With the exception of IR-59 and IR-60, the Agency has completed an initial review of Marathon Gold's combined submissions provided between April 1 and May 3, 2021 to determine whether they were sufficient to proceed with a technical review and pose follow-up questions, as necessary. Currently, the Agency has identified seven responses that do not provide sufficient information:

- IR-08
- IR-09
- IR-11
- IR-12
- IR-41
- IR-54
- IR-70

The Agency therefore re-iterates the requirements stated in the above-noted IRs.

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In the interest of expediency, we are providing you with the attached table for your consideration in advance of the completion of our review of IR59 and IR-60.

The Agency will notify you of the outcome of the review of the two remaining responses and any potential conformity concerns upon receipt of Newfoundland and Labrador Wildlife Division comments.

We are available to discuss the IRs and required information at your convenience.

The Agency has started a technical review of the remaining IR responses and is seeking input from federal and provincial authorities. The Agency may request further information based on the outcome of technical review.

The timeline for the EA will be paused, effective May 21, 2021. Once Marathon Gold has submitted revised responses to the non-conforming IRs, the Agency will take a period of up to 15 days without the timeline resuming to form an opinion on whether the required information has been provided. If the Agency determines the responses to be complete, it will commence a technical review of the remaining IRs and the timeline for the environmental assessment will resume the following day. If the responses are determined to be incomplete, you will be notified at that time. If the Agency has not come to a conclusion after 15 days, the timelines will resume the next day. For further information, please consult the Agency document *Information Requests and Timelines* https://www.canada.ca/en/environmental-assessment-agency/news/media-room/media-room-2016/information-requests-timelines.html.

This letter may be shared with Indigenous groups and posted on the Canadian Impact Assessment Registry Internet Site: Valentine Gold Project - Canada.ca (iaac-aeic.gc.ca).

If you have any questions or concerns, do not hesitate to contact me.

Sincerely,

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

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Cc:

J. Pulchan - Environment and Climate Change Canada
T. Warren - Department of Fisheries and Oceans
W. Smith - Natural Resources Canada
J. Flanagan -Transport Canada
J. Reader - Health Canada
E. Watton - Environment and Climate Change
K. Miller - Fisheries, Forestry and Agriculture
B. Adams - Fisheries, Forestry and Agriculture

Attachment:

Attachment 1 - Summary Table for Non-Conforming IR Reponses

Valentine Gold Project - Summary Table for Non-Conforming Responses to Information Requirements issued on February 10, 2021

IR Number	External Reviewer ID (as applicable)	Context and Rationale	Original Information Requirement	Missing information/Conformity issues
IR-08	NRCan-01	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.	The Proponent provided a map of borehole and test pit locations, and not time series plots of water levels for 12 months from the monitoring wells. As context, the provision of 12 consecutive months of water level data is important, and in some cases critical, to understanding seasonal flow patterns and relationships to baseflow and fish habitat. At least one monthly water level reading from each monitoring well is required, plotted on a linear plot using appropriate scales.
IR-09	NRCan-02 MW-48	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	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.	To facilitate technical review of the assessment of fault hydraulic conductivity, details on the packer testing are required. Packer testing is useful for assessing the effects of faulting on groundwater flow patterns, but to be properly interpreted requires documentation on each packer test. This includes information such as straddle length (distance between packers if double packer), packer length, stem diameter, depth of test, inflation pressure, borehole diameter and borehole depth. These are all commonly recorded details of packer testing programs. If these details are included in Terrane (2020, 2021)delivery of those reports may be sufficient to meet the requirements of the IR.

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		types may influence the degree to which open pit dewatering influences groundwater – surface water interactions.		
IR-11	NRCan-05	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. 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.	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-11a requests details on the type of boundary condition set for the Victoria River, and the net groundwater flux at this boundary from pre-construction (baseline) through closure. This information has been provided for the tributaries to the river, but not the river itself as requested. This information is lacking from both Figure IR-11.1 and Tables IR-11.1 and IR-11.2. This information cannot be extrapolated from the tributaries. Groundwater flow models are constructed with various types of boundary conditions around their edges (constant head, no flow, etc.) that reflect the characteristics of the natural system. A description and rationale for all boundary conditions is an important part of numerical model documentation, and is needed to ensure a comprehensive technical review.
IR-12	NRCan-06	The EIS Guidelines require the delineation and characterization of groundwater - surface water interactions.	a. Discuss the calibration of the groundwater model to baseflow. Provide a rationale for the	IR-12f requests that the calibrated recharge rate of 381 mm/yr be discussed relative to the site water balance data including the annual water surplus (i.e. a discussion on the model calibrated recharge value in the context of the site

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		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. 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-	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.	water balance data). The IR response discusses this value in the context of model calibration rather than relative to the site water balance data. The groundwater flow model uses an annual recharge rate of 381 mm/yr to optimise the calibration of the model with various water level measurements around the project site. Independently of the numerical model, the proponent has completed a site water balance that accounts for precipitation, runoff, recharge, discharge, river flows, etc. in a process that inherently defines infiltration. It is important to compare the two infiltration values and discuss variations and their significance, including seasonal effects, with respect to model calibration.

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		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-41	ECCC-12 NRCan-22 Pub-07.11	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.	The need for sediment quality modelling is an important part of addressing the quantification of residual effects for the Environmental Assessment. The proponent was requested to present time series plots of sediment quality. Instead, only values during operations were provided. The proponent's rationale for only providing operations information is that contamination will be highest during this period and will be associated with release of a maximum of 15 mg/L of suspended solids, the *Metals and Diamond Mining Effluent Regulations* limit. The time series plots were requested to add certainty to the prediction of effects of contaminants in sediments that may be present after the mine ceases production and to allow a comparison with field tests during follow-up and monitoring. For instance, during closure and post-closure, the proponent explains that no suspended sediments will be released; hence, low contamination of sediment will occur. However, problematic rock piles on site, when covered, will erode with time and may become a source of contamination over the long-term. The proponent is correct in stating that seepage contains mainly dissolved elements, however, these dissolved constituents will precipitate or be taken up into the food chain.

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IR-54	ECCC-10-CWS-04 MFN-41	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.	The proponent indicated in its response that "Water quality within "settling ponds", which are designed and located across the site to manage and treat contact water (not process water) are expected to contain sediment and minor dissolved metals and other potential constituents like ammonia at very low concentrations. As a result, avifauna or other wildlife that may contact or ingest this water or adjacent vegetation would not be at an increased mortality risk." The proponent has not provided any evidence to support the conclusion that "avifauna or other wildlife that may contact or ingest settling pond water/adjacent vegetation would not be at an increased mortality risk". Without this information a complete technical review of this response is not possible. The proponent must provide a rationale or evidence to support its determination that the effects of tailings management facilities and settling ponds would be minimal or provide mitigations on how to prevent those effects.
IR-70		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.	The response does not provide evidence to support the conclusion that avifauna or other wildlife that may contact or ingest settling pond water (if an unplanned release occurred) or adjacent vegetation would not be at an increased mortality risk. Similarly, the proponent does not provide adequate information or evidence related to the effect of an unplanned release of contact water on Indigenous land use or health, specifically to conclude that adverse effects would be negligible. Either evidence to support these conclusions or mitigations to prevent potential effects is required to complete the technical review.